



Hullcar (Clcahl) Aquifer Response Plan Report

Ministry of Environment & Climate Change Strategy

November 2018

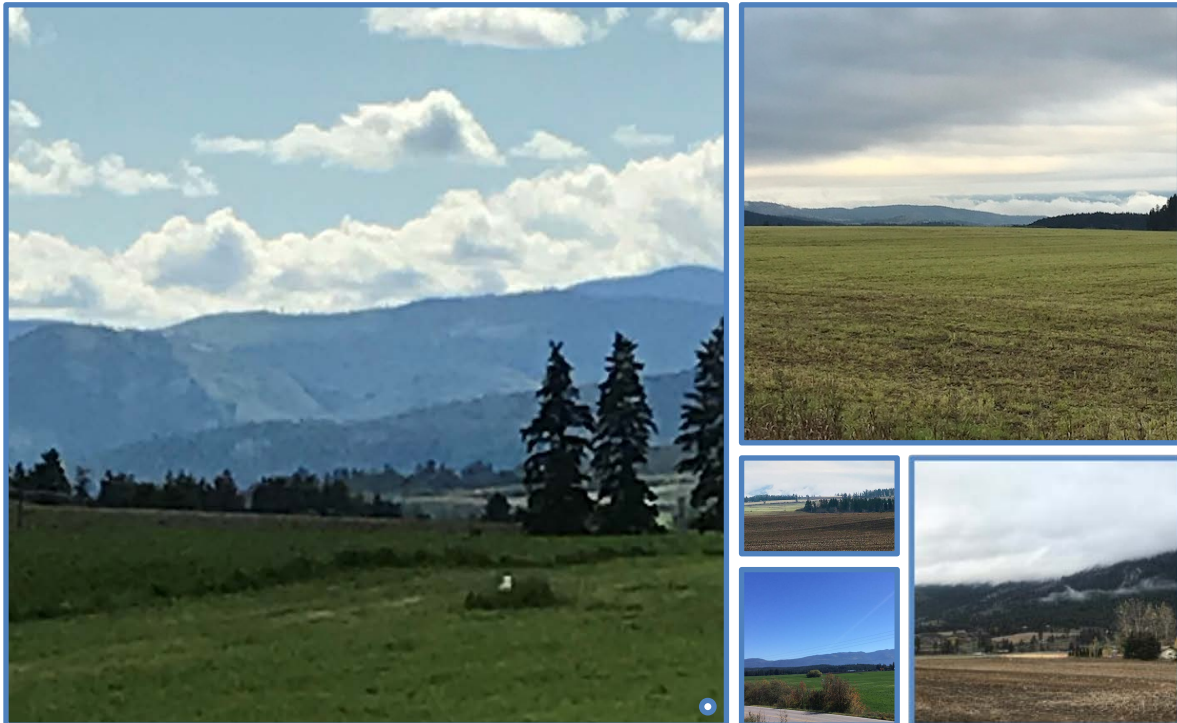


Table of Contents

Acknowledgements.....	ii
List of Acronyms.....	iii
Executive Summary.....	1
Context.....	3
1. Public Health and Safety	5
Provision of Alternative Drinking Water	5
Inter-Agency Collaboration and Notification.....	5
Communication with the Public.....	6
Status of Environment in Hullcar Valley.....	7
2. Drinking Water Source Protection Governance, Laws and Policy	7
Drinking Water Quality Management for Indigenous Communities	7
Drinking Water Governance.....	8
BC Legislative Framework for Drinking Water Source Water Protection	10
3. Regulatory Requirements for Agriculture Industry	12
<i>Environmental Assessment Act</i> , Reviewable Projects Regulation	12
<i>Local Government Act</i>	13
<i>Environmental Management Act</i> , Agricultural Waste Control Regulation.....	13
Compliance and Enforcement.....	15
4. Soil and Water Monitoring.....	16
Amount and Type of Data	16
Establishing the Monitoring Program	18
5. Technological Options and Incentives	20
Farming Technology	20
The Low Carbon Economy Fund.....	20
Appendix 1 - Government of British Columbia Action Plan.....	21
Appendix 2: Compendium of Environmental Monitoring Information for Hullcar Valley.....	25
Appendix 3: Table Summarizing the Cross-Jurisdictional Responsibilities for Source Water Protection and Drinking Water Supply Systems	32
Appendix 3: Summary of Policy and Planning Tools under the <i>Drinking Water Protection Act</i> , <i>Water Sustainability Act</i> and <i>Environmental Management Act</i>	38
Appendix 4: Concept – Proposed Hullcar Valley Advisory Board	42
Works Cited.....	44

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- The Hullcar valley farmers, residents and local action groups who contributed their time, well-access permissions, and nutrient management efforts to improve the protection of their community’s drinking water safety; and
- The authors of the “From Crisis to Solutions” report for their timely, objective and comprehensive review of the Hullcar aquifer situation.

List of Acronyms

Agriculture Waste Control Regulation	AWCR
Ambient Groundwater Monitoring Network	AGWMN
Area Based Management Plan	ABMP
Beneficial management practices	BMPs
British Columbia	BC
Drinking Water Officer	DWO
Drinking Water Protection Act	DWPA
Drinking Water Protection Plan	DWPP
Drinking Water Protection Regulation	DWPR
Environmental Management Act	EMA
Environmental Monitoring System	EMS
First Nations Health Authority	FNHA
Interior Health	IH
Ministry of Agriculture	AGRI
Ministry of Environment and Climate Change Strategy	ENV
Ministry of Forests, Lands and Natural Resource Operations and Rural Development	FLNR
Ministry of Health	HLTH
Ministry of Municipal Affairs and Housing	MAH
Nutrient Management Plan	NMP
Office of the Provincial Health Officer	OPHO
Provincial Health Officer	PHO
Provincial Groundwater Observation Well Network	PGOWN
Steele Springs Water District	SSWD
United Nations Declaration on the Rights of Indigenous People	UNDRIP
Water Sustainability Act	WSA
Water Sustainability Plan	WSP

Executive Summary

Residents of Hullcar valley have been under a Water Quality Advisory for nitrates in drinking water since spring 2014. The prominent land use over the Hullcar aquifer is agriculture, which is most likely influencing the water quality in the aquifer. BC Government took action through initiating compliance and enforcement of agricultural operations under the *Environmental Management Act* (EMA); undertaking legislative review of the Agriculture Waste Control Regulation; and undertaking environmental studies to better understand the Hullcar situation. In August 2017, the Minister of Environment and Climate Change Strategy (ENV) ordered an independent review of the Hullcar aquifer situation, which resulted in the POLIS Recommendations Report found at: [“From Crisis to Solutions: Towards Better Source Water Protection and Nutrient Management in the Hullcar Valley” \(POLIS Report\)](#).

The POLIS Report included 90 recommendations which focused on nine key themes with the goals of: improving the soil nitrate balance; restoring the aquifer to acceptable nitrate levels in the Hullcar valley; and improving regulatory mechanisms to help prevent a similar situation from occurring in other drinking water aquifers in British Columbia (BC). The POLIS Report identified immediate, short and long-term recommendations. Of the 90 recommendations, the Provincial Government has implemented or undertaken 32 and is currently actioning another 34. There are future actions to implement another 14 and a further 10 recommendations will be implemented in alternative methods.

On receipt of the report, the Provincial Government initiated an Inter-Agency Working Group to address the recommendations. Recommendations requiring immediate and short-term action were immediately addressed by the working group and include:

- Providing access to alternative drinking water sources for Hullcar residents;
- Collaborative government-to-government approach between Splat-sin and ENV for addressing water quality in Hullcar valley;
- For the 2018 Progress Report on the Action Plan, the Office of the Provincial Health Officer (OPHO) is considering recommendations around reviewing the Action Plan and oversight of drinking water;
- Developing better indicators of safe drinking water that aligns with the multiple barrier approach;
- Conducting a regulatory review of the Environmental Assessment Process and the Agriculture Waste Control Regulation;
- Timely communication and access to information;
- Reviewing compliance and enforcement actions under EMA; and
- Supporting agriculture producers to utilize best management practices and use of technology.

Government actions going forward includes establishment of an Advisory Board, including membership by First Nations, rights holders, stakeholders and key government representatives, to formally provide advice on:

- Appropriate legislative planning tool(s) under the *Water Sustainability Act* for the Hullcar valley and may include the establishment of water objectives for the Hullcar aquifer;
- Best practices for irrigation and other water use;

- Establishing soil and water nitrate targets; and
- Identifying the best environmental monitoring program to support the planning tool(s).

The Advisory Board could either be formed for the short-term in order to provide advice to the Steering Committee established under the MoU or formed for the long-term to provide on-going advice and governance on the Hullcar aquifer water quality.

Other actions for government action include:

- Providing regular environmental reporting of the monitoring program;
- Completing a review examining the public health risks associated with manure leaching to groundwater; use of water quality guidelines and regulatory responses applied by the respective agencies against the legislative requirements to trigger interagency or public notification, regulatory enforcement or compliance action; and adequacy of timeframe for responses; and
- Supporting implementation and use of anaerobic digesters utilizing manure to produce renewable natural gas.

Context

This report is the Provincial Government's response to the POLIS Recommendations Report found at: "[From Crisis to Solutions: Towards Better Source Water Protection and Nutrient Management in the Hullcar Valley](#)"¹ (POLIS Report), and includes actions for government implementation. On August 2, 2017, the Minister of Environment and Climate Change Strategy ordered an independent review of the Hullcar aquifer situation, with the goal of ensuring practices in the agricultural sector are aligned with the provision and protection of clean, safe drinking water for all British Columbians.

The review, led by Oliver Brandes, co-Director of the POLIS Project on Ecological Governance, is meant to inform the development of new approaches and inform future decisions around agricultural waste management specifically in the Hullcar valley in the southern interior of BC. The POLIS Report lists nine sets of recommendations with the goals of: improving the soil nitrate balance, restoring the aquifer to acceptable nitrate levels in the Hullcar valley; and improving regulatory mechanisms to help prevent a similar situation from occurring in other drinking water aquifers in BC.

On receipt of the POLIS Report, the Provincial Government initiated an Inter-Agency Working Group to address the POLIS recommendations. Working Group membership includes representatives from:

- Department of Indigenous Services Canada
- First Nations Health Authority
- Interior Health
- Ministry of Agriculture
- Ministry of Environment and Climate Change Strategy
- Ministry of Forests, Lands and Natural Resource Operations and Rural Development
- Ministry of Health
- Ministry of Indigenous Relations and Reconciliation
- Ministry of Municipal Affairs and Housing
- Office of the Provincial Health Officer
- Splatsin

Each recommendation was reviewed to identify if the actions were already underway, and if not, determine the feasibility of implementing the recommendation as presented in the POLIS Report; or whether the recommendation is more appropriate to be implemented in an alternative way. Response actions were themed into five key areas.

1. Public Health and Safety
2. Drinking Water Source Protection Governance, Laws and Policy Tools
3. Regulatory Requirements for the Agriculture Industry
4. Soil and Water Monitoring
5. Technology Options and Incentives

¹ Oliver Brandes, Jesse Baltutis, Jon O'Riordan and Jessica Wilson. (2017, November). *From Crisis to Solutions: Towards Better Source Water Protection and Nutrient Management in the Hullcar Valley - Independent Recommendations Report*. Retrieved from Hullcar Aquifer Information: <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-permitting-and-compliance/hullcar/review-docs/POLIS-hullcar.pdf>

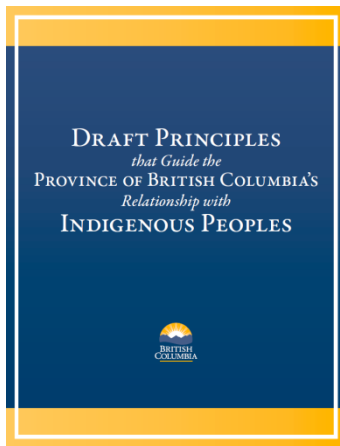
These five key areas are discussed in this report and include both an overview of how government is addressing the POLIS recommendations, and what future actions are needed to achieve the POLIS recommendations.

As part of this process, in November 2017, Minister Heyman and Kukpi7 (Chief) Christian of Splitsin, signed a Memorandum of Understanding (MoU), which established a collaborative government-to-government approach for addressing water quality in the Hullcar valley. The MoU includes establishment of a Steering Committee, comprised of Splitsin and ENV staff, to identify, develop and support implementation of solutions associated with water quality and governance in the Hullcar valley.

The Canadian government and the Province of British Columbia have both adopted the United Nations Declaration on the Rights of Indigenous People (UNDRIP)² and the Calls to Action of the Truth and Reconciliation Commission³. In September 2017, each ministry in the BC Government received a mandate letter that includes policy direction from the Premier to implement UNDRIP. Broadly speaking, implementation includes the acknowledgement of Indigenous territories, languages, self-governance rights, resource access rights and economic development rights. More specifically, articles 25 - 29 of UNDRIP relate to source water protection.



In May 2018, the BC Government implemented the *Draft Principles that Guide the Province of British Columbia's Relationship with Indigenous Peoples*⁴. These ten Principles are a starting point to guide a renewed relationship with Indigenous peoples in BC including a desire to achieve a government-to-government relationship.



The MoU between Minister Heyman and Kukpi7 (Chief) Christian, Splitsin and the Hullcar Aquifer Response Plan are consistent with UNDRIP and the ten Principles.

² United Nations. (2008, March). *United Nations Declaration on the Rights of Indigenous Peoples*. Retrieved from http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf

³ Truth and Reconciliation Commission of Canada. (2015). *Truth and Reconciliation Commission of Canada: Calls to Action*. Retrieved from: http://www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls_to_Action_English2.pdf

⁴ Government of British Columbia. (2018 May). *Draft Principles that Guide the Province of British Columbia's Relationship with Indigenous Peoples*. Retrieved from: <https://www.gov.bc.ca/sites/default/files/background/file/2018/0517/draftprinciples.pdf>

1. Public Health and Safety

The POLIS Report includes many recommendations for alternative drinking water sources, partnerships, transparency and communication. This section describes how the BC Government has addressed these recommendations.

Provision of Alternative Drinking Water

The Province has provided \$950,000⁵ to support alternative drinking water sources; fund treatment for domestic well users; and support sustainable, environmentally appropriate farming in the Hullcar valley. The Fraser Basin Council is administering \$650,000⁶ to support: Splatsin to continue drinking water improvements amongst community members; Steele Springs Water District (SSWD) to conduct studies and undertake small infrastructure works to connect to a local government water system or shift to a new water source; and independent well owners over Hullcar aquifer to install point-of-use nitrate filters. BC Agricultural Research and Development Corporation is administering \$300,000 to support: the development and implementation of nutrient management plans for farms located over the Hullcar aquifer; and to provide support for a community liaison resource in the Hullcar valley.

Splatsin is utilizing a portion of the funding to install point-of-use water treatment in 18 homes, and is using the remaining funds to conduct groundwater flow monitoring and contaminant modelling. First Nations Health Authority (FNHA) is supporting Splatsin by reviewing the plan for point-of-use treatment, testing drinking water wells and interpretation and communicating the results to Splatsin and residents.

SSWD has utilized the funding by completing an engineering study which evaluates four options for potable drinking water sources, and drilling a test well near its current source. SSWD is continuing to work with Interior Health (IH) and other government agencies to receive approvals for the new drinking water source.

IH is supporting independent well users over the Hullcar aquifer by canvassing the Hullcar community in August 2017 to offer sampling of private wells for *E. coli*, fecal coliforms and nitrate. Of the ten households that participated, no households exceeded the 10 mg/L drinking water threshold for nitrate. Independent well owners over the Hullcar aquifer can access funding to purchase point-of-use filters for installation on domestic taps. Instructions can be found on the Hullcar aquifer Information [webpage](#)⁷.

Inter-Agency Collaboration and Notification

The *Drinking Water Protection Act* (DWPA) requires that a water supplier must monitor its drinking water source, the water in its system and the water it provides, for the parameters, and at the frequency, established by the regulations and by its operating permit. The water quality parameters established by the Drinking Water Protection Regulation include *E. coli*, total coliforms, and fecal coliforms. Labs approved by the Provincial Health Officer (PHO) for water quality testing must notify the

⁵ Government of British Columbia. (2017, March 3). *News Release*. Retrieved from <https://news.gov.bc.ca/releases/2017ENV0017-000472>

⁶ Of the \$650,000: \$300k for Splatsin; \$300k for SSWD; and \$50k for independent well users over Hullcar aquifer

⁷ https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-permitting-and-compliance/hullcar/2018-04-27_notice_to_ind_well_users_access_to_treatment_funding.pdf

drinking water officer of any results not meeting a reporting standard in the Drinking Water Protection Regulation (DWPR). A Drinking Water Officer (DWO) has the authority to require a water supplier to collect additional water quality samples for parameters not included in the regulation. The water supplier is required to share the results of any additional samples with the DWO.

In response to a complaint of high nitrates in Steele Springs drinking water overflow, ENV staff began regular sampling of the overflow site in January 2014. Staff initiated a pre-investigative referral to the Conservation Officer Service and, on receipt of the groundwater sample results, provided them to IH, Conservation Officer Service and SSWD. ENV staff also met with Ministry of Agriculture (AGRI) staff to discuss nutrient application to crops.⁸ Inter-agency staff are continuing to collaborate and notify each other on the Hullcar situation. A technical working group comprised of members from Splantsin, AGRI, Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNR), ENV, IH, and FNHA meet regularly to discuss environmental technical aspects and share information. This technical working group has conducted environmental studies (including the 2016 and 2017 Post Harvest Nitrate Studies, Hullcar Aquifer Integrated Monitoring Study) which have supported DWPA and EMA orders. This group has been guided by their Phase I and Phase II action plans, and is in the process of developing a Phase III action plan.

Communication with the Public

Communications with residents of the Hullcar valley is occurring through: newsletter; in-person meetings with Splantsin, Township of Spallumcheen, SSWD, Save Hullcar Aquifer Team; general meetings with agriculture producers; community meetings; and open houses. Between March 2016 and April 2017, SSWD and ENV staff also participated in regular bi-weekly conference calls. ENV has and continues to maintain a dedicated [Hullcar Information webpage](#)⁹ to publicly share all environmental studies completed in the Hullcar valley, inter-agency memos, drinking water advisory, compliance actions, legislation, newsletters and other information. This webpage includes the POLIS Report: “[From Crisis to Solutions](#)”¹⁰ and will include this Hullcar Aquifer Response Plan Report. A community liaison has conducted community outreach to build community understanding of agricultural beneficial management practices such as nutrient management planning.

Transparency and timely sharing of information with BC Citizens is important. The BC Government has established [policy](#) that provides guidance to public bodies in determining when mandatory *Freedom of Information and Protection of Privacy Act* (FOIPPA) section 25 disclosures are necessary, how to identify and assess information for disclosure and what steps are required for notification and the release of information. In addition, the policy outlines ministry-specific procedures to support the consistent

⁸ Ministry of Environment and Climate Change Strategy. (2017, September 21). Hullcar aquifer Information. Retrieved from https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-permitting-and-compliance/hullcar/review-docs/hullcar_chronology.pdf

⁹ <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-permitting-compliance/hullcar-aquifer>

¹⁰ <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-permitting-and-compliance/hullcar/review-docs/POLIS-hullcar.pdf>

application of section 25 across government.¹¹ Thus, resolving the issues of proprietary nature of qualified professional reports and ability to publicly post them under section 25.

Moving forward, the BC Government will continue to work closely with Splantsin, SSWD and independent well users over the Hullcar aquifer to support access to alternative drinking water sources. Continued communication with the Hullcar community remains a priority to ensure conveyance of timely information and community understanding of the Hullcar situation. Finally, BC Government will undertake a review of the Hullcar situation, including potential public health risks; use of regulatory responses; and adequacy of timeframe for agency responses. Process improvements and recommendations for improved communication between agencies will be implemented province-wide.

Status of Environment in Hullcar Valley

Since 2016, a number of environmental studies have been undertaken in the Hullcar valley for surface water, groundwater and soil to better understand the extent of nitrate pollution within the valley. A compendium of the environmental studies is included in Appendix 2.

2. Drinking Water Source Protection Governance, Laws and Policy

The POLIS Report includes many recommendations for the review of the governance of drinking water and source water protection regime, including developing and implementing planning tools. Many government agencies at a local, provincial or federal level have a role in minimizing potential impacts to watersheds through legislation, policy and best practices that govern the activities and industries they regulate. This section describes drinking water governance structure within BC; describes the legislative framework for drinking water source protection; and provides an overview of the policy and planning tools.

Drinking Water Quality Management for Indigenous Communities

Drinking water quality management for Indigenous communities in British Columbia is shared by:

- Indigenous communities;
- The Government of Canada, Department of Indigenous Services; and
- The First Nations Health Authority

Chiefs and councils manage the day-to-day water and wastewater systems on reserves. Indigenous Services Canada (DISC) provides funding and advice for water systems on reserves. FNHA, as part of the 2013 British Columbia Tripartite Framework Agreement on First Nations Health Governance, has taken on the responsibility for providing independent public health advice and guidance to Indigenous communities in BC, and provides funding and technical support to enable effective monitoring programs for drinking water quality.¹²

¹¹ Government of British Columbia. (2017, July). *Section 25 - Information must be disclosed if in the public interest*. Retrieved from <https://www2.gov.bc.ca/gov/content/governments/services-for-government/policies-procedures/foippa-manual/information-disclosed-public-interest>

¹² <http://www.aadnc-aandc.gc.ca/eng/1314034319353/1314034564208>

While all provinces and territories have laws governing drinking water and wastewater management, there is no regulatory regime governing the same on First Nation lands. Section 91(24) of the Constitution Act, 1867 granted the Canadian federal government exclusive power to legislate in relation to “Indians and lands reserved for the Indians”. The *Indian Act* leaves the federal government inextricably involved, not as a distant policy-maker and law-enforcer, but as an intimate partner and fiduciary.¹³

The *Safe Drinking Water for First Nations Act* (SDWFNA), which came into force on November 1, 2013, allows for the development of federal regulations to close this regulatory gap so that residents in Indigenous Communities have comparable levels of health and safety protections for drinking water as other Canadians.¹⁴ The federal government continues to engage with Indigenous communities on the development of regulations pursuant to the SDWFNA. In the absence of regulations that protect or address off-reserve contaminants impacting on-reserve water sources, and the inability to apply the BC DWPA on-reserve, there continues to be a considerable legislative gap with respect to source water protection.

Drinking Water Governance

The [Action Plan for Safe Drinking Water in British Columbia](#)¹⁵ (Action Plan) embodies a source-to-tap approach for drinking water protection, which includes comprehensive legislation and measures to protect drinking water by improving standards for monitoring, treatment, reporting and accountability. This accountability framework emphasises that BC natural resource agencies¹⁶ have a collective responsibility for source water protection through their legislative mandates and other programs. The Office of the Provincial Health Officer (OPHO) reports on the Progress of the Action Plan and makes recommendations to the agencies with a role in ensuring safe drinking water.

The OPHO is producing a report entitled: *Clean, Safe, Reliable Drinking Water: An Update on Drinking Water Protection in BC and the Action Plan for Safer Drinking Water* which is the Provincial Health Officer report on activities under the DWPA for fiscal years 2012/13 through 2016/17. In this report on the Action Plan, the OPHO is considering recommendations around reviewing the Action Plan and oversight of drinking water in light of regulatory and contextual changes that have occurred since its release. The OPHO, with support of the health authorities, is leading a project to develop better indicators of safe drinking water that align with the multiple barrier approach for reporting purposes. This work is underway and requires changes to be made to the health authority databases to collect and report on the recommended indicators.

¹³ Report of the Expert Panel on Safe Drinking Water for First Nations. Retrieved from: <http://publications.gc.ca/site/eng/298371/publication.html>

¹⁴ Legislative Summary: Bill S-8: The Safe Drinking Water for First Nations Act. Publication No., 41-1-S8-E; 15 March, 2012. <https://www.afn.ca/uploads/files/parliamentary/s-8legislative-summary.pdf>

¹⁵ Ministry of Health. (2002). *Action Plan for Safe Drinking Water in British Columbia*. Retrieved from:

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/safe_drinking_printcopy.pdf

¹⁶ Includes the Ministries of Agriculture; Environment and Climate Change Strategy; Forest, Lands and Natural Resource Operations and Rural Development; and Energy, Mines and Petroleum Resources; and Environmental Assessment Office and Oil and Gas Commission.

The DWPA provides the legislative framework for health authorities to regulate drinking water supply systems to ensure water suppliers deliver potable water, assess risk to the system, treat water and monitor the drinking water quality. The *Local Government Act* provides the legislated framework that governs local governments and improvement districts regarding provision of water utilities. It is the policy of BC Government to shift responsibility of provision of drinking water from improvement districts to local governments as local governments are typically in a better position to provide an improved level of service and ability to fund the necessary infrastructure. Dissolution of improvement districts typically occurs on a voluntary basis.

The Ministry of Municipal Affairs and Housing (MAH) supports this policy through the provision of funding/grants to local governments to conduct studies and technical analysis on the feasibility of incorporating smaller water utilities into local government services. Additionally, the policy restricts infrastructure funding for capital works to improvement districts, unless those improvement districts are willing to dissolve into a local government system.

There are 18 water districts within the Township of Spallumcheen boundaries, some of which draw water from the Hullcar aquifer. The Township directly administers four of the water systems within its boundaries; the remaining 14 systems are independent improvement districts. The Township has been working closely with MAH for several years to assess the feasibility of converting some of the improvement district systems into Township systems. Since 2014, MAH has provided approximately \$150,000 to the Township for the purposes of conducting engineering assessments focused on ten water systems and in some cases the preparation of bylaws, agreements and policies for the conversion of improvement districts. The Township has since requested additional funding to conduct similar investigations on seven more improvement districts. There is a MoU between the Township of Spallumcheen and City of Armstrong¹⁷ for provision of drinking water. This MoU was developed in 2013 and establishes a framework to develop mutually beneficial agreements to consolidate, integrate and enhance existing water district service provision and explore the feasibility of extending service to other water districts.

Additionally, the Government of Canada and the BC Government are implementing the Environmental Quality program which will provide \$243-million to support infrastructure projects that result in clean, safe drinking water.¹⁸ The Government of BC has opened the application process to local governments and First Nations. The program will provide access to funding for projects to improve community infrastructure.¹⁹

¹⁷ Memorandum of Understanding between the Township of Spallumcheen and City of Armstrong for Provision of Water. (August 12, 2013). Retrieved from: <https://armstrong.civicweb.net/document/99746/Water%20MoU%20with%20Armstrong%20to%202020.pdf?handle=D69A6BB1D78145D3BD9A77AA24C39A8F> and the News Release (undated) retrieved from: <https://armstrong.civicweb.net/document/56948/Water%20Communications%20Spallumcheen%20Armstrong%20-%20me.pdf?handle=119F1380434A451AA6FB048A8B81A13C>

¹⁸ Government of British Columbia. (2018, May 24). *News Release: Communities to Benefit from Improved Environmental Infrastructure*. Retrieved from <https://news.gov.bc.ca/releases/2018MAH0034-001005>

¹⁹ More information can be found at: www.gov.bc.ca/Investing-in-Canada-Infrastructure-Program.

BC Legislative Framework for Drinking Water Source Water Protection

The Action Plan also outlines the legislative framework with multi-agency responsibilities to support drinking water source water protection. Figure 1 shows the regulatory landscape for source water protection as it relates to the Hullcar situation, and Appendix 2 identifies the cross-jurisdictional nature of source water protection. The Ministry of Health (HLTH) administers the DWPA; however, the regional health authorities are responsible to implement the DWPA and the DWPR at the operational level. The DWPA provides powers to specific officers employed by the health authorities to ensure drinking water supply systems comply with both the DWPA and DWPR, and issues authorisations for construction and operation of the systems. Water suppliers have statutory requirements with respect to the supply and delivery of potable water. These requirements include, but are not limited to: assessing risk to their systems; treating water; monitoring the quality of drinking water supplied; reporting requirements; having qualified operators; and taking specific actions in the event of a threat to drinking water. The DWPA also includes provisions for Drinking Water Officers to issue Orders and make recommendations to the Minister of Health to establish drinking water protection plans (DWPP) if there are threats to a drinking water source.

ENV is the lead agency for water management and source water quality protection as it relates to human health. The key legislation is the *Environmental Management Act* (EMA) and the *Water Sustainability Act* (WSA). Under EMA, ENV is responsible for regulating pollutants and industries that may contaminate water supplies. EMA enables the use of Orders, development of area based management plans and supports development of ambient water quality guidelines and objectives for the protection of aquatic health and human contact. ENV works closely with HLTH on the adoption of Health Canada water quality guidelines for the protection of drinking water and will develop a BC specific guideline as needed.

Figure 1: BC's regulatory landscape for drinking water source protection as it relates to the Hullcar situation.



The WSA came into force in 2016, and is designed to work with the broad range of provincial and federal statutes that manage natural resources and empower local governments. FLNR has primary responsibility for administering the WSA, and ENV is the policy lead for provincial water management.

FLNR has responsibility for operations under the WSA through, for example, issuance of authorizations and compliance verification. Designating the Minister of FLNR with the authorities under the WSA ensures legal and administrative certainty of powers and decisions under the Act

Included in the WSA are a number of tools supporting new forms of watershed governance and improved watershed management. Opportunities to test changes in watershed governance are currently developing. For example, in March 2018, five First Nations in the Nicola watershed and the Province of British Columbia signed a memorandum of understanding agreeing to move forward to collaboratively address issues relating to water management in the watershed under a government to government governance framework. This work will not only examine decision-making in the watershed in a government to government setting, but also use a number of WSA tools focused on creating better connections between land and water. A similar approach is under consideration in other watersheds in the province.

As noted, the WSA offers new tools that help improve watershed management and better connect activities on land with the impacts on water. Water Sustainability Plans facilitate a planning approach and collaboration with First Nations, communities and stakeholders and are focused on managing land (crown, private) and water activities within a watershed. Key opportunities when using Water Sustainability Plans include a tool that is responsive to the scope of an issue or the area of management needed, a planning framework that supports planning leadership outside the provincial government and among First Nations and communities, and a unique suite of regulation-making powers that can influence how land and water are managed. In addition to the planning provisions, the WSA offers the opportunity to create area-based regulations focused on water use. These diverse regulation-making powers within the Act provide the opportunity to customize solutions for watersheds in response to regional or watershed-level issues. For more information on these and other WSA tools see Appendix 3.

FLNR is also responsible for the *Forest and Range Practices Act (FRPA)*, and the supporting Government Actions Regulation which allows for the designation of community watersheds. However, the Minister of ENV is responsible to establish water quality objectives for those community watersheds. Currently, there are no community watersheds designated in the vicinity of the Hullcar aquifer. Designation of a community watershed could help to protect communities that use surface water as their drinking water, like SSWD, from the potential effects of forest and range activities governed under FRPA.

The DWPA, EMA and WSA include policy and planning tools (overview provided in Appendix 3) that, if implemented, can assist with management of the environmental resources at a regional or watershed scale. The Steering Committee, established under the MoU between Minister Heyman and Kukpi7 (Chief) Christian, Splatsin, will be establishing an Advisory Board to formally gain advice on: appropriate planning tool(s) for Hullcar; establishment of water objectives for Hullcar aquifer; best practices for irrigation and other water uses; and other matters that are deemed appropriate. Membership of the Advisory Board may include First Nations, rights holders, stakeholders and key government representatives. See Appendix 4 for a proposed Hullcar Valley Advisory Board.

3. Regulatory Requirements for Agriculture Industry

The POLIS Report includes: recommendations for updating the regulatory framework pertaining to intensive livestock operations; continuing amendment of the Agriculture Waste Control Regulation (AWCR); and taking further compliance actions regarding the Orders issued under EMA. This section describes the regulatory review of the *Environmental Assessment Act*, the EMA- AWCR, and describes the compliance regime implemented in Hullcar.

Environmental Assessment Act, Reviewable Projects Regulation

The [Environmental Assessment Office](http://www.eao.gov.bc.ca/)²⁰ (EAO) is the provincial agency that administers the [Environmental Assessment Act](http://www.eao.gov.bc.ca/acts.html)²¹ (EAA) and supporting regulations. The EAA applies to major projects that may have potentially significant adverse environmental, social, economic, health and heritage effects. The [Reviewable Projects Regulation](http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/13_370_2002)²² (RPR) identifies the thresholds for projects to be captured for environmental assessment review. If a project is not captured under the RPR, the Minister of Environment and Climate Change Strategy may direct a project be reviewed under the EAA or a project proponent may request environmental assessment review.

Currently, operations that draw large volumes of groundwater may be captured under RPR, Part 5 - Water Management Projects.²³ Such projects either require an Environmental Assessment Certificate or certificate exemption. The EAO is to be contacted if:

- The well or well field was drilled and operational after June 30, 1995, has a total design capacity of 75 L/s or more and is in operations for a year or more;
- The project was modified after 1995 to increase the extraction rate by $\geq 35\%$ and/or result in extraction of >75 L/s;
- There is a current proposal to increase the extraction rate by $\geq 35\%$ and/or result in extraction of >75 L/s that has not yet been discussed with EAO;
- The groundwater extraction project had an EAC but it is no longer valid (e.g., because it has expired); or
- The groundwater extraction project was issued a certificate exemption under s. 10(1) b of the EAA which is no longer valid because the conditions were not met and/or the scope of works changed and were not captured in a revised certified project description.

The Premier has mandated the Minister of Environment and Climate Change Strategy to [revitalize the environmental assessment process](http://www.eao.gov.bc.ca/revitalization/index.html)²⁴ to ensure the legal rights of First Nations are respected and the public's expectation of a strong, transparent process is met. The EAO is working with Indigenous groups at every step of the revitalization process to ensure that this work contributes to achieving government's commitment to fully implement UNDRIP. Building trust and partnerships where all parties can participate in a revitalization process to make decisions that are responsible, effective and efficient is a key priority. The revitalization process is expected to focus first on how the environmental

²⁰ <http://www.eao.gov.bc.ca/>

²¹ <http://www.eao.gov.bc.ca/acts.html>

²² http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/13_370_2002

²³ <http://www.eao.gov.bc.ca/files/EAO-EAC-Requirements-for-Groundwater-Users.pdf>

²⁴ <http://www.eao.gov.bc.ca/revitalization/index.html>

assessment process works.

The revised *Environmental Assessment Act* was passed on Nov 27, 2018 and likely will be brought into force in the fall of 2019. The review of the RPR will evaluate what types of projects require an environmental assessment. Inclusion of intensive livestock operations will be referred to the EAO for consideration. The EAO webpage includes information on how to participate in this review.

Local Government Act

The *Local Government Act* provides authority to the Minister of Agriculture to establish agricultural standards (Minister's Bylaw Standards) for the guidance of local government in the preparation of various bylaws affecting agriculture. The Strengthening Farming Program²⁵ has developed a Guide for Bylaw Development in Farming Areas, and is committed to working with First Nations and local governments on developing Bylaw standards for the benefit of agriculture in the Province.

Environmental Management Act and Agricultural Waste Control Regulation

The purpose of EMA is to prevent pollution from occurring, and to manage the pollution once it has occurred. EMA provides the authority to issue Orders, develop Area Based Management Plans (ABMPs) and establish regulations to protect human health and the environment. The AWCR was established under EMA and contains the legal provisions for waste management on agricultural operations. It describes the mandatory requirements for using, storing and managing agricultural waste to protect human health and the environment. The current regulation came into force in 1992, and ENV initiated an update of the AWCR through an intentions paper process in 2012 and 2015. In November 2017, ENV posted the 2017 [*AWCR Review Intentions Paper*](#)²⁶ as a first step in consulting on the ministry's proposed regulatory changes in response to the recommendations from the POLIS Report. The ministry's goals for updating the AWCR and associated guidance are to:

- Enhance and improve water and air quality by requiring that good, environmentally protective agricultural practices are followed;
- Ensure watercourses (i.e., surface water) and groundwater are protected through proper storage and use of manure, other nutrient sources and agricultural materials;
- Provide certainty through clear, unambiguous requirements focused on desired environmental outcomes); and
- Update guidance to facilitate appropriate and beneficial use of manure and other agricultural by-products.

ENV staff have consulted with the Interagency Working Group (IAWG), Splatsin, AWCR Agriculture Industry Working Group and others on the proposed changes. Many of the POLIS Report recommendations were already contemplated and addressed in the previous proposed requirements while other requirements were specifically added to address POLIS's recommendations (refer to the

²⁵ <https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/strengthening-farming/local-government-bylaw-standards-and-farm-bylaws>

²⁶ <https://www2.gov.bc.ca/gov/content/environment/waste-management/industrial-waste/agriculture>

2017 Intentions Paper for more details). The ministry will be adding new regulatory provisions to meet the ministry's goals and address POLIS's recommendations, including requirements for the following:

- Effective manure storage and transport (integrity and capacity);
- Appropriate timing for application of nutrients (i.e., time of year, environmental conditions);
- Increased requirements in high risk areas (e.g., vulnerable aquifers and phosphorus impacted areas);
- Nutrient management plans and soil testing requirements for nutrient application and
- Additional powers to the Director to:
 - On a case-by-case basis, and based on evidence of negative impact or potential negative impact, require the development of an independently verified nutrient management plan (NMP) that is independently verified;
 - Assess cumulative impact of nutrient application in an area, i.e., the ability to request all NMPs for a specific area and evaluate, in conjunction with other environmental information; and
 - Require environmental monitoring or testing.

It is expected that the new regulation will come into force in early 2019. It will provide higher standards for agricultural operations which result in greater human health and environmental protection. As well, ENV will have greater access to nutrient monitoring data which will better inform any future compliance actions, when appropriate. As part of the regulatory update, ENV will develop guidance and tools for industry, ministry staff, and undertake compliance promotion activities to ensure the agriculture industry understands the new regulatory requirements.

With regard to regulating the land application of nutrients (including manure), the new regulation proposes to accomplish this objective using a multi-prong approach as follows:

In all areas

- no land application on water saturated soil, frozen or snow covered ground.
- must apply nutrients without exceeding the amount of nitrogen needed by the crop

In high precipitation areas (600 mm or more from October 1 - April 30)

- land application in November, December and January is prohibited
- land application in October, February and March will require that a farmer uses a tool provided by government to assess risks of manure application in real time. The assessment will need to demonstrate low risk conditions for land application to occur. This requirement will come into force in 2022 in order to give industry time to make the necessary capital improvements (e.g., expand manure storages).

There will also be additional requirements for nutrient management planning (NMPs), record-keeping and new tools to provide the Director with greater powers and oversight. More specifically, the new regulation will require NMPs for agricultural operations with high soil nutrient levels that are located in high risk areas (e.g., Hullcar Aquifer). NMPs will need to be designed such that nutrients (including manure) are applied at the right rate, time and place. The new tools for the Director will include powers to request more information, prohibit spreading on specific operations, groups of operations or regions and require NMPs on case by case basis in response to environmental concerns.

Compliance and Enforcement

ENV is responsible for verifying compliance with EMA and AWCR. The current legislation prohibits the application of manure on a field if it causes pollution. As well, EMA Orders provide authority to the Director to request additional information about agricultural operations or to create requirements aimed at immediately controlling the entry of nitrates into the aquifer. Specifically, Information Orders are used for the Director to determine, on reasonable grounds, if a Pollution Prevention Order or a Pollution Abatement Order should be issued. A Pollution Prevention Order is issued when a Director is satisfied on reasonable grounds that a substance is likely to cause pollution, and a Pollution Abatement Order is issued when a Director is satisfied on reasonable grounds that a substance is causing pollution.

ENV is responding to the Hullcar aquifer situation by issuing several Orders under EMA and ensuring a focused compliance effort. Eleven EMA Orders were issued to agricultural producers in the Hullcar Valley: one Information Order, one Compliance Order, two Pollution Prevention Orders, and seven Pollution Abatement Orders. The purpose of the orders is to abate the further entrance of agricultural waste into the environment and prevent further contamination of the aquifer. Seven Orders are fully complied with and are no longer in effect. The remaining four agricultural producers are in compliance with their Order requirements. ENV will continue to allocate additional compliance resources to respond to environmental protection issues as they emerge.

Three of the agriculture producers are required under the Orders to implement nutrient management plans for application of nutrients to fields. AGRI is supporting the development of these nutrient management plans through post-harvest nitrate studies that indicate the effectiveness of crop nitrogen management for each field. The [2016 and 2017 post-harvest nitrate studies](#)²⁷ for crop fields above the Hullcar aquifer show that residual soil nitrate levels were lower at the end of the 2017 cropping season than the 2016 cropping season in most of the fields. Study results suggest that over the last two years, with the implementation of nutrient management planning on fields over the aquifer that agricultural producers are making improvements in optimizing their manure and fertilizer applications over the aquifer. As previously identified, the intensions paper for the AWCR amendments includes development of nutrient management plans to determine appropriate amount of nutrient application to fields.

AGRI is strengthening its resources under the Environmental Farm Plan Program to target education and outreach in sensitive and high "environmental risk" areas. AGRI currently delivers cost-share funding to

²⁷ Government of British Columbia. (undated). *Soil Nutrient Studies*. Retrieved from <https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/soil-nutrients/nutrient-management/technical-reports/soil-nutrient-studies>

support the implementation of beneficial management practices (BMPs) through the Environmental Farm Plan Program. Nutrient management has been identified as a priority and will receive funding under the Canadian Agricultural Partnership Agreement for the next five years. AGRI is utilizing the \$300k of the \$950k funding announced March 2017 to support nutrient management planning, irrigation education, assessments and soil moisture meters, on-farm application equipment and a community liaison to work with agriculture producers. These beneficial management practices can be used to effectively manage the application of fertilizers and manure.

ENV is updating the EMA Orders Handbook to place a greater emphasis on the use of Information Orders to delineate the source and geographic location of a pollution issues prior to issuing a Pollution Abatement Order or Pollution Prevention Order. This will inform all future EMA Orders.

4. Soil and Water Monitoring

The POLIS Report includes recommendations for providing a robust independently verified monitoring and reporting program. This section describes the amount and type of data currently collected by government, and identifies establishment of a monitoring program that would support evidence based decision making including remediation of the Hullcar aquifer.

Amount and Type of Data

ENV funds and coordinates provincial operations of the [Provincial Groundwater Observation Well Network](#) (PGOWN); funds the Ambient Groundwater Monitoring Network (AGWMN); as well as funds and operates the provincial data repositories for groundwater level and chemistry data. FLNR undertakes the regional operation and maintenance of both networks. The PGOWN provides groundwater level data that supports defensible, science-based groundwater licensing. Additionally, as the only long-term groundwater monitoring network with sites across the province, the PGOWN is key to understand the impacts of climate change on groundwater resources in BC. There are two operational PGOWN monitoring wells installed in the Hullcar valley.

The purpose of the AGWMN is to assess spatial and temporal variation of groundwater quality for a given aquifer. The network for Hullcar aquifer includes ten private wells and two PGOWN wells as sampling points; however, not all private or PGOWN wells are sampled on an annual basis due to private well owner access and depth-to-water constraints – which requires a contractor to pump water from the well – associated with one PGOWN site. In 2017, only one PGOWN well and nine privately owned domestic wells (see map below for sampling/well locations) were sampled²⁸. The data collected for the PGOWN and the AGWMN is stored in the [Environmental Monitoring System \(EMS\)](#).²⁹ These wells are installed at the lower reaches of the aquifer and not in the location (top of aquifer/at the water table)

²⁸ Ministry of Forests, Lands and Natural Resource Operations. (2016, March 04). *ENV Hullcar Aquifer Information*. Retrieved from https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-permitting-and-compliance/hullcar/2016_03-04_flnr_hullcar_aquifer_quality_memo.pdf

²⁹ The Environmental Monitoring System (EMS), is the Ministry of Environment and Climate Change Strategy corporate electronic repository for the capture and extraction of results for chemical, physical and biological analysis performed on air, water, biological, solid waste discharge, and ambient monitoring locations throughout the province. Website located at: <https://a100.gov.bc.ca/pub/ems/indexAction.do>

where the nitrate is accumulating. Therefore, expansion and upgrading of the PGOWN or the AGWMN in Hullcar valley will not support evidence based decision-making in this area for the nitrate issue.

Other discrete surface water, groundwater and soil monitoring in Hullcar valley includes:

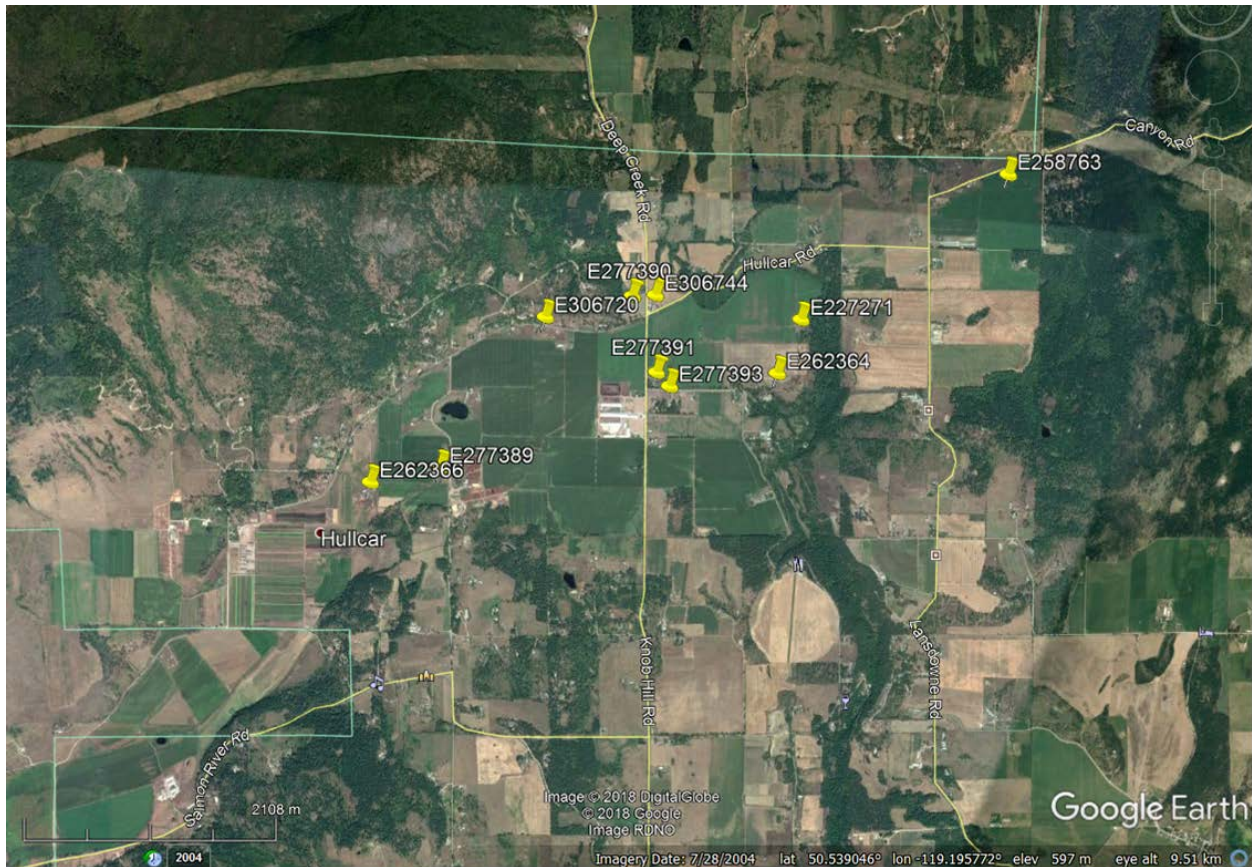
1. Fall 2016 and 2017 Post Harvest Nitrate Studies³⁰ (39 agricultural fields were measured in the 0-90 cm. soil layer).
2. August 2017 IH sampling ten domestic wells.
3. February 2017 Golder Integrated Monitoring Study³¹ (includes two monitoring wells, four domestic wells and five surface water locations - Deep Creek and Parkinson Lk).
4. 2016 EMA Orders:
 - Seven monitoring wells Jansen & Sons Dairy Farm;
 - Three monitoring wells GraceMar Farm; and
 - Eight irrigation wells Ken Regehr Farm.
5. IH Community Water Systems (i.e., SSWD).

Of the environmental data collected above, all of the data is collected into EMS except for IH community water systems data.

³⁰ Government of British Columbia. (March 29, 2018). Tracking Post-Harvest Soil Nitrate in Agricultural Fields in the Hullcar Valley in 2017-18. Retrieved from: <https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/soil-nutrients/nutrient-management/technical-reports/soil-nutrient-studies>

³¹ Golder Associates. (February 2017). Hullcar Hydrogeology Study – Phase 1 and 2 Assessment. Retrieved from: https://www2.gov.bc.ca/assets/gov/environment/airland-water/site-permitting-and-compliance/hullcar/2017-02-25_golder_ims_phase_1_2_assessment.pdf

Map 1: Ambient Groundwater Monitoring Network Well Locations in Hullcar Valley



FNHA is responsible³² for monitoring on-reserve drinking water quality for all community water systems, public water systems, and individual wells. Monitoring data is stored in Watertrax™, a database that is accessible only to FNHA, Department of Indigenous Services Canada and Splatsin.

Establishing the Monitoring Program

The monitoring program to be established for the Hullcar valley will ensure alignment between the monitoring objectives that support the planning tool(s) (ABMP, Water Sustainability Plan (WSP), Water Objective (WO), etc.), and the soil and water thresholds³³ to be established under the tool. A Technical working and Steering Committee, made up of technical representatives from each stakeholder group, will be convened to provide oversight and technical direction to scope out and define objectives of the monitoring program. The current AGWMN was not intended to inform compliance and decision making

³² Government of Canada, Province of British Columbia and First Nations Health Society. (October 13, 2011). *British Columbia Tripartite Framework Agreement on First Nation Health Governance*. Retrieved from: <http://www.fnha.ca/Documents/framework-accord-cadre.pdf>

³³ The monitoring program may also include sampling parameters to detect if other sources of nitrate are contributing to the Hullcar aquifer issue. IH has responsibilities under the Systems Sewerage Regulation, and will conduct an inspection if there are complaints about a failing septic system. The SSR provides authorities to order homeowners to repair the septic system if there is a failure. To date, no failures have been reported.

actions, hence the need for the development of a monitoring program specifically designed to support the planning tools. Additionally, the development of the monitoring program could consider using community based monitoring options.

Several of the Golder (2017) recommendations are implemented including: completing the re-mapping of Hullcar aquifer boundaries and monthly samples of Steele Springs which are analyzed for a full-suite of water chemistry parameters. The remaining Golder recommendations will be reviewed, and if appropriate to support the planning tool, may be implemented. Given the scope of the work required, additional funds may be needed to procure a qualified hydrogeology consulting firm to develop the numerical flow model, and associated work if existing government resources are unable to complete the work. The shallow monitoring wells installed to comply with the EMA Orders will be considered for inclusion in a future monitoring network to provide for long-term monitoring and trend analysis, and confirm assumptions regarding appropriate application of nutrients on the land surface and crop uptake. FLNR and ENV will utilize an independent external partner for data analysis and verification.

Groundwater remediation begins by stopping the contamination from continuing. This is being achieved through issuance of EMA Orders, which require implementation of nutrient management plans for the agronomic application of nutrients to fields above the aquifer, and amending the AWCR which establishes the regulatory standards for environmental protection of agriculture operations. The monitoring program (and implementation of the Golder (2017) recommendations) will inform whether remediation effort is needed. As part of producing an annual summary report for Hullcar aquifer, ENV and FLNR will review the data to determine if remediation should be undertaken.

5. Technological Options and Incentives

The POLIS Report includes recommendations for employing innovative technology such as a biogas facility in partnership with First Nations and the community. This section describes the actions AGRI is taking to support agriculture producers and opportunity for First Nations and local community to access funding to support processing of manure to biogas.

Farming Technology

AGRI continues to engage Hullcar producers in innovative cost-share funding.³⁴ AGRI has utilized the \$300k of the \$950k funding announced March 2017 to support irrigation education, assessments and moisture meters; and a community liaison to work with agriculture producers on beneficial management practices. The focus is to have agricultural producers implement new farming technologies such as installation of moisture meters to support irrigation planning. Producers will also be upgrading their irrigation equipment to allow for improved water-use efficiency to reduce the loss of water from their on-farm irrigation delivery systems. Agricultural producers will also be utilizing new equipment that allows for more efficient and targeted application of manure. These beneficial management practices can be used to effectively manage the application of manure and irrigation water to ensure sufficient moisture to support crop growth while minimizing downward migration of nutrients.

The Low Carbon Economy Fund³⁵

The Government of Canada announced in December 2017 that \$162M funding under the Low Carbon Economy Fund is being provided to the Province of BC to support projects that reduce greenhouse gas emissions. The BC Government has also identified an additional \$162M to support energy efficiency, reforestation and organics diversion and processing. \$20 million dollars of the combined provincial and federal funding has been set aside for organic waste processing infrastructure in BC that will result in increased organic waste diversion, including municipal organics and agricultural waste. Applicants are expected to invest one-third of the funding required. The application process for obtaining funding under the organics processing stream is currently being developed and is expected to be shared with potential applicants by fall 2018. Local governments will be eligible to apply, and may partner with First Nations or private companies.

Moving forward, AGRI will continue to work closely with Hullcar agricultural producers and provincial agriculture associations to provide continued support and incorporation of best management practices. AGRI will develop and deliver targeted demonstrations and field trials of Nitrogen and Phosphorous management in the 2018 growing season. As well, AGRI is supporting the [ARCTIC nutrient recovery AGRITECH innovation challenge](#) for agricultural anaerobic digesters for 2018/19. The BC Government is committed to providing Splatlin and the Hullcar community access to the Low Carbon Economy Fund for the possible implementation of technology to process organics (manure or manure and wastewater) processor.

³⁴ Utilizing a portion of the \$300,000 announced March 2017 to support agricultural best management practices.

³⁵ Government of Canada. (2018, March 13). *The Low Carbon Economy Fund*. Retrieved from

<https://www.canada.ca/en/environment-climate-change/services/climate-change/low-carbon-economy-fund.html>

Appendix 1 - Government of British Columbia Action Plan³⁶

This section describes in more detail government’s planned actions in response to the POLIS Report recommendations.

	Action Planned	Lead	Support	Target Date for Completion
Public Health and Safety				
1.	<p>Complete a review, within the respective agency roles and legislation, to:</p> <ul style="list-style-type: none"> Examine the public health risks associated with manure leaching to groundwater using a screening health risk assessment approach. Review potential contaminants of public health concern, combined with toxicological and exposure assessment principles under acute (short-term) or chronic (long- term) timeframes; Assess use of water quality guidelines and regulatory responses applied by the respective agencies against the legislative requirements necessary to trigger interagency or public notification, regulatory enforcement or compliance action; Examine and summarize the conditions necessary to deem a situation to be a “drinking water health hazard” under the <i>Drinking Water Protection Act</i>, and for contaminants to cause “adverse environmental effects” under EMA and the interplay with the <i>Public Health Act</i> (PHA); Review the adequacy of the timeframe for responses between agencies, available public messaging and hazard abatement orders in consideration of the results of the screening health risk assessment; Identify process improvements; and Summarize “lessons learned” and develop recommendations for an improved communication framework between agencies and with the public, if necessary. 	<p>HLTH</p> <p>HLTH</p> <p>ENV, HLTH, IH,</p> <p>HLTH, IH,</p> <p>IAWG</p> <p>IAWG</p> <p>IAWG</p>	<p>ENV, IH</p> <p>FLNR</p> <p>OPHO</p>	<p>January 31, 2019</p> <p>January 31, 2019</p> <p>January 31, 2019</p> <p>January 31, 2019</p> <p>February 28, 2019</p> <p>February 28, 2019</p> <p>February 28, 2019</p>

³⁶ Agencies may be acting independently and not under the endorsement of the IAWG.

	Action Planned	Lead	Support	Target Date for Completion
Drinking Water Source Protection Governance, Laws and Policy				
2.	<p>Establish an Advisory Board to review the ‘planning tools’ under EMA, DWPA and WSA to determine which tool(s) (i.e., ABMP, DWPP, WSP, WOs, etc.) are most appropriate for implementation in Hullcar. The scope of the review will focus on the appropriate regulatory response to addressing contamination events and may include:</p> <ul style="list-style-type: none"> • Developing terms of reference including the purpose of the water board as well as potential roles and responsibilities; • Reviewing the role of the Splantsin Water Advisory Committee; • Determining the appropriate legislative tools which may be applied to a Hullcar situation, including the application and sufficiency of regulatory tools under the DWPA, PHA, EMA and the WSA; • Establishing soil and water nitrate targets and assess sufficiency for EMA Orders to achieve the targets; and • Determining whether the tools are going to be preventative/proactive on private land. 	Splantsin and ENV via Steering Committee	FLNR, HLTH OPHO	Late Winter 2019
Regulatory Requirements for Agriculture Industry				
3.	ENV to continue regulatory updates to the AWCR for completion in 2018 and includes development of guidance and tools for ministry staff, agriculture industry, and compliance promotion activities.	ENV	AGRI	Fall/Winter 2018-19
4.	Promotional compliance activities will be undertaken to ensure agriculture producers understand the legal requirements when the amended AWCR comes into force.	ENV	AGRI	Winter 2019
5.	AGRI will develop and deliver targeted demonstrations and field trials of Nitrogen and Phosphorous management in the 2018 growing season. As well, AGRI is supporting the ARCTIC nutrient recovery AGRITECH innovation challenge for agricultural anaerobic digesters for 2018/19.	AGRI		March 31, 2019
Soil and Water Monitoring				

	Action Planned	Lead	Support	Target Date for Completion
6.	<p>Once the appropriate planning tool is identified for the Hullcar situation, the Advisory Board will then identify what monitoring program is necessary to support the appropriate planning tool(s) including:</p> <ul style="list-style-type: none"> • Review the Golder (2017) recommendations and, if appropriate to support the planning tool, may be implemented; • Evaluate options to utilize an independent external partner for data analysis and verification which may include: <ul style="list-style-type: none"> a. Outsourcing field tasks to academia, federal government (GSC), an Organizational Quality Management (OQM) Certified hydrogeology consulting firm, or ENV Contaminated sites group; or b. Have a steering committee comprised of aforementioned interested parties provide direction to OQM firm to execute field portion. 	ENV/FLNR	IH, AGRI, FNHA	TBD
7.	<p>When establishing the monitoring program, consideration will be given to establishing a Technical working and Steering committee, made up of technical representatives from each interested party, to provide oversight and technical direction to scope out and define objectives of the monitoring program. The committee could also provide clarity on the full scope of monitoring needed (e.g., environmental or health based monitoring) to fully realize intended outcomes. Consideration will be given to engage various organization units in ENV (Land Remediation, Water Sustainability and Knowledge Management) to provide a lead role in the development of the network.</p> <p>ENV will produce an annual status summary report for Hullcar aquifer utilizing the data that is collected as part of the monitoring program.</p>	ENV/FLNR ENV	IH, AGRI, FNHA	TBD Annually once monitoring begins.
8.	IH will engage the responsible Drinking Water Officers to require community water systems upload source water sampling data to EMS.	IH		Ongoing

	Action Planned	Lead	Support	Target Date for Completion
Technology Options and Incentives				
9.	AGRI will continue to work with Splatsin, Fortis BC and the Hullcar community to determine feasibility and governance of an anaerobic digester to produce renewable natural gas. Potential linkages with the Low Carbon Economy fund for Organics diversion will be explored once the Program is launched.	AGRI	ENV	Ongoing

Appendix 2: Compendium of Environmental Monitoring Information for Hullcar Valley

A. Surface Water

1. [ENV review of the Nitrate-Nitrogen Water Data for the Hullcar Valley - May 4, 2016](#)

In response to the finding of nitrate levels exceeding the Health Canada drinking water guidelines at the Steele Springs domestic water supply, ENV reviewed the available WQ data for the Hullcar aquifer to identify potential sources of contamination.

The assessment report reviewed nitrate data from Deep Creek, the outflow from Steele Springs and Parkinson Lake. Historic water samples, collected at Deep Creek above Hullcar Road before 1990, recorded a high of 10.1 mg/L which decreased to below 1.0 mg/L in 2015. High nitrate levels in the outflow from Steele Springs may be responsible for higher instream values on Deep Creek below Hullcar valley noted in 2015. Steele Springs and two groundwater sites located near the Steele Springs water intake showed increasing values from 5.23 mg/L in April 2012 to 13.0 mg/L in April 2016. Samples collected before 1990 ranged from 3.65 mg/L to 4.75 mg/L indicating historic nitrate contamination in the domestic water supply. Surface samples from Parkinson Lake were at ambient levels.

The Hullcar aquifer is unconfined and is therefore vulnerable to any uncontained source of nitrogen – manure, chemical fertilizer, septic fields, manure storage or high animal density farming operation has the potential to introduce nitrate to the aquifer. The data confirmed high levels of nitrate in the Hullcar aquifer but there was insufficient information to identify the source(s) of contamination.

2. [2017 Golder Report – Integrated Monitoring Study- February 2017](#)

The 2017 work was undertaken to achieve Activity 6 of the Inter ministry working group's Action Plan - to develop an integrated hydrogeological monitoring study to map and characterize the physical and geochemical features of the aquifer. The study included surface/groundwater interactions, to refine the existing hydrogeological model, evaluation of potential nitrate sources, loadings to ground and surface waters as well as the enumeration of all fate and transport processes to be used in the develop or a conceptual contaminant flow model.

The Hullcar valley straddles the South Thompson and Okanagan watersheds, although there is no surface flow discharging to either watershed. The small kettle lakes and ponds dotting the valley bottom do not have inlet or outlet streams, inferring groundwater recharge while the surface water/groundwater relationships in the eastern portion of the valley are not clear.

Deep Creek is the only surface water flow in the valley. It enters the area from the north, flows approximately 1km along the north edge of the valley before turning south, transecting the unconsolidated sediments with an incised canyon, eroded to bedrock in several locations. Deep Creek continues south, through the City of Armstrong and Otter Lake to Okanagan Lake. There are three water licences on Deep Creek in this area – two for irrigation licences and one instream storage licence. There are several springs flowing from the west bank of the gulley along the incised creek bed – the largest is Steele Springs. There are 11 water licences on Steele Springs for domestic, irrigation and water works purposes dating back to 1882.

Isotope analysis of the water indicates there is a hydraulic relationship between Deep Creek as it enters

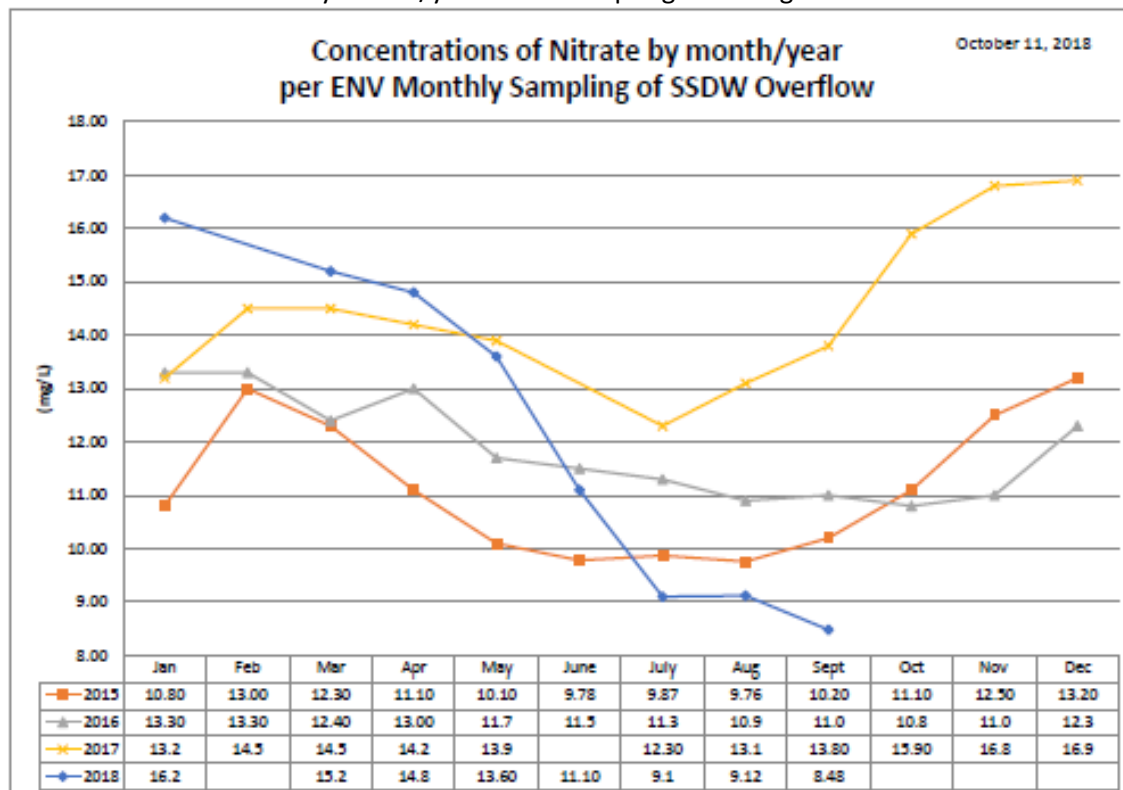
the Hullcar valley and the shallow groundwater on the north edge of the valley. Samples collected from the lower Deep Creek, below Hullcar suggest that groundwater outflows from the aquifer make up a significant portion of the stream water volume - the proportions of groundwater increase with declining surface water flows. The nitrate samples of Deep Creek also support this finding with low nitrate levels shown in the upper watershed with moderate levels in the lower reaches in the area of groundwater inflow. Nitrogen isotope analyses suggest that the nitrate samples collected from Deep Creek and Steele Springs are from manure or septic seepage sources.

Data gaps were identified in both surface water chemistry and water flow measurements (discharge). The study recommends the continuation of surface water sampling on Deep Creek and SSWD. The recommendations also included increasing to a full suite of chemical parameters including dissolved organic carbon and metals to trace different water sources and assess the potential for denitrification. Adding the analysis of the tracer chemical caffeine, should also be considered to better assess septic sources of nitrate contamination. Surface water hydrometric monitoring stations should be installed at several locations in upper Deep Creek to determine water gains to the aquifer and losses to Deep Creek.

3. [Summary of Steele Springs Drinking water overflow \(2015-present\)](#)

The results of the sampling conducted on the Steele Springs raw water supply were reviewed for results from January 2015 to September 2018. Results for nitrate analyses for each month and year are shown in Figure 1. Annual fluctuations in nitrate concentrations are shown as well as overall increases in nitrate values for 2015 to high of 16.8 mg/L December 8th, 2017. In 2018 the concentrations began to decrease. Each monthly sample has steadily decreased from the 2017 high of 16.8 to 8.45 mg/L on September 17, 2018.

[Figure 1.](#) Shows the results of the Ministry of Environment and Climate Change Strategy sampling for concentrations of nitrate by month/year at Steele Springs Drinking Water overflow.



In Figure 2, the nitrate concentrations are plotted with groundwater levels to see if groundwater levels affect nitrate concentrations at the Steele Springs water source. In 2015 and 2016, the highest nitrate concentrations appear to occur following the lowest water levels with a slight lag between the lowest water levels and the highest nitrate concentrations. The highest groundwater levels since 2012 were recorded on June 19, 2017 and May 22, 2018. However, the pattern of lower nitrate concentrations did not follow the higher groundwater levels. Instead we observed a steady increase in nitrate concentrations though the period of highest minimum groundwater level recorded in September 2017. A secondary peak in groundwater levels occurred following heavy fall 2017 rains until the maximum nitrate concentration was noted on November 2017. Then the data pattern changes. Following the highest nitrate values in 2017 the nitrate concentrations started to decline, even before the groundwater levels began increasing, and decrease steadily to 8.45 mg/L during the period minimum groundwater levels which was recorded in August 2018. This is reversal in the earlier observed pattern.

The nitrate concentrations at the Steele Springs raw water source are currently at the lowest levels recorded since January of 2014. This decrease follows two years of significant increases in the groundwater levels recorded at Observation Well 409. It's not clear if the decreasing nitrate concentrations will continue or increase following the minimum groundwater levels this fall. Given the groundwater travel time of 35 to 50 years as determined by the Environmental Impact Studies conducted during 2016 (Golder, 2017) it is unclear if this current pattern of decreasing nitrate concentrations indicates decreases in contamination of the aquifer. Continued measurement of the Steele Springs raw water source will be required to monitor the impacts on the aquifer.

[4. Assessment Comparing Steele Springs to Deep Creek – May 7, 2018](#)

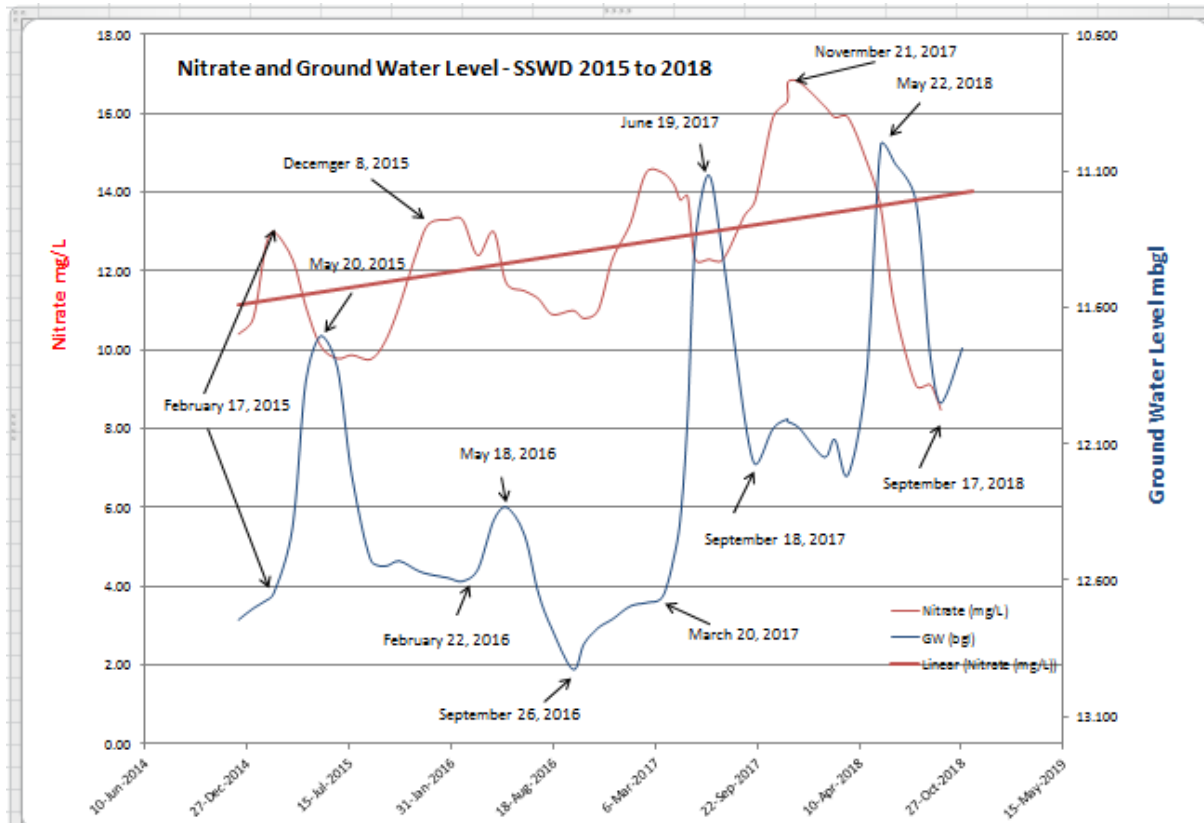
In response to high bacterial counts recorded during two routine sampling of the SSWD raw water source, the Hullcar Inter Agency Technical Working Group directed ENV Monitoring and Assessment staff to investigate the potential for overland contamination to the Steele Springs by high water levels on Deep Creek.

MAS staff conducting monitoring during April and May, 2017 during spring freshet. Samples were collected from sites on Deep Creek above and below the Hullcar valley as well as from the Steele Springs raw water source. During the sampling, the fields along the upper section of Deep Creek as well as those along Hullcar Road were flooded. Although Steele Springs is located in a shallow depression below field level, south of where Deep Creek enters the Hullcar valley, no overland connections were observed.

Analysis of the data collected was interesting. The conductivity, hardness and nitrate values (the ionic fraction) showed the effects of dilution as would be expected during the influx of low ionic waters characteristic of snow melt and rain. However, the organic and bacterial components remained unchanged or display slight increases. This result indicates that overland inflows during the flood conditions had picked up high levels of nutrient and fecal contamination – sufficient to maintain instream concentrations. These conditions were not observed in the Steele Springs samples. Although nitrate was significantly higher in the Steele Springs samples, the organic and bacterial components were much lower. Comparisons of the ionic signature of the two water sources indicate that they are very different.

Water samples collected from Deep Creek and SSWD investigated the potential for bacterial contamination from Deep Creek to enter the SSWD source water as a result of freshet flows. During the study, water levels were very high; flooding fields where manure had been applied the previous fall. No

Figure 2. Shows the nitrate concentrations graphed with groundwater levels to see if groundwater levels affect nitrate concentrations at the Steele Springs drinking water source.



The study was unable to establish a link between the two water sources and was also unable to determine the source of contamination. However, analyses of the chemical composition of water samples revealed that the water from the SSWD source was significantly different than the flood waters of Deep Creek. This indicates that the two sources are not connected and the risk of contamination of the SSWD by Deep Creek is low. Continued monitoring of the SSWD source water is recommended along with regular inspection of the upland infrastructure.

Groundwater

1. [Ambient Groundwater Monitoring of the Hullcar Aquifers](#)

The Ambient Groundwater Quality Monitoring Network (AGWQMN) in the Hullcar valley consists of yearly monitoring of groundwater quality from residential wells in an area where groundwater quality may be of concern. There are between 8 – 10 wells monitored annually since 2009. The results are accessible via the Environmental Monitoring System (EMS) maintained by the Ministry of Environment and Climate Change Strategy. The data from the ambient monitoring network was incorporated into the 2017 Golder Integrated Monitoring Study (described below); however, no further interpretations have been completed.

2. [Groundwater Data from EIS Reports and Annual Summaries](#)

The Ministry of Environment and Climate Change Strategy required Environmental Impact Studies (EIS) to be conducted by three different farming operations in the valley. This involved the installation of shallow groundwater monitoring wells in the vicinity of the farms to monitor groundwater quality. Collection and submittal of the groundwater quality data is generally required for a period of 3-years from issuance of the order. These water quality results are also to be made available via the Environmental Monitoring System. The Environmental Impact Studies and Annual Summaries can be found at the following links:

- a) Grace-Mar Farms Ltd
 - i. [Environmental Impact Study, February 2017](#)
 - ii. [Annual Summary, June 2017](#)
 - iii. [Annual Summary, April 2018](#)

 - b) H.S. Jansen & Sons Farms Ltd.
 - i. [Environmental Impact Study, February 2017](#)
 - ii. [Annual Summary, December 2017](#)

 - c) Ken Regehr Feedlot and Farm
 - i. [Environmental Impact Study, February 2017](#)
 - ii. [Annual Summary, June 2017](#)
 - iii. [Annual Summary, June 2018](#) and [Supplemental Information](#)
3. [2017 Golder Report – Integrated Monitoring Study](#)

This 2017 report, commissioned by the Ministry of Environment and Climate Change Strategy, is the most comprehensive hydrogeological report done in the Hullcar valley, pulling together available groundwater, surface water, and soil quality data. The report includes some preliminary data from the EIS as well as the AGWQMN, and isotopic analysis of water to determine water age and nature of the nitrate source. The main recommendation from the report is for a numerical model to be constructed to better understand groundwater flow in the valley and to help manage the resource. Prior to the construction of a numerical flow model, a number a data gaps were identified by Golder and would need to be collected first. The report also concluded the aquifers are relied upon heavily for irrigation, and a high-level water budget analysis showed the system to potentially be in a water deficit in some years.

4. [2006 Golder Report on Groundwater Potential Evaluation for the Hullcar Area](#)

This report for the Township of Spallumcheen was intended to review potential water supply options within the Hullcar Valley. It was the first Hydrogeological analysis of the aquifers in the Hullcar valley, and it made some preliminary assessments of groundwater flow direction and suggestions for further study.

Soil Studies

In recent years, the drinking water quality in Aquifer 103 in the Hullcar valley in the North Okanagan of British Columbia has been compromised by elevated levels of nitrate. Agricultural practices, particularly the growth of forage crops grown for livestock feed, are potential sources of nitrate. Unused nitrate in soil can move downward with water below the soil root zone, a process that generally occurs during the fall and spring thaw periods when plant water and nutrient uptake is low. Then, nitrate can continue to leach through the unsaturated soil zone and eventually pollute groundwater systems. Different soil sampling methods were used in three sets of studies to determine the concentration of location of nitrate throughout the unsaturated soil zone above groundwater.

[1. Tracking Post-harvest Soil Nitrate in Agricultural fields in the Hullcar Valley \(2016 Final Report and 2017-2018 Progress Report\)](#)

The Study objectives were to: (1) Determine how many of the studied agricultural fields had elevated levels of post-harvest soil nitrate in the 0-90 cm layer of soil in 2016 and 2017, (2) Determine how Post Harvest Nitrate Test (PHNT) levels compared between 2016 and 2017 in the studied fields, and (3) Determine if nitrate leached through the soil (0-90 cm depth) between fall and spring in the area overlying Aquifer 103.

Three methods were utilized for this study: (1-2) 39 fields were sampled in fall of both 2016 and 2017 at the 0-30, 30-60, and 60-90 cm depths to test and compare post-harvest soil nitrate. (3) Soil nitrate concentration was monitored at several points in time, at multiple sites of varying soil type, over the non-growing season when crops were dormant (fall to spring).

The 2016 study results showed, most fields (55%) had less than 100 kg N ha⁻¹ PHNT (0-90 cm sample depth), the proposed threshold for 'high PHNT'. More fields had a medium PHNT rating (50-99 kg N ha⁻¹) than any other rating, and three of 40 fields had a very high PHNT rating (more than 200 kg N ha⁻¹). In 2017, most (87%) of the 39 fields had less than 100 kg N ha⁻¹ PHNT (0-90 cm soil layer) in 2017. More fields had a low PHNT rating (less than 50 kg N ha⁻¹) than any other rating. Only 13% of the fields, representing 64 ha of the 776-ha study area, had greater than 100 kg N ha⁻¹. In the benchmark study, changes in soil nitrate concentrations indicated that post-harvest soil nitrate leached from the top, 0-30 cm layer during a non-growing season. Nitrate did not leach below the root zone (top 60 cm) over the 2016/17 non-growing season. In contrast, nitrate leached deeper over the 2017/18 non-growing season, below the 90 cm layer in coarse-textured soils, due to weather conditions that favoured greater infiltration of snowmelt in 2017/18 than in 2016/17 or in most years (unpublished data).

Overall, PHNT levels were lower in 2017 than in 2016 and the results suggest that producers improved crop nitrogen management practices in 2017 in most fields compared to 2016. Post-harvest soil nitrate was leached from the soil root zone over some but not all non-growing seasons.

[2. Comprehensive Monitoring Program and Environmental Impact Assessment for H.S. Jansen & Sons Farms Ltd., Grace-Mar Farms Ltd., and a Feedlot owned by Ken and Brenda Regehr](#)

- [2017-Feb-27 Environmental Impact Assessment \(EIA\) - Jansen \(PDF, 47 MB\)](#)
- [2017-Feb-27 Environmental Impact Assessment - Grace-Mar \(PDF, 18.2 MB\)](#)
- [2016-Dec-23 Environmental Impact Study - KRegehr \(PDF, 19.8 MB\)](#)

The objective for each of the three environmental impact studies was to use deep soil sampling to determine whether the existing agricultural operations in the Study Area were having an adverse effect on Hullcar Aquifer 103 and connected surface water by increasing the concentrations of nitrate-N and other nitrogen compounds to levels that are a hazard to human health.

Deep soil samples, taken from the soil surface down to groundwater (which ranged from 4 to 12 m below the soil surface) at 60 cm intervals, were used to determine the impacts of previous manure applications and management on nitrate movement to groundwater at two farms (H.S. Jansen & Sons Farms Ltd. and Grace-Mar Farms Ltd.). An environmental impact assessment was done at a third operation (Regehr Feedlot) but deep soil sampling was not reported for this operation.

At H.S. Jansen & Sons Farms Ltd., soil nitrate and ammonium at the 0.3 to 12 m depth was 386 kg nitrate-N ha⁻¹ and 233 kg ammonium-N ha⁻¹, respectively, in one field. The soil in another field at the 0.75 to 10.7 m depth had 300 kg nitrate-N ha⁻¹ and 330 kg ammonium-N ha⁻¹. The amount of time necessary for nitrate-N and ammonium-N to travel to these depths within the soil profile was estimated to be from a few years to several decades. Soil nitrate levels were elevated in some parts of Grace-Mar Farms Ltd. (143 kg nitrate-N ha⁻¹ at one location), but deep soil sampling and soil sampling near the soil surface indicated that manure application was balanced with crop N removal.

Overall, the distribution of nitrate in the unsaturated zone (between the root zone and groundwater) describes over-application of nitrogen in some areas before 2016, and this nitrate will eventually migrate to the water table.

[3. 2017 Golder Report – Integrated Monitoring Study](#)

This 2017 report, commissioned by the Ministry of Environment and Climate Change Strategy, is the most comprehensive hydrogeological report done in the Hullcar valley, pulling together available groundwater, surface water, and soil quality data. To evaluate soil quality six boreholes in the east-central portion of the Hullcar valley study area were drilled for the purpose of installing monitoring wells and collecting deep soil samples for nitrate and ammonium analysis. Groundwater and surface water samples were also taken for nitrogen analysis.

The report concluded ammonium and/or nitrate concentrations in soils from the six boreholes were generally highest within the top 0.9 to 1.5 m depth, and decreased to below detection limits in the bottom approximate 2 m of the soil profile. The exception was the nitrate concentrations in soils at “MW16-03,” located north of Schubert Road and immediately west of Deep Creek, and within a depression historically utilized as a collector basin for runoff from the Regehr Feedlot. At this location, nitrate concentrations were high within the top 0.3 m (22.8 mg/kg), and ranged from 3 to 4 mg/kg between 0.3 to 2.9 m depth. Stable isotopic analysis confirmed that the nitrate originated as animal manure.

Appendix 3: Table Summarizing the Cross-Jurisdictional Responsibilities for Source Water Protection and Drinking Water Supply Systems

Roles and Accountabilities of agencies for source water protection		
Ministry	Activity	Legislation
Ministry of Environment and Climate Change Strategy	Source Water Quality/Quantity Protection <ul style="list-style-type: none"> • Management of industrial activities and permitted waste discharges to watershed: <ul style="list-style-type: none"> - Agriculture waste, pesticides, municipal wastewater, organic matter recycling, biosolids, landfills, pulp and paper, contaminated soil treatment, gravel pits, oil and gas processing, mining, and metal processing. • Ambient water quality objectives for the protection of human health. • Soil quality objectives for the protection of human health – contaminated sites. • Area-based planning, regulations • Water policy (legislation, regulations, operational) • Groundwater well/aquifer protection 	<i>Environmental Management Act</i> Municipal Wastewater Regulation Organic Matter Recycling Regulation Agricultural Waste Control Regulation Contaminated Sites Regulation Hazardous Waste Regulation <i>Integrated Pest Management Act</i> <i>Water Sustainability Act</i> <i>Water Protection Act</i> <i>Park Act</i>
Ministry of Forests, Lands, Natural Resource Operations and Rural Development	<ul style="list-style-type: none"> • Forestry and logging watershed protection - runoff, roads, deforestation, turbidity and pathogens • Designates “community watersheds” • Riparian (stream edge) protection • Sets objectives and monitors ambient surface water and groundwater quality (with ENV). • Approve the design, construction of new dikes, and change of existing dikes for flood control and water storage. • Licenses non-domestic groundwater use • Supports community well head protection plans • Monitors the management of flood protection works by local diking authorities. • Compliance programs to address 	<i>Forest and Range Practices Act</i> and <i>Government Actions Regulation</i> <i>Ditch and Dikes Act</i> , <i>Dike Maintenance Act</i> <i>Water Protection Act</i> <i>Water Sustainability Act</i>

Roles and Accountabilities of agencies for source water protection		
Ministry	Activity	Legislation
	<p>critical dike safety issues.</p> <ul style="list-style-type: none"> • Cumulative effects policy • Land use planning • Bulk water removal and rights. • Authorizing water use and making changes in and about a stream (operations) • Water program operations 	
Ministry of Agriculture	<p>Advice and Education</p> <ul style="list-style-type: none"> • Provide advice to producers on groundwater well and land management to protect water quality. • Issues management related to water contamination or potential contamination (e.g., assisting in educating farms over the Abbotsford Sumas aquifer on practices to reduce potential impacts of nitrate and pathogen contamination). • If a spill was associated with agriculture operation or was to impact an agricultural operation, would be involved as a sister agency in the emergency response and recovery. <p>Regulatory</p> <ul style="list-style-type: none"> • Disposition of provincial Crown Land through sale, lease, right of way, license or occupation – deals with activities that can impact watersheds 	<i>Land Act</i>
<p>Ministry of Health (Policy role)</p> <p>Health Authorities (Operations and Compliance)</p>	<p>Source Water Quality Protection</p> <ul style="list-style-type: none"> • Onsite sewage design standards. • Point source contamination setback from water wells. • Standards for treating drinking water for pathogens in surface and groundwater. • Guidelines for drinking water quality from chemical, physical or microbiological contamination • Issue warnings regarding beach water quality hazard to swimmers (municipal role too). 	<p><i>Public Health Act</i> Health Hazards Regulation Sewerage System Regulation</p> <p><i>Drinking Water Protection Act</i></p>

Roles and Accountabilities of agencies for source water protection		
Ministry	Activity	Legislation
	<p>Compliance and Enforcement</p> <ul style="list-style-type: none"> • Water supply system permits • Prohibition against contaminating a drinking water source. • Boil Water Notices and Do Not Consume Advisories. • Drinking Water Protection Plans. • Landlords to provide tenants with potable water. <p>Monitoring</p> <ul style="list-style-type: none"> • Water system monitored by water supplier (at intake and in distribution). • Property owner responsible if issues related to building plumbing system (e.g., lead pipe). 	
<p>Oil and Gas Commission (operations role) and Ministry of Energy, Mines and Petroleum Resources (policy role)</p>	<p>Source Water Quality/Quantity Protection, Compliance and Enforcement</p> <ul style="list-style-type: none"> • Management of oil and gas drilling waste, drilling fluids and produced water. • Production and disposal well casing requirements to protect drinking water aquifers. • Setbacks from drinking water wells. • Water withdrawals licensing. • Handling of fracking chemicals. • Remediation and restoration. 	<p><i>The Oil and Gas Activities Act (OGAA)</i></p> <p>Oil and Gas Environmental Protection Regulation</p> <p>Drilling and Production Regulation</p>
<p>Ministry of Energy, Mines and Petroleum Resources (EMPR) and Federal Government</p>	<ul style="list-style-type: none"> • Mining and managing runoff and effluent: chemical waste discharges; selenium, arsenic, etc. 	<p><i>Mines Act, Health, Safety and Reclamation Code for Mines in British Columbia</i></p>
<p>British Columbia Utilities Commission regulates BC Hydro (BC Hydro reports to EMPR)</p>	<ul style="list-style-type: none"> • Hydro Dams, reservoirs, river levels, flooding – potential mercury contamination in fish as a result of land flood. 	<p><i>Water Act</i> <i>BC Energy Act</i> <i>Hydro and Power Authority Act</i></p> <p><i>Utilities Commission Act</i></p>
<p>Ministry of Transportation and Infrastructure</p>	<ul style="list-style-type: none"> • Development/Housing: subdivision regulation in unincorporated areas, including water services and receiving environment for sewage. • Transportation/Highways – road runoff, catch basins, drainage, erosion control. 	<p>Subdivision Regulation, <i>Public Works Agreement Act</i> <i>Transportation Act</i> <i>Transport of Dangerous Goods Act</i></p>

Roles and Accountabilities of agencies for source water protection		
Ministry	Activity	Legislation
	<ul style="list-style-type: none"> Response to transportation spills. 	
Ministry of Transportation and Infrastructure, and Ministry of Municipal Affairs and Housing	<ul style="list-style-type: none"> Development/Housing: subdivision regulation in incorporated areas, water and sewage services. 	<i>Local Government Act</i> <i>Community Charter</i>
Environmental Assessment Office (facilitation) Ministry of Environment and Climate Change Strategy (regulatory decision)	<ul style="list-style-type: none"> Environmental assessments of large industrial projects – risk management proposals for managing impacts to human health from changes in water quality. 	<i>Environmental Assessment Act</i>
Ministry of Energy, Mines and Petroleum Resources	<ul style="list-style-type: none"> Protects and reclaims the land and watercourses affected by mining. Monitors mining activity, aiming minimum environmental disturbance, taking into account sound engineering practice and prevailing economic conditions. 	<i>Mines Act</i> , <i>Health, Safety and Reclamation Code for Mines in British Columbia</i>

Roles and Accountabilities of other agencies for <u>drinking water supply systems</u>	
Ministry	Role/Accountabilities
Ministry of Health	<p>Develops policy, legislation, and guidelines for public health risk management in collaboration with government partners, stakeholders, local government and the public. This includes:</p> <ul style="list-style-type: none"> <i>Drinking Water Protection Act</i> Drinking Water Protection Regulation <i>Public Health Act</i> Sewerage System Regulation Health Hazards Regulation
Provincial Health Officer	Oversight and accountability role under the <i>Drinking Water Protection Act</i> . The PHO can review decisions by DWOs and prepares an annual report on the status of drinking water in B.C.
Ministry of Forests, Lands, Natural Resource Operations and Rural Development	<p>Regulates privately operated water systems that service five or more persons or a corporation under the <i>Water Utility Act</i>.</p> <p>Operators are subject to the same duties, responsibilities and restraints that are imposed on a public utility under the <i>Utilities Commission Act</i>.</p> <p>Regulates authorizations under the <i>Water Sustainability Act</i>, including for waterworks water use purpose.</p>
Ministry of Municipal Affairs and Housing	Oversees the local government financial and governance systems and supports local government infrastructure through the administration of capital funding programs. Responsible for the <i>Local Government Act</i> and the <i>Community Charter</i> .

Roles and Accountabilities of other agencies for <u>drinking water supply systems</u>	
Ministry	Role/Accountabilities
	Responsible for subdivision regulation and land use "zoning".
Health Authority	<p>BC's health authorities are responsible for administering the <i>Drinking Water Protection Act</i>.</p> <p>Drinking Water Officers have legislated authority to issue hazard abatement orders to protect drinking water sources if a potential health hazard is identified.</p>
First Nations Health Authority	<p>FNHA supports access to safe drinking water by working in partnership with Indigenous communities. Environmental Health Officers (EHOs) work directly with communities to inspect drinking water systems, test drinking water to ensure it meets the Guidelines for Canadian Drinking Water Quality, interpretation and communication of drinking water quality results, provide guidance and recommendations about drinking water safety issues, such as drinking water advisories, review plans for improvements to systems, awareness and education on safe drinking water practices and risk prevention, and investigate waterborne illnesses.</p> <p>FNHA also provides funding and technical support to communities for community-based drinking water monitoring programs.</p>
Department of Indigenous Services Canada	<p>DISC provides regular operation and maintenance funding to communities yearly for their community systems and regular (every three years) inspections that are carried out to identify and fix system deficiencies.</p> <p>DISC also offers support through various avenues for Indigenous community drinking water systems (those with five homes or more connected to a single system), including:</p> <ul style="list-style-type: none"> • Circuit Rider Training Program - where an experienced operator can go in to assist the First Nations operator in operating or maintaining their system, if the issue that caused the advisory is operational in nature; • The Safe Water Operations Program, where we can make minor capital investments to fix a community system if small upgrades/installations are needed; or • The regular capital program where a larger investment may be needed to upgrade a community water system. This would then generally require feasibility and design work as the investments would be complex and would require a longer period of time to implement.
Well Drillers and Pump Installers	Well drillers and pump installers must be qualified under the <i>WSA</i> . The Groundwater Protection Regulation outlines requirements for the safe installation and closure of a well prevention of groundwater contamination.
Water Supplier	<p>Water suppliers are responsible for providing safe drinking water, meeting legislative requirements and notifying the public and health authorities about water quality problems or the potential for health risk.</p> <p>These operators may be local governments, private utilities, corporations, societies, co-operative associations and other forms of organization.</p>
Environmental	The Environmental Operators Certification Program (EOCP) has established

Roles and Accountabilities of other agencies for <u>drinking water supply systems</u>	
Ministry	Role/Accountabilities
Operators Certification Program	classification systems for water and waste water systems, as well as standards and processes for certifying system operators.
Single-family Residences	A single-family residence on its own water supply system is exempt from most of the requirements of the <i>Drinking Water Protection Act</i> (e.g., construction and operating permits). It does, however, benefit from the parts of the act related to threats to drinking water and source water protection. Property owners are responsible for the safety of the water out of their taps, but are not empowered to protect their water sources unless they own the land or are responsible for activities on that land.

Appendix 3: Summary of Policy and Planning Tools under the *Drinking Water Protection Act, Water Sustainability Act and Environmental Management Act*

The following is an overview of the various policy tools which may be applicable to manage resources in Hullcar valley.

Drinking Water Protection Plan - *Drinking Water Protection Act*

A DWPP under the DWPA can only be initiated by the Minister of Health upon recommendation by the PHO. The PHO may only make this recommendation if satisfied that a DWPP will address or prevent a threat that may result in a drinking water hazard and when there are no other practicable measures available under the DWPA sufficient to address or prevent a drinking water health hazard. The local Drinking Water Officer (DWO) does not have the authority to initiate a DWPP, but could request the PHO consider that decision. The government responses employed for the Hullcar situation include a number of other regulatory measures (EMA Orders and DWPA Orders) to address the health hazards. Thus far, these regulatory measures are practicable to address or prevent health hazards arising in this case.

Water Sustainability Plan – *Water Sustainability Act*

Water Sustainability Planning (WSP), under the WSA, focuses on managing crown land, private land and water within a watershed. Implementation can be voluntary or by regulation. A WSP is a tool that can be scalable to respond to the scope of an issue or the area of management needed. It enables a planning framework that supports planning leadership outside the provincial government and among First Nations and communities, and it is supported by a suite of regulation-making powers that can influence how land and water are managed. The broader range of WSA regulation making authorities can also be used in plan implementation. As a result, development of a WSP could result in establishing water objectives or an alternative form of governance (e.g., an advisory board or change in decision making model could result). The opportunity for those in a plan area who may be potentially affected by the plan outcome to engage in the plan's development is a key element of WSPs.

Water Objectives – *Water Sustainability Act*

Water objectives for water quality, water quantity and aquatic ecosystems are intended to align with government's Cumulative Effects Framework and Environmental Mitigation Policy. Broad provincial-level objectives as well as specific watershed-level objectives can help provide strategic and operational guidance for decision makers on managing water and aquatic ecosystems consistently across the natural resource sector and through local government planning. While primarily focused on crown land, there can be limited application of water objectives to private land where statutory decisions are being made (e.g. water allocation decisions under the WSA). For water objectives to be most effective, linking them to the issuance of a permit or authorization with appropriate terms and conditions is needed. Where this does not exist, voluntary compliance could be sought.

Water objectives could also be developed as part of a WSP. In this case, the additional planning-related regulation making authorities may be used to help apply water objectives to any land and/or in cases where no statutory decisions are being made. Further, water objectives could be a bridging tool while a

WSP is under development (i.e., a water objective is set as a short-term measure to help manage water. The water objective may be repealed when the plan is implemented if appropriate).

Advisory Boards– *Water Sustainability Act*

Advisory Boards are established by the FLNR minister and can be used as a formal tool to gain advice on any matter under the WSA including establishing water objectives; methods for determining environmental flow needs or critical environmental flow thresholds; standards and best practices in respect of the diversion and use of water; standards and best practices in respect of activities in relation to wells and groundwater protection; standards and best practices in respect of activities in relation to artesian flow, methods for estimating amounts of water diverted or used; or any other matter under the WSA. A key opportunity is the formal recognition by statute to engage First Nations and other governments as well as stakeholders on issues such as the development of water objectives, water sustainability planning and watershed governance.

Area Based Regulations– *Water Sustainability Act*

The WSA offers the opportunity to create area-based regulations. The diverse regulation-making powers of the WSA provide government with the ability to customize solutions for watersheds in response to regional or watershed-level issues. These regulation-making authorities encompass the planning provisions but also apply to the broad regulation making authorities under the WSA (e.g., restrictions on groundwater diversion and use, closing a basin to types of water use, measuring and reporting water use).

Delegate Decisions– *Water Sustainability Act*

The WSA also provides the authority to confer or delegate decisions of the comptroller, water manager, engineer or officer via regulation to another person or entity. This authority could be complementary to other non-statutory roles and responsibilities a local governance entity such as water board could assume, such as monitoring or out-reach and education. It should be noted that the WSA does not provide authority for the ‘corporate structure’ of a water board (e.g., how the entity functions as an organization). This can be found under other statutes such as the *Societies Act*.

The provisions under the WSA continue to be implemented by regulation and policy. It would be premature to create another enactment (*Watershed Authorities Act*) which may duplicate the statutory authorities provided under the WSA and other statutes. Guidance and policy on the uses of the above tools and how these programs will unfold is forthcoming. WSPs enable linking land-water interactions and provide a number of regulation making authorities that can help manage and influence land practices. Further, water objectives can be a form of ‘planning light’ where shared goals within a watershed are supported by one or more objectives related to water quality, water quantity and aquatic ecosystems. A pilot in the Nicola watershed has been initiated with the Nicola Bands to inform policy and regulation development, potentially related to these tools.

Area Based Management Plan – *Environmental Management Act*

The Minister of Environment and Climate Change Strategy is the only party that can only order development and approval of an ABMP. The Minister may designate an area for the purposes of environmental protection; establish the party responsible for preparation of the plan; require a

technical advisory committee; and establishment of terms of reference for the plan. The terms of reference must consider the impact of point and non-point source of waste, cumulative impact of the wastes, environmental management objectives and outcomes for the designated area, and ongoing monitoring and reporting. The Minister may order that the ABMP be considered when making statutory decisions under the EMA. In Hullcar valley, the predominant industry is agriculture. Agricultural producers are required to abide by the Agriculture Waste Control Regulation (AWCR) which is a results-based regulation where if the producers follow the requirements of the regulation they are in compliance with the law. If an ABMP were to be developed, it would require the cooperation and participation of the Hullcar Community and the ABMP could only be enforced when incorporated into statutory decisions.

Water Quality Guidelines and Objective – Environmental Management Act

ENV can protect ambient water quality as it relates to human health by setting water quality guidelines/objectives for human contact in receiving waters. Water quality guidelines are province-wide in application, and are developed for the following water uses: source drinking water; aquatic life and wildlife; agriculture (livestock and irrigation); recreation and aesthetic; and industrial (water supplies). Guidelines for the protection of drinking water from Health Canada are used to assess potential impacts on drinking water sources. Water quality objectives are also a science-based tool that can be utilized on a site-specific scale to establish an acceptable level for a water quality variable at a specific location (i.e., Deep Creek). Both water quality guidelines and water quality objectives are used in permitting under the EMA.

Provincial Cumulative Effects Framework

Provincial Cumulative Effects Framework³⁷ measures the effects of natural resource activities and natural disturbances on values that are important to the people of BC. Values are the things that the people and government of BC care about and see as important for assuring the integrity and well-being of the province's people and communities, economies and ecological systems, as defined in policy, legislation or agreements with First Nations.

There are five initial values that have been selected for the cumulative effects framework: aquatic ecosystems, forest biodiversity, grizzly bear, moose and old growth forest. Standard value assessment protocols have been developed for each of these five values to define consistent methods for assessing and reporting on their estimated condition and trend across the province. Results from these assessments are intended to inform strategic decision making, and may also provide relevant context for operational decision making.

The Aquatic Ecosystems value provides a framework for assessing drinking water as one of many nested values, but no specific assessment on drinking water is currently performed under this protocol. The Aquatic Ecosystems value provides a high-level snapshot of the estimated condition of watersheds but does not specifically indicate the state of drinking water. To assess drinking water under the Aquatic Ecosystems value, additional value-specific indicators will require development and specific information

³⁷ Government of British Columbia. (no date). *Cumulative Effects Framework*. Retrieved from <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/cumulative-effects-framework>

will be required to confirm the estimated or actual condition of drinking water (e.g., location of aquifers, location of actively managed agricultural lands, water quality monitoring data).

Land Use Planning

The current government is committed to [modernizing land use planning](#)³⁸ in BC. FLNR has a mandate to “...[w]ork with the Minister of Indigenous Relations, First Nations and communities to modernize land-use planning and sustainably manage BC’s ecosystems, rivers, lakes, watersheds, forests and old growth.” This work is currently in its early stages and will likely entail a variety of plan types and opportunities.

Water System Risk Management Plans for Water and Wastewater

Work is underway with ENV, HLTH, and MAH to develop an approach for Water System Risk Management Plans (WSRMPs) for drinking water and wastewater systems. WSRMPs are a risk review process conducted by a water supplier or local government and are intended to facilitate best management of drinking water, wastewater and the watershed through the lens of the system as a whole – from watershed to tap, and sink to watershed. A WSRMP is undertaken through a collective effort of local, responsible individuals to achieve improved public health and safety, best infrastructure management and environmental protection. This work involves facilitated relationships and a “dialogue on water” between water professionals and owners, regulators, Ministries, water users and the public. This work is in the preliminary stages, but could be helpful in pro-actively addressing the coordination of source water protection among communities and government.

There are many other government agencies at a local, provincial or federal level that have a role in minimizing potential impacts to watersheds through land use and resource development legislation, policy and best practices that govern the activities and industries they regulate. In addition, actions by the regulated industries and other parties, down to individual property owners, can all play a role in source water protection.

³⁸ <https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/land-use/land-use-plans-objectives>

Appendix 4: Concept – Proposed Hullcar Valley Advisory Board

Overview

The Hullcar Aquifer Response Plan identifies several actions to be undertaken to address the issues of increasing nitrates in Hullcar aquifer. One action is to establish an Advisory Board to help address identified aquifer issues. Such an approach could:

- Include governments, rights holders, and stakeholders for source water protection and governance within the Hullcar valley;
- Support identification of the goals and outcomes for the aquifer, the priority problems to be addressed, and the tools available and the specific actions to address the problems; and
- Provide an opportunity to collaboratively explore different governance structures and models of decision making.

Proposed approach

Guided by the existing MOU with Splantsin and Minister of the Environment and Climate Change Strategy, the Steering Committee serves as the government to government executive for discussion of the Hullcar aquifer goals, priority problems, tools available and the resulting actions needed. The model is for the Steering Committee, which is co-led by Splantsin and ENV, to engage the appropriate governments, rights holders, stakeholders, among others to form an Advisory Board. The Advisory Board could report to the Steering Committee and be supported by an ongoing resource team of individual experts (e.g. Hullcar Technical Working Group). Working, technical and other groups could be established as needed and report to the Advisory Board. Existing groups working in the Hullcar valley could assume a role to help ensure work in the valley is coordinated and aligned with the stated goals of the Advisory Board.

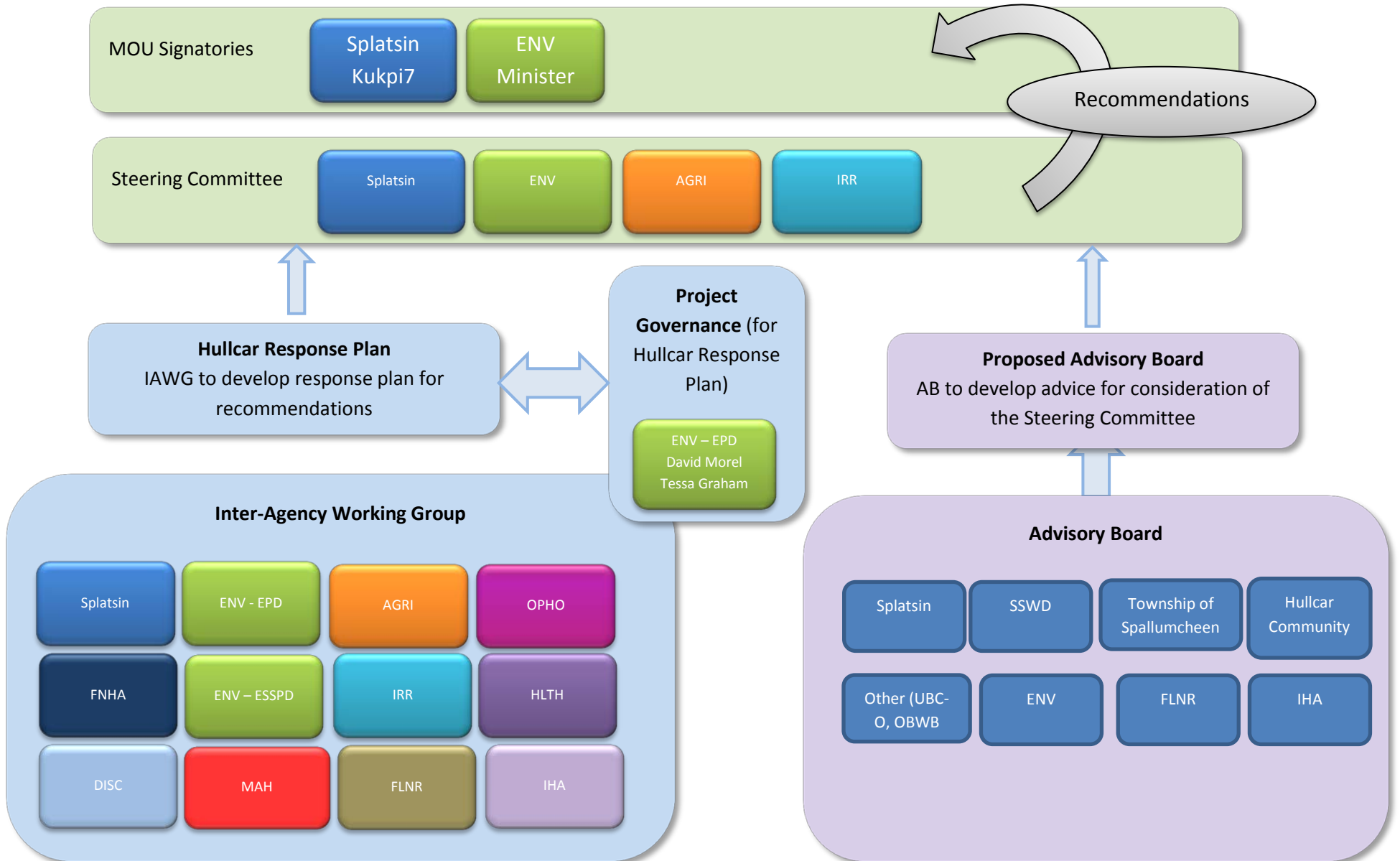
A general governance structure is included on the following page. The roles and responsibilities of the Advisory Board members will be confirmed through development of a Terms of Reference.

Phase implementation

To support this approach, work by the Steering Committee could be undertaken in three general phases:

- i. **Scoping** – An initial scoping phase to confirm governance approach ensuring alignment with the Steering Committee Work plan, etc., could be undertaken. Continued communications with communities, local governments, stakeholders and others would be important.
- ii. **Determining governance, outreach and priorities** – A second phase could establish the governance structure and membership of the advisory board. The Advisory Board could then begin to identify goals and objectives, priorities, tools, projects and approaches to implementation. While much work has already been completed on problems (including the POLIS report), an aquifer characterization could be undertaken to bring the current state of knowledge together and to identify any gaps and needs. Communications could be ongoing more broadly.
- iii. **Implementing projects** – Under a third phase, specific projects could be undertaken that address key water management issues, exploration of the use of relevant WSA tools, and development of monitoring and reporting programs. Communications would continue to be ongoing.

Overview of Hullcar MOU Governance Model with Proposed Advisory Board



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