



a place of mind

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Water Sustainability Act,
Ministry of Environment,
Water Protection and Sustainability Branch,
PO Box 9362 Stn Prov Gov,
Victoria BC, V8W 9M2.

November 15, 2013

RE: Proposal for Water Sustainability Act

To Whom It May Concern,

I am writing to provide feedback regarding “A Water Act Sustainability Act for BC: Legislative Proposal” dated October 2013. As a hydrogeologist, I am pleased to see the integration of all water under a single licensing scheme and am supportive of the overall efforts to modernize our water governance. I would like to commend all of those involved for their hard work in moving the proposal to this stage. I

I am pleased to have an opportunity to provide feedback on this proposed legislation and think this legislation will represent a large step forward for water stewardship in B.C. I am supportive of many of the provisions. The introduction of Water Objectives, area based regulations and Water Sustainability Plans will provide mechanisms for providing a graduated scale of water management. I am glad to see groundwater licensing, the collection of important geological data via mandatory well log reporting, and the reporting of water use by both surface water and groundwater users. These data are essential for the groundwater and surface water assessments that will be needed for joint water management.

As indicated above, I am supportive of many of the aspects of the proposal. I have provided some commentary and feedback below on issues I feel may need further consideration in the hopes of contributing to the efforts to improve water stewardship in B.C. I first address some broader issues relating to the implementation of the act, then

address individual technical points in the order, and under the titles, presented in the proposal.

Investment in Water as Investment in the Province

Water within the province can be seen as part of our province's environmental, social and economic infrastructure and food water stewardship benefits all aspects of our province. There is an underlying suggestion in the proposal that any new water management framework must also result in a revenue stream that fully finances all water stewardship operations. This may be a misplaced emphasis if the pressure it places on water managers to recover fees limits opportunities for success across broader provincial and local government objectives. The majority of shared civil infrastructure, such as roads, is considered an investment with payback in broader provincial success. Good water stewardship and well-managed water resources should also be considered an investment in our overall environmental, societal and economic infrastructure. Those managing water issues for the province should not be solely held accountable to a direct budget line item representing user fees generated, but should be motivated by, and recognized for, the wider economic and social benefits their component of good stewardship realizes as part of a wider provincial success strategy.

A focus on user fees within certain sectors of the overall provincial water stewardship framework may also lead to conflicting actions between different parts of the provincial government with different mandates, or with different levels of government, resulting in generation of pennies that ultimately hamper dollars. For example, recent provincial decisions in the Okanagan have resulted in the granting of long term land leases beside water reservoirs, including the 're-licensing' of water contained within those reservoirs. This land use and licensing decision does generate fee or lease recoveries, but has caused difficulty for those formulating regional scale water budgets, water treatment plans, drought plans, regional growth strategies, and investing in water infrastructure, all of which may have larger economic implications than the fees or rents collected in the short term.

Implementation and Staffing

The province will need to hire appropriate numbers of qualified and experienced staff to oversee the implementation of the new act. The current legislative framework for managing water in British Columbia is complicated, as the overview in Figure 3 of the proposal indicates. Multiple acts managed by multiple ministries currently provide the regulatory framework for water in this province. My experience has been that the level of staffing is currently insufficient to effectively manage the existing framework and plan for our province's future, and would therefore certainly be insufficient for overseeing the proposed changes. The implementation of watershed scale water resource estimates for joint licensing of surface water and groundwater will require provincial staff with appropriate expertise to conduct these assessments, or experienced staff to oversee the contracting out and review of these requirements. I have noticed a significant decline of

the provincial resources committed to water stewardship over the last eight years in a manner that has begun to hinder the success of the province on the larger scale. I my work there are projects I can no longer undertake, and results of past projects which remain underutilized, due to a lack of provincial staffing.

Managing water in an integrated manner under the new act will require expanded staffing levels, but also staff with the right high-level expertise and experience specific to both surface water and ground water. In particular, the coming few years will be a critical period of re-assessing watershed scale resources, and for the first time, considering groundwater as part of those resources. It would be unwise to simply reassign staff from other parts of the provincial government who do not have specific training and experience in groundwater as this may lead to poorly defined water resource estimates at the start of groundwater licensing that could lead to difficulties for the province in later years.

The implementation of the new act should also be accompanied by an effort to improve communication between different provincial ministries, between staff within ministries, and between the province and other water stewardship stakeholders. It has been my experience that the different provincial acts, and the different roles related water stewardship at the provincial level, such as water quantity, water quality, inspection, enforcement, ecosystem issues, agricultural management, range management and forestry, are currently managed by multiple provincial ministries. The ministry staff find their roles changed regularly, and this complicates communications by breaking down communication channels. I am aware of several ongoing water quality issues remaining unresolved primarily due to do difficulties in coordinating mandates and coordinating the requirements of conflicting acts, particularly as provincial staff struggle with limited resources, staffing changes and organizational change. Better information sharing, greater clarity of roles, and stability of staffing would help ensure inter-stakeholder communications are effective.

Comments Organized by Legislative Sections:

Section 1 General: Water Use Purposes

The re-definition of “mineral trading” to include “..water of a temperature that gives it commercial value” is proposed to be redefined, and will need to be redefined carefully. The advent of medium temperature geothermal, and low temperature geoexchange means that any water is potentially of “commercial value”.

I am not a geothermal expert, but my understanding is that considerable potential economic benefit may be derived from medium temperature geothermal development. I have seen presentations by Dr. Stephen Grasby of the Geological Survey of Canada, and others, who have done considerable work in this area. My recollection is that this potential economic benefit is particularly realizable in regions of oil and gas activity where It may be possible to re-purpose uneconomic or expended oil and gas wells for geothermal

development. It is my understanding from seeing discussions by Dr. Grasby and others is that part of the reason this potentially economically important energy source for Canada is not being developed at the present is due to a lack of regulatory clarity over water rights and tenures. There are suggestions in later parts of the proposed act that certain water uses relating to oil and gas activities may be exempted from certain part of water licensing. Careful consideration should be given as to whether providing for universal licensing and hence greater certainty of water rights might actually benefit both the industry and the province by facilitating investment and hence economic reward in geothermal development.

I suggest consultations with Dr. Grasby and others working in this area to determine if some provision for this ought to be included in the act modernization, or at least, whether a placeholder should be left to allow for future regulations.

Section 1: Regulation of Surface Water

As surface water and groundwater come under one joint licensing scheme, there are likely to be more cases of surface water and groundwater interactions that are purposeful and require coordinated licensing to succeed. Currently, groundwater may be extracted adjacent to a stream without license restrictions; there are myriad implications if the extraction results in changes to the surface water flow or has impacts on fisheries or habitat, but overall, the exact regulatory implications are perhaps not clear. It is therefore currently unlikely that a water user would invest in pumping groundwater adjacent to a stream as a purposeful strategy due to this regulatory uncertainty and hence investment uncertainty.

Under the new legislation, where all water will be licensed, there may be ways of introducing legal certainty for joint water management schemes such as induced recharge or bank filtration. In this, a water intake may be moved from surface water to extract groundwater adjacent to a stream as a means to provide natural filtration of the surface water prior to its further treatment and use. The benefits afforded by this natural filtration may make for significant differences in water treatment plant capital costs, borrowing costs and operating costs, and also reduce risk to human health. A new scheme of this sort might require licenses for upstream storage so as to release water to surface water during low flows, and licenses to recover the released volume by extraction of groundwater. The new regulatory framework should allow for such uses, where a surface water volume supported by storage (or not) can be purposefully drawn into a licensed groundwater extraction.

Further discussions of these types of integrated licensing arrangements, the conversion of licenses between surface water or groundwater extraction points, mechanisms for environmental assessment of these schemes, and how the mechanism of First in Time

First in Right relates to this, are included in the comments below relating to Section 4 Regulate and protect groundwater extraction and use.

Section 2: Protect Stream Health and Aquatic Environments: Environmental Flow Needs

The current legislative proposal refers to “Environmental Flow Needs” which suggests that the quantity of water flowing within a surface water body is the sole determining factor for environmental health and ecosystem sustainability. I suggest that this term be changed to “Environmental Water Needs” to more formally recognize the integration of groundwater and surface water together in a joint licensing framework. Other water-related parameters may be just as important in a jointly regulated framework such as lake water temperature, groundwater table depth in wetlands or riparian zones, locations of groundwater discharge relating to salmonid spawning site selection. Having only one regulated parameter for the specification of environmental needs, flow rate, may lead to more conservative and less adaptive flow requirements and therefore less adaptive licensing options.

The volume of flow within surface water is often used as a measure of overall water availability, but also as a proxy other environmental water needs such as water velocity, water depth, and other surface water environmental needs such as water quality or temperature. As our understanding of eco-hydrology, climate change and environmental water needs evolves, future regulations may need to govern other aspects of the integrated surface water groundwater system such as locations and volumes of groundwater discharge or recharge, water table elevations, or stream temperatures. Being able to directly specify other parameters such as stream temperature during parts of the year, instead of using flow rate as a proxy, may allow for more direct management of the essential environmental parameter and hence open up other creative management options by watershed users in order to meet the true environmental needs while maximizing water available for non-environmental purposes.

Parameters other than surface water flow volume are mentioned in the section on Water Objectives, but it is not clear how this relates to Environmental Flow Needs in Section 2. From the proposal, it appears that the EFN regulations would be “required”, whereas Water Objectives are spoken of more as “guides”. Similar clarity is needed on whether other parameters may be considered under area-based regulations or Water Sustainability Plans.

Section 3: Consider Water in Land Use Decisions

Water objectives appear to represent a flexible, adaptive and enforceable set of local priorities introduced by the province (CWR and RWM). It is not clear what criteria will be used to invoke Water Objectives within a watershed on top of any province-wide general water objectives. The proposal is also not clear on what the process will be for

stakeholders within a watershed to have input on provincially mandated Water Objectives, or to appeal the Water Objectives.

Water Sustainability Plans provide for a next level of complexity and consultation in their formulation. The proposal indicates they can be provincially initiated, or locally requested, with more details to follow on locally initiated plans. The process is outlined to be a broadly consultative and collaborative effort to generate a comprehensive water plan with participation of the maximum number of stakeholders. I look forward to more details on this important element of a graduated water stewardship policy.

Section 4 Regulate and Protect Groundwater Use

Cumulative Effects of Domestic Usage

The use of water for domestic purposes and for small scale irrigation has been given exemptions under certain conditions to some licensing requirements, but also a priority place in water usage in times of scarcity regardless of FITFIR. Some care should be given that these provisions do not encourage housing or other development that relies upon multiple individual domestic users securing their own water supplies in contrast to development of a larger community water provision scheme that would trigger a license consideration and be held to a FITFIR date. Generally, this may encourage less cost-efficient and harder to manage water delivery, result in larger numbers of wells and hence more potential for aquifer contamination if well maintenance is not looked after. There would potentially be a proliferation of domestic licenses, which are then given some enshrined preference over other water users in times of water crisis. There are provisions in Water Objectives and area based regulations to restrict this type of drilling, but clarity needs to be given as to when the number of domestic licenses might begin to represent an impediment to coordinated water planning and management. Perhaps a certain number of wells within a given surface area would be considered a 'well field' and trigger a FITFIR consideration, or automatically introduce area-based regulations. Those with long standing FITFIR groundwater rights should not have their water volume progressively eroded by land conversion and a proliferation of domestic licenses without some form of review.

Requirements to Obtain an Authorization

An approval, or perhaps a notification, should be required for all wells, including domestic wells, prior to drilling. A requirement for a pre-approval, or for a notification, would make sure the owner and province have had the opportunity to engage in discussion of the proposed well and well reporting requirements prior to well construction. It would ensure the proposing owner is aware of any Water Objectives, Water Sustainability Plans or area-based regulations in force at their location prior to incurring any expenditure. This would prevent home-owners investing in a well not permitted under existing water restrictions. It would raise their attention to resources available for assisting in well construction such as

the Wells Database or Water Resource Atlas, inform them as to likely well yields based on surrounding wells, overall ground conditions and would limit instances of drilling resulting in uncontrolled artesian conditions.

It is suggested that an application for an amount of groundwater in the desired license be made prior to construction of a groundwater well, with a mechanism for amendment of licensed volume upon well testing. Application for the license volume after construction would create severe pressure on decision makers to approve the tested or projected extraction rates on an already constructed well where the financial outlay was considerable. Pre-approval for a maximum rate, or range of rates, would also provide certainty for well drillers that the owner is aware of and has taken responsibility for the requirements to provide the province with well information and is aware of all the Objectives/Plans/Area regulation realities of water licensing prior to drilling. This would provide drillers with greater certainty in their work and some protection from owners subsequently unable to secure a license for the volume they wanted, or possibly, a license for any volume at all.

Conversion of Licenses

The current proposal aims to manage surface and groundwater as a single resource within a watershed and there should be provisions for being able to convert the point of uptake between surface water and groundwater. Creative solutions may be required to meet current and future water stewardship challenges, particularly in areas where water is likely already over-licensed. There is currently no mechanism indicated as to whether the holder of the license for a particular volume of water within a particular watershed may be permitted to convert the method of extraction from surface water to groundwater or vice versa. I

I propose that a conversion of extraction type should also include retention of the FITFIR priority. At present surface water licenses and groundwater licenses will be separate things. Surface licenses may be tied to location of intake, intake rate or timing of extraction and have a FITFIR date. Groundwater licenses would be similarly tied to a well location, depth and pumping rate. The proposal indicates that groundwater licenses will be granted similar priority rights to surface water, based upon investigations by the CWR or RWM into matters such as the date of construction of the well where reliably recorded or upon the date of application after the enactment of the new act. They will then be governed by a unified first-in time first in right system of priority. There are considerable potential economic and human health benefits to providing for conversion that would only be attractive if there was a mechanism whereby a license holder could retain their FITFIR priority.

An example cited for Section 2 above was that of the use of induced recharge for primary water filtration. In this case, a water purveyor may be the holder of a surface reservoir

license and may retain water in spring, release it during summer, then pump that surface water from the stream under another license. Extracting groundwater from adjacent to the stream, and inducing the reservoir released volume to infiltrate through the streambed to a groundwater well would provide primary filtration. A mechanism whereby the existing senior FITFIR surface water extraction license could be converted to a same date FITFIR seniority groundwater license on a new well would permit the water purveyor to realize considerable savings in water treatment cost. A license holder would be unlikely to pursue this option if the groundwater extraction was given a new FITFIR date.

A second example is improved management of the pumping of surface water directly from a stream by multiple holders of surface water licenses. The direct extraction of surface water has an immediate effect on water levels and flow rates within the stream. Where multiple irrigators or other surface water license holders extract directly from the same stream, poor coordination of the timing of extraction may result in short term critical low flows. The same volumes removed by well-timed, non-overlapping surface water extractions may have resulted in no harm, but coordination of surface water extraction between users may be very difficult. In contrast, pumping the same volumes from wells appropriately located in the adjacent aquifer may result in a delayed impact on streamflow, smoothing out the rate of removal of water from the stream between the multiple users and thus avoid critical low flows. Again, users would be unlikely to convert to this improved management option if it resulted in loss of FITFIR priority.

The conversion of a surface water extraction location to a groundwater extraction location, or vice versa, may require careful consideration of impacts on water quality, timing, habitat or other factors, but this type of conversion may be beneficial to overall watershed management, may permit more adaptable water licensing, provide better environmental water management, and allow opportunities for considerable economic savings. The mechanism for the conversion of licenses could be something within the regulations applicable to day to day management by the CWR or RWM, or this could be a process only evocable under area management or a Water Sustainability Plan. A user certain they could move their intake, but retain both the volume and FITFIR priority, could be able to make investment decisions with considerable benefit for them, and for the watershed.

Mechanisms for Well Replacement

The act should include explicit provisions for well replacement that retain FITFIR priority. Currently, surface water licenses are independent of the equipment used to remove the water, and regular maintenance or replacement of the actual pumping equipment at the end of its design life is simple. The drilling of a water well is much more location specific. It involves the installation of the well to a given depth, or distance from surface water, and this would presumably be reflected in the accompanying license. All wells have a lifespan and will need replacement at some future time.

There should be clarity in the act, or in regulations, over the continuation of the licensed FITFIR priority for a groundwater extraction license when the original well has reached its design life and a replacement well is drilled for the same aquifer and same use. There may need to be some sort of review process whereby a check can be made that drilling the replacement well at a slightly different location will not lead to an adverse affect on other users or licenses. This could be part of an authorization to drill, or some other mechanism. However, if there is no continuation of FITFIR priority from an existing well to a replacement well, it would provide considerable incentive for owners of failing wells to continue their use beyond a safe well life. This could potentially lead to adverse impacts from failing wells such as leaking casings, increased aquifer contamination, well collapses, or uncontrolled artesian flows.

Oil and Gas Sector Licensing

It appears that extraction of certain water for the Oil and Gas sector may not be subject to the same licensing and royalty payments as other sectors. I have no direct expertise regarding the use of water in oil and gas development and make no comment or judgment here on the activity itself. I do think it would be unwise to make any exemptions for water licensing and/or to eliminate water pricing for the oil and gas sector or for any other industrial sector. The total revenue to the province from the oil and gas sector is comprised of royalties derived from the gas or oil recovered itself, but also from any fees associated with permits to use water, or royalty on the volume of water actually used. These fees totaled together represent the total revenue to the province for every unit of oil or gas extracted. Similar revenue totals would exist for other industries who pay to extract resources, such as mining. If water use is excluded from charges, then there are no economic lever available to the province to optimize water use per unit oil/gas extracted and hence maximize overall economic benefit to the province.

At present, water may not be a limiting factor for growth in the oil and gas economic sector in a particular geographic area. In future, scarcity of water resources or inefficient use by existing water users may limit overall development and hence limit the total benefit and revenue to the province. Allowing total revenue recovery to be a variable mix of oil/gas royalty and water royalty, would enable using variable pricing of the water use component of the total revenue recovery model as a pricing tool to reward those industry partners who are more water efficient. This could potentially lead to higher total economic benefit or revenue for the province. This may be a legislative tool that is not needed now, and current water pricing could be set to be low, but it may be useful to provide the structure within the act as planning for the future. This means removing any licensing or pricing exemptions.

Deep Saline Water

Page 36 and Box 10 indicate that deep saline groundwater would be exempted from the requirements for licensing on the basis of "minimal hydraulic connection with shallower

groundwater". This designation is perhaps expedient in the short term, but not wise in the long term. The extraction of large volumes of water from any depth, without commensurate re-injections, would lead to either water flow to replace the volume extracted from somewhere else in the system, or to a permanent decrease in groundwater storage and hence ground settlement. The time scale of interaction between the extraction of the deep resources, and the resulting downwards flow from shallower water may be quite long, or the downwards flow may be geographically distributed, but there will be movement of water from near surface to depth. The only other way that water can be removed from deep water is to permanently remove water from storage. Simplifying somewhat, water pumping reduces pore water pressure, which leads to consolidation of the aquifer, the reduction of pore space, water release from storage, but also to the corresponding reduction in elevation of the ground surface as the aquifer compresses vertically.

The same argument for consideration of pricing oil/gas revenue and water revenue jointly can be applied to saline water resources. No licensing or pricing of saline water implies no provision for future price-based inducement towards better water efficiency in the industry. Having a water pricing tool may lead to greater industry wide economic activity in times when water resources (saline or fresh), are limiting to this activity.

Section 5: Regulate During Scarcity

The unified FITFIR system will be used to manage licenses in times of scarcity. There should be some consideration given that a surface water extraction has an immediate effect upon surface water volume. In contrast, a groundwater extraction may have a delayed, or more gradual effect on surface water flows due to balancing effects of aquifer storage. Licenses of the same priority date but having different extraction locations within the watershed could therefore have very different consequences on critical environmental flows (CEF). The potential for groundwater storage to permit adaptive management not strictly in FITFIR management order during scarcity may be something that might only be considered under a Water Sustainability Plan.

Domestic licenses for groundwater and surface water are generally not limited in the proposal, but the cumulative effects need to be considered. I am encourage to see the note that cumulative effects legislation is under consideration and look forward to seeing how this will engage with the new act. In one case in the Okanagan, over 300 domestic licenses have been issued on a creek which was already considered fully allocated prior to World War II. In times of scarcity, the water extracted by these licenses does represent a significant proportion of the streamflow.

Livestock on rangeland is currently granted rights to for a volume of water to drink from a stream under agricultural or rangeland acts and may need to retain that right, but I am disappointed the new act would entrench livestock continuing to drink directly from the stream. Human and ecosystem health would be better protected by animal watering from

a designed watering station away from the stream. This could be as simple as a small gravity fed hose to a horse trough, or a water tank fed by a small solar pump. This rangeland watering situation is a longstanding example of conflicting regulations within the different acts and ministries governing water leading to a situation which can only be described as environmentally farcical. Rangeland animals should not be encouraged by a new water sustainability act to be standing and defecating in a stream full of future drinking water.

The volume of water required is currently considered and has been legislatively designated in the proposal as insignificant to a watershed budget and hence the animals are being afforded the right to water. Currently, diversion of an equal volume of water to a well-placed, environmentally appropriate watering station is disallowed if the stream is already fully allocated as this is considered a licensable water extraction and the province will issue no license. This leaves conscientious and environmentally responsible ranchers or agriculturalists, and others wanting to provide responsible watering, being banned from doing so, and being effectively required to continue to have these animals defecating in drinking water. Some form of reconciliation of these conflicting regulations needs to be found. Perhaps removals of volume of water based on a per-head watering need for rangeland cattle could be a new category of surface water use which is given certain exemptions similar to domestic licenses. This would permit the construction of off-stream water stations, potentially resulting in considerable benefits in regards to water treatment costs and reduced nutrient loading to streams which reduces the environmental flow needs required to maintain appropriate water quality.

Section 6: Improve Security, Water Use Efficiency and Conservation

Water License Review

The proposal provides for water licenses becoming subject to review. This seems a very appropriate measure, which will allow for accommodation of our ongoing knowledge development with regards to future climate and environmental needs. The current provision is for fixed 30 year license durations to balance the need for periodic review to ensure appropriate management with security of tenure for the license holder. Groundwater licensing will result in a large amount of activity in the 5 years following the implementation of new license requirements. New wells and/or poorly documented historical wells will likely all have similar license dates. Existing licenses are to be subject to review 30 years from the implementation of the new act. The existing proposal may result in a significant peak in renewals in the mid 2040's, 2070s and 2100's, placing uneven demands on provincial staff providing oversight. It may be better to allow for variability in the duration of licenses to smooth out the renewals demands, perhaps by permitting terms from 10 to 30 years. Perhaps more regular reviews could be considered by the CWR or GWM in areas of anticipated rapid changes in water availability. Another possibility may be longer terms for smaller users, but shorter terms for large users.

Section 8: Enable a Range of Governance Approaches.

Competence of Delegated Authority

The act proposal provides for the delegation of authority for certain aspects of the water act. It should be clear that this delegation can only occur when equal or higher expertise and capacity exists within the proposed body in comparison to that existing within the province. How that is assessed in terms of staffing levels, or staffing training, would need consideration. There should also be clauses which allow for the delegated authority to be reviewable or revocable if the expertise or capacity of the body to which authority has been granted falls below that provided by the province. There may be alternate governance structures or staffing set up during a review or development of a Water Sustainability Plan that are themselves not sustainable. The initial enthusiasm, financial resources, or human capital of a group may be sufficient to provide local management of superior quality to what the province at the time of delegation, but that capacity may diminish over time. There should be provision for review or revocation perhaps at the request of a RWM or watershed stakeholders, with assessment by a higher provincial level of authority.

Additional Considerations:

Legislative Certainty for Advanced Joint Water Management Options such as: Aquifer Storage and Recovery; Artificial Recharge; and Conjunctive Use

Although rare in province at the moment, the future may see more development of advanced forms of surface water and groundwater joint management that are in use in other water jurisdictions. The act should leave legislative flexibility to permit these schemes to have legal certainty in the future, thus attracting investment towards consideration of these opportunities. These involve the supplementation of groundwater recharge, and the use of groundwater to sustain surface water flows.

Conjunctive use is the pumping of groundwater from aquifer storage at a location located away from a stream, with discharge of the water into surface water. The water is later recovered downstream by a corresponding extraction of surface water. This utilizes the storage provided by an aquifer to maintain summer flows instead of constructing a surface water reservoir. The water extracted from storage during a lower recharge period such as summer is then replaced during following high rainfall periods when recharge can refill the aquifer storage. Clearly, careful environmental considerations around the water quality and well placement are required for such schemes, but these schemes are actively in use elsewhere and so appropriate environmental review considerations have been developed. This provides water storage for use in low flow periods using a smaller land footprint than surface water reservoirs, and at lower cost.

Artificial groundwater recharge, or aquifer storage and recovery schemes utilize the storage in groundwater to store water from times of abundance such as freshet until later in the year when there are times of need. This too can avoid the upfront capital costs, borrowing costs, land use, seismic risks, and overall social implications of creating additional surface water impoundments. There should be consideration given to regulations regarding engineered storage of groundwater with as much clarity as the rules for storage facilities for surface water. Licenses for these types of schemes may need to be joint or coupled; an extraction license for water from surface water during freshet or high flow periods, coupled with licenses to inject water to groundwater, and then further licensing to extract that water back from groundwater at a future time. In the case, the overall scheme would need to be covered under a coordinated scheme. The party responsible for the artificial recharge or injection of treated water in aquifer storage and recovery should have some legal certainty over their ability to recover the water.

It is possible that oil and gas development may provide sufficient economic benefit from water that these industries may be the ones considering the large scale use of aquifer storage and recovery as an option for optimizing production in a framework of limited water resources, or highly variable surface water flows. Exemptions to certain water licensing or royalty structures for the oil and gas sector should be examined for their potential effects on the incentive to create this type of alternate water management scheme. For example, the user paying for the aquifer storage part of groundwater injection should also have some clarity over their rights to the water again when the water is later recovered. If an oil and gas user looks to invest in aquifer storage and recovery in order to maximize production and hence provincial revenue, they should not have their investment compromised by a regulatory framework allowing others unlicensed access the same water.

Establishment of a Water Sustainability Trust

The province should consider putting aside a specific proportion of any licensing fees or royalty fees collected from water related management into a BC Water Sustainability Trust to be managed at a provincial level. This trust would be used to grant funds to areas of province reaching the need for more advanced water resource studies, the development of Water Objectives, area based regulations, the formulation of Water Sustainability Plans, or other types of cumulative effects studies. The Okanagan Basin Water Board currently operates a similar small grants fund on a watershed basis whereby individual project proponents within the larger watershed can apply for funds to assist them on improvements to water management as the need arises. This has proved successful at the regional scale in the continual improvement of water stewardship and infrastructure at the local scale.

The B.C. Water Sustainability Trust would provide a mechanism to address cumulative effects, and a financing mechanism for larger studies. The process of licensing for

groundwater and surface water generally intends to continue to exempt the domestic user, with the ability to invoke other management choices under area use plans, or Water Sustainability Plans. However, the financing of these plans is unclear. Areas with ongoing expansion of domestic and other licensing will potentially reach a threshold where additional study is required prior to any further authorization. A large potential water user may have sufficient resources to undertake a suitable water availability study to support their application, whereas an area with multiple small users reaching a similar threshold has no obvious resources for a cumulative effects study. The responsibility for a full study should not fall on the next domestic user to apply. A Water Sustainability Trust grant could be applied for by a RWM, local government, or other stakeholders, to undertake the study. This would represent future financing of cumulative effects efforts by the prior licensing and other fees collected from all users.

Summary:

I hope that some of the discussion above is useful to the province in the next stages of legislative development. I would again like to iterate that I applaud many of the provisions of the legislative proposal that I have not mentioned here. I provide the above feedback in the hope of assisting in the process of developing a water management framework that provides the greatest benefit to the province as a whole, with proper attention to environmental water needs as the foundation upon which other management is based.

Please do not hesitate to contact me if you would like to discuss further any of the points above, or if I can provide any additional information that may assist the legislative process.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Craig Nichol', written in a cursive style.

Craig Nichol, Ph.D., P.Geo.