

**Karen Jones**

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**From:** Aart <[redacted]>  
**Sent:** January 10, 2018 8:26 PM  
**To:** Peter Waterman; Richard Barkwill; Toni Boot; Erin Carlson; Doug Holmes; Janet Peake; Erin Trainer; Linda Tynan; Dean Strachan  
**Subject:** Shear Strength and Horizontal Movement  
**Importance:** High

Dear Mayor, Dear Council Members, Dear Staff Members,

Since I did not finish my last point during the Council Meeting on Monday, please allow me to do this by means of an email. I think is important to the discussion you had.

During the meeting there was quite a bit of exchange about "horizontal movements" of the soil/sediments. In scientific terms this refers to shear strength (i.e. the strength to resist shear/slippage) and this may be of major importance in regard to the Bank Crescent Development Proposal. Even though the vertical force from building activity may or may not not cause a problem to the aquifer if it is deep enough, there could be shear strength failure, the tendency for sediments to slip under force, because the sediments are sloped in the valley (dip towards the lake). This is particularly important if water is involved. That is why the buildings would really need deep pilings or "deep foundation" to secure their stability. However, deep pilings would puncture the aquifer with potentially disastrous consequences, which is why pilings are not being used. So, the buildings directly load the surficial sediments.

Now, if the aquifer depth is less than the 20m below excavation Lark suggests, even close to the surface or at the surface (the unpredictable nature of the aquifer as described in the valley), the risk for failure exacerbates.

I have included a short video of Professor John Burland, illustrating this phenomenon. This is not new by any means, but if you are not into physics, you probably have not seen this and it really is a must see video for the discussion you have had. It is very educational and eye opening. John Burland is an Emeritus Professor & Senior Research Investigator at the Department of Civil and Environmental Engineering of Imperial College London.

Effect of Water on soil strength:  
<https://www.youtube.com/watch?v=a-6YbkZJ5UY>

Bottom line: Water can pose a major threat to the stability of the Bristow Valley sediments, in particular if we load them with 5 buildings of 6 stories high. In this regard we should all be very concerned about the fact that "the proposed development will come within 40m of the spring area" (Golder & Piteau). That alone should be enough cause for alarm.

Please let me know if you have any question.  
I look forward to your response.

Sincerely,  
Aart Dronkers

## Action

File: \_\_\_\_\_  
Acknowledged: \_\_\_\_\_  
Copy to:  
\_\_\_ Mayor  
\_\_\_ Council  
\_\_\_ CAO  
\_\_\_ Council Correspondence  
\_\_\_ Reading File: \_\_\_\_\_  
\_\_\_ Agenda Item: Banks  
Referred to \_\_\_\_\_  
\_\_\_\_\_  
Completed by: [Signature]

**Karen Jones**

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**From:** Doug Wahl <d...>  
**Sent:** January 7, 2016 7:57 PM  
**To:** Peter Waterman; Erin Trainer; Erin Carlson; Toni Boot; Richard Barkwill; Janet Peake; Doug Holmes  
**Cc:** kyle.girgan ; tim.yesaki@  
**Subject:** Golder's third-party review

Hello Mayor and Council – I have read the third-party review and believe it presents an unbiased opinion about risks to the aquifer and springs.

Golder’s report includes at least five statements acknowledging gaps in available information. These gaps highlight the risks of accepting assumptions made by Lark’s consultants that the aquifer lies at a depth of 20-30m and therefore should not be affected by the development (*I think you will find that this is what FFSBC and their consultant have been stating all along*).

Page 1, paragraph 1	The aquifer has not been mapped by the province and the extent and classification have not been determined.
Page 8, paragraph 4	We are not aware of any vibration threshold criteria for damage to aquifers and springs so the German threshold criteria for sensitive/historic structures cannot be considered directly applicable.
Page 8, paragraph 7	While the risks to the aquifer and springs appears to be low, it is acknowledged that there are uncertainties in the assessments involving limited information and professional judgement.
Page 9, paragraph 5	The depth of the Shaughnessy Springs Aquifer is not known over much of the site...
Page 10, paragraph 1	While Golder acknowledges that lower vibration levels are associated with a lower risk, it is our professional opinion that the characterization of risk as negligible is not supported when a vibration threshold limit has yet to be established.

Of course the key unanswered question remains "if there is a deep-depth turbidity event or sloughing at the springs, how do you stop it?" (*i.e. Lark’s ESC plan only deals with managing sediment at the surface within the construction footprint*).

Sincerely,

Doug Wahl

No virus found in this message.

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Version: 2016.0.7924 / Virus Database: 4791/15293 - Release Date: 01/07/18

## Action

File: \_\_\_\_\_

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Copy to:

Mayor

Council

CAO

Council Correspondence

Reading File:

Agenda Item:

Referred to Sean BONIKS

Completed by: 8

**Karen Jones**

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**From:** Aart <a...>  
**Sent:** January 7, 2018 7:21 PM  
**To:** Peter Waterman; Toni Boot; Erin Carlson; Richard Barkwill; Doug Holmes; Janet Peake; Erin Trainer; Linda Tynan; Dean Strachan  
**Subject:** Comments regarding "Peer Review of Aquifer Protection Strategy for Proposed ICASA Resort Living Development in Summerland, BC"  
**Attachments:** Comments on Golder Peer Review wrt Bank Crescent Dev Prop\_Jan6\_2018\_SUMMARY sent to DOS Jan7\_2018.pdf  
**Importance:** High

Dear Mayor Waterman, Dear Council Members, Dear Staff,

Happy New Year!

May I kindly ask you to read the attached brief document. It will hopefully help to clarify the issues discussed in the Golder Peer Review of January 4th, 2018.

If you have any questions regarding my document, I would look forward hearing from you. Thank you.

Sincerely,

Aart J. Dronkers

**Action**

File: \_\_\_\_\_  
Acknowledged: \_\_\_\_\_  
Copy to:  
 Mayor  
 Council  
 CAO  
 Council Correspondence  
Reading File: \_\_\_\_\_  
Agenda Item: BANKS.  
Referred to par  
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## **Comments regarding "Peer Review of Aquifer Protection Strategy for Proposed ICASA Resort Living Development in Summerland, BC"**

Following is the opinion of undersigned of the Golder & Associates Peer Review of the Aquifer Protection Strategy proposed by Lark.

The authors of the review may have limited experience in the Summerland area and may not have visited the site as suggested by the language used in the review.

The Peer Review is based on the assumptions presented to Golder by Lark (Piteau and Rock Glen) and focusses entirely on the Aquifer Protection Strategy from Lark and the impact of vibration building activity on turbidity. There is no discussion at all on soil, slope stability and bearing capacity, which, in terms of potential impact, is a major issue. No new information was gathered.

The Background chapter in the Review acknowledges that the aquifer has not been mapped and the extent and classification have not been determined. In that regard the E-W cross-section of Piteau included in the Review is deceiving and, frankly, untrue given what we know. Yet in the Golder Review, a large part is based on Lark's assumption that the aquifer on the site is approximately 20m below the base of excavation. Golder does conclude that the risk to cause turbidity is dependent on depth of the aquifer. If the aquifer is 20m below the bottom of excavation (Lark's assumption) the risk is low for the building activity to cause turbidity, while shallower aquifer depths near or at Shaughnessy Springs have low-moderate risk. The terms low and moderate risk are undefined: Is low 5%-20%, is moderate 30-60% chance of occurrence? Even with Lark's assumptions Golder does state that "in our professional opinion the characterization of risk as negligible is not supported when a vibration threshold has yet to be established".

**However**, when the authors include other facts that are not part of Lark's assumptions, the Golder Conclusion is quite different as stated in the last paragraph of their Peer Review Summary, and in particular the last sentence. This comes down to: Because the aquifer depth varies over the building site area, "Shaughnessy Springs emerge from many existing locations", and "from time to time new areas of flow temporarily emerge", the construction vibrations do have the potential to trigger sloughing (slumping) and turbidity to the Shaughnessy Springs. Golder concludes that **"Due to this uncertainty, it is considered that the proposed earthworks and heavy vehicle movement present a sloughing and associated turbidity risk to Shaughnessy Springs"**.

This above realization combined with no discussion on soil, slope stability and bearing capacity hopefully will now be a trigger for our Mayor, Council and Municipal Staff to stop this project as soon as possible with no further spending of taxpayer's money!

Sincerely,

Aart J. Dronkers