BOWNESS FLOOD BARRIER
COMMUNITY WORKING GROUP MEETING 18
September 14, 2020 – 7 to 9 p.m.
Online Meeting – Microsoft Teams

Working Group Attendees	Guests	Working Group Resources
David Burton	Robert Cheetham	Mariel Higuerey
Sydney Empson	Dr. Tad Dabrowski	Judy Hoad
Jacqui Esler	Todd Hamilton	Amy Stansky
Jane Kahler	João Küpper	Frances Welsh
Patti Peck	Chuck Slack	
Ralph Smith	Alan Woodford	
Josie Stiles		**Apologies**
Hank Vrielink		Anne Campbell
Jean Woeller		Sheila Clayden
		Rae McKenzie
		Jolene Moran
		Jeff Riedl

Meeting Notes

1. Introductions

2. Groundwater Presentation

Klohn Crippen Berger presented the groundwater study results. Discussion comments and questions included:

- When the groundwater level is above the river level, the cut-off option requires pumping capacity. How much is needed to divert water over the barrier?
    - That option was looked as a separate solution in the model, and it is included later in the presentation (slide 31)
- SEB+TCG – 1:200 Attenuated Event (slide 24). Are you shortening the curtain below the surface and still have an above surface barrier toward the bridge?
    - Yes, we still have the surface barrier because it is important to stop the overland flow, pooling and percolation. In this slide and the model, we are just shortening the cut-off extension but still going to the base of the sand and gravel.
- If you take the centre cut-off barrier in the middle of Bow Crescent, there will be a significant amount of water that will go into the stormwater system. It will flow downhill into the two blue areas of slide 26 – does your model consider inflow from the stormwater system? Remember, stormwater outfalls are shut off during flood events.

    - The model does not consider that. More evaluation is required.
        - Further to the initial question, the presentation talks about the flow coming inland being a sizable number, but the number flowing through the stormwater pipe is significant too. KCB and The City need to include this information in the stormwater model
- Where does the water get pumped from the drain?
    - That element is not considered in the model. We assume it would be handled appropriately.
- Where would the pumps be located? How many pump stations?
    - We haven't gone into that level of detail. That would be determined in a subsequent study – this is a conceptual study only. It is not a huge amount of water, so would no need much for pumping stations but would likely include some redundancy.
- Is it only 11 litres/s for pumping capacity for the entire 800 m pipe? A Working Group member watched Water Services oversee the installation of a supply line connect for a new house down the street this afternoon. With their significant pumping, the water coming into the hole on the upstream side was practically a small waterfall.
    - Yes, only 11 litres/s because we have a cut off wall restricting the flow from the river inland. The aquifer adjacent to the river is very permeable. It will still get some flow under the cut-off wall, but it is a manageable flow.
        - Doing a cut-off is an incredible undertaking based on the work at the zoo
- How does your model account for paleochannels within the study area?
    - The gravel and sand aquifer is effectively a paleochannel. It was formed through river flow when the river deposits were carved out through the valley. They extend close to the surface and, more recently, have deposits of topsoil and fine fill. The aquifer becomes more permeable towards the centre of the community, where the river is flowing most of the time with the highest energy, removing most of the fine particles and leaving the more permeable material
- The cut-off wall addresses the water from the river coming into the community. There are high permeability channels under train tracks and through the back to the low areas of Bowness. With the barrier boundary conditions you are proposing, the concern is water escaping the cut-off and how much?
    - As part of the study, we have done testing through Bowness, but it has not been comprehensive. There is the possibility of high permeability paleochannels snaking through. The model includes the extended inland, so the risk of that type of scenario isn't huge but worth considering.
- There is a lot of data to present but conceptually is hard to pull all that together. Can we see all the different scenarios in a map view?
    - Yes, that is for example slide 36. The slide shows areas with the surface barrier, plus cut-off wall, plus pumping wells. It also shows where the water table is confined and how it lowers with the flood mitigation systems in place.

- How do you read Blue contour lines?
    - That is the elevation of the water table above sea level. Without the barrier, water will always flow from high pressure to low-pressure perpendicular to the lines and to the river. With the barrier, it curves and you will see the water build-up managed by the pumping wells in the simulation.
- The graph for the cut-off wall to the bottom of sand and gravel needs the well located closer to the barrier – right now, they are shown more inland
    - The pumps are more effective inland and not closer to the barrier
- Are there cut-off walls in the north part of the map (slide 36)?
    - No, those were not simulated. We model the southeast of the community as it was considered critical. If the cut-off wall option is taken forward, we would look further at the needs in the area.
- How far below the surface is the groundwater? What is the depth of the water table?
    - The first Groundwater presentation included a plot with the depth of groundwater. There isn't much more than 5 metres below ground in the inland areas. There are other places inland where it is dry, or maybe there is a couple of cm of water.
- The maps in the presentation show the worse conditions. It takes a few hours to get there. KCB and The City should consider doing a time-lapse with groundwater level, basement elevation levels and ground level elevation to show how quickly it happens over the 120 hours in a map view. For each of the scenarios presented, you can expect property owners in the flood zone to want to understand how it impacts them.
- Can pumps and wells be automated, or are they operated manually?
    - Technology is there for both options, and both solutions are relatively simple shallow installations.
- What is the capacity of the pumps? What happens if the engineers estimate the capacity wrong?
    - The pumps are designed to the range and flow they would have to manage. Engineers build contingencies in case of event failure. Back up capacity is considered in the design.
- What does this drain look like? Is it buried into the wall? Does it make the wall wider?
    - There is a schematic diagram in slide 42. It probably needs to be 4.5 meters deep in some cases, while others might be significantly shallow. The width and surface depend on the method of excavation and the stability of the wall. It would require extra area acquired, but that exact area would have to go with more detailed calculations. The drain would increase the barrier footprint and construction area. It is a very intrusive solution to be refined in Civil Engineering if the concept moves forward.
- For any construction in the area, there needs to be significant pumps to suppress the water table by 1-1.5 feet. It is hard to believe that if The City made a service connection to everyone's house during the flood, that combined pumping capacity would keep groundwater 2.5 m below ground level. The number in this model (full-length drain) promotes flow down the barrier. It opens permeability more than before.

    - In the solutions, we are trying to reach normal seasonal water table levels. Particularly in the SE were the water table is closer than 2.5 m below ground, that is the normal condition. We are doing other models to assess the range of probable flows. This is our best estimate to look if this option is worth considering for further design.
- If you get the model's prediction wrong, is there a commitment to fix it, or does the community have to live with it?
    - The surface barrier design should not cause any adverse effects on the existing groundwater situation in the community.
- Do you know of any projects where this much pumping has been successful?
    - Not answered
- Given where we are with the groundwater results, isn't it premature to go back to residents with barrier options as planned? Can we discuss this after the presentation?
    - This will be addressed in the engagement update
- Were these models run without a new upstream reservoir and at 1:100? It would be helpful to see the risk if the barrier and no upstream reservoir was in place.
    - Looked at 1:200 attenuated and will now look at lower events.
- The model is using a barrier alignment similar to the AE report. How much does the alignment affect the model? – variability in the alignment instead of straight?
    - From the surface water perspective, the model shows the change in response with and without groundwater. If we move the barrier further inland, it will have more overland flooding over the bank. When you see the difference and compare that to no-barrier, the difference is not pronounced. In some places, it is the same, while in some areas, it is less. Suppose we move the barrier, that difference will change. If the barrier was moved inland, we might see in the critical areas a bit more groundwater related flooding closer to the houses: no huge changes, but a slight increase. Options to manage groundwater further inland would still perform at a similar level.
- Are there any studies done looking at long term effects on surrounding land, etc., regarding the impact of the wall? Are there known environmental risks?
    - Not answered
- Next steps – finalizing the report right now, which will incorporate the final results. The aim is to have it by early October to the Working Group. The Working Group can send additional questions to Amy via email.

3. Engagement Update

- How did you arrive at the milestone date of the end of February, making a recommendation to Council? Did you map the discussions required?
    - The project timeline drives the engagement update. We have added some new engagement opportunities with the studies timeline changing. We also checked against the time to share new information with the community. One thing we would like to look at is increasing the number of Working Group meetings

- Working Group needs time to digest presentations, discuss with stakeholder groups and experts, and then have a dialogue with The City. Some of the information 'has been pretty over the fence'. We are not having a dialogue. One of the Working Group members would like to map the work that is remaining, the meetings needed, and the deferred items to confirm the timeline.
    - The engagement timeline change has taken into consideration feedback from the group and the project work needed.
- The 'Why the Barrier' letter and feedback were 'thrown over the fence'. A working Group member sent some points back to The City. One of the Working Group members would still want the discussion facilitated with minutes
    - The 'Why the Barrier' discussion was not meant to be a definitive piece of information. It was intended as information of when we would answer some of the outstanding Working Group questions.
- Does the TBL criteria follow up session include guests? During the groundwater presentation, it looked like there are additional barrier options that should be part of the TBL criteria. Would like to see an opportunity to discuss criteria for those other options. Working Group member recommends a session with guests to have a meaning full conversation. A survey is harder to provide feedback.
    - The City will bring the criteria to the Working Group first and from there, decide on an approach with guests
- The engagement timeline was feasible in a non-COVID world. Riverfront property owners will say this is an important conversation and should not be online. If COVID will take half a year to take its course engagement and the project should be put on hold.
- The City needs to consider how to share the studies' information with the community. The community wants to talk to the experts. They want to get the level of detail that the Working Group has been getting.
- Once the residents receive the booklets, and they understand it, they will be able to determine the level of conversation they want to have with The City. We have heard people saying they won't endorse the project with just online meetings.
- When looking at the booklet, it is important to walk around the yards – in person would be beneficial. Sharing the studies is probably fine online.
- Robust engagement needs robust discussion. How do you define 'robust engagement'? How will you measure it?
- Judy offered to provide information on engagement What is included in the Damage Cost model presentation? Does the groundwater report need to be finalized first?
    - Not answered
- How much time is needed before the last engagement activity and the recommendation meeting with Council?
    - Not answered

4. **Working Group**
    - Draft outline: Introducing the Working Group
        - The facilitator asked the group to take a few minutes to review the draft letter and provide feedback. The purpose is to inform the Bowness residents a Working Group is representing them. This will be included in the Nov-Dec community newsletter.
    - Meeting 17 Notes
        - The facilitator asked the Working Group to have a look at the meeting notes and provide any feedback via email

5. **Next Meeting – October 5, 2020**

    Future Working Group Meetings – discussion of schedule for October and November
    - Two-week schedule: October 18, November 2, 16, 30 (proposed)
    - Three-week schedule: October 26, November 16
        - The additional meetings would provide additional meetings to address technical topics with the technical experts. The meetings would be optional. No new information at the debrief meetings.
        - The facilitator asked Working Group members to respond if they are willing to accept the two-week schedule.