NATURAL RESOURCES CONSERVATION BOARD

Application No. 1701

SPRINGBANK OFF-STREAM RESERVOIR PROJECT

P R O C E E D I N G S

Volume 5

March 26, 2021

(Via videoconferencing)

Natural Resources Conservation Board Proceedings taken virtually in Calgary and Edmonton, Alberta.

Volume 5

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(PROCEEDINGS COMMENCED AT 8:30 A.M.)

THE CHAIR: Good morning, everyone, and I apologize for the quick disconnect yesterday. I think we've got that rectified.

So the discussion that Mr. Secord and I were having, I think, was taken as an active point pretty quickly, and the Zoom meeting was ended, which maybe didn't hurt too many people's feelings. It was the end of day, a long day, but we do have that, I think, figured out for today.

But if we did have a problem, I don't think we talked about that, but if you had an IT problem where either you're disconnected, the first thing to do is contact Ms. Friend in a hurry to get back on. And if you're part of the witness panel at the time, or you're crossing, we'll know that, of course, because you won't be there anymore, so we'll hold on.

But if you're not and you want to rejoin, you

still need to get a hold of Ms. Friend, and maybe I'll just say this number again in case you don't have it or misplaced it, but area code 403-620-8294. So her cell phone can be the best way to get a hold of her.

And if we have kind of a massive disconnect for some reason, then what we'll -- you can just use the -- wait 5 minutes, 8 minutes or so, and use the original link that you had to get into this meeting to just get back to the Zoom. So the same link will work again. You just need to go back in and reactivate it, and then Mr. Wiebe will allow you back in.

So before we start this morning, I was wondering also if anybody had any prelim matters for the morning or housekeeping?

MR. FITCH: Yes, Mr. Chair. It's Gavin Fitch. Can everyone hear me?

THE CHAIR: Yes, good morning.

MR. FITCH: I just wanted to advise the Board that Alberta Transportation is in the process of filing within the next five minutes or so with Ms. Friend a response to an undertaking, and that's Undertaking 11, which is basically whether Alberta Transportation would consider moving Springbank Road to allow uninterrupted access for residents in the event of a design flood.

So we've got a written response, and that will be,

as I said, provided to the Board and Mr. Secord momentarily.

THE CHAIR: Okay, thank you, Mr. Fitch.

So, and I would like to -- I guess we're going to start off with Mr. Secord or for you to finish up your cross this morning.

By my accounts, we've got a -- about to 11:30 for your allotted time, thereabouts, so it's going to take us pretty close to the lunch hour. Of course, we'll see how that time goes.

Mr. Secord, did you expect that that was the time that you had requested and we had granted is still going to be appropriate for your cross on this topic?

MR. SECORD: I do, sir. I have a number of climate change questions, but I was thinking what I might do is ask all of those climate change questions in Topic Block 4.

I'm assuming the witness that is dealing with climate change in Topic Block 3 will also be in Topic Block 4, but maybe, Mr. Fitch, you could confirm that because that will obviously impact my time today.

THE CHAIR: Mr. Fitch?

MR. FITCH: Yes, I was just confirming with Mr. Barbero.

Yeah, I think it's safe to say that Alberta

Transportation will have witnesses who can speak to climate change, both in this topic session and also the next.

MR. SECORD: So that might expedite matters this morning, sir, if I could move -- shift that piece over.

So with that, that's the only question I had.

THE CHAIR: Okay. Well, thank you.

Mr. Secord, please proceed.

M. HEBERT, M. SVENSON, W. SPELLER, D. BRESCIA, M. WOOD, Y. CARIGNAN, D. BACK, D. LUZI, D. YOSHISAKA (For Alberta Transportation), previously sworn/affirmed

MR. SECORD CROSS-EXAMINES THE PANEL:

Q. All right. If the document host could pull up Exhibit 339. We were looking at that yesterday. PDF page 9. And while he or she is looking for that, I might also note, I'm going to want to refer to Exhibit 249, so if that could be pre-loaded and available when the time comes.

MS. FRIEND: This is Laura. Is it 339 that we're looking for?

MR. SECORD: Yes, we were looking -- that's where we ended off abruptly yesterday.

MS. FRIEND: Okay. I don't see it pre-loaded,

so she's probably going to have to go to the exhibit list to look for it, but she'll find it.

MR. SECORD: Yeah, it was there yesterday, and I just assumed my documents from yesterday would carry over to today for this panel. So I'll need all of those references sent yesterday pre-loaded for the continuation of my cross today.

MS. FRIEND: Right. Okay, will do.

Q. So, panel, I think you had just caucus and you were going to get back to me with a response to the question I had about sharing testing and commissioning details with my clients.

A. MR. HEBERT: Mr. Secord, it's Matt Hebert. I could provide an answer now that we've returned today.

So, Mr. Chairman, as we've been discussing through the balance, or through the course of the hearing so far, Transportation is committed to regular and transparent communications with landowners of the Springbank community during construction project start-up. We are committed to providing regular updates through the ongoing regulatory process.

As we discussed yesterday, the steps discussed occurred in a different process, but, nevertheless, Transportation is committed to continue to provide updates about the parallel or subsequent or regulatory

steps through the construction project start-up stages.

Transportation commits, at a minimum, should the project be approved for yearly open houses for the community to share updates on constructions and plans for upcoming activities.

But I must say, unfortunately, AT cannot commit to providing detailed information on equipment commissioning/testing. This information is considered highly sensitive and confidential. And for security purposes, it is the policy of the government of Alberta to not circulate the information in the public domain.

However, saying that, once available and subject to the project's regulatory approval, AT is prepared to provide a fact sheet outlining the testing, commissioning, and operating framework for the project to the surrounding landowners in the community.

Q. Thank you, Mr. Hebert. And if we could turn to PDF page 10 of Exhibit 339, under the heading -- under Section 2.3, "Information Required For Environmental Impact Assessment," subsection 1 (a)(viii), it states: (as read)

"When an environmental impact assessment is required to support an application for authorization in relation to a dam, the dam owner must submit to the

director in writing all of the following information: (a) general information about the dam including (viii) the normal operating range."

What is the expected normal operating range for SR1?

A. **MR. MENNINGER: Mr. Chairman, this is John Menninger. The normal operating range for SR1 is described within the Preliminary Design Report. And, as we mentioned, it is when flows exceed 160 cubic metres per second, and up to the design flood event of 1240 cubic metres per second. That's what we would consider a typical or normal operating range for the project.**

We go on to further describe operation frameworks for flows that would exceed 1240 cubic metres per second in the event that we were to operate in those conditions.

And then, finally, we identify the performance of the project under various dam safety flows.

Q. And then if we go down the page, Section 2.3, sub (b), it says: (as read)

"Details regarding potential accidents or malfunctions including:

1. The identification of potential accidents and malfunctions that it could

occur for all stages of the project, such as cofferdam leakage or failure, sediment control failure, or other dam safety incidents."

Can you advise what -- I think you had a hard time with this yesterday, Mr. Menninger, but can you tell me what will you be advising the director with regards to potential accidents or malfunctions, including the identification of potential accidents or malfunctions that occur for all stages of the project, such as cofferdam leakage or failure, sediment control failure, or other dam safety incidents?

A. MR. MENNINGER: Mr. Chairman, the identification of potential accidents and malfunctions was provided in the environmental impact assessment as submitted, and detailed -- we could identify, if necessary, the location of that within the EIA for your benefit, but that's already been submitted.

Q. If you could do that for me, if you could point to the description of potential accidents and malfunctions?

A. MR. MENNINGER: One moment, please.

Q. And while you're looking for that, would that also include a description of the effects of a failure by tabulating the flow arrival down -- time at a downstream of the structures until the estimated

contents of the reservoir are within the estimated 1 in a 100-year flood level?

A. MR. MENNINGER: Sure. So the accidents and malfunctions section of the environmental impact assessment is Exhibit 60. It is Volume 3 and Volume 3D of the Environmental Impact Assessment.

Within that, we provide identification of potential accidents and malfunctions scenarios, including the potential off-stream dam failure breach or diversion structure, as well as other potential accidents and malfunctions as described within those components.

With regards to the dam -- the second part, the description of the failure by tabulating the flow arrival time at downstream of the structures, that was provided as it's the latest -- it's described in that same Exhibit 60, and it's also described within the appendices of the Preliminary Design Report.

Q. And that -- that Preliminary Design Report was dated --

A. MR. MENNINGER: It's been included in both the interim report that was submitted in 2017 and then in the final report provided in 2020.

Q. Exhibit 159?

A. MR. MENNINGER: That's correct. Well, it would be in the appendices. So it would actually be

Exhibit 174, I believe.

Q. And if we go to PDF page 13, this is under Section 3.2, "Requirements in Determining Consequence Classification." It says: (as read)

> "Unless otherwise specified in writing by the director, a dam owner must use the following types of procedures in determining a consequence classification."

And at the top of PDF 13, it states: (as read)

> "A quantitative assessment that consists of:
> (i) a detailed breach inundation study that includes failure mode -- that includes failure node evaluation, computerized dam break, and hydraulic routing models, detailed hydrological estimates, and high quality input data; and;
> (ii) detailed scientific analyses and assessments of environmental and economic losses."

Can you tell me, Mr. Menninger, has that information been provided to the NRCB?

A. **MR. MENNINGER:** **So as you mentioned, Mr. Secord,**

it says "one of" must use the following types of procedures. It does not stipulate that all of those procedures must be performed.

However, we did perform a quantitative assessment that utilized a detailed breach inundation study that includes the failure mode evaluation, computerized dam break, hydraulic routing models, detailed hydrological estimates and high quality input data.

The -- for the purposes of a hazard classification, Mr. Chairman, we utilize those detailed breach inundation studies to determine the potential effects, and then classified the dam accordingly, based off of those effects.

Q. And where is that quantitative assessment in the material?

A. MR. MENNINGER: It is in exhibit -- I just had it up. It is in Exhibit 174, and that would be PDF -- starting at PDF page 335.

Q. And has AT also completed a detailed scientific analyses of assessments of environmental and economic losses as a result of --

A. MR. MENNINGER: It was determined that those were not necessary in order to classify the dam structure according -- according to the elements identified. So we did not perform a detailed break -- although we do

provide that -- we do provide an overview of the potential environmental and economic impacts within the EIA. So I guess it would be -- we'll provide an assessment.

A. MR. WOOD: **Mr. Chair, but if I may supplement my colleague's response.**

COURT REPORTER: Sorry --

A. MR. WOOD: **We have to remember that the exercises to determine --**

THE CHAIR: Mr. Wood, just -- let the court reporter get your name in first, please. Thanks.

A. MR. WOOD: **My apologies, Mr. Chair. It is Matt Wood.**

What I was going to say and supplement Mr. Menninger's response is that the exercises that determine the consequences classification, the reason why environmental assessment and things are included in there is in the cases where those may be added on to raise a classification. We are dealing with an extreme consequence structure that was verified by the exercise Mr. Menninger described, and that is why those were not included.

Q. And so, finally, with respect to Exhibit 339, PDF 15, just while we're turning there, Mr. Menninger, in terms of the analyses that was done, would there be loss of

life in the --

A. MR. MENNINGER: In the highly unlikely scenario of a breach of the off-stream storage reservoir, it was determined that there was the potential for life loss downstream, and that was the basis for the determination of an extreme consequence structure.

And, as I think we've explained before, these -- an extreme consequence classification is not uncommon in the dam safety industry, but it is taken very seriously by the design team.

And for that reasons -- for those reasons within the dam safety industry, that stipulates the requirements for the stringent criteria applied to the design and the loadings to the dam, and the requirements for post-construction operation and maintenance of the dam.

Q. And was there a determination of how many lives would be lost in the Springbank community?

A. MR. MENNINGER: We did not do an exact determination on the individual number of lives to a specific degree, Mr. Secord.

Q. Is there a range of loss of life?

A. MR. MENNINGER: In the dam classification criteria for an extreme consequence structure, there is a number for what would qualify as an extreme consequence.

Q. And what is that number?
A. **MR. MENNINGER: So in the Alberta Dam and Canal Safety Directive, it identifies an extreme consequence structure as a structure that if -- if, as I said, in the very unlikely effect of a failure, there is the potential for life loss of more than 100 people or individuals. It doesn't mean that it's guaranteed, but that means that there is the potential, and so that's how you classify it accordingly.**
Q. All right. If we could turn to PDF 15, and I'm looking at the safety management plan -- and I know that we talked about this yesterday, but my clients had some questions that they wanted me to ask.

So in this "Section 4.1 - Safety Management Plan," it states: (as read)

"The safety management plan must, at a minimum, include all of the following information..."

And then it sets out under (b), which is what I'm interested in: (as read)

"The roles and responsibilities of key individuals involved in the safe operation of a dam or a canal including: (i) the dam owner; (ii) the safety manager; (iii) the engineer of record;

(vi) the designer of record; (v) the regulatory reporting contact; (vi) the operator; and (vii) the emergency contact."

Now, my clients have said it would be good to know where these individuals will be located and who the alternative contacts will be.

And their concerns -- I'd like you to comment on that -- their concerned about (a) the ability to contact; (b) response times; and (c) how long it would take them to -- or whether they're required to be at the site at all.

So can you comment on, first of all, ability to contact, and so -- I guess where they will be located, one --

A. MR. MENNINGER: **So --**

Q. I'll do it one at a time, I think, Mr. Menninger, or, Mr. Wood, if you want to jump in.

A. MR. HEBERT: **Mr. Chairman, just one moment. Because of Mr. Menninger's location, we're just trying to sorting out the right person, so just bear with us for one moment.**

THE CHAIR: Thank you. And when you get the right person, please announce the name for the court reporter.

Q. MR. SECORD: Mr. Menninger, I take it you're in the midwest of the US, are you?

A. MR. MENNINGER: I am.

A. MR. HEBERT: Mr. Chairman, Yvonne Carignan -- or, sorry, Matt Wood will start the response, and it may be supplemented by others.

Q. MR. SECORD: Maybe I'll just give you one at a time, Mr. Wood.

So, first of all, where will these individuals be located and who will the alternative contacts be?

A. MR. WOOD: Mr. Chairman, thank you for the question.

You know, I think what's important here is that part of preparing the plan is identifying these individuals, and that is why it's stipulated here very clearly is the safety management plan identifies these individuals with their contact, and it's frequently updated, as I believe Mr. Menninger mentioned earlier, I believe every five years an extreme consequences dam plan is revisited, and I believe there's provision for annual updates of things like this.

So it's not determined at this time for any of these items, and that is -- that is essentially the point of preparing this plan at a later date and those individuals are all identified.

Q. And are you able to comment at all on the concerns about (a) ability to contact; (b) response times; and (c) whether they're required to be at the site?

A. MR. WOOD: I think --

A. MR. MENNINGER: Mr. Chairman, I'll take that that's an important consideration, and will go into the provision of the safety management plan, including the responsibilities; and their contact, which is common within the dam safety industry, to identify all of these individuals and how one would contact them, including backups.

A. MR. HEBERT: Mr. Chairman, for the benefit of the Panel, as we've previously indicated, Alberta Transportation has committed a community liaison function, both the construction and operation phases of the project. That would be, you know, certainly a contact available to -- to residents and to members of the community in parallel to the -- to the contact that was contemplated in the plan itself.

Q. And in terms of the potential for a catastrophic breach and potential for a hundred lives being lost, can you tell me, how much notice would people downstream in Rocky View County and Springbank and Rocky View County [verbatim], how much notice would people have to evacuate, and how would that be communicated?

A. **MR. MENNINGER: The -- so the details of the full communication plan will be developed as part of the emergency management plan, emergency response plans for the project.**

As I mentioned, during operations of the structure, this facility will be attended to in -- and observed throughout its filling and operations. So the identification of potential issues with the structure is the -- is the first step within an emergency action plan, emergency response plan.

So the -- the step process goes is: You would identify a potential issue, you would classify that issue, whether -- and then, basically, there's step-by-step processes and the contact of the vulnerable populations downstream.

So if it's just an observe and report versus a mitigation measure, there's different levels of notification, but that the intent would be to notify those immediately once upon an issue is identified.

Q. Thank you, Mr. Menninger.

Document host, you can take down this exhibit, and could you please put up SCLG Aid to Cross Number 2. I think it's AQ2 in your -- thank you. It's the revised one that I sent this morning, Ms. Friend. There we go. Thank you.

So, yesterday, Mr. Menninger, we were -- we were going back on and forth on dam classification, and can you tell me, are you dam with the International Commission on Large Dams, I-C-O-L-D?

A. MR. MENNINGER: I am.

Q. And can you confirm that the ICOLD has defined a large dam as one whose height is 15 metres or higher and: (as read)

> "Between 10 and 15 metres if it meets at least one of the following conditions:
> A crest length of not less than 500 metres;.
> A spillway discharge potential of at least 2,000 cubic metres per second;.
> A reservoir volume of 15,000 [verbatim] cubic metres or more."

Are you familiar with that definition?

A. MR. MENNINGER: Until you provided it this morning, I was not aware that ICOLD had a specific definition for a large dam.

Mr. Chairman, we'd acknowledge ICOLD's definition in that SR1 would be fit within the definition of a large dam as indicated.

But I'll also note that this designation does not change the design criteria. The dam was, as I

mentioned yesterday, was classified and is classified as an extreme consequence structure and, as such, we're utilizing the most conservative design standards and criteria that are established by Alberta Environment and Parks and the Canadian Dam Association.

Q. And just to put the SR1 into context, it is 15 metres in height?

A. MR. MENNINGER: It exceeds 15 metres in height.

Q. And what is its crest length?

A. MR. MENNINGER: Approximately, 3,000 metres, a little bit more.

Q. And what is its spillway discharge potential?

A. MR. MENNINGER: The emergency spillway is a little over 300 cubic metres per second -- the low-level outlet works is 27.

Q. And what is the reservoir volume?

A. MR. MENNINGER: I believe we've covered this. It's 77 million cubic metres --

Q. So 77,000 dam cubed?

A. MR. MENNINGER: Yes.

Q. -- or 77,000 [verbatim] cubic metres? That's the conversion?

A. MR. MENNINGER: 77 million cubic metres, yes.

Q. 77 million cubic metres. Okay.

A. MR. MENNINGER: Yes.

Q. Lots of zeros there, Mr. Menninger.
A. MR. MENNINGER: There are.
Q. Yeah, okay.

All right. If we could then turn to, document host, Exhibit 149 -- or sorry, 249, we can take this down now. And if we could scroll down to the bottom of where we see the Robinson properties. Just go down a little more, please. Perfect. Thank you.

So Mr. -- I don't know who is the best for this. I think this is -- this could be the hydrologist getting involved here, as well. I know part of it probably is for you, Mr. Menninger, or Mr. Wood, but, you know, please feel free to jump in whoever is appropriate.

So, in this case, we can see the Robinson/Hawes property, which is going to have an embankment running through the middle of that -- I guess through the middle of that property; correct?

A. MR. WOOD: Mr. Chair, this is Matt Wood.

That is correct.

Q. And then we see Mrs. Robinson's property essentially just, I guess that would be the southwest quarter of 5-4-24-3, that would be just to the southwest of that diversion embankment; correct?

A. MR. MENNINGER: The floodplain berm. Yes, it's

located southwest of it.

Q. Right. So we have a series of questions relating to the operation of the SR1 in relation to impacts on Ms. Robinson.

So perhaps what we could do is, in relation to -- so now that we've got the Robinson -- as I understand it, part of the Robinson/Hawes property will be expropriated for the diversion berm. Is that correct, Mr. Woods?

A. MR. HEBERT: Mr. Chairman, it's Matt Hebert. We would, as I referenced this week, we would be interested in having discussions with Ms. Robinson and Ms. Hawes about the acquisition of property within the project development area.

Q. So either it's -- one way or another, for this project to proceed, you have to acquire the Robinson/Hawes parcel in the northeast and northwest of 5-4-24-3; correct? Or at least a good portion of it?

A. MR. HEBERT: Mr. Chairman, that is correct.

Q. So could we now pull up Exhibit 327, PDF page 54 -- 64, 6-4. Keep going. There we go.

And can you just fit the photograph into the frame for us? That's the -- you need to go up or down. There we go.

Now, can you -- what have you got there, you've

got 75 percent. Is it possible to, I guess, go down to 70 or 65 percent?

THE CHAIR: Does this work, Mr. Secord?

MR. SECORD: That's -- that's working. Thank you. It just seems the resolution is --

THE CHAIR: It is -- it appears fine on my screen --

MR. SECORD: Yeah, I'm just going to pull up my copy of the exhibit.

Okay. So from my -- from my screen, I need -- I need a resolution of -- I think you have to go down. Let's try -- let's try -- yeah, that's not -- you know what, that's good enough, thank you very much. That's perfect.

Q. All right. So can you tell me, Mr. Menninger -- well, first of all, you probably don't know this, but I'm sure Mr. Wood/Mr. Hebert can confirm -- but the buildings that we see on the bottom of Exhibit 327, PDF 64, you can confirm that that is the -- those buildings belong to my client, Mary Robinson? Can you confirm that, Mr. Wood?

A. MR. WOOD: Mr. Chairman, it's Matt Wood.

I can confirm that.

Q. And can you, either you or Mr. Menninger, advise the Board how far the diversion berm comes down towards the

buildings that we see? And I'm going to suggest to you -- I'm going to suggest to you that the diversion berm -- what happened here? There we go.

THE CHAIR: Mr. Secord and Alberta Transportation, we're going to have this transcribed -- so far so good -- but I think we need to ensure that our descriptions in the transcripts will allow us to go back to page 64 of Exhibit 327 and really identify what's been discussed here if we want it recorded.

So, so far, I think we've identified the buildings in the bottom of page 64 of Exhibit 327 is Ms. Robinson.

So we're on the right track, but let's make sure that our descriptions allow us to read the transcripts and come back to this piece of testimony and figure out what was said and why. Thanks.

Q. MR. SECORD: Okay, so maybe I can put this to you.

You see the legend on the right-hand side of the -- of PDF page 64 of Exhibit 327? You see that legend there, Mr. Wood?

A. MR. WOOD: This is Matt Wood.

Yes, I do see the legend.

Q. And you'll see that there's a road that runs to the north from that legend?

A. MR. WOOD: Yes, I do.

Q. And you'll notice that there are some trees that come in from the west side of the road. Can you tell me, does the diversion berm -- the southernmost tip of the diversion berm, would it intersect that basically halfway up the road that we see on the right-hand side of the map that I've just described?

A. MR. WOOD: Mr. Chair, this is Matt Wood. We may want to reference another figure. What Mr. Secord is referencing is the footprint of the floodplain berm, and it's unfortunately not shown on this figure. This is the figure showing the model output overlaid on the air photo, but, Mr. Secord, I believe I can effectively answer your question.

The berm terminates before crossing into the property that's solely owned by Mrs. Robinson. It's located on the Robinson/Hawes property.

Q. Right. And so can you pinpoint where that termination point is on this map?

A. MR. WOOD: I can.

A. MR. MENNINGER: Matt, I can --

Mr. Chairman, approximately where you see where the river makes a bend to -- the river goes north and then makes a bend to the west, if you follow that across, the floodplain berm terminates pretty close to

where that, like, white dot is, you know, basically even with the turn -- the rivers turn left.

So I think as Mr. Secord may have mentioned, the floodplain berm terminates about halfway between the legend and the kink in the roadway, you know, based off of what generally I can tell from this aerial.

Q. I think that works for me. Thank you, Mr. Menninger.

Now, this particular figure that -- this particular image on PDF page 64 of Exhibit 327 is showing a one in 100-year flood; correct?

A. MR. MENNINGER: Mr. Chair, if we could please request the document controller to scroll down, just to check the legend, that would probably be the best way to verify it.

THE CHAIR: Thank you, Ms. Kaminski.

A. MR. WOOD: Yes, it --it's Matt Wood here. Yes, it is a 100-year flood.

Q. MR. SECORD: And what is this -- what is this actually showing in relation to the impact of the operation of SR1 on Ms. Robinson's property in a 1 in a 100-year flood?

A. MR. WOOD: Matt Wood here, Mr. Chair. What we're looking at here is a hydraulic model, and if we want to discuss the details, I may request those from Mr. Menninger, but this is the output from a hydraulic

model that shows flooding and, effectively, the effects of the service spillway creating the head pond that Mr. Menninger had mentioned earlier.

Now, I must draw to the Board's attention that the effects from the rise in the head pond are within this -- within a portion of this area shown here.

What you're seeing on -- largely on the left side is the existing flooding that would happen in a 100-year event anyways. And somewhere around the midway point there is where you start to see the -- experience the influence from the operation of the diversion structure.

And if I may draw to the Board's attention, in Exhibit 131, we actually have a much better description of the operational backwater effects. This here it's unfortunate, this is used for determining velocities and depths, but it doesn't help show the separation of the impacts from the diversion structure versus what would be experienced in an existing 100-year flood.

A. MR. MENNINGER: Matt, I guess what I would note on and just continue that discussion point. Two things that you may note: One, is that the 100-year is not even touching the floodplain berm at its termination point or really up until that kink in the road there. So it's constrained by the natural floodplain in this

scenario that you observed here, and to --

Q. How is it observed?

A. MR. MENNINGER: Oh, sure, no problem. So the floodplain berm runs along that -- basically right along that road as proposed. And so you can see the separation of the colour from the -- from the green.

So basically, you can see the natural grades and the jagged edges. If it looks like a straight line, it's against the berm; if it's got a jagged, looks like it's following contours, it's following natural grade in that scenario.

The -- you know, in that case. And as Matt had mentioned, Mr. Wood had mentioned in Exhibit 131, we demonstrate or we show the area of impact. So basically, what we did was we took two models. We took the existing conditions, what's out there today, and modelled it. And so we have -- and we used a grid. So this shows water surface elevation at every small grid space across this whole area, and then we compared that with project and without. And what we've demonstrated in that analyses and presented in Exhibit 131 is that the extent of this project do not go beyond the -- or do not extend onto that land -- Mrs. Robinson's land in that case, and in this case, to the end of the floodplain berm, because it doesn't even touch the

floodplain berm at the end. Basically it has no effect.

A. MR. WOOD: **Mr. Chair, it's Matt Wood here. If I may request that the document controller bring up 131, it may help explain. It's 131, page 565.**

THE CHAIR: Thank you. I was hoping you'd do that.

A. MR. WOOD: **And while this is being brought up, I would just highlight that the figure was prepared to communicate the extent of these effects, and it shows some distances on it to the Tsuut'ina Reserve, but the parcels, while not labelled, does show the boundaries and the footprints of the structures I was referencing earlier.**

THE CHAIR: It's a new document being brought up, and it is a large document. So it'll take a couple seconds off our web server.

Q. MR. SECORD: So while it's being brought up, Mr. Menninger, let me take you down the path that is of concern to my client, Ms. Robinson.

And we've looked at Exhibit 249, the map of where the property is. We've looked at the 1 in 100-year flood showing where -- the impact, as you said in the head pond, and we're going to get back to discussing the head pond effects from a design flood 'cause this

one is not even the design flood but something, you know, half of the design flood.

But the question -- the question I have is what -- are we here? Okay, let's go --

THE CHAIR: Thank you.

Q. MR. SECORD: What page do you want, Mr. Wood?

A. MR. WOOD: Thank you. It's this page here that's shown.

Q. Page 565?

A. MR. WOOD: Correct, PDF page 565. And as I mentioned earlier, this figure shows the distances from various reference points, some from the structure, some from the different waters, and some from the PDA boundary to the Tsuut'ina Reserve for the purposes of communicating what we're discussing here.

As I mentioned when we were looking at --

Q. Could we see the legend, please. Maybe take it down to 75 percent. That's good. Thanks.

A. MR. WOOD: So this figure shows in purple the floodplain berm and its extents. And, as well, in grey there -- it's probably a bit of a familiar shade, but in grey, that's the PDA boundary. And where you see it starting to go a little squiggly on the bottom left side, that is starting to fall -- follow down into the river bed and following a contour there.

But what's important in this figure is the light blue area. That is the extents of the hydraulic impacts of the diversion structure during the design flood. And so, you know, contrary to the previous figure that showed water and depth and velocity through there, the impact from the diversion structure service spillway gates raising from the river and creating that backwater that drives water -- floodwater into the reservoir -- that impact, that hydraulic impact is limited to that light blue area in the -- during the design event.

Q. And what is the elevation -- is this what you called the head pond, Mr. Menninger?

A. MR. MENNINGER: This would be the extent of it, yeah. So it would be that dashed -- that kind of dash line down at the bottom of the light blue blob, yeah, in that scenario.

Q. And what's the elevation under the head pond?

A. MR. MENNINGER: 1215.8 at the structure. It varies a little bit as it goes upstream.

Q. But at the dotted line, what would be the elevation?

A. MR. MENNINGER: We could pull up the -- we could pull up the hydraulic profile if necessary.

A. MR. WOOD: I do have those available. This is Mr. Wood.

Q. Can you get me that elevation, Mr. Wood? I don't know that I need to get it now, but could you get me that elevation at an appropriate point?

A. MR. WOOD: I would suggest maybe that it's presented in Exhibit 174, page 18 of the PDF.

Q. Thanks. I don't need that. Thank you. Let's stay there, please, where you were before. Thank you.

And so can you tell me, does the -- does the head pond also cause water to back up onto Ms. Robinson's property and farming operations?

A. MR. MENNINGER: No. The -- the fact of the matter is that the Elbow River is a steep riverbed, average slope of about 1 percent or greater. That elevation increase is localized to the area within the influence of the floodplain berm. And by the time you get to the end of the floodplain berm, and before you get to the end of the floodplain berm, the effects of the gate operations in SR1 basically run back into the natural conveyance of the river.

Q. And one of the things that I was wondering about is you've indicated that when a design flood comes along, you can operate at 480 or 600 cubic metres per second in terms of diverting water. Is the head pond that we see here on Exhibit 131, PDF 565, is that head pond as a result of having the gates operating at a 600 cubic

metres per second level or 480 cubic metres per second level?

A. MR. MENNINGER: I believe it's 600.

Q. And what would be the dotted line if your operators were operating at 480 cubic metres per second?

A. MR. MENNINGER: It would be slightly closer to the structure upstream -- or downstream, sorry. So smaller, smaller influence, less -- the less flow we're pushing into the channel, the lower the water surface elevation is.

Q. So what my clients -- both Ms. Robinson and my clients are concerned about is what measures are in place if the water in the Elbow River decides to cut a channel eastwardly before it reaches the intake, i.e. across Ms. Robinson's front field, to the east of the floodplain berm?

A. MR. WOOD: Mr. Chairman, I can answer that. Essentially from what we're looking at here, the diversion structure itself has no bearing or impact on the risk of that occurring.

I would note that that blue line crossing through the number 619 is an old side channel of the Elbow River, and what was once turned into a canal inlet. You know, something like that in a 100-year flood may create a sort of an evulsion through there,

and that type of action is not influenced by the diversion structure because its hydraulic impact is limited to the blue area we see here.

Q. So you're saying where the line -- where you see the black line with the number 619 metres, that shows that this is an old channel, did he say?

A. MR. WOOD: Yes, I've had the fortune of Ms. Robinson escorting me around her property in that area, and it is an old channel that was upgraded to be the inlet for the Pirmez canal diversion.

Q. Right. And I don't know whether the hydrologist wants to chime in here. This would be Dr. -- no, I guess it would be Dr. Luzi, Luzi, L-U-Z-I, but have you looked at Ms. Robinson's property and noted old channels of the Elbow River on her property that would be capable of moving water to the east of the floodplain berm?

A. MR. WOOD: Mr. Chairman, if I may speak for Mr. Luzi on this question. It's Matt Wood.

As indicated in the figure, that channel is beyond the PDA. It wasn't studied in depth. I've simply made my observations based on what I was available to see while being escorted by Ms. Robinson.

Q. And did you note that, in her front field to the east of -- of the floodplain berm, did you note that the elevation drops very rapidly to the east?

A. MR. WOOD: I did not note that, no.

Q. And can you confirm that, if the water did choose to go through the Pirmez canal, it would bypass the entire SR1 structure?

A. MR. WOOD: It is limited by the Highway 22 there, there's culverts in that. I mean, it is a potential, but there's culverts there, and it's -- it's in low probability.

A. MR. MENNINGER: And Matt -- and this is John Menninger.

And we would note the Elbow River channel here is very wide and has a significant amount of capacity. So some -- if some water went that way, a lot of water will stay in the river and proceed to SR1.

Q. Now, in terms of how channels are created and how rivers can move, is it possible that the debris from fallen trees, F350s and other, you know, boulders from berms upstream are capable of creating trenches and changing the Elbow River's course downstream of the floodplain berm such that the water may completely bypass the SR1 structure?

A. MR. WOOD: Mr. Chairman, I'm not sure if -- you know, maybe if we can go back to the previous figure, if I may. I don't have the exhibit number, but the one that was brought up showing the --

Q. Sure.
A. **MR. WOOD: -- modeling results. I think I can best explain using that.**
Q. Exhibit 357, PDF 64.
A. **MR. WOOD: So what you see in this figure is the velocities within the floodwaters that are coming down, and within the backwater created by the diversion structure.**

And the velocities notably are quite high in areas, particularly in the channel, and in the floods like this, it's transporting that material through this reach and through that head pond area.

So, you know, while -- while during a flood, debris does influence channel switches, and all kinds of things, throughout the Elbow River, you know, there's nothing within these modelling results that would suggest that anywhere within here is a particularly prone location to debris accumulations that could cause such features; and I say that because of the conveyance through the channel, the high velocities through that reach.

Q. Mr. Wood, did Elbow River floodwater run along Highway 22 in 2013 in this area that you've described?
A. **MR. WOOD: I believe it ran along Highway 22, but I believe that most of it came from a little bit**

more from the Kiwanis area -- I know there was areas of from Mrs. Robinson's -- Ms. Robinson's property inundated, but that water then concentrated down towards Kiwanis and pulled in up against Highway 22 and through.

And may I add in that scenario, it did not avulse a new channel through that area, and so it's not a guaranteed thing that that kind of rapid geomorphic change would happen at a given location.

Q. Yeah, and the Kiwanis property, do we see that on this figure just to the -- I guess on the top right-hand corner, basically located downstream of the auxiliary spillway?

A. MR. WOOD: That is correct. Mr. Chair, it's not the entire property, but it's up in the uppermost right corner in this figure.

Q. And looking at the map, does the proposed cement plant, would that be located on this -- on the Kiwanis property or to the north of it, where it's proposed?

A. MR. MENNINGER: Mr. Chairman, we do not have a proposed location for a cement plant. We have identified areas for contractor staging and use during construction.

Whether the contractor ultimately decides to utilize a concrete plant at that location -- or at a

particular location will be constrained to within the construction footprint for the project and will be at the discretion -- it will be at the determination of need and as approved by Alberta Transportation.

Q. And I think my last question in this area is, if the Elbow River channel scoured the cut bank just north of Mary Robinson's arena, where would those waters flow relative to the southern edge of the diversion berm?

A. MR. WOOD: Mr. Chairman, it's Matt Wood here. The waters would continue to flow downstream.

Q. And can you tell me, are there any inundation maps for Mary Robinson's property that we see on PDF page 64 of Exhibit 327 that would show the impact of a design flood on her farm in the event the inlet was operated at 480 cubic metres per second versus 600 cubic metres per second?

A. MR. MENNINGER: Could you repeat your question, Mr. Secord?

Q. Are there any inundation maps for Ms. Robinson's property showing the effects of a design flood on her land?

A. MR. MENNINGER: The -- there are -- there are analyses and maps -- I'm not sure if we have it extending to her property in the Preliminary Design Report, primarily, because the effects of the project

do not extend that distance, as mentioned previously.

So we constrained, I think, the figures to the direct impacts of the project in that particular set.

Q. So the answer, then, is no? There are no inundation maps for Ms. Robinson's property showing what the impacts on her property would be of a design flood?

A. MR. WOOD: Mr. Chairman, I'd request that we can caucus? This is Matt Wood.

Q. Sure. And while you're doing that, maybe we could pull up exhibit...

MR. FITCH: Mr. Chair, it's Gavin -- here we go.

MR. SECORD: Exhibit 355. Too many documents open, Mr. Fitch.

MR. FITCH: Wasn't sure if we were still waiting on you. That's all.

A. MR. HEBERT: Mr. Chairman, it's Matt Hebert.

I believe the members of the Transportation panel have emerged from the breakout room, and Mr. Menninger is in a position to respond.

THE CHAIR: Thank you.

A. MR. MENNINGER: Yes, this is John Menninger. On Exhibit 327, I believe just page 66 shows the design flood.

Q. MR. SECORD: All right, and let's just --

before we get there, if we could go to PDF pages 3 -- sorry, yes. So this is Exhibit 355, PDF page 3 showing the banks of the river below the arena. And floodwaters were to the top of the bank. And then if we go to the next page, please, PDF 4, again, this shows the floodwaters.

Will -- will the -- will SR1 improve the flooding that Ms. Robinson experienced as a result of the design flood or the flood of record?

A. **MR. MENNINGER: Mr. Chairman, the -- and I think, as stated earlier, SR1 will not have an effect on the design flood elevations based off of our analyses at her property, either negative or positive.**

Q. So SR1 is not going to do anything for Ms. Robinson in terms of mitigating that design flood. Doesn't matter how you operate SR1, it has no effect, then?

A. **MR. MENNINGER: That's correct. The area within the influence of her property is the natural floodplain of the Elbow will be functioning as a natural floodplain or flood conveyance of the Elbow River at that location.**

Q. And then if we could turn up your reference, please, sir?

A. **MR. MENNINGER: Sure, so that was Exhibit 327, PDF page 66.**

Q. And this is entitled, "Elbow River Flow Paths and Velocities in the River Channel at Flood Zone through the Project Spillway Diversion Inlet that may Affect Fish Displacement and Entrainment During Design Flood-Scenario Operations." Correct?

A. MR. MENNINGER: Correct.

THE CHAIR: Sorry, can we see -- is there a legend on the bottom of this page still?

MR. SECORD: Yeah. It's called Attachment A, Figure 5.

THE CHAIR: And sorry, this represents design flood inundation?

MR. SECORD: Yes, that's what it says at the bottom of this.

A. MR. MENNINGER: That's correct, Mr. Chairman.

A. MR. WOOD: Mr. Chairman, this is Matt Wood here.

If I may, I believe we're having a similar scrolling issue as earlier. It's possible you might have to go up and come back down. It seems to cut off the legend there. Thank you. That seems to be working. If you wouldn't mind keep going just so we can see the legend. Thank you.

THE CHAIR: Right. Thank you. Thank you very much.

Q. MR. SECORD: All right. Thank you. Thank you, panel.

If we could now turn to some questions on failure modes.

In the event of -- in the event that a situation where water is redirected back to the river due to issues with dam operations, would this be considered a natural flood or a dam failure? And where I'm going with this is where does the responsibility reside? Will this impact insurance claims for disaster recovery funding for homeowners downstream?

So yesterday we looked at the auxiliary spillway basically pointing at Kamp Kiwanis, and then we've already looked at the emergency spillway and have seen that it would have to run over private property land -- over private property back to the Elbow River in the event it was engaged.

So in the event that these waters are redirected back to the river due to issues with dam operations, would that be considered a natural flood or a dam failure?

A. MR. WOOD: Mr. Chairman, I believe that may be a question for the administrators of the DRP program, and the other one Mr. Secord mentioned.

COURT REPORTER: Excuse me, sorry --

A. MR. WOOD: That was Matt Wood.

Q. Mr. Wood, yeah. That would be the disaster recovery program?

A. MR. WOOD: That is correct.

Q. And the other one I mentioned is that -- that's the insurance companies; is that what you're referring to, Mr. Wood?

A. MR. WOOD: My apologies. This is Mr. Wood, and you're correct. You did say insurance company.

A. MR. MENNINGER: Mr. Chairman, I guess I should also note quickly that the auxiliary spillway is not pointed at Kamp Kiwanis. It is a component of the floodplain berm that is upstream of the property of Kamp Kiwanis.

We have looked at the potential conveyance routes downstream of that structure during events, and we are not showing impacts to their buildings and properties with activation of the structure. So I would note that I think that is a bit of a false characterization to say that it is pointed at the camp.

Q. But that was actually going into my next question, Mr. Menninger.

If there is an issue and the operators need to redirect water back into the river, will they delay the redirect of the water through the auxiliary spillway or

the emergency spillway in order to allow time to evacuate downstream residents?

A. MR. MENNINGER: Mr. Chairman, I guess to explain a little bit of the operations of this structure, and how they function, the -- the reference was to redirect. So the water is in the river until we divert. And we explained the operating scenarios for when that diversion would occur.

It's simply passing downstream otherwise. It's still within the river. It's not a redirect back.

The spillways that are indicated by Mr. Secord, the emergency spillway and the auxiliary spillway are fail-safes. They're not intended for operation; they're located to provide a dam safety function and feature.

So, typically, our flows will be controlled by the service spillway in the river, and water will pass through it.

Q. Has AT provided inundation maps caused by malfunctions at the floodplain berm or inlet?

A. MR. MENNINGER: Mr. Chairman, I'll start with the diversion inlet. There is no inundation map to provide. There's not a path for breach other than into the channel and then into the reservoir.

So it's -- the malfunction there is the mapping of

water through the channel, as indicated.

The auxiliary spillway is a -- is a function, in part, of the floodplain berm. We evaluated a failure of that component as part of that referenced document in the malfunction section and in the dam breach scenario and assessed the potential effects of a failure downstream.

The failure scenarios that were investigated indicated a very small rise and less than a metre downstream of the project, and by the time they reach Highway 22 will primarily have dissipated.

Q. In terms of the operation of SR1, can the operators delay redirecting the water through the auxiliary spillway or the emergency spillway?

A. MR. MENNINGER: So, Mr. Chairman, the emergency spillway should not operate. The design and function of the project is to not operate the emergency spillway. It is to close the gates before -- you know, when the dam is complete. And so there's not a redirect to the emergency spillway; it is a fail-safe function of the reservoir.

So we are not delaying or directing water to the emergency spillway in any scenario. It is a passive structure that functions.

The auxiliary spillway functions in very much the

same way. It is a run of -- it is a component that has a fixed elevation and, depending on the water level in the river, will activate when the water exceeds that level. That level is higher than the design operation for the structure, and so again, it is not intended to operate in other -- other than a dam safety scenario as a fail-safe measure.

Q. And under what circumstances would the emergency spillway be engaged in the operation of SR1?

A. MR. MENNINGER: Only in the scenario where the reservoir is full and water is continued to be directed into the channel.

Q. When you say "into the channel," are we talking the Elbow River?

A. MR. MENNINGER: No, the diversion channel. The emergency spillway is located on the diversion channel. So with the gates closed at the diversion inlet, water can't enter the channel, water will not flow over the emergency spillway.

Q. And under what circumstances, then, would it flow into the emergency spillway?

A. MR. MENNINGER: In an extremely unlikely scenario. Number 1, the flood would have to exceed the flood of record, the 1 in 200-year recurrence interval, so that would mean -- because you'd have to fill the reservoir.

So, Number 1, you would have to have a recurrence interval that exceeds that. And then you would have to have the unlikely scenarios of not being able to close our gates at the structure.

As I mentioned previously, we've added several safeguards to that scenario, including the provision of debris barrier to prevent debris from affecting the closure of those gates, we have primary and backup power, and we have the ability to close the gates without power.

Q. So what you're saying, then, is the emergency spillway would not be engaged unless the flood was higher than a flood of record or the 2013 flood, Number 1, that's the first -- the first point. You're saying that the emergency spillway could never be operated or engaged in a design flood scenario?

A. MR. MENNINGER: What I'm saying is that the recurrence interval of that type of scenario would exceed 1 in 200 years. Whether it is two 100-year floods that happen in the same year, which has -- which has a probability that's less than 1 in 200 -- or a 1 in 200 event. That type of scenario would have to fill the reservoir to its capacity.

And so the starting point there is that you have an extremely unlikely sequence of events, whether it is

a -- the full reservoir is a very unlikely and low probability occurrence in any given year.

Q. What are the flooding consequences for downstream communities of SR1 during larger floods than the 1,240 cubic metres per second flood of 2013, and has this been considered by the proponent?

A. MR. WOOD: Mr. Chairman, this is Matt Wood. I believe I can answer that. If I may begin by stating that SR1 reduces flood risk to all -- all -- all properties downstream event.

Mr. Secord's question about larger floods, while possible, we have to remember that in those scenarios, SR1 will have reduced the flow rates in those events by up to 600 cubic metres per second, which is considerable.

And so while -- while there is -- it's still residual flood risk, as there's residual flood risk with any flood mitigation structure, a 200-year service level is considerable and -- and, in addition to that, we also have additional factors of safety that raise that service level.

And so while I understand Mr. Secord is asking about what could happen to these properties or what is the risk, we have to -- we have to be aware that the risk is far less than it would have been without SR1 in

play.

Q. So your design report indicates that the SR1 reservoir will work in tandem with the Glenmore Reservoir to limit flood rates downstream of the Glenmore Reservoir for floods equivalent to the 2013 flood such that flow rates below Glenmore are less than 160 cubic metres per second. So I've got that right, Mr. Wood?

A. MR. WOOD: Mr. Chair, this is Mr. Wood. That's correct.

Q. And you've indicated the following operational parameters, SR1 can divert flows from the Elbow River up to 600 cubic metres per second into active storage. I've got that right?

A. MR. WOOD: 600 cubic metres per second into the SR1 off-stream storage reservoir.

Q. And storage capacity in SR1 is 77,771 -- or I should say 77,771,000 cubic metres plus an additional 10,000 cubic metres in Glenmore Reservoir?

A. MR. WOOD: That is the total active flood storage of the SR1 system, the first number being the storage at the off-stream storage dam; the 10,000 being what's allocated at Glenmore by the City of Calgary.

Q. And excess flows bypassing the SR1 diversion structure will be stored in the Glenmore Reservoir; is this correct?

A. MR. WOOD: That is correct, up to its active storage capacity.

Q. And are flows in excess of 160 cubic metres per second considered levels beyond which flooding is expected it?

A. MR. WOOD: It depends on which location of the river you're referencing. Downstream of Glenmore, the city has actually identified that 170 cubic metres per second is where overland flood damages occur to private property. That is what helps set the design basis.

Again, as Mr. Menninger mentioned earlier, 160 was selected by the design team to coincide with the low-level outlet at Glenmore.

Q. And if we could pull up, please, SCLG Aid to Cross Number 1, it might be AQ1.

So to help us gain a better understanding of the operations of SR1 during flood conditions, could you provide us with a brief explanation of "Figure A3 - Design Flood, Diversion Hydrograph" as it relates to those parameters discussed above -- that we've just discussed above.

First of all, can you confirm that the blue line in this figure represents a maximum diversion rate of 600 cubic metres per second?

A. MR. WOOD: Sure. Mr. Chair, this is

Matt Wood.

That is correct.

Q. And can you confirm that the dark grey area represents the peak flow upstream of SR1?

A. MR. WOOD: That is correct. This is the hydrograph from the Bragg Creek hydrometric station.

Q. And the light grey area downstream to the Glenmore Dam?

A. MR. WOOD: That is correct.

Q. And the light grey would be basically that -- we see a peak, it looks likes, on the -- those lines -- between June the 20th and June the 21st, is that -- what time is that, Mr. Wood? Is that midnight or is that noon?

A. MR. WOOD: I'm not too sure from the scale, Mr. Chair. It looks like it's about --

Q. Every 12 hours?

A. -- I guess noon. Yeah, those are every 12 hour --

Q. So basically the grey -- the grey portion that we mentioned -- the grey area that represents flow continuing downstream to the Glenmore Dam, that -- it looks like that would have peaked at noon on the 20th of June; correct?

A. MR. WOOD: I believe, yes, that's correct.

Q. And in looking at this graph, is it your understanding that for the design flood, i.e., the 2013 flood, the SR1 diversion structure is only capable of diverting

about one-half of the peak flow; the remaining flow will travel downstream and will be stored in the Glenmore Reservoir such that flows below the Glenmore Dam are moderated below the 160 cubic metres per second. Would that be correct?

A. **MR. WOOD: If -- if SR1 was in place in 2013, it could have cut the flows downstream of the diversion structure in half, that is correct.**

Q. So do you agree, then, that your design expects flow levels in the section of the Elbow River below SR1 and above Glenmore to exceed 160 cubic metres per second and that flooding will occur?

A. **MR. WOOD: The flows downstream of the diversion structure could exceed 160 cubic metres per second if the incoming flows were greater than 760 cubic metres per second.**

Q. And, in this case, during the noon hour on the 20th of June, it would appear the flows were in the order -- somewhere in the order of 1150 cubic metres per second?

A. **MR. WOOD: That is correct. In accordance with the Bragg Creek gauge, which is coming down. You may see other references -- that hydrograph below utilizes the hydrograph recorded at Glenmore and brought up.**

So just pointing that out because there's a slight

discrepancy there, but that is also why I said it essentially cut those flows in half.

Q. So, then, looking at this hydrograph downstream of -- in a design flood, the flows downstream of SR1 for the Springbank community and other residents of Rocky View County could be in the order of 550 cubic metres per second?

A. MR. WOOD: If -- if there was another 2013 flood, and it came in in this shape and format, with this type of peak, at these rates, yes.

Q. And do you agree that, in fact, depending how -- depending on how SR1 is operated, you could make the situation even worse for the Springbank residents, and other residents in Rocky View County?

So what I'm getting at is, rather than diverting at 600 cubic metres per second, your operators apparently are at liberty to divert at 480 cubic metres per second, so that would send even more floodwaters downstream of SR1, impacting Springbank residents --

A. MR. WOOD: Mr. Chairman, in any of these scenarios, SR1, when operating, diverting, only makes a situation better for all downstream residents.

It diverts a considerable portion of flood flow from the river and sends it to the off-stream storage reservoir.

Q. But you could -- you could operate SR1 to make things better by 120 cubic metres a second at the peak for the Springbank residents downstream of SR1, could you not?

A. MR. WOOD: Could you maybe rephrase that question?

Q. It's just math, Mr. Wood. You say, "Oh, well, SR1 is going to make things better."

What I'm saying is, by choosing to divert the peak at only a rate of 480 cubic metres per second, you increase the amount of flooding for my clients below the structure.

What I'm -- what I'm saying is, isn't it just math?

A. MR. WOOD: You don't --

Q. If you're diverting -- diverting it at 600 -- diverting the peak at 600 cubic metres per second is better for everybody downstream of SR1 than diverting the peak the 480 cubic metres per second?

A. MR. MENNINGER: MR. Chairman, if I may. We provided a range because we're operating a structure in a rivering environment. Ignoring the potential and just saying a solid 600 number is not the appropriate communication to those at -- downstream.

What we've communicated is the project will provide a benefit to downstream residents between 480

and 600 cubic metres per second less, and that is the stated goal for the project, and we will strive to meet that goal in the operations of the structure.

MR. SECORD: Mr. Chair, now would be an appropriate time for a break, if that's agreeable?

You're on mute, sir.

MR. FITCH: No one can hear you, Mr. Chairman.

THE CHAIR: It would help if I unmuted, sorry, sorry. Sorry, folks.

Yeah, I mean, I was planning a break any time now.

Mr. Secord, are you planning on wrapping up around 11:30?

MR. SECORD: I think that's the direction from you, sir. So yes.

THE CHAIR: It is, thank you. I mean, you know, we've got some flexibility -- we've shown some flexibility, but without asking, it's hard to know; right?

MR. SECORD: Sure. I expect that I should be close to being done, sir.

THE CHAIR: Thank you. So let's get back at just after 20 minutes after 10. About 22 minutes after. Thanks.

(ADJOURNMENT)

THE CHAIR: Welcome back, everyone.

So, Mr. Secord, if you're ready to go, the next hour is yours. So please proceed.

MR. SECORD: Thank you.

Q. If we could turn up AQ1, document host. I seem to be -- looks like I'm freezing sometimes.

THE CHAIR: All good on this end.

MR. SECORD: Okay, good.

Are we -- are we getting this document pulled up?

THE CHAIR: Which? Do we have the wrong document -- I've got the hydrograph back on screen --

MR. SECORD: I've got nothing on the screen.

THE CHAIR: Okay. You may be having issues. Does everyone else see the Figure A3 on the screen?

Yeah, we do, Mr. Secord. So it might be your end on Internet speed, I'm not sure.

Or is it a view -- unless you've got your Zoom set to a different view that doesn't have the screen share, I don't know:

Mr. Secord? Actually, I think I may have lost Mr. Secord. Does everybody see -- Mr. Secord, can you hear us?

MR. WIEBE: I think he's left, and he's going to come back to try to resolve the problem.

THE CHAIR: Okay, thank you, Mr. Wiebe.

MR. WIEBE: I'm just waiting for him to show

up in the waiting room, and then I'll admit back in.
THE CHAIR: He has not shown up back yet.
MR. WIEBE: No, he hasn't.
THE CHAIR: Mr. Kennedy, perhaps just maybe make sure that he is able to get back for us. Thanks.
I'm not hearing Mr. Kennedy.
MR. KENNEDY: Help if I put on my headset. I'll give him a phone call.
MS. FRIEND: Actually, this is Laura. Mr. Secord just called me, and he said he's going to call in again. He's going to try to reconnect.
THE CHAIR: Okay. Great, thank you, Ms. Friend.
MR. WIEBE: Yeah, he was just in the waiting room, and I've admitted him.
THE CHAIR: Thanks, Mr. Wiebe.
Mr. Secord, can you see the document on the screen now?
MR. SECORD: I am back. I don't know what happened. So sorry about that.
THE CHAIR: Can you see the document now?
MR. SECORD: Oh, yes. Everything's fine.
THE CHAIR: Great. Thanks.
MR. SECORD: Perfect, thank you.
Q. So let me just go back to my notes here.

So if we could go to Figure 12, please. Go down one.

Can you hear me? Again, it booted me out again. Are you able to hear me?

THE CHAIR: We can.

MR. SECORD: Oh, good. Okay.

THE CHAIR: Do you have a hard copy? We do have Figure 12 in front of us. Do you have a copy -- a hard copy even or --

MR. SECORD: No, I can see the figure clearly now. So, hopefully, we're -- I'm good to go.

Q. So this is from Section 8.1.2 in Exhibit 159, the Preliminary Design Report, and it's PDF page 84, but I just thought it would be quicker having everything in one place.

In looking at Figure 12, does this accurately describe how under idealized conditions, you would or could operate the diversion structure?

A. MR. MENNINGER: No. Mr. Chairman, this is John Menninger.

The -- this does not represent the idealized condition for operation. This represents the bare minimum required in order to mitigate against the event.

Now, similarly, you would not try to hug the

bottom of your design operating range, that, in order to -- but this identified, at a minimum, what we would have to achieve in order to offset for the 2013 design flood.

Q. And looking at Figure 12, would it be correct that the cross-hatched area above the grey area represents flows that would be directed downstream to the Glenmore Reservoir?

A. MR. MENNINGER: That is correct.

MR. SECORD: And then document host, if you could turn down to Mr. Frigo's slide Number 11. So just hit the button up top, the arrow. Arrow. The one on the left, that changes the pages. There's an arrow beside the Number 2, and you can just click on it. Yeah, go down. There we go. Thank you.

Q. So, Mr. Menninger, this is -- Mr. Frigo's slide Number 11 in Exhibit 351 -- and I don't think you need to turn this up, but it's Section 3 of the Preliminary Design Report, Exhibit 159, starting at page PDF 28. The second sentence indicates that, and I quote: (as read)

> "Probabilistic discharge and volume estimates for a range of annual return intervals were developed from the historic gauge record."

Is the range that you evaluated the same as the range presented in Mr. Frigo's slide Number 11 in Exhibit 351?

A. MR. WOOD: Mr. Chairman, this is Matt Wood here.

I believe Mr. Frigo is actually pointing -- the results in that are pointing to another exhibit, which is...

Q. 229.

A. MR. WOOD: Subject to check, it's 229.

Those estimates are -- were prepared by Golder and Associates in draft for AEP in 2020. They were submitted as evidence by SCLG.

And those -- those estimates, while they use the same hydrometric data, those estimates also consider historical events on the Bow River transposed to the Elbow River.

Q. So is that what Mr. Frigo has done, then, in this slide?

A. MR. WOOD: I can't speak for Mr. Frigo, as you're saying that the estimates shown there for flood frequency are those from that source report.

Q. From the Golder report?

A. MR. WOOD: Correct.

Q. And -- and so how does that information differ from the ranges that you used in your application?

A. MR. WOOD: Mr. Chair, I just explained that. It is the same hydrometric record, one that uses a combined station of hydrometric recorded data on the Elbow River, with the exception, the ones in blue above also take anecdotal information about floods on the Bow River, and attempt to transpose that to the Elbow River to -- as part of the estimates.

So it's a few extra years of floods, although I must point out that those floods were not specifically known to have occurred on the Elbow.

Q. And then if we could scroll down -- if you could hit the arrow. Keep going. Keep going. One more. There we go.

So PDF 7 of AQ1. Are you aware and have you considered the rates of flood return periods and associated peak flow rates published by AEP?

A. MR. WOOD: Mr. Chair, we've considered them as -- as they were submitted as draft. I believe they were made public as draft December of 2020, we were aware of those and have been considering them through correspondence here as part of this regulatory review.

Q. And are you aware the accompanying Flood Inundation Map Library?

A. MR. WOOD: Mr. Chair, this is Matt Wood.

Yes, we are aware of that.

Q. And Zoom host, if you could go down to page 8.

This shows -- I have this annoying little blue thing that shows up on mine -- oh, yeah, it says "Zoom host --" I can get rid of that.

So the first map shows an AEP inundation map of 1 in 10 years, then there's a second map below, another AEP inundation map, 1 in 20.

Then if could go to page 9, please?

THE CHAIR: Ms. DiPaolo, are you still okay with Mr. Secord's voice level?

A little bit higher? Okay. Thank you.

Q. MR. SECORD: And then we have, then, on the page 10 of AQ1, a further AEP inundation map, 1 in 20 years.

If we could go back to PDF 7.

So are those -- are those the accompanying flood inundation maps that are part of the library that you've looked at?

A. MR. WOOD: Those maps appear to have been annotated; but, yes, the base layer on them is the flood map.

Q. And would you agree that the AEP data sent corresponds with the values that the City of Calgary has advanced in Mr. Frigo's slide Number 11 that we looked at a moment ago?

A. MR. WOOD: Mr. Chair, that's what I stated earlier, yes.

Q. And would you agree that the range of peak rates and return periods that you have considered is somewhat different than those advanced by AEP?

A. MR. WOOD: Yes, those -- the estimates that were considered during the design of SR1 are indicated in the table above and, yes, they are different.

Q. And do you have an opinion about the validity of the AEP materials, and can you comment on these differences?

A. MR. WOOD: I would say that both are valid. You know, they are a product of the approaches taken, and for their intended purpose.

Q. Is there anything in Canada that is comparable to the SR1 project? And where can we see one in operation?

A. MR. MENNINGER: Mr. Chairman, if we could clarify what aspects are the comparable -- or comparison you're looking for?

Q. Well, maybe we could start here. How many dry reservoirs have been built in the last 50 years in Canada?

A. MR. MENNINGER: Mr. Chairman, the function of SR1 as a -- with a flood storage surcharge component of the project is not unique.

The function that the reservoir is completely drained is -- may be -- may be the terminology utilized for a dry dam.

However, many dams that serve as flood control function have a base level, and then a flood surcharge level that occurs rapidly and then empties over a period of days. This is not an uncommon aspect for -- for a project.

Q. And can you give me an example of anything in Canada that is comparable to the SR1 project?

A. MR. WOOD: Mr. Chair, if I may, we have an example that is very similar right here in Alberta, the Pine Coulee Reservoir.

It's an off-stream storage reservoir, with a diversion structure located on the river channel, and a diversion channel that takes the water from the diversion structure to the off-stream storage reservoir. That water is held there and then released for later use.

Q. Can you tell me how did -- how did AT arrive at time estimates for various locations during -- as a result of the failure of the embankment? Is that inundation mapping that provides those time estimates?

A. MR. WOOD: Mr. Chairman, would you please ask Mr. Secord if he could please clarify.

Q. So, for instance, my clients have wondered how it is possible that the Sarcee Bridge arrival time takes two hours when the dam is only 10 kilometres upstream with a failure of 17,000 cubic metres per second.

A. MR. MENNINGER: Sure. So the failure -- so the time -- the time is the time to peak from the analysis -- in the analysis. So I believe what you're referring to is the dam bridge analysis developed for the hazard classification for the project.

I will, again, note that that is under an extreme scenario with a -- you know, highly unlikely scenario to occur, and it also utilizes parameters in the breach analysis that are conservative for the purposes of hazard classification. That said, the numbers reported for arrival times represents the peak. So a breach takes a while to occur; it doesn't instantaneously show up in the river.

And so those elements that you're talking about is from time to breach -- time of breach of the reservoir to the peak downstream. So that's -- that would be the timing that you're referring to.

Q. Sorry, go ahead, Mr. Wood.

A. MR. WOOD: If I may supplement my colleague's response. We ask the Board to remember that when water flows down a channel like that, especially large

volumes suddenly, it's not what a lot of people envision which is a wall of water coming or a torrent of water, it is a series of fills and spills.

When the -- when the rate is coming very high, it takes -- still takes some time to fill up those areas of the floodplain and work its way down. So it's maybe a common falsity that water can move very, very quickly down a channel. It takes time just by the nature of how it flows in the scenario.

MR. FITCH: Mr. Chair, it's Gavin Fitch. I don't know about anybody else, but Mr. Wood's video has gone off on my screen. I could hear him fine, but couldn't see him. There he is.

THE CHAIR: It was the same here, and I heard him fine, so I let it go. Thank you, Mr. Fitch.

A. MR. WOOD: My apologies.

Q. MR. SECORD: And how long would it take for the peak to reach Range Road 440 on the south side of the embankment?

A. MR. MENNINGER: One moment.

Mr. Chairman, our analysis does not present that specific arrival time in our analysis, so I can't offer a specific time for that.

Q. Would it be a matter of minutes? If it takes two hours to get to the Sarcee Bridge --

A. MR. MENNINGER: It would be -- I don't know what that -- I guess I don't know what a matter of minutes means. It would be less than the time of Sarcee, correct, probably within the hour.

Q. What is the diversion rate of the Pine Coulee Reservoir?

A. MR. WOOD: Mr. Chairman, can I request a brief caucus?

Q. While you're doing that Mr. Wood, what is the storage capacity of the Pine Coulee Reservoir? Is the reservoir fully emptied, and is Pine Coulee a wet reservoir and used as a park?

A. MR. WOOD: The question is noted, thank you.

Again, if I may, may we have a brief caucus.

Q. Yes, sure.

A. MR. WOOD: Thank you.

THE CHAIR: Welcome break, Ms. DiPaolo.

All good? Okay.

A. MR. HEBERT: Mr. Chair, it's Matt Hebert. The Transportation panel should be returning from the breakout room if Zoom is treating us kindly today.

Mr. Svenson is in a position to respond.

THE CHAIR: Thank you.

A. MR. SVENSON: Good morning, Mr. Chair. This is Mark Svenson.

So, yes, in reference to the Pine Coulee Reservoir, the volume of Pine Coulee Reservoir is 50,000 dam cubes, so 50 million cubic metres of water, and it has a dam length of 3.5 kilometres.

It does not completely empty, so it is -- it does hold some water during -- year-round. And there are some park-like amenities that do surround the top of that reservoir.

Q. So it's not a mud bowl, as Mr. Copithorne stated earlier in the week, Mr. Svenson?

A. MR. SVENSON: Pine Coulee Reservoir does not completely empty, but I don't think Mr. Copithorne mentioned Pine Coulee at all.

Q. And what river does Pine Coulee divert?

A. MR. SVENSON: Pine Coulee diverts Willow Creek.

Q. And what is Pine Coulees's low-level outlet rate?

A. MR. SVENSON: That is not a figure that I have.

Q. And is Pine Coulee in a mountainous flood region with all kinds of debris coming at it from the headwaters of Willow Creek?

A. MR. SVENSON: Pine Coulee Reservoir is in the foothills of Alberta.

Q. And are the headwaters of Willow Creek comparable to the headwaters of the Elbow River?

A. MR. SVENSON: The headwaters of Willow Creek

extend to the east slopes of the mountains.

Q. Is there a debris deflector at Pine Coulee?

A. MR. SVENSON: I'm unable to answer that one at this time.

Q. I thought you were on that hearing, Mr. Svenson?

A. MR. SVENSON: Pine Coulee? No, I was never on...

Q. You were on the Little Bow, was it, Highwood hearing?

A. MR. SVENSON: I was not on a hearing for either.

Q. Okay, I thought somebody on -- I thought I made a note that somebody on the panel had been on one of the previous NRCB hearings. Maybe I got that wrong.

And the purpose of the Pine Creek project is for irrigation?

A. MR. SVENSON: The reservoir serves a number of purposes, one of which may be irrigation.

Q. And one of the other purposes is water and conservation?

A. MR. SVENSON: I don't know. I'm not going to claim to know all of the purposes of Pine Coulee Reservoir.

Q. Well, let's move away from that example of a -- it's not a dry dam, then, Mr. Svenson?

A. MR. SVENSON: As I mentioned, no, it is not a dry reservoir.

Q. Let's move on to diversion capacity.

My clients would like to know why was 600 cubic metres per second chosen?

MR. FITCH: Mr. Chair, it's Gavin Fitch. I believe it's fair to say the witnesses have, in the course of the hearing so far, explained many times how the 600 metres cubed per second diversion rate was -- or why it was selected. And I mean, you know, my friend, of course, is free to ask whatever questions he wants, but it seems to me in the last hour or two in particular, we've really been re-ploughing very old ground. And so I just -- I question why we need to keep asking the same questions over and over again.

MR. SECORD: Well, I don't think I have asked that question, and I don't think I have re-ploughed any new ground or old ground.

Every question has been, to my mind, quite different. But my clients would like to know whether there would be the ability to divert more than 600 cubic metres per second. And contrary to what Mr. Fitch says, that question hasn't been asked.

MR. FITCH: That's a slightly different question, and I'm fine to let the witnesses answer.

THE CHAIR: And, Mr. Fitch, you know, from my perspective, I've -- we have received time requests

from folks, we have honoured those time requests. So from Chair's and Panels's perspective, you know, we've given a lot of deference on questions, in part, because it's not our job to sort of, you know, tell you what questions are appropriate or not, but also because there's a time limit.

We may have been a little more watchful of repeating, and that sort of thing, if we had no time limit set, but Mr. Secord has his time, and to some extent, I guess, you know, really, Mr. Secord, if there are some repeat questions, it's your time. But so --

MR. SECORD: Thank you, sir.

Q. So my clients would like to know is there an opportunity in SR1 to divert more than 600 cubic metres per second at the peak?

A. MR. MENNINGER: Mr. Chairman, this is John Menninger. The design, the maximum design rate for the channel is 600 cubic metres per second, as explained previously. So the design is not intended to divert more than 600.

Q. And then, Mr. Menninger, would it be fair to say there is no opportunity to divert more; that's the max. Would that be fair?

A. MR. MENNINGER: That should be viewed as the max.

Q. Okay, thank you.

So my understanding is that there is much debris left over from the 2013 flood upstream from the diversion inlet. I don't know if that's correct or not.

Can you tell me, does -- has -- has AT or Stantec considered what the existing debris field is upstream of SR1 as a result of the 2013 flood?

A. **MR. WOOD: Mr. Chairman, this is Matt Wood. Yes, that was explicitly considered. I don't have the reference at hand right now, but in the materials, you'll see there's maps quantifying that debris using the air photos.**

Q. And is there concern that in a design flood in the future, that debris field may be mobilized and come barreling down the Elbow at the SR1?

A. **MR. WOOD: Mr. Chairman, this is Matt Wood again. It doesn't use the word "barreling down," but it does look at the potential for remobilizing some of that degree from the bars, and that's what was used in the design of the debris deflection barrier.**

Q. And in terms of the operation of the debris deflector barrier, will that debris then essentially bounce off of the deflector for the most part and then go on down -- downstream past the SR1 structure?

A. **MR. WOOD: It -- Mr. Chair, this is Matt Wood**

again. It has been designed as such. You know, as we discussed yesterday, there's a lot of analysis looking at impacts from accumulation and clogging, again, similar to some of the redundancies. It's been designed to promote the passage of debris downstream, but its design does not rely on the passage of that debris downstream.

Q. Now, the community -- in terms of transportation risk, the project has removed community detour roads.

Does the proponent agree that the original recommendation to upgrade range -- Township Road 250 and to upgrade Range Road 40 with a dedicated turn lane, can you tell me where those projects sit today, in terms of transportation risk from the SR1 project?

A. MS. CARIGNAN: Yes, Mr. Chairman. This is Yvonne Carignan.

I believe what Mr. Secord is referring to is my response from Monday when I had indicated that those two pieces of the project had been removed, as part of Undertaking 11 from Topic day 2 as -- sorry --

Q. Go ahead. Is that the one that was just filed this morning?

A. MS. CARIGNAN: That is correct, Mr. Secord, yes.

Q. I haven't had a chance to look at that yet, Ms. Carignan.

A. MS. CARIGNAN: Can you just give me one moment, Mr. Secord?

Q. Sure.

A. MS. CARIGNAN: Mr. Secord, if -- and Mr. Chairman, if it pleases you, I could actually summarize the contents of that undertaking here right now.

Q. That would be great.

A. MS. CARIGNAN: I don't know if it's possible, but it may be helpful to actually pull up the response to that undertaking.

Q. Has that been given a number, Ms. Friend?

MS. FRIEND: Yes. It's been given 369, but, document manager, you'll have to go to the website. It's not on the exhibit list yet.

THE CHAIR: I'm not sure about the size of this one, but the one that we got last time was 3 gigabytes, which is why it did take document manager a little bit of time to download it off the web. I think it was a 3000-page part of the EIA, so. This one looks to be a lot shorter, but if there's a delay, often that's what it is.

A. MS. CARIGNAN: This is not the right document, sorry. It's only a one-page document.

MR. SECORD: I got an email from Mr. Fitch this

morning, I thought with some undertaking...what's the description of it?

MS. FRIEND: I've got it named as the response to Undertaking 11, 369, but it looks like a -- may have saved the wrong document on there.

Can you open that, Sylvia?

Oh, there it is. And scroll down, I think it's -- there it is.

A. MS. CARIGNAN: Excellent. Thank you very much. It may be helpful to zoom this in just a little bit so that everyone can read it a little bit more easily, in particular, to focus on the three options near the top -- oops -- sorry. Right there where it says "Response" there. So there's a 1, 2, and a 3.

So earlier in the project, the department had considered three options for addressing traffic concerns when flow was being diverted, and one of those was to raise Springbank Road.

Another one was to retain the existing Springbank Road, and divert traffic north along Range Road 40 and then westward along Township Road 250.

And then the third option was to realign Springbank Road to the south and run it along the crest of the dam.

So, as part of that earlier analysis, everything

was kind of given a rating of good, average or poor, and Option 2 came out as the clear winner.

Further to that, if you could just scroll down a little bit more, there were discussions this week after concerns were raised by stakeholders that improvements weren't going to be made to Range Road 40 and Township Road 250.

So I'm happy to report back that Alberta Transportation, as part of this undertaking, is going to be improving Range Road 40 to a county collector road, as well as improving the intersection of Township Road 250 with Highway 22 for improved safety.

Q. And will that Range Road 40 have a dedicated left-turn lane?

A. MS. CARIGNAN: That would be subject to the engineering design, Mr. Secord. Mr. Chairman, I can't speak to that yet. We would need to proceed with more detailed engineering on that.

Q. Thank you, Ms. Carignan. Now, in terms of potential conditions -- I know my clients don't like me asking questions about conditions because, obviously, they made their views pretty clear about what they view the project -- but in the event that an approval was provided to AT for this project, my clients believe

that the community must be engaged in the creation of an early warning system, including methods of communication.

And so from an emergency planning point of view, would AT provide a commitment to engage the community in a thorough way to create an early warning system in the event of some malfunction with SR1?

MR. FITCH: Mr. Chair, it's Gavin Fitch, just while the witnesses are conferring, I would just simply note for the record that one potential difficulty with the question being asked is that the evidence on the record already is that the emergency management plan will be created by Alberta Environment and Parks, not Alberta Transportation.

So I just wanted to, I guess, flag that potential issue.

But happy to now turn it back to the witness panel.

A. MR. HEBERT: Mr. -- Mr. Chairman --

THE COURT REPORTER: Sorry, who's speaking?

A. MR. HEBERT: My apologies, it's Matt Hebert.

A couple aspects to the question. One, as part of the development of the emergency management plan that Transportation counsel referred to, there is engagement with stakeholders, particularly the local authority,

there are certain protocols that must be followed when building a structure of this nature.

I also noted this morning the interest of Transportation in engaging with local landowners in the community as it relates to the finalization of these plans and to ensure that they're kept up to date of the development, that they're aware of the implications to them from a public safety perspective.

You asked a very specific question about a specific system. I propose that, subject to the advice of our counsel, that's taken on as an undertaking.

UNDERTAKING - TO ADVISE WHETHER AT WOULD PROVIDE A COMMITMENT TO ENGAGE THE COMMUNITY IN A THOROUGH WAY TO CREATE AN EARLY WARNING SYSTEM IN THE EVENT OF SOME MALFUNCTION WITH SR1

Q. MR. SECORD: And then to Mr. Fitch's point, we're in a situation where really AT, presumably, you know, gets the -- goes through the regulatory process, gets the approval to construct, I guess then you do the construction, and then, at some point, you hand it off to Alberta Environment to operate. Do I have that right?

A. MR. HEBERT: That's correct, sir.

Q. And so is Mr. Fitch right in the sense that, would

there be no emergency plan in place during construction while AT is still notionally the owner of this dam?

A. MR. HEBERT: Mr. Chairman, I would invite the appropriate person on the panel to provide a response on emergency management during construction.

A. MR. MENNINGER: So the emergency management plan will be developed during the construction period.

And, you know, the nice thing about SR1 is that it is off-stream, so we will not operate as a dam until we have an emergency management plan. So that it -- and it's been approved. So we choose to operate, right? Not if -- we're not in the river.

Q. So do I understand, then, you don't need an emergency plan to construct the work in-stream, to put up the diversion gates?

A. MR. MENNINGER: So the river will be running through without -- without the tension or -- during that period of time.

Q. So you're able to construct the diversion gates in the river while the river is flowing?

A. MR. MENNINGER: We will -- as -- as the application demonstrates, we will divert the river around the construction works for a period of time, and those construction works will be protected in an -- encompassed within an isolation, but it won't -- the

thing that's protected in that scenario is only the construction works.

Q. And --

A. MR. MENNINGER: So it's surrounded by a berm.

Q. Does the diversion around the construction works create any additional risks for any of my clients who are adjacent to the diversion in the event a flood event coming down the river?

A. MR. MENNINGER: We don't foresee any additional risks associated with the diversion.

Q. So in relation, then, to the emergency planning document, is AT in a position, then, to pass on -- to make a commitment to conditions that would be passed on to the operator?

A. MR. HEBERT: Mr. Chairman, as -- as the proponent to the department currently responsible for the project, conditions then are -- that we applied as a part of this regulatory proceeding in the transfer to AEP would equally apply to them as to what would then be the department responsible for the Springbank project.

Q. So then Alberta Transportation would have no objections concerning the NRCB imposing conditions that would be passed onto the eventual operator of this high consequence dam?

A. MR. HEBERT: Mr. Chairman, as I just stated, Alberta Transportation as proponent is the department responsible for the project up until the point where the project is transferred to Alberta Environment and Parks, or the department that may be responsible for the operation of -- of these types of projects in the future.

Those conditions are attached to the project, regardless of the government department responsible at the given time.

THE CHAIR: Mr. Secord, perhaps I could just interject. This comes up with NRCB often. I see Mr. Kennedy is back. I was going to ask him to perhaps explain how the NRCB has dealt with this before.

But we are not the downstream regulator, so we've faced this before, and we do have conditions that are returnable to Alberta Environment as an example -- most often it's Alberta Environment, so is this is not uncommon for the NRCB to -- in terms of approvals that we have issued in the past.

Mr. Kennedy, would you mind maybe just weighing in?

MR. KENNEDY: Well, I'd love to weigh in, but I was on the phone with Mr. Williams dealing with a procedural question. So I totally missed the

discussion on the table, if you --

THE CHAIR: Sure. So, Mr. Kennedy, it's kind of being punted back and forth in terms of AT's willingness to accept conditions, and then what happens after the project has passed from AT on to AEP as the ongoing operator, because some conditions may in fact be operating conditions well after AT has raised the project.

And I just wanted to shed a little bit of light in terms of NRCB's past experience, because this comes up often, and we've issued conditions in the past when projects have been approved; and if you could just maybe add to that in terms of how we deal with it.

MR. KENNEDY: So if the question is, will those conditions carry forward to future custodians of the ownership of the project, absolutely. Those conditions flow with the project.

And it's pretty common, both with public projects, which typically are advanced, in this case, by Alberta Transportation and will move to Alberta Environment, or with private sector projects where there's a change in ownership that takes place sometime post-NRCB approval.

MR. FITCH: Mr. Chair, it's Gavin Fitch again.

I want to be clear that, obviously, any condition

that's imposed by the NRCB in an approval will bind AEP as the eventual operator. I wasn't intending to say or imply anything different.

My comment was more directed at AT's ability to commit to things which are operational, given that it won't be the operator. I was just simply -- the distinction, then, is between -- if it's a condition that's been imposed by the NRCB, then so be it.

But I think my friend is going down the road of asking AT to make -- would you commit to do this, would you commit to do that.

The point is that, to the extent the commitments relate to operations and AT won't be the operator, they're just saying there might be -- depending on what the requested commitment is, it might be difficult for AT to provide that commitment. That's all I was trying to say.

THE CHAIR: Thank you.

MR. SECORD: Thank you. Thank you for that clarification, Mr. Chair, Mr. Kennedy, Mr. Fitch.

Q. Ms. Carignan, in relation to the cost of the road upgrades, can you advise me what the projected costs are and whether they can be added into the project budget in Appendix G-2 to Exhibit 159?

A. MS. CARIGNAN: Mr. Chairman, that would be

subject to additional engineering.

The investigation that's been done to date is very conceptual, and the cost estimate, cost opinion, that was provided in that report is at a preliminary engineering stage, so it's considerably more advanced, and I would not consider that to be accurate.

Q. Could you undertake to provide a more accurate cost of the road upgrades that AT is now agreeing to implement?

A. MR. HEBERT: One moment, Mr. Chairman.

Mr. Chairman, subject to the advice of counsel, Alberta Transportation will take that as an undertaking.

Q. Thank you, Mr. Hebert.

UNDERTAKING - TO PROVIDE A MORE ACCURATE COST OF THE ROAD UPGRADES THAT AT IS NOW AGREEING TO IMPLEMENT

Q. MR. SECORD: My clients are concerned about the initial filling of the dam.

So going to Mr. Fitch's caveat about operations, my clients would like to have the capacity of the reservoir restricted for a first fill and would like to see the reservoir gradually increased over time, rather than allowing a large flood to be a first use.

And I'm wondering, is that a condition that would be acceptable to Alberta Transportation, that there be

some, essentially, gradual breaking -- kind of breaking in the SR1, rather than getting it filled, you know, up to FSL in an initial flood?

A. MR. HEBERT: Mr. Chairman, I -- the Transportation Panel would like to caucus, if that's acceptable to you?

THE CHAIR: Yes.

Ms. DiPaolo is probably enjoying the pace of this cross-examination. Appreciate your work, Ms. DiPaolo, and Ms. Vespa, in particular given these proceedings have a lot more technical information than perhaps other proceedings that you record, so...

So we're back, Mr. Hebert.

A. MR. HEBERT: Yes, Mr. Chairman, I believe the Transportation panel should be reentering the main room.

So, to respond to the question, and I'll invite Mr. Menninger to supplemental, you know, I do appreciate where the -- where the question is coming from. But, unfortunately, it's not an item that we can consider.

We expect that the -- you know, should the project be approved, that it will be in a position to perform the function that it's intended to do, which is to provide the flood mitigation on the Elbow River to

the -- to the design levels, the design storage capacity.

That -- that's assuming again that it's been built to the standards required, that it's been -- it's been tested, it's been commissioned, and it is in a position to be -- to be used for its -- for its purpose.

I would invite Mr. Menninger to provide some background to the Board on what would occur in the event the reservoir is used on -- on first go.

A. MR. MENNINGER: Sure. So, Mr. Chairman, I believe as we explained previously, you know, we will have a first filling plan for the project with the proposed operations, the proposed monitoring of instrumentation during the process, the proposed observations to be performed by the owner/operator and engineering teams. At that time, that process will also involve management and emergency response elements. The system will be observed and monitored throughout that filling, and we will have interventions in place as necessary or appropriate to react.

If -- if an issue is to occur or be observed, you know, the -- that would require a significant intervention, we would shut off the flow to the reservoir and proceed through the intervention process through that manner.

Q. MR. SECORD: Another condition for your consideration, MC1 would have protected Bragg Creek and significant flow rates, future floods may impact Bragg Creek's access at Balsam Avenue Bridge, which is the only access point for West Bragg Creek.

Will the proponent provide a secondary emergency access road for Bragg Creek residents on the west side of Bragg Creek as a condition of an approval of SR1?

A. MR. HEBERT: One moment, Mr. Chairman.

Mr. Chairman, as referred to earlier this week, the berms at Bragg Creek are delivered by the local authority. Certainly, the concern regarding access roads is noted, and if it's -- if it's okay, Alberta Transportation could raise the concern with -- with Rocky View County as the local authority responsible.

Q. The next -- the next condition actually relates to Rocky View County, in particular, emergency planning expenses for SR1.

Will the proponent be providing funding for Rocky View County to have the ability to respond to a dam malfunction?

A. MR. HEBERT: Mr. Chairman, as we've described today, there is a process through which emergency management planning occurs as a result of the dam.

I would expect that -- that Transportation where AEP would be in discussions with Rocky View County regarding matters that are -- that are contemplated in response to that plan, I would not believe it's appropriate at this time to make a financial commitment, subject to discussions with the local authority.

Q. A further condition: Will the proponents agree to provide additional funding over and above the new disaster recovery limitations of $500,000 one time for homeowners in Rocky View County, not limited to Bragg Creek, Springbank, and Elbow Valley, considering that MC1 would have provided superior flood mitigation for these communities?

A. MR. HEBERT: Mr. Chairman, as was raised earlier this morning, the jurisdiction of disaster recovery funding sits with a different government department, that being Department of Municipal Affairs. Their response to disaster recovery is a matter of public record, and certainly questions regarding local flood mitigation are within the jurisdiction of the local authority.

Q. Perhaps as a further condition, will the proponent apply to have SR1 classified as critical infrastructure to adequately address risk of terrorism, et cetera?

A. MR. HEBERT: One moment, Mr. Chairman.

Mr. Chairman, subject to the advice of counsel, Alberta Transportation will take that as an undertaking.

UNDERTAKING - TO ADVISE IF THE PROPONENT WILL APPLY TO HAVE SR1 CLASSIFIED AS CRITICAL INFRASTRUCTURE TO ADEQUATELY ADDRESS RISK OF TERRORISM, ET CETERA

Q. MR. SECORD: My clients would like to ask whether, as a condition of an approval of this project, whether AT would retain an independent dam engineering firm to conduct an independent assessment of MC1 versus SR1 to perform flood mitigation effectiveness at various flood rates and hydrographs and operating risk assessments?

A. MR. HEBERT: Mr. Chairman, on account that we're advancing the application of SR1, we're not prepared to undertake that as a condition of approval.

UNDERTAKING - AS A CONDITION OF APPROVAL FOR THE SUBJECT PROJECT, TO ADVISE WHETHER AT WOULD RETAIN AN INDEPENDENT DAM ENGINEERING FIRM TO CONDUCT AN INDEPENDENT ASSESSMENT OF MC1 VERSUS SR1 TO PERFORM FLOOD

MITIGATION EFFECTIVENESS AT VARIOUS FLOOD RATES AND HYDROGRAPHS AND OPERATING RISK ASSESSMENTS - REFUSED

MR. SECORD: Mr. Chairman, I have reached, I believe, 11:30, and those are all of my questions. Thank you very much.

THE CHAIR: Thank you, Mr. Secord.

Mr. Williams, I understand that you may have some questions for Alberta Transportation. Are you online and is that correct?

A. MR. WILLIAMS: That's correct.

THE CHAIR: Okay, please proceed.

MR. WILLIAMS CROSS-EXAMINES THE PANEL:

Q. Two questions with regards to safety and security.

In regards to the diversion barrier and, in the time period of a flood event, is there a protocol and procedure in place for debris downstream so that sweepers, et cetera, do not re-divert the river creating flood events somewhere else and/or to ensure the channel is -- is clear to allow the flow of water to go its natural course?

A. MR. WOOD: Mr. Chairman, this is Matt Wood. I can answer that, and thank you for your question, Mr. Williams.

The project will not increase the amount of debris

that comes downstream. In a flood, currently debris is washed down there, and it's moved around in a rather chaotic manner, as I'm sure you know, depositing in different places.

As we mentioned, while the debris deflection barrier is designed to help promote this material moving downstream, it's also very likely to accumulate onto it as well. So, if anything, there might be a slight reduction in that debris downstream, but it shouldn't have a negative impact in the manner of which your concern is, which I believe is public safety, things like sweepers and stuff. It should have no impact on making any of that worse.

Q. Yeah. Just my experience of water and how it flows if it -- if it piles up somewhere else further downstream, I guess my question is is there policy -- or sorry, protocol or procedure to clean it to ensure that the flow of the river maintains its natural course? That's -- so, in essence, I think you've answered that, but I do think that's important. So that's the first question.

The second question, and this is to do with Mr. Menninger's presentation yesterday on safety -- safety and security at the site during the operation of a flood event. Has the Alberta Transportation

considered safety and security in a non-flood event, and the other period of time that the facility exists; i.e. winter, people that are tobogganing down the slopes, or skateboarders in the parking lot, or teens breaking in at night, has there been any thought process for procedures and policies in regards to the non-operational safety and security?

A. MR. MENNINGER: Absolutely. This is John Menninger responding. Mr. Williams, safety -- and I believe I mentioned this before, as with -- in the non-operation periods for the project has been one of the key concerns for the design team. And so one of the tenets I think I mentioned was that we design most of our concrete and hydraulic structures not to retain water. So there's no drowning hazards on site, you know, for -- you know, like an retention pond might have or other components, because it's difficult for us to fence things that are in the active floodway -- flood pathway, as you might imagine.

Similarly, we are also mindful of the potential for falls from high walls and things like that, so all of our proposed walls and elements have railings and other fall arrest prevention components.

You mentioned skateboarding. We actually have -- at the outlet of the channel is like a stepped spillway

structure that may look desirable for folks to be on a bike or a skateboard or something to go down. But that structure will be actually constructed of something called roller compacted concrete. And a feature of roller compacted concrete is that it has a rough surface. It's not like the smooth concrete that you would form. It's actually very rough, and you would not want to skateboard on this. It would be very uncomfortable and we actually thought about that as well.

So these things are all considerations, you know.

I think to mention one other element. The areas that, you know, of high security we have fenced with, you know, chain-link fencing and gates in other elements. But the realization is that it is a very big project site, and so other elements -- we made these concerns because we anticipate the potential access from others, and we can't restrict them.

And so all of those elements have been incorporated into the design with that consideration, to make sure if those unauthorized access, you know, were to utilize it for manners that we -- that the design team could think of and implement.

Q. Excellent. I just want to ensure the unintentional incidents that are being considered, so -- and that

would be all my questions.

THE CHAIR: Thank you, Mr. Williams.

Mr. Wagner? I believe Mr. Wagner had -- I thought he might have had questions.

Are you online, Mr. Wagner?

MR. WAGNER CROSS-EXAMINES THE PANEL:

Q. I am. I continue to research for a specific map, and I kind of need Mr. Secord's help here because he was the one that requested it get brought up.

I'm wondering if we can break a little early and I can request Mr. Secord's help here.

MR. SECORD: Mr. Williams, do you know the -- can you describe the map to me?

MR. WAGNER: It was brought up as -- when you were talking about the fingers on our property, and it's a different map than I've seen before.

MR. SECORD: So that would be exhibit --

MR. WAGNER: I've literally been through thousands of --

MR. SECORD: I agree, but I think you might want to turn up Exhibit 254, PDF 114.

THE CHAIR: Thank you, Mr. Secord.

And that map you're talking, Mr. Wagner, that was yesterday; is that correct.

MR. WAGNER: You know, Mr. Chair, I wished I

could point the exact time. I've actually gone through literally everything that I can think of to try and find that map, and it's a unique map so.

MR. SECORD: Yeah, and I think if we go to PDF page 115, you'll see the fingering. And Mr. Wood may be able to help us because he referenced another map with fingering as well.

So between Mr. Wood and I, I think we'll be able to help you, but try Ms. Hunter's presentation, which is Exhibit 254, PDF 115, and maybe we'll go from there.

THE CHAIR: Ms. Kaminski, if you can get that one up, thank you. Page -- sorry, was that 11 you said?

MR. SECORD: 115.

THE CHAIR: 115.

MR. WAGNER: Yeah, unfortunately, this is not it, Mr. Secord. What the map actually showed was something that is sticking in my brain and is the difference between the 200-year flood line in front of our house, and it was an expanded map, and a black line that it was actually on the east side of our house.

MR. SECORD: Yeah, yeah. That was the one that Mr. Wood brought up yesterday.

A. MR. HEBERT: If I can assist, Mr. Chairman. I'll have Mr. Wood identify it in the effort to advance

this discussion.

THE CHAIR: Thank you.

MR. WAGNER: I can ask a couple other questions, Mr. Chair, in advance of bringing up that map.

THE CHAIR: Let's do those first. Thank you.

THE COURT REPORTER: Sorry, can I have Mr. Wagner on the screen, please?

MR. WAGNER: Oh, most certainly, although I am in the country, so I apologize if it doesn't come up well. Is that better?

THE CHAIR: Well, yeah, it doesn't look -- well, yeah, we've got you now. We'll see how long that lasts, but, Ms. DiPaolo, he may not be moving, so it may be a little tricky, but you'll hopefully have his voice now between Mr. Wood and Mr. Wagner. If not, just hold up your hand, I'll try to watch for you, if you don't know who's speaking and we'll identify.

Mr. Wagner, perhaps you can do that as well. When you start, just identify yourself for Ms. DiPaolo.

MR. WAGNER: Most certainly, Mr. Chair. This is Scott Wagner.

THE CHAIR: Thank you.

Q. MR. WAGNER: My first question for the panel or for the GoA is have you been in touch with the local

fire departments re fire safety within the SR1 footprint?

A. MR. HEBERT: Mr. Wagner, are you speaking about the construction phase of the project or the operational phase of the project or both.

Q. I would say both?

A. MR. HEBERT: To date, no, but I would anticipate that both, for the construction phase and the operational phase, that would be one of the organizations the constructor and operator will have to be in contact with.

Q. I would like to bring forward an undertaking for the -- for Alberta Transport. In 2010, Bragg Creek fire department was stationed in our yard, and there was a grassfire west of us. And by your maps, we have a boreal forest on our property.

By the grace of God, we got a southeast wind that actually diverted that grassfire north to Highway No. 1 just west of our property.

The fire department was stationed in our yard. Interestingly enough, they passed on information that they will not go into the field to fight a fire, and as in my submission, I am quite concerned about fires. And so my undertaking would be should the NRCB approve this project, would the GoA engage with local fire

departments to change policy and enable grass firefighting?

A. **MR. HEBERT:** **Mr. Chairman, I think it would be appropriate that we take that away as an undertaking, to provide a written response.**

THE CHAIR: Thank you.

UNDERTAKING - TO ADVISE IF THE GOA WILL ENGAGE WITH LOCAL FIRE DEPARTMENTS TO CHANGE POLICY AND ENABLE GRASS FIREFIGHTING SHOULD THE PROJECT BE APPROVED

Q. MR. WAGNER: If I could get Exhibit 131, page 1962 brought up. It should be a map showing the boreal forest or the forestry. Could I get that expanded to the fingers on the map, which is our property?

THE CHAIR: That would be the upper sort of left corner.

Q. MR. WAGNER: Yes, thank you. It appears as though we have, according to your map, the majority of the forestry on this particular template of the SR1. And I would like to ask the GoA, upon a flood event, it is highly probable -- I'm not an expert in this area, but I have seen it happen -- all the trees die. So we'd be left with a standing forest in percentage of

the dam footprint that would be a severe fire hazard.

Has the GoA considered the implications of this?

A. MR. WOOD: Mr. Chairman, this is Matt Wood. While we have this open, if I may, I may request that the document controller open up another figure that actually zooms right in on this location where you can see on an air photo, and it might allow me to help describe. And maybe if you could keep this open in case Mr. Wagner wants to reference it as well, we can go back and forth.

The figure that I'm requesting is Exhibit 159, page 244, and it is the engineering drawings. I may have provided the wrong exhibit. That appears to be the report. One moment, please.

A. MR. MENNINGER: Matt, that's correct.

A. MR. WOOD: Thank you, Mr. Menninger. It was page 244, please. Seems to be having that scrolling issue. Perhaps if you could go down and -- fully down and up, it should work.

My apologies, perhaps if the figure is struggling, we could explain it with the other one.

As I've described the other day to Mr. Wagner that the flooding in this area is really -- up the fingers is the low-lying area that is currently occupied by the watercourse from the Unnamed Creek channel.

The reason why I was trying to bring this figure up is to show that many of the trees that Mr. Wagner speaks of are not inundated. I understand in this map here that was previously brought up, it shows some of that dark green in that area, but what I wanted to show here -- was to allow Mr. Wagner to see that many of the trees themselves in this area would not be submerged in a design flood event or even one that -- even up to that top of dam level.

Q. As a follow-up question, Mr. Wood, there is a significant amount of long-living, very hot-burning willow, it's diamond willow here in the footprint, which is in the bottom. And it probably is under the same conditions; it probably won't survive flood event.

So has the GoA considered the fire hazard of the diamond willow?

A. MR. WOOD: I believe this may be a question for the vegetation experts on the project.

A. MR. BRESCIA: Mr. Chairman, it's Mr. Brescia. So what we can see, if you actually go back to that Exhibit 131 figure that Mr. Wagner had brought up, you can see there that the black line represents the PDA, which as Mr. Menninger explained previously, is the top of the dam elevation.

So it's -- it's even further out than the designed

flood elevation would be.

And while there is some -- some broadleaf forest and some shrub land identified in there, we don't expect either the water depth to be great enough or the time of inundation to be long enough to create substantial loss of vegetation in this area from inundation.

So we would think that the -- the risk of those -- that vegetation dying would be quite low.

Q. I've got an undertaking for the GoA, and despite that particular comment back, should the NRCB approve this project, would the -- would the GoA consider options for removing the call it damaged forestry after a flood event? By "removing," I would say mowing, by the way, don't talk about digging it out. But is -- I read about other dams, and if we leave the forestry in place, it has a problem; on the flip side, the forestry has been removed with some other dams?

A. MR. HEBERT: Mr. Chairman, it's Matt Hebert. I would suggest that we add this to the undertaking that we're preparing for Mr. Wagner.

Q. Thank you, very much, Mr. Hebert. By the way, just as a general comment, I'm really conflicted about this Mr. Hebert. The forestry does give excellent cover for the elk, and it hides the elk calving in the spring.

And that may have a significant impact on hunting as you can see the elk from the road.

So I'm a little -- I am highly conflicted on this area, so I think there's other implications, as well.

A. **MR. HEBERT: Mr. Chairman, if I may, you know, I certainly appreciate what Mr. Wagner is saying. I don't want to preempt or prejudge our response.**

But as I've referenced before, we'd certainly appreciate continued engagement with Mr. Wagner, in terms of understanding his concern as it relates to the impact of the project on his property.

Q. If I could get Exhibit Number 64, page 264 brought up.

THE CHAIR: Just a large file; it will be loaded in a minute.

MR. WAGNER: Yes, it took me a while to load it up this morning, as well, Mr. Chair.

THE CHAIR: Do you see it?

MR. WAGNER: Looked like the correct -- there it is, 264. I was going to say there was a -- it was a much larger file. I apologize. This is not the map that I'm looking for, but I will deal with this.

The map that I was looking at actually had the rainfall in Springbank, and it had a particular area identified as a rainfall area. And if I remember correctly, and I apologize if I get the facts a little

bit off, but 32,000 dam cubes was the -- I believe the amount of rainfall from the Glenmore Dam up to the area past the SR1. So it would be the amount of water flow potential that would come down.

And I've heard it referred to for the first -- you know, first time, they call it "Unnamed Creek." In my background, I think I'm showing Unnamed Creek in my background.

Has the GoA determined how much additional flow that would come into the dam from all sources around the area of the SR1? And I think Unnamed Creek is one of them, but there's also -- it is Springbank, and there is a number of springs in the area.

And obviously rain flow has a big impact on that, so I think that information -- some of the information is available. Have you calculated that?

A. **MR. MENNINGER: Mr. Chairman, this is John Menninger, this is John Menninger. I can respond to that.**

Yes, Mr. Wagner, we have. And we -- and I think you may have referred -- you've heard us perhaps refer to the different volumes that we've added to the storage reservoir for, you know, with what's required for the 2013 event, what's required -- and then some additional capacity for sediment and then -- but then

we also added the capacity to take on a localized rainfall event. And all of that is added to the number that gets to that line that's shown on your drawings, that 1210.75 elevation.

So that's all-encompassing of the 200-year event, the additional volumes associated potentially with that buffer, and -- and an additional volume for rainfall to the reservoir.

So we looked at in that -- in that term to make sure we understood kind of how high the water could get within the reservoir, and then we've also looked at it in terms of the capacity of the culvert underneath 22. We've looked at it -- the capacity of the low-level outlet to make sure we're not -- that it in itself is not going to cause a backup from localized rainfall either during construction or afterwards, as well.

So yes, indeed, we have looked at that as part of the design.

Q. Thank you, John. I do have a couple of probably more pointed questions coming up here.

So in the event, I think I heard 70 percent of the rainfall would come down, as opposed to 30 percent would get absorbed by the ground, if I got that correctly.

But anyway, the long and the short of that is if

the reservoir is full and in the event of 2005, we saw -- and I see that in your documentation that there was more flow in 2005 than in 2013 in the Unnamed Creek, if I got that correctly, which would verify our observation here, though, you got the reservoir full, and you got water coming down from areas around the reservoir, how do you deal with that and will that cause a difficulty with overflow on the dam?

A. **MR. MENNINGER: Sorry, this is John Menninger. So a couple -- if I understood the question, the -- so the capacity for the reservoir will only be exhausted, you know, for that 1 in 200-year timeline that we're talking about. Whether that's a one flood or a couple floods, you know, we looked at the capacity for -- and the probabilities of having, like 2005, when there were multiple flood events on the Elbow in the same year, and I'm sure that there was some significant rainfall in the foothills area contributing to the location. We've accounted for all that within the volume of the reservoir.**

But if the reservoir's full and there's a local rainfall event, Number 1, we'll probably be lowering the reservoir using the low-level outlet works to make some room for it. But second, as well, is that there is that emergency spillway and a very rare chance that

we would have to use it, that water that comes into the reservoir would then spill out that spillway. These provisions, the emergency spillway has an immense capacity compared to the localized rainfall.

So the threats for dam overtopping are well accounted for in the design of that spillway system.

So I hope -- I hope that answered your question.

Q. Another follow-up question, at what level of dam storage would the overflow be invoked?

A. MR. MENNINGER: So that is in excess of the 2013 flood event, like I said. So that's that 10 percent excess of that and that localized inflow. So it -- the elevation specifically is 1210.75.

Q. So with regards to that, that means that that's, in my layman terms, that would be the 77,000 dam cubes?

A. MR. MENNINGER: That's correct, yes.

Q. Boy, I got one right.

Okay, so now I got a very personal question. I only have the 200-year flood line, which has been described as 35 metres from the bottom of our house corner, and I do not have the high water -- and by the way, the acquisition line in most of the GoA's documents have the 200-year flood line and the acquisition of land, I believe it's very close, if not the same, in our yard, which seems to be rather unique

because I could show a lot of maps where they have the black line much farther out from the 200-year flood line.

So my question is how much higher is the water going to be in our yard from 70,000 dam cubes to 77,000 dam cubes, which appears to be the level that could be reached in a difficult situation?

A. **MR. MENNINGER: So in elevation-wise, they're about -- they're about a metre apart, give or take. So that depends on kind of the slope of your land from a horizontal distance, but they're not far apart because you can imagine just adding in that giant area, you, just by increasing it by a metre, you get a lot of storage.**

And so the different between that 70 and the 77 is roughly about a metre.

Q. Can you confirm that, because my rough calculations are that the dam is -- is a certain size, and I would like to have the GoA take that as an undertaking to get back to me.

A. **MR. HEBERT: Mr. Chairman, we can undertake to provide that information to Mr. Wagner.**

Q. Thank you, Mr. Hebert.

UNDERTAKING - TO ADVISE HOW MUCH HIGHER THE WATER IS GOING TO BE IN THE WAGNER

YARD FROM 70,000 DAM CUBES TO 77,000
DAM CUBES WHICH APPEARS TO BE THE LEVEL

Q. In the absence of the other map, what the other map was showing was the black line on the east side of the house, and I can't find that. And yesterday, I had -- and this is all related to this entire conversation with regards to risk of flooding in our basement.

So it does -- it's very important to me, and the impact to our house is quite a bit.

MR. FITCH: Mr. Chairman, it's Gavin Fitch. Mr. Wagner, are you referring to the map that has the black line, and then within it, there was the sort of dark blue area which represented the 1 in 200-year design, and then we had the 1 in 100 and the 1 in 10.

MR. WAGNER: Yeah.

MR. FITCH: Okay, I think that's in, I want to say Exhibit 20. It's Volume 1 I think is the project description, I'm not -- I can't recall the PDF page number but...

MR. SECORD: I think it might be Exhibit 20, PDF page 75.

MR. FITCH: That sounds right.

MR. WAGNER: And I deeply apologize to the panel. I've been looking all morning for that. Thank you, Mr. Fitch.

MR. SECORD: Yeah, I think Mr. Wood referred it to me yesterday at page 785 of the transcript.

MR. WAGNER: So are we calling that up now then.

THE CHAIR: Sorry, I think she's just getting that up now.

MR. WAGNER: And I apologize, Mr. Chair, I think I've gone over my time.

THE CHAIR: I think this was -- was this your last question on this map?

MR. WAGNER: It is related question, but it is my last question.

THE CHAIR: Okay, thank you.

MS. FRIEND: Which page, sorry?

MR. SECORD: 75, it's 75.

MR. WAGNER: This doesn't appear to be the map, Mr. Chair, unfortunately, because it was very explicit with regards to where my -- our house is. And it has been brought up over the last number of days, so I'm not sure if that was an undertaking by another party or whether it was AT that did -- what brought the map up. So I apologize.

THE CHAIR: Are the various houses identified with either a little triangle or circle?

MR. WAGNER: Yeah, no, there's lots of those,

and none of them showed the detail of this one. It actually was under a discussion that Mr. Secord was having about the black lines covering some of our access road, as well, and our two houses were shown as being within the black line.

MR. SECORD: Was that the map which had the two properties split?

MR. WAGNER: I'm not sure.

THE CHAIR: Could I suggest under the water section, which is going to deal with some other hydrology questions and that, and Mr. Wagner, I notice you have time under Topic Area 4, perhaps we could have -- Mr. Wagner, you could identify, look for that map, identify and perhaps have it ready under the next topic.

MR. WAGNER: Mr. Chair, I don't actually have time allocated in that area. So I guess if you're asking if I could be available, that would be fine.

THE CHAIR: Okay, so Mr. Kennedy, I've got -- I thought you provided this to Mr. Kennedy, Topic 4 you've got 15 minutes request for cross-examine time. But regardless, it seems like it'd be a relatively quick question, so we do have you allocated.

MR. WAGNER: Most certainly.

THE CHAIR: If you wait for Topic 4. But in

the meantime, find the exhibit and the page numbers, that would be appreciated.

MR. WAGNER: That'd be really great, thank you, Mr. Chair. I have no further questions.

THE CHAIR: Okay, thank you. So panel, if you could be ready after lunch, we could get back at one o'clock for lunch or after lunch, sorry, take about a 55-minute break, and the NRCB staff and Panel do have a few questions.

So if that's agreeable, we'll break for lunch now, and see you at 1:00.

(PROCEEDINGS ADJOURNED AT 12:03 P.M.)

PROCEEDINGS ADJOURNED TO 1:00 P.M.

Volume 5
March 26, 2021
P.M. Session

(PROCEEDINGS COMMENCED AT 1:00 P.M.)

THE CHAIR: It's 1:00. If possible to get started, Alberta Transportation. Mr. Wiebe.

And, Ms. Vespa, are you taking over this afternoon, court reporting?

COURT REPORTER: Yes, I am, Chair.

MR. SECORD: And I had one preliminary matter. It's Richard Secord speaking.

THE CHAIR: Mm-hmm, yes.

MR. SECORD: So looking at this afternoon, we have obviously cross -- or questions from the Board and then the City of Calgary, and we have the SCLG panel that's ready for this afternoon as well.

Dr. Fennell had arranged for an appointment today at 3:00, and it's also come to my attention that Roger Austin from Austin Engineering has to be on a dam site on Monday.

So what I was going to propose is to have Dr. Fennell give all of his evidence during the water topic block in the hope that we could get Mr. Austin, at least his cross-examination completed today.

Because there was a climate change component in both Topic Blocks 3 and 4, we had put Dr. Fennell in both.

We had a similar situation in Grassy Mountain, and we ended up just putting Dr. Fennell in one topic block.

So subject to what my friend Mr. Kruhlak or Mr. Fitch have to say, and subject to your direction, I wonder whether we might let Dr. Fennell go?

He has actually an appointment to give blood at 3:00, so it would be nice if we could let him go this afternoon and have him maybe come back on Tuesday and be dealt with then.

And that would probably end up shortening our day. It may not be a short day, but it, at least, takes one witness out of the equation.

THE CHAIR: And it might depend on panel availability with Alberta Transportation. So Mr. Kruhlak, Mr. Fitch, Mr. Hebert?

MR. FITCH: It's Mr. Fitch.

We are fine if Mr. Fennell -- is it Mr. or Dr. I can't recall.

MR. SECORD: Jon Fennell.

MR. FITCH: Jon Fennell -- he can go over to Topic Session 4, fine with us.

THE CHAIR: Okay. Great.

MR. SECORD: So if Dr. Fennell is listening, he can go. Thank you.

THE CHAIR: Thank you.

MR. SECORD: Thank you, sir.

THE CHAIR: Any other matters?

Okay. So let's get started with questions from Board staff and panel.

M. HEBERT, M. SVENSON, W. SPELLER, D. BRESCIA, M. WOOD, Y. CARIGNAN, D. BACK, D. LUZI, D. YOSHISAKA (For Alberta Transportation), previously sworn/affirmed

THE CHAIR: Mr. Kennedy.

MR. KENNEDY: Thank you, Mr. Chair. I have a couple of questions.

MR. KENNEDY QUESTIONS THE PANEL:

Q. And the first one is simply a matter of clarification, and I think for you, Mr. Wood. It relates to answers to questions that you gave I think in both instances to Mr. Secord. And I thought I heard a different answer today than what I heard on Tuesday, and it relates to the flood forecasting done and the data set used.

I thought I heard on Tuesday that the data set was 1908 to current time. And I thought I heard this morning that the earlier floods, the 1902, 1898, and I think there was a third one, were factored into the

flood frequency forecast. Can you just clarify whether the pre-1908 values were or were not included?

A. MR. WOOD: Those pre-1908 values were not included in Stantec's assessment and the assessment used for SR1. They were included in the recent evidence submitted by SCLG, the Golder estimates, and that's why you see those discrepancies.

Q. And when you say that, the Golder work was the work that was tendered both by SCLG and the City of Calgary?

A. MR. WOOD: I'm aware of the work. You know, I could maybe speak to it a little bit. It was tendered by AEP, Alberta Environment and Parks, for part of their flood hazard mapping. Back in December they posted it online in draft for public consultation, and I believe that's where it was -- that's how it ended up into evidence here.

Q. Okay. That's helpful. Thank you.

And then the other question I have, and I'm not sure who this would be for, but it just relates to the dam classification, whether it's -- the consequence rating is extreme or high.

And as I understand it, as the builder of the dam, you do the initial rating. Is that the way the dam safety guidelines work?

A. MR. WOOD: Yes, it is. And perhaps I

could -- Mr. Menninger if you could please explain.

A. MR. MENNINGER: Absolutely. This is John Menninger.

Mr. Kennedy, so the way that that works is that you -- we propose --

My apologies, I think my video cut out.

THE CHAIR: Mr. Menninger -- there you go. Okay, we've got you -- perfect. Thank you. Proceed.

A. MR. MENNINGER: So the way that it works is that the proponent proposes a hazard classification. In this case, that's what we have done, and we've proposed it to Alberta Environment and Parks and their dam safety group for review, and they will make the ultimate decision on the classification.

So we provided them the information and what we recommend as what makes sense, and then they will make the determination.

Q. And my next question was going to be whether they'd done that yet, and I gather they have not. When do you expect that?

A. MR. MENNINGER: I don't know if I'm -- they haven't given us a timeline on that official designation. We've had discussions with them on it and what we've proposed and presented.

Our results didn't seem to have much kickback, but

that doesn't say that they won't have a comment on it. But it will be part of this initial review of the documents that we've given them.

Q. And the consequences of them not accepting it, does it change the project at all?

A. MR. MENNINGER: Sure. That's a very good question. The dam? No.

And I don't think -- there's nothing beyond "extreme," so it's -- I think we're all pretty well set that it's going to be an extreme consequence structure and everything is designed accordingly.

On the floodplain berm and service spillway structure, if that consequence rating was increased, we may have to add slightly to the freeboard of the floodplain berm.

I wouldn't anticipate a significant change, though, in the project develop. It's rather minor, if anything.

Q. And how quickly will you get that pronouncement from the dam safety director?

A. MR. MENNINGER: I do not know.

Q. Prior to the commencement of construction?

A. MR. MENNINGER: Yes.

Q. Thank you.

A. MR. HEBERT: Mr. Kennedy, Mr. Speller, our

regulatory lead, might have some guidance that will be useful to your question.

A. MR. SPELLER: Mr. Kennedy, it's Wayne Speller. So the information from the dam safety review team -- pardon me, I was going to sneeze -- is currently -- goes through the same process at the same time as the *Water Act* review. And so they review the *Water Act*, they're also reviewing the application, they're also reviewing the dam preliminary design information as part of that.

If the project were to be approved, the hope is that those activities and those decisions will be made through the remainder of this year.

Q. Thank you.

Thank you, panel. Thank you, Chair. Those are my questions.

THE CHAIR: Thank you, Mr. Kennedy.

Ms. Vance?

MS. VANCE: I don't have any questions, Mr. Chair. Thank you.

THE CHAIR: Dr. Heaney?

MR. HEANEY: Thank you, Mr. Chair.

MR. HEANEY QUESTIONS THE PANEL:

Q. Dan Heaney. Just a couple of quick questions.

Like, during the review -- it came up this morning

that you have to look at cascading effects during your risk analysis of any downstream structures like the Glenmore Dam.

The question I had for you is, during your review of risk, did you look at cumulative risk of having multiple extreme structures on the Bow watershed upstream of Calgary?

So did you look beyond the Elbow at some of those other structures and, you know, what the cumulative risk would be? I think that Mr. Wood mentioned that there's three or four of them on the Bow.

A. **MR. MENNINGER: We did not. This is John Menninger speaking. We solely looked at the structures on the Elbow River.**

Q. Okay. And, then, the other question that I -- and I think this is Mr. Menninger again -- you talked about various -- you know, various safety attributes of the various structures. The one I want to know is, you know, it's almost inevitable that some kayaker or tuber is going to try to go through the spillway, and, you know, whether they have -- so just under normal operation or dry operation, can -- you know, can boaters, tubers, canoers, if they get into trouble, will they pass over the spillway safely, or is it going to form a hydraulic at the bottom of it that if they

capsize, they trap them?

A. MR. MENNINGER: Sure. I think I'd be happy to answer, but I think Matt Wood would be a great one to respond to this question. He's actually been coordinating with some of the White Water Association folks and others about this issue.

A. MR. WOOD: Thank you, Mr. Menninger. Thank you, Dr. Heaney.

Yes, while I mentioned about the portage structure, the portage structure is really a redundancy, encouraging people to not pass through the diversion structure, but it has been designed to be inherently safe. I use that word obviously cautiously because everything has some element of risk, but the hydraulics do not create rollers, trapping rollers. The water is concentrated to that low flow channel where the fish passage mitigations are so that folks can actually -- it actually facilitates movement through there. I know a lot of the Elbow can get quite shallow.

And, as Mr. Menninger mentioned, we have been working with the Alberta White Water Association and received some feedback on them -- from them on the design and incorporated it in there, specifically some refugia for groups coming through.

It seemed to be their interest was, for example, if you had a group of kayakers, one person could pass through, rest behind the boulder, and watch the others come through the gated spillway.

Q. So then, like, the spillway under normal dry operations is built so that its river passage is maintained?

A. MR. MENNINGER: Correct, yeah. It's flat to the bed of the river. Even the stilling basin on the downstream side, a lot of times stilling basins would have -- they would call them baffle blocks or chutes that dissipate energy. We designed this without any baffle blocks. We just extended it so that there's no obstructions if somebody would -- for impact.

In fact, we're proposing to backfill it with native materials so it, in essence, functions as a better river.

MR. HEANEY: Okay. Thank you, that's my questions.

A. MR. MENNINGER: You're welcome.

THE CHAIR: Thank you, Dr. Heaney.

Ms. Roberts?

MS. ROBERTS: I have no questions.

THE CHAIR: Thank you. Mr. Ceroici?

MR. CEROICI: Yes, thank you, Mr. Chairman. I've got a couple of questions.

MR. CEROICI QUESTIONS THE PANEL:

Q. What one is to do when water is released via the low-level outlet in the Unnamed Creek through the Elbow, at the confluence of the Elbow, you have 27 cubic metres per second coming in during the time the outlet is active, which I imagine there would be some scouring and turbulent water, et cetera. What action is being taken there to reduce any risks there at the confluence with the Elbow?

A. MR. WOOD: Mr. Chairman, Mr. Ceroici, I can answer that question.

There is proposed a small amount of riprap at that confluence. There's some existing riprap on the left bank of the Unnamed Creek and the left bank of the Elbow River. And so where the creek comes down and enters the Elbow, we are extending that riprap a little bit upstream of the Unnamed Creek to ensure that any erosion that occurs there keeps the creek in its alignment at the confluence.

Q. Okay, thanks.

And my next question relates to the emergency spillway, when it is active, if there's a flood greater than a design flood, can you describe what that flow from that emergency spillway, what it looks like on its way to the Elbow River? Is it a channel flow? Is it

overland flow?

A. MR. MENNINGER: Sure. So this is John Menninger. And just to make sure that we're all on the same page, you know, the proposal here is that it should not ever flow, that the gates should be closed and that it would prevent overfilling and spilling of the spillway. So the intent is that the water stays in the river.

In the unforeseen condition, that water would overtop the emergency spillway. There is an excavated channel from the spillway that takes it about 500 metres away from the structure.

Okay, so that's basically -- so in that segment, it's about 180 metres wide, and it would be -- and at that absolute worst-case scenario of the probable maximum flood, no gates closed ever, no obstructions, you'd get about a metre of water running in that width.

And then it would basically transition to overland flow once you're beyond 500-plus metres from the structure, and it would spread out and then enter the Elbow River floodplain at that point.

Q. Okay. Thank you. That's all my questions.

A. MR. MENNINGER: You're welcome.

THE CHAIR: Dr. Heaney, I believe you have another question?

MR. HEANEY QUESTIONS THE PANEL:

Q. Yeah, Dan Heaney. Yeah, just the question I had was when the -- when the SR1 is being operated in a flood situation and if something untoward were to happen, where does the authority rest to basically shut down diversion? Is that with the local people or the local operators on site, or is it -- I mean and what's the typical situation in dam safety sort of for that? Do you understand the question?

A. MR. MENNINGER: I do. We're taking one second to make sure we get you the right person to answer.

A. MR. HEBERT: Just bear with us, Dr. Heaney. Go ahead, Yvonne.

A. MS. CARIGNAN: Sorry about that.

THE CHAIR: Who will be speaking?

A. MR. HEBERT: Oh, sorry, Mr. Chairman, it's Yvonne Carignan from Alberta Transportation that will respond.

THE CHAIR: Thank you.

A. MS. CARIGNAN: My apologies. My video kicked out again.

Thank you, Dr. Heaney. I want to make sure that I've understood your question correctly here, so please correct me if I've missed something.

With respect to if we needed to close those gates

during operation because there was something unforeseen happening, first of all, the operators, my understanding, would be contacting their manager within Alberta Environment. And what's important to note that all this would be developed as part of their emergency management plan if something were going wrong with the facility.

So there would be a cascade of decision-makers that would be contacted very rapidly, and they would confirm what their next steps needed to be, whether they were monitoring, whether they were taking action.

MR. HEANEY: Okay. That's it.

THE CHAIR: Okay, no further questions. Thank you. Thank you, Ms. Carignan.

THE CHAIR QUESTIONS THE PANEL:

Q. I have a couple of questions. Mr. Menninger, I forget if you provided AS an example or if it was a direct question, and I think I have this right, but it had to do with multiple floods which has come up quite a bit.

So you indicated I think that you stated that two 1 in 100-year floods in the same year, has I think you characterized it as less probability than a 1 in 200-year event. So by that, did you mean that there is a higher probability of having two 1 in 100 floods in the same year than only one 1 in 200 or the other way

around?

A. MR. MENNINGER: The other way around, yeah. So the individual probabilities would be a 1 percent chance of occurring having one occur in a given year. So having a second greater than 1 percent chance in a given year would be -- there's -- the probability -- I can't split that out exactly, but they're less than having a, yeah, 1 in 200-year.

Q. Okay. Thank you.

And there was also a fair amount of discussion with -- doesn't need to be brought up, I think it was the Figure 83, the 2013 hydrograph and the peak flows, and my understanding is from, you know, the discussion so far and the evidence that we have is that, you know, every flood event will have a different hydrograph; they're all unique.

I guess I'm wondering two things, one is do they all typically follow the same sort of pattern? I mean, you get a peak, but the 2013 flood seems to be a very dramatic and short-lived peak. And my follow-up question from that is does it matter from the perspective of operating the dam once, you exceed the 160, will you continue -- is the operating procedure still to divert as much water as needed until you reach the maximum diversion capability until it's full,

regardless of what you might know is coming down the river ahead of time, the duration of what you think the storm might be, that's the operating procedure, there's no accounting for what you might know ahead of time, just divert until you're full and then stop?

A. MR. MENNINGER: That's a good question.

So I guess to start off with, you're right. The 2013 looks different than some of the other hydrographs that -- from the historic record that we have from the Elbow, but it is -- it had a very dramatic peak in the front, but it also had a very long receding kind of base to it, as well. So it had a lot of volume.

So actually if you characterize it either by total volume or by peak, either one of them I would have characterized it as a 1 in 200-year flood. We looked at a seven-day occurrence of volume or peak.

With regards to operations, the simplest, I guess the most basic way to explain it is that when it exceeds 160, you divert up until a point, and then -- until you reached the maximum capacity to divert. That's based off of what our understanding of kind of what we anticipate today to be the -- the state of play, I guess, for those operators.

That's not saying in the future we don't have much more sophisticated forecasting models and capabilities

that may improve that going forward. But yeah, sitting here today, I think that would be the understanding, most likely. But there is flexibility for the operators if need be.

Q. And, again, you know, we heard quite a bit still some downstream effects, downstream of SR1, upstream of Glenmore because of the maximum diversion capability of 600, and part of that I believe is from elevation, there's only so much going through the channel and take advantage of the natural landscape. Was there ever thought given to doubling or tripling the width of the channel, as an example, and which might -- I'm not sure if that would equate to exact doubling or tripling of volume to account for an even a bigger potential or taking a potential bigger diversion of removing more of potential peaks off of extreme storms. And if it was, what did that lead you to conclude and why was the conclusion then to size it the way it is?

A. **MR. MENNINGER: Sure. So the -- we did look at some alternate options in the early concept phases of the project where we looked at almost doubling, it was up to over a thousand cubic metres per second diversion.**

Ultimately, it didn't -- the net benefit was not there for operation of the structure to meet our goals

for the project of that downstream flood risk downstream of Calgary.

So the 1,000 cubic metres per second required as you said on a much larger channel, much larger environmental impact, much larger gate structure at the inlet of the channel.

So we -- upon after that initial concepts review, the -- the benefits associated with that, while we recognize that it could have prevented some flooding potential in the downstream of the project, the ultimate drawbacks were larger than the perceived benefit.

Q. So it's fair to say, then, that the objective was sort of calculated first, which was the flow rate downstream of Glenmore, and then the design was to provide that flow rate, as opposed to an overall capture rate? Is that overly simplistic, or is that a fair characterization?

A. MR. MENNINGER: I think that's a fair characterization.

Q. Okay. Thank you. And the last on emergency response, and again, part of my question is driven by sort of the attention, some of the questions and answers that have come before it. But on evacuation, I'm not familiar totally with the provincial government's alert system

which was tested, I don't know if you folks remember, I think it was last year or the year before, cell phone alert systems often are used for personal situations where, you know, for non-disaster reasons.

But does anyone know, is that available for the purposes of providing notice -- or evacuation, say, if there's a dam failure scenario or a diversion is going to take place and you wanted to notify people. Is that system available?

A. **MS. CARIGNAN: Mr. Chairman, it's Yvonne Carignan. We're not exactly sure if that's available, but we could take that as an undertaking to find out for you.**

If it were available, it would get incorporated into any emergency response plans that Alberta Environment would put together.

Q. Right. And you know, in the past, and the question came up before, you know, if there is a decision to approve this project, as an example, often the Board does have conditions in, and we've had in the past emergency response plans as part of the conditions or elements of those.

So as an undertaking, I would appreciate that, if that potential is available, if you could find that out ahead of the close of hearing, that would be

appreciated, thank you.

A. MR. HEBERT: Mr. Chairman, we can undertake that absolutely.

A. MS. CARIGNAN: Mr. Chairman, could I just get one point of clarification on that?

THE CHAIR: Mmm.

A. MS. CARIGNAN: I'm curious, if I can phrase this as a question, when you're talking about that emergency notification, I just want to make sure that I'm understanding what you're asking.

Are you asking that, when we go into operation that is a notification, or if there's something wrong with the dam, how would we notify?

Q. So my question really is if there's a reason to notify the public of something, whether you feel that the operation of the dam, there needs to be notification, or, you know, I guess in a worst-case scenario, if there's potential issues with a diversion, it's not operating as you expected or if there's an issue with the dam itself, there may be reason to be giving downstream users notice.

So my question is is that cell phone alert system that we've seen tested over the last -- I don't recall the timing of it, but would that system be available to the dam safety folks who are in the emergency response

plan?

A. MS. CARIGNAN: Thank you. I appreciate the clarification.

Q. Thank you.

UNDERTAKING - TO MAKE ENQUIRIES ADVISE WHETHER THE CELL PHONE ALERT SYSTEM COULD BE MADE AVAILABLE TO THE DAM SAFETY MEMBERS WHO ARE IN THE EMERGENCY RESPONSE PLAN

THE CHAIR: And those are all my questions.

So thank you to the panel. There is an opportunity, and there may be some other work for you yet in terms of redirect.

Mr. Fitch, does Alberta Transportation have any redirect?

MR. FITCH: Yes, Mr. Chairman just a couple of questions. And they relate to a map that we were all looking at, and I just thought some clarity about the map might be useful.

MR. FITCH RE-EXAMINES THE PANEL:

Q. So it's Exhibit 131, PDF 565. You will recognize the map when we get it called up.

And I think I'll probably direct the questions to Mr. Wood once we get the map up.

THE CHAIR: And I think Ms. Taylor is on this

afternoon, so thank you, Ms. Taylor. Do I have that right?

MR. FITCH: Oh, no, that's not -- yeah, here it is.

Q. So, Mr. Wood, can you confirm, am I correct in looking at this map that the squares are quarter sections?

A. MR. WOOD: Mr. Chairman, I can say that Mr. Fitch is correct. Those are quarter sections.

Q. Okay. And then looking at the quarter section that has the floodplain berm in it, what quarter section is that? Like what legal description?

A. MR. WOOD: Mr. Chair, one moment, please.

A. MR. HEBERT: Mr. Fitch, I believe you referred to NE 3-24-4 West of 5.

Q. Okay. Thank you. And then the -- and that quarter section, I believe, is owned by Ms. Robinson and her sister Ms. Hawes; is that correct?

A. MR. HEBERT: Mr. Chairman, that is correct.

Q. Mr. Hebert, I guess I'll just stick with you.

The quarter section south of that and west, so in other words, kitty-corner, which quarter section is that?

A. MR. HEBERT: If my information is correct, that is the SW of 3-24-4 west of 5.

Q. Is that the quarter section owned by Ms. Robinson in

her name alone?

A. MR. HEBERT: Yes, it is.

Q. And is that the quarter section where Ms. Robinson has her residence and her riding arena?

A. MR. HEBERT: Yes, it is.

Q. Thank you. Those are all my questions, Mr. Chair.

THE CHAIR: Thank you. Once again, thanks to Alberta Transportation and the panel. Thank you very much.

(PANEL STANDS DOWN)

THE CHAIR: Ms. Senek and Ms. Munkittrick, City of Calgary, are you ready to provide direct evidence?

MS. SENEK: We are, Mr. Chair, although Mr. Frigo was having some computer issues. So are you there, Mr. Frigo?

MR. FRIGO: I am. Are you able to hear me?

MS. SENEK: We can hear you, but I -- I can't see you personally. I'm not sure --

THE CHAIR: Just give Mr. Wiebe just one chance to see if he can locate him.

MS. SENEK: You're there now.

THE CHAIR: Looks like it's working. Okay. So, Ms. Senek.

FRANK FRIGO (For The City of Calgary), previously sworn

MS. SENEK EXAMINES THE WITNESS:

Q. Perfect. So Mr. Frigo, I just am going to ask you to confirm that you're still under oath?

A. Yes, I understand I'm still under oath.

Q. Perfect. And I understand you have a presentation and that would be the PowerPoint that was submitted as Exhibit 351, I believe, document manager?

A. Yes.

Q. And we will have to start at slide 16.

A. Thank you.

Q. Okay. Mr. Frigo, go ahead, please. Thank you.

A. Thanks, document manager. Can we advance to the next slide?

Good afternoon, Mr. Chairman, and good afternoon, all. Perhaps I may start by commenting on a few key aspects of the SR1 design which are also highlighted in the City's written submission Exhibit 229 that are relevant to Topic Area 3.

Unlike Calgary's Glenmore Dam and Reservoir, SR1 incorporates features which are primarily above ground and will only rarely be wet. As a dam operator, the City understands that this will facilitate surveillance, operational testing at gates and controls among other capital maintenance or dam safety

activities.

The off-stream nature also means that SR1 won't appreciably alter river flows other than during flood operations, nor will the reservoir store appreciable water other than during and for a few weeks after significant floods. This will limit the time during which SR1 is susceptible to what is referred to as fair-weather failure.

We also recognize that significant design investigation of debris management has supported the design. That included hydraulic modelling, physical scale testing, and inclusion of a debris deflector. The City recognizes this is an important element in ensuring diversion will function to meet the intended diversion rates.

We also recognize that SR1 has a large storage volume relative to the scale of the basin upstream. The 77 million cubic metres of storage lies downstream of the basin in the order of about a thousand square kilometres, yielding over 700 cubic metres per hectare of catchment area service.

By comparison, Glenmore and the Ghost reservoirs offer in the range of 200 and 140 cubic metres per hectare of storage respectively, so less than a third of SR1 normalized to the catchment areas upstream.

We understand that this relatively high capacity is extensive enough to store the diverted flow from two 1 in 100 severity events separated by only days.

I did have a reference to Exhibit 93, page 95, though the questions immediately preceding this presentation absolutely addressed that. That reference does recognize that back-to-back 100-year events, so two 1 in 100-year events, as Mr. Menninger explained, which are much more rare than the single 1 in 200, could be stored within the capacity.

This amount of storage relative to basin size is large, and it simply means more security and more latitude of operational performance is afforded in SR1 than many, if not most, existing regional reservoirs.

As reported in our Topic 1 presentation materials in Exhibit 351, and written submission, Exhibit 229, analyses show that this degree of storage, working with the incremental 20 million cubic metres at Glenmore with the expanded gates, can significantly attenuate peak flow rates for events even more severe than the design event.

And perhaps I can remind that according to our more recent baseline flood damage calculations, and as according to representations made for Topic 1, SR1 represents a stark reduction in net damage and safety

risk for communities downstream.

Presently, the remaining annual average damages in Calgary are around the $75 million per year mark of which 40 percent accrues to the Elbow River. SR1 will reduce 27.7 million per year of that, most of which, 20 million per year, is on the Elbow; the remainder, the 7.7 million remainder, on the Bow.

After SR1, potential damages are around $43 million per year, most of which -- 85 percent of which would be on the Bow.

In some ways, Mr. Chairman, if I liken the Elbow River Basin to a car, I think of Glenmore like the seatbelt. You use it all the time and it's very effective to mitigate small and medium impacts, where as, perhaps, SR1 is like the airbag. It's not used as often, but it is configured specifically for deployment in higher risk scenarios and it works very much with the seat belt.

Relative to dam safety, this is important since SR1 is expressly engineered with factors of safety, as we heard this morning, safeguards and redundancies, like an airbag, to function specifically under unusual conditions.

Another important consideration around safety of major infrastructure is what the City's emergency

management professionals would refer to as situational awareness. For our water management infrastructure, we recognize that operational decisions need to be made on the basis of understanding of what is happening in the dynamic basins that we're part of.

Just as the City collaborates with other water managers and licence holders on the Bow River through weekly participation with Alberta Environment and Parks' weekly major water users meetings, we expect and understand that the City and other water management stakeholders will be engaged by SR1's operator, AEP, to ensure that seasonal readiness, flood forecasting and communication protocols are clearly set and coordinated.

For management of many types of incidents, including flood and water quality events, optimizing environmental outcomes and collaboratively meeting all water licensees' requirements, collaboration has been key.

The City understands and expects, from the descriptions of the operational protocols provided by Alberta Transportation, that the City will remain engaged in aspects of operations, forecasting, and response through annual, seasonal, and event-based mechanisms.

Again, since we do this now with AEP and stakeholders on the Bow Basin, we are confident that similar processes and participation will be implemented for SR1 should it proceed.

Next slide, please, document manager.

Turning more specifically to dam safety. I note that the City itself owns, operates and maintains 13 dam structures listed with AEP. These include the Glenmore Reservoir, which, like existing hydro power facilities on the Bow River, classifies within the Canadian Dam Association's extreme consequence category. Glenmore is designed, maintained, and operated in this context.

Like SR1, Glenmore is designed to safely pass the PMF over its spillway with factors of safety embedded in the structural assessments of the stabilizing versus destabilizing forces.

As Mr. Menninger noted earlier, the PMF is a theoretical flood event which represents the maximum amount of moisture that the atmosphere can hold, dropping onto the basin to produce the largest flood event physically possible. As Mr. Menninger noted, probabilities of such an event are estimated at 1 to 100,000 to 1 to 1 million range.

The City understand that the province, the

provincial *Water Act* and Alberta's Dam Safety Directive of 2018 will apply to SR1 and that Alberta Transportation also understands this and has directed design with this recognition.

So, SR1, like Glenmore, and the hydro power structures on the Bow River is engineered and will be instrumented, regularly assessed, tested, maintained and operated to the standard.

An important distinction between SR1 as an off-stream structure operating for periods of up to 40 days following a major flood is that it will not, unlike Glenmore and the hydropower structures on the Bow, hold significant volumes and height of water continuously. Those structures are subject to what dam safety engineering practice refer to as fair-weather failure since failure is theoretically possible, although a vanishingly remote probability.

As I noted, speaking to the preceding slide, this also means that SR1's primarily above ground and rarely inundated major features can readily be accessed, maintained, and tested all the more readily than for a typical wet or online dam.

Next slide, please, document manager.

Notwithstanding both the extreme conditions embedded in the engineering protocols and operations

and the extremely remote probability of a breach, the City maintains emergency response plans and processes for regulated dam structures within its flood emergency reference manual. This manual forms an annex to the City's municipal emergency plan. Should SR1 proceed, similar plans, despite the remote probability of failure, would be included for it as well.

Mr. Chairman, again, I want to bring attention to the scale of the storage that SR1 offers relative to the basin that it would service. At over 700 cubic metres per hectare, unlike many dams, including Glenmore, SR1 will have flood attenuation and peak time delay effects for extreme events all the way up to the PMF.

From both Stantec's analysis, Exhibit 327, and our own hydrograph routing work on floods as large as the 1 in 1,000-year event, we expect that in a rare event of a PMF, SR1 would delay and reduce peak flows to Glenmore. This would reduce the expected water level and forces at Glenmore, increasing the PMF factors of safety for Glenmore. Importantly, the onset of higher flows would also be delayed for as long as SR1 would be diverting, offering more time for areas within river valleys to be evacuated.

With these elements in mind, the City of Calgary

finds that SR1 is likely to have a positive effect on safety risk during flood events even those more severe than the designed 2013 or 1 in 200-year design event and all the way up to floods as improbable as the PMF. Thank you.

MS. SENEK: And that completes our direct evidence. Thank you.

THE CHAIR: Thank you, Mr. Frigo and Ms. Senek.

So Mr. Cusano, did you have any questions?

MR. CUSANO: No questions, thank you, sir.

THE CHAIR: Mr. Fitch or Mr. Kruhlak?

MR. KRUHLAK: I can perhaps speak, it's Mr. Kruhlak. We would not have any questions.

THE CHAIR: Thank you. Ms. Louden or Mr. Rae? I'm not sure who's on today.

MS. LOUDEN: This is Sara Louden, sir, and no, we do not have any questions.

THE CHAIR: No questions? Thank you.

Mr. Secord?

MR. SECORD: Thank you.

MR. SECORD CROSS-EXAMINES THE WITNESS:

Q. Mr. Frigo, my name is Richard Secord. I'm counsel for the SCLG Group.

I enjoyed your presentation earlier in the week,

and I guess we get to see you again in the next water topic block as well; correct?

A. Good afternoon, Mr. Secord. Yeah, you get to see me again in Topic Block 4.

Q. Just calling up my -- my notes here.

I think some of this has been covered in your slides, but just a couple of general propositions. You would agree that water is a limited resource, and Calgary's water supply is changing due to climate change and a growing population?

A. Yes, I would agree.

Q. And I believe you confirmed that the Elbow River is the source of approximately 40 percent of Calgary's water supply, and the Elbow Valley watershed covers an area of about 1227 square kilometers and drains into the Glenmore Dam?

A. Correct.

Q. And the Bow River watershed covers an area of 7700 square kilometres, so many times larger than the Elbow watershed; correct?

A. Correct.

Q. And the Bow River supplies the Bearspaw water treatment plant, and it is the source of nearly 60 percent of Calgary's water supply?

A. Correct.

Q. And in the 2013 flood, can you tell me, I was in Calgary, actually, and at an AUC hearing when the rain started in that week of June, June 18th, June 19th. At its peak, how high was the Bow River, in terms of its flow through the city of Calgary?

A. Through the city of Calgary, upstream of the confluence with the Elbow River, the Bow River flowed at approximately 1840 cubic metres per second, which would place it somewhere in the 80-year-return period. Downstream of the confluence, the two flows were additive.

And so the attenuation effect, there was 1240 cubic metres per second that came into the Glenmore Reservoir. Operations at Glenmore didn't quite cut that in half but dropped that 1240 cubic metres per second peak to around 710.

The 710 going downstream added to provide not exactly coincident peaks, but a peak flow downstream of the confluence in the order of 2400 cubic metres per second, again in approximately the 80-, 90-year return period range.

Q. So the Bow River was barrelling along you said at about 800 metres per second as it hit the confluence of the Elbow and Bow?

A. About 710 was our understanding of it.

Q. I thought you said that the Elbow was 710 as it hit the confluence?

A. Sorry, the Bow was 1800, 1840 roughly.

Q. I'm sorry, I just heard 800.

So the Bow River was zooming along at 1800 cubic metres per second, and the Elbow was running at 710 cubic metres per second as the two rivers hit the confluence, and then downstream of the confluence the rate was 2400 cubic metres per second. Do I have that right?

A. Correct, that's our understanding.

Q. And I remember when I was one of the last people to get out of Calgary over the bridge, the river, the Bow was extremely high. Can you tell me how many metres above the sort of normal range was that river on, you know, let's say the 20th of June, 2013? How many metres was it above normal range?

A. Very similar. Rivers are amazing self-replicating, and though the Elbow River is about 1/6th the size, the morphology and hydraulics contribute to very similar response.

So both the Bow and the Elbow on average were between about 4 and 5 metres higher than their normal summer values in elevation, and obviously that would vary from location to location, depending on

hydraulics.

Q. So one of the things -- and the other thing, this is one of the things I've been wondering about, not as being a hydrologist, but you're a hydrologist. So I've got the man to answer these questions.

As I understand it, the Bow River flood event in June of 2013 was not as extreme an event as the Elbow event; is that correct?

A. Fundamentally, yes. The precipitation that fell, the centroid of precipitation that fell was very much centered over the Elbow, Sheep, Highwood, and some of the southern tributaries to the Bow.

So the strongest precipitation, and we talked earlier about the unique attributes of the hydrograph from the 2013 flood on the Elbow, that very strong initial response was driven by an upslope mechanism, a meteorologic mechanism where the rainfall was being, if you will, pushed against the front ranges of the Rocky Mountains. So much of the upper Bow catchment did not contribute at the same intensity.

So areas north and west of, for instance, Lake Louise, they certainly did get rain but not at the same intensities, and the runoff response was not nearly at the same intensities as it was for the areas hit by the centroid of the heaviest rainfall, which again was the

Bow, Elbow, Highwood, Sheep, and some of the southern tributaries to the Bow.

Q. What I was interested in, Mr. Frigo, was the 2013 flood on the Elbow was let's say a 1 in 200, 1 in 210-year flood, whatever. What was the flood on the Bow?

A. On its smallest tributary -- so, again, some of the small tributaries close to Canmore, as high as that 200-year level.

But in Calgary, as I mentioned earlier, somewhere in the order of the 80-year return period.

Q. That's what I was getting at.

So the Calgary flood of 2013, at 1800 cubic metres per second, with an increased river height of 4 to 5 metres was a 1 in 80 flood; correct?

A. Correct.

Q. Okay. So here's the question for you that's bothering me, bugging me: You get SR1 built, and you've got a flood event coming down the Elbow and the Bow River. And SR1 is doing a wonderful job. And the Glenmore Reservoir is turning out through Elbow Park and those lucky people who are downstream of the reservoir. They see the Elbow going by at 1600 -- they see the Elbow going by at 160 cubic metres per second, and all is well.

Meanwhile, coming down the Bow is not a 1 in 80,

but let's say it's a 1 in 200-year flood?

A. Yes.

Q. And the river is even higher than 5 metres, and I don't even know what the cubic metres per second would be, you probably do -- it's probably in your chart, Slide 11 -- hits the confluence of the Elbow and the Bow, and presumably the Elbow is at a much lower elevation, a much lower flow rate.

So, as a hydrologist, are you going to see in that situation the Bow inundating the Elbow River?

A. Only, Mr. Secord, for a very short distance upstream of the confluence. Recall that both the Bow and the Elbow River are fundamentally mountain-fed streams and they have what we would hydraulically refer to as relatively steep slopes. They don't sound steep when I describe them mathematically because they're .2 percent, but for rivers, this is relatively steep.

What this means that the Elbow River is sloping at a steep enough gradient that that degree of backwater would only come a couple of hundred metres upstream from the confluence.

Again, imagine two eavestroughs, both are sloping, that backwater effect simply can't make it back very far into Calgary because of the hydraulic and geographic parameters that describe the Elbow River.

Q. Have you done an inundation map to look at what would happen if you had a 1 in 200-year flood coming down the Elbow River and what -- sorry, a 1 in 200-year flood coming down the Bow River and what impact that would have on the communities downstream of the -- upstream of the confluence?

A. We don't have maps of that type available, but as a very regular component of training and working with the flood response team that I oversee, we look at scenarios exactly like that, Mr. Secord.

In general, the hydraulics are pretty straightforward in that we can take the water elevations predicted for the flow rate in the Bow River and translate those upstream with hydraulic models.

We don't have mapping directly available for that, but we do know that that would more or less create a flat gradient. Slightly more sloping than flat because of course there has to be a gradient for flow to occur, but fundamentally the elevations in the Bow at the confluence would map as the contour elevation of that respective water level up the Elbow.

We have analyzed that in many cases, but we don't have mapping directly available for that combination of scenarios.

Q. And can you tell me, in relation to the Bow, what would

be the elevation of the river at the confluence at a rate of 160 cubic metres per second in comparison to the Bow in 2013, which would have been 4 to 5 metres higher than normal? Would it be a 4- to 5-metre difference, then, just in the 1 in 80-year return period?

A. Yes, it would.

Q. Okay.

A. Roughly.

Q. So if we could turn up Exhibit 345, I just had a few questions for that. And that's the "One Calgary One Water" document, Zoom host.

If we could turn to PDF 3, I guess it's PDF 3, I think. It's odd the way it works. Actually, it looks like -- yeah, that's it. It's funny, on mine it shows as PDF page 1, but I don't know.

So I take it you're familiar with this document, Mr. Frigo?

A. Yes.

Q. And in the first paragraph, it says: (as read)

"In southern Alberta, water is already a limited resource, and the City of Calgary is working on addressing water resource challenges."

And then over in the second column, it says: (as read)

"Our water supply is changing river flows, and water quality seen in the past will be very different in the future because of a changing climate."

And then if we could turn to PDF 7, it says that -- it identifies three water security risks. It says: (as read)

"Calgary's water security is challenged by three main risks that must be managed in the short and long term: Climate change, water licence limits and population and growth. While additional socioeconomic and environmental risks do exist, these three main risks have the most significant impact to future water security."

Which would you say is the greatest of these three risks?

A. **I would say the three are interlinked, and I would say that the science of climate change continues to adapt. So though it may be a very significant risk, it's quite difficult to quantify it in concrete terms today.**

I would say all three of the risks are, as the diagram suggests, important considerations.

Q. Now, on the next page under "Climate Change," it says

in the first column, it states: (as read)

> "Climate impacts now and in the future are uncertain, but alterations in the timing of river flows are expected. Mountain snowpack will melt earlier in the year; precipitation will be more intense. Summers will be hotter, drier, and longer. Rising temperatures will cause snow to melt earlier in the year, leading to a longer, hotter outdoor water use season making it more difficult for our reservoirs to satisfy water demands. Southern Alberta is an arid region inherently susceptible to drought. Severe multiyear droughts observed in the past include those between 1858 and 1872..."

So that would be a, what, 14-year drought? 1930 to '41, that would be an 11-year drought: (as read)

> "...and dry conditions in the early 2000s."

And it talks about tree ring evidence suggests that even more severe droughts hit the region in the 1400, 1500s, and 1700s, and that's shown in Figure 1.

Would you agree, Mr. Frigo, that SR1 does nothing

for Calgary in relation to alleviating water shortages as a result of drought?

A. No, I would disagree in that, though it is a subtle effect, having additional flood mitigation in place by way of SR1 would mean that seasonal operations at Glenmore Reservoir, which are very flood sensitive, could be altered and optimized so that instead of drawing water levels as low as we need to be able to effect the type of flood mitigation potential required now, we may be able to offset that slightly.

This is a relatively small effect because, again, when we talk about the Elbow and the Bow and the distribution of their current proportion of the current city's demand, we're talking in average terms.

And so it's very much recognized, both within this plan, all the capital infrastructure planning within the city, that the Bow Basin is, as you mentioned, the approximately six times larger basin.

Not only that, it is the basin that has the larger proportion of high elevation mountain terrain that sustains both glacier and permanent snowfield that become increasingly important to water supply under low precipitation conditions.

So no, Mr. Secord, I would disagree, though I would qualify that that effect is a relatively modest

effect.

Q. So let's put some numbers on it. What does the Glenmore Reservoir hold?

A. With the expanded gates for flood storage, it has the capacity of 20 million cubic metres, but at its full supply level, it would generally have 10 million cubic metres of available active storage.

Q. So I'm confused. You say it holds 10 million cubic metres at FSL?

A. Yeah. Actually, it's somewhere in the order of about 16, at 16 million cubic metres at FSL.

So dam crest at Glenmore is 1075.33 metres above sea level. A metre and a half above that is the full supply level, and then above that is an area that is only utilized for flood storage, and the gates obviously -- the gates are 2.5 metres high, so 1 metre of the gate height goes into that flood storage level, which is beyond the normal full supply.

Q. And so in terms of the operation of the Glenmore Reservoir, is there always a certain amount of water left in it for recreational use?

A. Not necessarily for recreational use. The very lowest levels in Glenmore really have to do with the physical capacity of the intake structures, though obviously we're always trying to balance a number of water

resources outcomes, one of which is recreation, but importantly also, our downstream environmental flows and environmental management.

So always, water supply, flood, environmental, and recreation are major objectives when we're managing reservoir level at Glenmore.

Q. And you're saying the intake is limited in terms of the amount of water that you can divert into the reservoir?

A. For a number of reasons, yeah, there's a minimum level below which we would only consider drawing down to under very unusual circumstances, and that's about three and a half metres below the 1075.33 dam crest I mentioned earlier.

Q. Now, on this page, it says: (as read)

"Temperature increases for Calgary region are expected to be higher than the rest of the globe."

Would you agree with that statement?

A. Yes. That's the finding of some of the global circulation models.

Q. And it says: (as read)

"The risk of drought occurrence in summer and early fall, in particular, when demand tends to peak is likely to increase."

Do you agree with that statement?

A. Yes.

Q. : (as read)

"Water management for both extreme flood and drought are priorities."

Do you agree with that statement?

A. Yes.

Q. And then in relation to PDF page 18, one more page.

MR. SECORD: Mr. Chair, we're having problems with the quality of the document display.

THE CHAIR: Yes. I'm not sure if it's a memory issue. There's a lot of exhibits up there. I saw that message come up earlier.

MR. SECORD: It might be better to get rid of some of the -- might be easier to get rid of some of the exhibits.

It's 345, document host.

THE CHAIR: Do you know offhand for sure which ones we won't need.

MR. SECORD: It seems to have disappeared, Mr. Chair, from the list. There it is. You've got it. There it is. So PDF 18 just use the arrow. There we go. But we're not on 18. What I have here is page 20 of 22. There we go.

I'm sorry, document host, it's PDF 18, for some

reason, on my laptop. It's PDF 20 on the Board's document.

Q. So under -- on this page. Priority actions, it says: (as read)

"Advocate for a new upstream reservoir on the Bow River."

And I understand that's currently underway, Mr. Frigo.

A. Yes. The City's been participating with Alberta Environment and Parks' Bow River reservoir options. Actually many of the groups that have been participating in this proceeding have also been a party to that ongoing work.

That work is in its second phase of looking at alternatives where additional storage might be added to the basin for the benefit of both water supply and flood mitigation.

Q. And let's say as a hypothetical as a result of opposition from First Nations, or for environmental reasons, you're unable to get another dam on the Bow River, would you consider advocating for a new upstream reservoir on the Elbow River?

A. Very, very unlikely -- pardon me.

Q. So if you couldn't get one on the Bow, given what we've just read about Calgary's temperature being one of the hottest city's in the world, would you consider

advocating for a new upstream reservoir on the Elbow.

A. Very, very unlikely, Mr. Secord.

Again, the scale of the basin and the hydrology and meteorology of the basin, the Elbow basin, do not make it a prime candidate for that kind of investment.

Again, the Bow would be six times larger catchment, much more area, 5,000 square kilometres of mountain -- high elevation mountain terrain along the continental divide, glacier, permanent snowfield, higher precipitation make it a much stronger candidate for that type of investment and that type of consideration.

I would add, as well, that with the Glenmore gates, the gates that we have now, the water licence capability of the Elbow is maximize -- just perhaps the wrong word, but close to optimized; that is, the Elbow is only so large of a roof.

If you put a bucket at the end of that roof, you're only going to get so much water off of it, especially in times that are more, if you will, "droughty." Mr. Secord, if you'll allow me to use that word.

So, absolutely, the City of Calgary's long-term plans anticipate that population growth and changes in demand would likely be met through incremental

infrastructure investment and licence considerations along the Bow River.

Again, it is, by far, the more secure, more reliable, less seasonally variable source. In addition to that, there's already a larger component of controlled storage on the Bow. And as I mentioned in the presentation, City of Calgary works with all of the water licence holders, irrigation districts, hydropower, downstream municipalities, upstream municipalities to try to make sure that we are stewarding the resource in a very collaborative manner.

Q. But do you understand that McLean Creek, it holds 70,000 dam cubed?

A. Understood, yes. Obviously, at full flood charge, yes.

Q. And I take it the Glenmore Reservoir holds 20,000 dam cubed?

A. Correct.

Q. On page 20, there's an item Number 6 which says: (as read)

"Finalize the source water protection plan and policy."

It says: (as read)

"Source water protection is critical for water security. The City's source water protection plan identifies contamination

from wildfires and storm water runoff from land development as the top risk to the quality of Calgary's water supply."

Can you tell me, how does contamination from wildfires factor into the water quality?

A. Evidence from events around Alberta have suggested that organic carbon content in runoff can change post wildfire. So it is one of the components that is a consideration in terms of water quality.

Q. And do you understand that McLean Creek would have provided an option for firefighting in the Elbow River catchment area?

A. I am not certain of the -- I'm not certain McLean Creek had facility for that. That is, I understand water would be stored there; I'm not clear on how that water could be extracted for firefighting. That hasn't been part of any analysis that I've understood.

Q. Okay. I take it you haven't then examined whether MC1 could have been used to -- as a source for firefighting in the Elbow River catchment area?

A. Pardon me, I missed the first part of that, Mr. Secord, apologies.

Q. I take it you haven't looked at whether any of the 700,000 dam cubed that could have been stored at MC1, whether any of that water could have been used for

firefighting in the event there was a fire in the Elbow River catchment area?

A. No, no. Our understanding is that the permanent pool that would be required for MC1 was primarily because the bedload and wash load, that is the sediment that the Elbow River would normally transport to support its typical morphology would be completely blocking outlets from MC1, the permanent pool we understood existed primarily to halt the progress of that bedload sediment toward the reservoir, not so much that the pool was intended for any kind of multiwater resources objective use.

Q. And then one of the things I wondered about from a water security point of view, and I don't know, were you following along today my questions of Alberta Transportation?

A. Yes, I was.

Q. And we looked at various hydrographs, and I think you would agree that it shows that SR1 would capture perhaps half of the peak of a flood of record.

We looked at that hydrograph from Bragg Creek, for instance, and it looked like, depending upon whether the gates were letting in 480 or 600 cubic metres per second, anywhere from, you know 700 to 600 cubic metres per second that the peak would be passed downstream?

And my understanding is, in the last flood, there was -- there were various instances of contaminated water going over private property and lands, and I'm just wondering, is there any water security risk for Glenmore, for the Glenmore Reservoir and the water treatment plant from flooding that would obviously be occurring upstream of the Glenmore Reservoir in the event of another flood of record coming down the Elbow?

A. Very -- very limited, Mr. Secord. Of course, during a major event like that, of course anything could happen.

But what we did see in 2013, both at Glenmore and at Bearspaw, we were able to treat water incoming to the plant to drinking water standards throughout the event. There was a brief period at Glenmore where we had to, if you will, treat it twice before we could put it into our distribution system.

But no, I wouldn't expect significant impacts, though under the duress of a major event, again, when we're talking about something in the 2 to 500-year, virtually, you know, a number of things could happen.

I would suggest that the kind of contamination would be -- the risk of contamination would be more acute downstream in the urban environment in the urban, fabric where pipelines, utilities, construction materials, et cetera, almost necessarily are.

And so very much part of the consideration around flood mitigation for the City of Calgary is to try to prevent that, that is, to prevent floodwaters from mixing from sanitary sewer flows, et cetera, certainly within the city and recognizing that the city could become a source for that, that is, you know, beyond life safety and economic impacts, one of the significant drivers why flood resilience in a wholistic plan has been something that the City of Calgary pursued for both the Elbow and the Bow Rivers.

Q. Now, you mentioned I think in your presentation earlier in the week about health impacts in the 2013 flood; correct?

A. Yes.

Q. And do you see the City of Calgary transferring health impacts to the citizens of Springbank and their children immediately downwind of the SR1 facility as a result of decreased air quality?

A. My understanding, Mr. Secord, is that the dust abatement protocols that have been identified, application of tackifiers, reseeding, wetting of sediments, are very much part of the plan. And therefore my reading is that, no, I would expect that that would be a very important element that Alberta Transportation and the eventual operator, Alberta

Environment and Parks, would be paying very specific attention to.

Q. Can you tell me, in what years has the Glenmore Reservoir been drawn down in anticipation of the spring for shed and not refilled, other than when the dam gates were reconstructed recently?

A. I wouldn't have a full history off the top of my head unfortunately, Mr. Secord, but in the 14 years that I've been with the City, we've always been able to refill at least partially.

Q. What does that mean, Mr. Frigo?

A. That is, not to the full supply level, but to some elevation close to the full supply level. Again, that full supply level being 1.5 metres above the concrete crest of the dam at 1075.33.

Q. Can you tell me what 1075.33 is?

A. Sure.

Q. I've got 16,000 cubic metres for --

A. Apologies, it's just the vertical elevation, the number of metres above mean sea level that would represent what a surveyor would identify as the top of the dam, the dam crest elevation.

Again, it is that crest elevation upon which the 2.5-metre-high gates that we've spoken about at Glenmore would normally close to and then during flood

events would open to control flows downstream.

Q. And what is FSL?

A. Full supply level is the --

Q. No, what's the number if you usually --

A. 76.83. 1076.83.

Q. 1076.83. And then the 20,000 cubic metre storage level is what?

A. 1077.83. Oh, pardon me, yes, I believe that's correct.

Q. I just --

A. That may be subject to check.

Q. That's okay. We're not going to go there. I just wanted to be working with -- I've had some of my numbers in, you know, cubic metres, and then you've got this elevation. So I just wanted to be speaking the same language with you, Mr. Frigo.

THE COURT REPORTER: Excuse me, when you're saying "10-77-83," is that a point 83?

A. Yes, yes, it is. So 1,000 -- yeah, 1075.33 would be the 1075.33.

Q. And that's metres above sea level?

A. Correct.

Q. So the question was how -- in what years was the Glenmore Reservoir drawn down in anticipation of the spring for shed and not refilled. Are you drawing it down to 1075.33, or are you drawing it down below that

number for the spring for shed?

A. Below 1075.33. So, typically, between 2 and 3 metres below that 1075.33.

Q. So anywhere from 1072.33 to 1073.33 would be the drawdown?

A. Yes. And very much seasonally dependent based on forecasting inputs from both the City of Calgary's hydrometric forecasting team as well as the Alberta Environment river forecast centre out of Edmonton. We utilize those estimates to be able to set those values, yes.

Q. And you say in the last 14 years, there have been very few years where you haven't been able to essentially replace the drawdown with waters coming in from the Elbow?

A. Yes. And that's correct, in part, because the way the City of Calgary has engineered the two plants -- so the Glenmore water treatment plant on the Elbow River and the Bearspaw water treatment plant on the Bow River -- is that we do have the flexibility to supply all of our pressure zones from either of the two.

So what we are able to do is very carefully manage to be able to utilize or supply demand out of the Glenmore treatment plant less so, rely more heavily on Bearspaw, or vice versa as conditions require, so that

we can rebuild that storage and still pass the environmental flows downstream required to maintain environmental performance downstream.

So, yes, I would mention, yeah, it's a continual game of numbers. There's continual analysis feeding into the analysis of both the demands and the supply to be able to try to optimize that -- those water resources outcomes we talked about earlier -- water supply, environmental performance, flood mitigation, and recreation.

Q. When you say you, in the last 14 years, have been able to replace the amount that's drawn down, would I understand, then, that the amount -- the replacement amount would take it back up to 1075.33, or would it be something higher?

A. After flood season has passed, and prior to the new gates, there was a system of stop logs that could be implemented to take us close to full supply level. With the new gates we're able to do that a little more readily.

Because the old stop log system couldn't be in place and altered in a rapid sequence - it took a couple of days to do that -- it wasn't possible to leave those gates in during flood season. Pardon me, long answer.

But no, we can come all the way to the full supply level which is a metre and a half above the 1075.33 and 1076.83, we can come that high. In the past we couldn't do that until after flood season had passed.

It's another aspect of the Glenmore gates offering more flexibility on both the flood mitigation side as well as the water supply side.

Q. So then why is -- how is SR1 then enhancing water security?

A. Well, in that Glenmore -- still to be able to -- so presently, SR1 does not exist. If a flood event happens this year, and actually, this is what my team and I are doing, you know, right now, in this part of the season, is preparing to set those levels, to help our water treatment operations and our water supply operations set those levels.

And so what we're doing is looking at how does snow pack look, what are we expecting from a meteorologic standpoint, what's going with the Pacific Ocean, and then we would set those levels accordingly.

Normally, to be able to achieve the maximum impact downstream, we do have to be sitting I'll call it within striking distance of the minimum operating level so that when a flood comes, like it did in 2013, again

that terrible 1240 cubic metre per second, and maybe that's a great example.

We recognized three days before the event occurred that a large synoptic event was progressing across the Pacific, was likely to make it through to us. We didn't have a great sense of the magnitude, but what we were able to do was draw the reservoir down to the minimum operating level so the optimum -- the maximum storage so that we got all of the utility for flood attenuation out of Glenmore that we could have.

We talked about the unique nature of the hydrograph in 2013. In some ways, that unique nature was very much a blessing in that that very high peak was captured. That was on the very front of the hydrograph. Glenmore was as low as we could have it, as empty as we could have it, and, therefore, we were able to take that first peak and attenuate that 1200 down to 700.

Had Glenmore not been drawn down, we estimate that water levels downstream would have been up to a metre, metre and a half higher, would have likely outflanked many of the emergency operations we put in place and damaged, we estimate, somewhere in the order of 5 to 600 additional buildings that were not damaged in 2013. So very much that need to optimize and maximize the

storage that would be required for peak flood attenuation potential.

Then if an event doesn't materialize, if that large synoptic event shifts to the north and hits the Red Deer Basin, or shifts to the south and ends up in Montana, we can go from the scenario where we're expecting hundreds of cubic metres per second to literally expecting tens, if not single sets of cubic metres per second, 3, 5, 7 cubic metre per second. This is part of the -- riding the wild bucking bronco that is hydrology in southern Alberta. That is very much part of my job.

Q. So I think my hour allocation is coming to a close, Mr. Frigo. I have to say I really appreciate, enjoy questioning you. I should have asked for more time.

Can you tell me, were you aware, and by "you," the City, I don't know whether you can speak for that, but was the City aware of the 2017 OPUS report on MC1 that's Exhibit 101, and I'd refer to PDF page 46?

It shows that MC1 could reduce flow rates in a 1 in a thousand-year flood to 830 cubic metres per second versus the 1400 cubic metres per second from SR1.

And the rates in a design flood to 212 cubic metres per second at MC1 versus SR1's 640 cubic metres per second? Were you aware of that document when it

came out in 2017?

A. I'm not sure whether it was right in 2017, but I am aware of the document now. I certainly don't remember when precisely I became aware of it.

Q. And would you say that MC1 would have provided superior flood mitigation outcomes for the City of Calgary, had it been chosen?

A. Not necessarily, and this largely stems from analysis that the City has done on the 2005 event that several of the participants have mentioned.

In 2005, we had precipitation that was centered more down-basin, so not as high in the catchment as in 2013. So, in 2013, very much alpine in the mountains was where the heavy precipitation occurred.

In 2005 primarily, the precipitation was a little more down-basin, that is, the centroids of precipitation were closer to Bragg Creek and further downstream.

The position of MC1 higher in the catchment would make it less able to be able to deal with rainfall and capture rainfall that would occur lower down in the basin.

And so, in general, there would be very much a tradeoff, Mr. Secord, between the two because of the relative catchment areas.

And, again, that was based on analysis internally that we've done, looking at 2005 trying to calibrate our hydrologic models to capture, again, events like 2005, which are longer, slower, more down-basin precipitation, versus 2013's which was much more centered in the alpine portion of the catchment.

Q. So are you saying, then, that a 1 in a 1,000-year flood with a flow of 830 cubic metres per second is worse than a flow of 1400 cubic metres per second from SR1?

A. Very much dependent on the -- again, the hydrograph shape because again, we can use that 20 million cubic metres in the same way we can use the 70 million either at MC1 or SR1 dependent on that hydrograph shape.

So if we were going to have a higher flow but it sustained longer, that could be more problematic than having a sharp peak like we did in 2013 and were able to capture.

So very much dependent on the event, and that's precisely why I tried to qualify my previous answer around there's very much a tradeoff, and the relative position of storage in the catchment is very important factor to how effective it would be.

On the Bow, a similar analogy would be Upper and Lower Kananaskis Reservoirs most people are familiar with, they sit so high in the catchment that they're

not terribly useful for flood mitigation from the standpoint that they don't capture enough area to actually have a strong influence on a peak. They're much more useful for resupplying, if you will, Ghost reservoir and other reservoirs downstream on the Bow system afterwards.

So very much that position in the catchment has a lot to do, as well as the storage size, as well as the capacity of the various outlets, all contribute to the factor of benefit or choice relative to different locations.

Q. And have you -- have you actually looked -- have you looked at any studies to determine how much of the Elbow River catchment MC1 captures? If I suggested to you that MC1 captures 96 percent of the Elbow River catchment area, would you disagree with that or do you have a comment on the percentage?

A. I would have to check that number. That doesn't seem correct because my recollection is that at MC1, we're well below a thousand square kilometres, but I would need to check that, Mr. Secord.

Q. Would you undertake to check for me the percentage of the catchment area that MC1 would capture and provide that in due course? Is that agreeable?

A. Sure, subject to check with counsel.

UNDERTAKING - TO ADVISE THE PERCENTAGE OF THE CATCHMENT AREA THAT MC1 WOULD CAPTURE SUBJECT TO CHECK WITH COUNSEL

Q. MR. SECORD: All right. I think, Mr. Chair, my time is up. Am I correct?

THE CHAIR: You're not. While I've been maybe a drill sergeant when coming up to your time. I think it's only reasonable to say, according to my watch, I think you're at 1:45, and you asked for an hour. So that takes you to 2:45, another ten minutes.

MR. SECORD: Okay. I just want to make sure I'm not --

THE CHAIR: All good.

MR. SECORD: -- out of line here. I think I'm pretty much done, so I'm just going to check my notes.

THE CHAIR: Sounds like somebody --

MR. KRUHLAK: Sounds like an alarm.

MR. SECORD: It's somebody phoning me, Mr. Kruhlak, sorry, but I had the ringer off.

THE CHAIR: All good.

MR. SECORD: Let me just go to my notes here, and sorry to --

Thank you very much, Mr. Frigo. Those are all my questions.

Thank you very much, Mr. Chair.

THE CHAIR: Thank you, Mr. Frigo. Thank you. We may have questions I think from Mr. Williams from Calalta. Mr. Williams, are you online?

MR. WILLIAMS: Yes. Can you hear me?

THE CHAIR: We can. Video, as well. There we go. Thank you, Mr. Wiebe. Please proceed.

MR. WILLIAMS CROSS-EXAMINES THE WITNESS:

Q. Thank you. Thank you for the presentation, Mr. Frigo.

I just have a few questions with regards to -- could you repeat the short version of the process of managing the Bow on a weekly basis?

You talked about stakeholders upstream managing this process on the Bow River?

A. Yes.

Q. And is that just during flood mitigation, like a flood event period or is that weekly on a monthly basis for a complete 365-day year?

A. It's weekly, and it's typically weekly through the open water season so from around April through to around October because water management obviously becomes a little more -- less dynamic in the wintertime; there's not weekly meetings.

The forum I mentioned is set up and operated, run, chaired by Alberta Environment and Parks, their Bow operations group. They invite major water users so

city of Calgary, TransAlta, irrigation districts, a number of other participants. We meet each week. We talk about demands. We talk about supply. We talk about hydrometric conditions. And then we ensure that we time and work with each other to make sure everyone's demands can be met.

That process my team has been involved with for several years, yes.

Q. Okay. And are you indicating that the SR1 dam would then stimulate this same process for the -- all the stakeholders on the Elbow River?

A. Perhaps not identical process, but what I was trying to point out in my presentation is that because we, as a City of Calgary, need to operate the Glenmore Reservoir, both for water supply, environmental, and flood mitigation, we would need to have very close working relationships. We fully understand that.

And very much part of our diligence, in terms of understanding what's coming down the river, we have our own monitoring programs that we would want to then synergize with everyone else's monitoring programs. We share our information and vice versa.

So this is, you know, I was trying to use the example of what's happening on the Bow presently to

provide an indication of what our expectation is we would need to be involved with SR1.

With SR1 being primarily focused on flood mitigation, we would expect that we would -- and with our responsibilities around dam safety for Glenmore, we would be especially interested in any elements that would relate to dam safety, maintenance and checking of gates, all of the geotechnical components around evaluating settlement, other aspects around the dam safety issue.

So it would likely be a different forum because we're talking a different basin and obviously different infrastructure but perhaps something of that nature. And obviously we would expect that it would be Alberta Environment and Parks as the operator to sort of take the lead and prescribe, if you will, the boundaries and the mechanism for that forum.

The City would very gladly participate and would expect that we would need to participate in something of that nature.

Q. In all the information that's collected within this forum or within this group, does it stay within the group or does the City of Calgary use that information within other agencies, i.e. within the City, the growth management board, et cetera? Would that information

ever move to other areas of the City?

A. Virtually, all the information is public.

So primarily, for instance, hydrometric information that we're utilizing is primarily published on Alberta Environment and Parks' river app that shows real-time information. Similarly, the City of Calgary has various public information.

There is some information, of course, that is proprietary. So for instance, I mentioned TransAlta is an important water stakeholder on the Bow. Some of the information that TransAlta has is obviously governed by rules because of their involvement in the hydropower industry.

Q. And so I guess my next question, then, we're in agreement that the managing and the regulations with regards to water licence is the jurisdiction of Alberta Environment and not with the City of Calgary; correct?

A. Absolutely, yes.

Q. Okay. And then the only other thing that -- and the reason I bring this up is because we have a third party operator for our plant, and if we're then drawn into reporting and managing, you know, information provided on a weekly basis and it was caused by SR1, that would grow our costs with our third party operator obviously, and obviously we'd be sensitive to that or we would

have to have a discussion with AT in regards to that.

And I believe that is all the information I had or questions I have. Thank you very much.

THE CHAIR: Thank you, Mr. Williams.

Mr. Wagner, did you have questions for Mr. Frigo?

MR. WAGNER: No questions, Mr. Chair.

THE CHAIR: Okay. Thank you. Board staff, counsel and Panel members. Mr. Kennedy?

MR. KENNEDY: I have no questions for the City of Calgary. Thank you.

THE CHAIR: Ms. Vance?

MS. VANCE: I do not have questions. Thank you.

THE CHAIR: Ms. Roberts?

MS. ROBERTS: I don't have any questions.

THE CHAIR: Mr. Ceroici?

MR. CEROICI: I don't have any questions, thank you.

THE CHAIR: Dr. Heaney?

MR. HEANEY: No questions. Thank you, Mr. Frigo.

THE CHAIR: I just have one clarification.

THE CHAIR QUESTIONS THE WITNESS:

Q. It seems to me I heard Mr. Secord talk about Calgary temperatures under climate change regimes in up to

2080, and I think at one point or twice mentioned Calgary will be, if I have it right, among the highest temperatures in the world.

Did that not -- did the report not refer to the potential increase due to climate change is going to be highest in the world as opposed to actual ambient temperatures? Because the way it sounded by Mr. Secord, may be referring to the actual temperature, as opposed to increase in temperature. Which is it?

A. It's increase. And my understanding was that Mr. Secord indicated it was increase.

Q. Increase. Thank you. And if that's the case, Mr. Secord, I apologize. I just wanted to make sure I had that clear for the transcript.

That's all I had, Mr. Frigo. Thank you very much.

Ms. Senek, did you have any redirect?

MS. SENEK: No redirect. Thank you, Mr. Chair.

THE CHAIR: Okay. Well, we're at quarter to 3 --

MR. SECORD: Shall we take a brief break now and then we can sit the SCLG panel?

THE CHAIR: That's exactly what I was going to do, Mr. Secord. Thank you. I'll hire you as a right-hand man, I guess.

MR. SECORD: And my partner Ms. Okoye will be doing the direct.

THE CHAIR: So, at 3:00, we'll return for SCLG. Thank you.

And just before we do that, I understand that Mr. Cusano and Ms. Louden did not have any direct in this area. I just want to confirm that?

MR. CUSANO: It's Lou Cusano. That is correct.

THE CHAIR: Thank you. And Ms. Louden?

MS. LOUDEN: Yes, Mr. Chairman, that is correct, we do not have any direct on this topic.

THE CHAIR: Thank you. We'll see you back at 3:00.

MR. SECORD: Thank you.

(ADJOURNMENT)

THE CHAIR: Mr. Secord, are you and your panel ready?

MS. OKOYE: Yes, Mr. Chair, the panel is ready.

THE CHAIR: I'm sorry. Ms. Okoye, yes.

Mr. Secord had mentioned you're doing it. I'm sorry, yeah.

MS. OKOYE: Yes, he's been at it for a while, so he's getting tired.

THE CHAIR: All right. Well, welcome and

take it away.

MS. OKOYE: Thank you. Good afternoon.

So we'll start off first with Roger.

I'll just introduce -- I'm sorry -- oh, I'm sorry, my picture wasn't on.

So I'll start off first by introducing our witnesses.

We have Roger Austin, Ruth Keyes, both from Austin Engineering Limited; Dave Klepacki, and Ian Dowsett.

If Madam Court Reporter could, please, either swear or affirm them.

R. AUSTIN, R. KEYES, D. KLEPACKI, I. DOWSETT (For SCLG Panel), sworn/affirmed

MS. OKOYE EXAMINES THE PANEL:

MS. OKOYE: Thank you, Madam Court Reporter.

Q. So we'll start off with Mr. Austin and Ms. Keyes. I'm referring both of you to your CV filed as Exhibit 257, your report filed as Exhibit 256, and your opening statement.

Were these documents prepared by you under your direction or control?

A. MR. AUSTIN: Yes, they were.

A. MS. KEYES: Yes, they were.

Q. The documents are true to the best of your knowledge and belief?

A. MR. AUSTIN: Yes, they are.

A. MS. KEYES: Yes, that's correct.

Q. Do you adopt them as part of your evidence in this proceeding?

A. MR. AUSTIN: Yes, I do.

Q. 1do you both acknowledge that you have a duty to provide opinion evidence to the Board that is fair, objective, and non-partisan?

A. MR. AUSTIN: Yes, I do.

A. MS. KEYES: Yes.

Q. Perfect. Could you please explain Austin's Engineering's role in this proceeding.

A. MR. AUSTIN: Yes. So Austin Engineering was hired to review and assess the project's overall design and operational risk with the view of improving dam safety and reducing the risks for operational load structure.

Q. So starting first with you, Mr. Austin, could you please provide the Board with a brief summary of your professional qualifications and experience.

A. MR. AUSTIN: Yes, I can. So I graduated with a bachelor of civil engineering in 2003. I began my career by building earth structures for water retention

and conveyance for Fisheries and Oceans Canada.

I then moved into heavy civil construction where I joined the construction team that installed the world's largest post-sanction anchors at Seven Mile Dam. We followed that with upgrades to spillway at Seven Mile Dam.

And a few years later, I was involved in the Revelstoke Unit 5 upgrade where I was the project engineer for Unit 5 installing a 530-megawatt generator.

I left Kiewit and heavy civil construction and was employed by FortisBC. Throughout my career with Fortis, I ended as manager of generation engineering for FortisBC, and also dam safety. In that role, we covered FortisBC, FortisOntario, Fortis Generation East and Fortis US.

Following my employment with FortisBC, I started Austin Engineering. Austin Engineering has been in existence for seven, just about seven years now. And we specialize in dam safety and dam safety-related projects, and have completed in excess of 100 projects over the last seven years relating to dam safety.

Q. Thank you, Mr. Austin.

Ms. Keyes, would you please provide the Board with a brief summary of your professional qualifications and

experience?

A. MS. KEYES: Yes. So I graduated with a bachelor of engineering, civil and environmental in 2005.

I have over 16 years of engineering experience working predominantly as a consultant on hydraulic design, hydrotechnical analysis, hydrological analysis and erosion protection design.

I've previously been registered as a professional engineer with APEGA, and I'm currently registered as a professional engineer with EGBC.

Q. Thank you, Ms. Keyes.

Document manager, would you please pull up Austin Engineering PowerPoint presentation.

COURT REPORTER: So I'm just going to remind the parties that I need to write what you're saying, so I'm going to ask that you speak slowly and clearly.

A. MR. AUSTIN: Thank you.

MS. OKOYE: Thank you.

Q. Could you please proceed in giving an overview of your findings in this matter.

MR. FITCH: Mr. Chairman, it's Gavin Fitch. Just before the witnesses begin. I have no recollection of receiving the PowerPoint presentation. If I did, I must have somehow overlooked it.

That said, you know, let's let the witnesses go ahead, but I'm just -- I'm confessing this is the first time I've seen this document.

But as I said, let's proceed and we'll see how it goes.

THE CHAIR: Okay. Thank you, Mr. Fitch.

Ms. Okoye, have you not forwarded that? I don't believe I've seen it either actually.

MS. OKOYE: It was submitted to Ms. Friend yesterday. So I'm not sure. Let me see. Perhaps -- maybe we didn't copy Mr. Fitch.

Well, they can proceed and I'll forward that to Mr. Fitch as quickly as possible.

THE CHAIR: I expect this is the information that has been driven out of the report that was --

MS. OKOYE: Yes --

THE CHAIR: -- previously?

MS. OKOYE: Yes.

THE CHAIR: Thank you.

Q. MS. OKOYE: Ms. Keyes or Mr. Austin, you can proceed.

A. MS. KEYES: Just for the court reporter, this is Ruth Keyes talking for the first half.

Document manager, can I please have Slide Number 2.

Austin Engineering is a consulting company with extensive experience in dam safety projects. As Roger Austin mentioned previously, our objective on this project was to identify risks with the engineering -- with the engineered design and operation of the SR1 project, and provide recommendations to improve the dam safety aspects of the project and prevent long-term dam safety non-conformances or deficiencies that could negatively affect downstream residents, landowners and infrastructure or have detrimental ecological impacts.

Slide 3, please, document manager.

Our main references through the course of our design review was the government of Alberta, Alberta Dam and Safety Directive, and the Canadian Dam Association Dam and Safety Guidelines 2007 (2013 Edition).

Slide 4, please, document manager.

Our review of the SR1 project and design included a background information review; the downstream inundation from dam break analysis; consequence classification of the storage dam and diversion structure; a review of hydrotechnical considerations; a review of geotechnical considerations; operation, maintenance and surveillance considerations; emergency planning and response; dam commissioning; dam

dewatering; dam safety management; and environmental considerations.

Next slide, please.

This is slide 5. Our design review considered hydrotechnical considerations including a review of the hydrological analysis and the inflow design flood or IDF determination; a review of the discharge capacity of the diversion inlet, service spillway, auxiliary spillway, emergency spillway, and storage dam low-level outlet works.

The service spillway operation is characterized by six rating curves as shown in Exhibit 174, page 391.

The six rating curves represent different operational settings of the service spillway over the Obermeyer weir. The operator moves from one rating curve to another by changing the Obermeyer setting, depending on the Elbow River flow upstream of the diversion structure.

Based on that same flow, the operator opens and closes the diversion inlet gates in conjunction with a review of the off-stream storage reservoir level, the Glenmore Reservoir level, and the results of monitoring instrumentation within the storage dam.

The diversion structure operation -- operational decisions are also impacted by the flow increment in

the Elbow River upstream of the diversion structure; for example, 0 to 160 metres cubed per second, 160 to 760 metres cubed per second, 760 to 1600 metres cubed per second, 1600 and 2200 metres cubed per second, and 2200 to 2700 metres cubed per second.

The operator must also be aware of developing public safety issues, impacts that occur within the off-stream reservoir area, and forecasted changes to the Elbow River flows in order to try and divert the peak flow of the flood event hydrograph.

A design review also considered freeboard requirements, erosion protection, and impacts between the service spillway and the Glenmore Reservoir.

Next slide, please.

THE CHAIR: Ms. Keyes, there's some interference coming. I think Ms. Vespa, our court reporter, is getting it, but I'm not sure if there's other paper rustling close to your microphone or something, but it is kind of cutting overtop of your voice a bit.

A. MS. KEYES: Hopefully it's better. I can move my paper.

THE CHAIR: Better. Thank you.

A. MS. KEYES: A review and analysis also considered geotechnical considerations. We reviewed

the slope stability analysis of both the storage dam and the floodplain berm for various scenarios including end of construction before reservoir filling, the static normal maximum reservoir level, the pseudo-static scenarios, rapid draining, and rapid filling.

We also reviewed erosion protection provisions, settlement, and impacts to the low-level outlet in the storage dam as well as provisions for instrumentation and monitoring.

Next slide, please.

This is slide Number 7.

In response to our design review report, Alberta Transportation provided reply submission Volume 1 of 2, which is Exhibit 327. I'll just check if you can hear me okay now.

THE CHAIR: Yes, thank you.

Ms. Vespa, that's good?

A. MS. KEYES: So Figure 1 on page 27 of Exhibit 327 indicated a constant diversion maintained at 480 metres cubed per second based on incremental closing of the gates of the diversion inlet gates.

A review of reservoir routing scenarios in Exhibit 159, which is section 10.1.3, page 173 to 177, indicate that none of the scenarios presented in this

section have the diversion channel discharging at design flow of 600 metres cubed per second.

Plots in Figure 2 on page 28 of Exhibit 327 have been developed to demonstrate the emergency spillway can discharge the IDF, taking into account the routing effects of the reservoir, without infringing on the minimum freeboard requirements. However, the routing analysis should be started with the IDF entering the reservoir when the reservoir is already at the full service level, or FSL, of 1210.75 metres and then routed up to the minimum freeboard level of 1212 metres.

Plots in Figure 2 on page 28 of Exhibit 327 have been developed based on three assumptions: That there is a loss of diversion control after seven hours of diversion, but before loss of diversion control occurs, the diversion rate was set at 480 metres cubed per second based on the operational scenario of incremental diversion gate closing before the PMF; and that routing with the IDF started with storage reservoir at an elevation of 1196.6 metres, rather than at FSL.

The mechanism of loss of diversion control was not stated in Exhibit 327, but we are assuming the most likely form of loss of diversion control would be through a structural loss, such as the loss of the

middle pier between the diversion inlet bays. This is based on the placement of the access bridge across the diversion inlet blocking flow between elevations of 1215.5 metres and 1219 metres.

I now hand over to Roger Austin to discuss the responses we received to our 24 recommendations.

A. MR. AUSTIN: Thank you very much. Roger Austin speaking.

So before we continue with our review of our recommendations, we would like to indicate that Stantec provided a response in Exhibit 327 of Appendix E. And we find the following responses to our recommendations to be acceptable, and as such, we are not going to discuss them further during our presentation.

Recommendation Number 3, Points 2 and 4, Recommendation Number 4, paragraph 1 and 2; Recommendation Number 5, paragraph 2; Recommendation Number 6; Recommendation Number 7; Recommendation Number 9; Recommendation Number 12; Recommendation Number 13; Recommendation Number 16; Recommendation Number 18, paragraph 2 only; Recommendation 21 through 24 inclusive.

Next slide, please.

A. MS. KEYES: So our Number 1 recommendation was that the diversion inlet maximum discharge capacity be

reviewed and modelled with the access bridge in place. Between the draft and final preliminary designs, an access bridge has been added over the diversion inlet with a bottom elevation of 1215.5 metres.

Section 8.2.4 of Exhibit 159 indicates the hydraulic performance of the diversion inlet design was evaluated using the physical model discussed in Section 4.2. However, Section 4.2 references the 2016 physical 3D model, which was developed without the access bridge in place. Section 8.2.4.2 of Exhibit 159 includes the diversion inlet rating curve.

Our next slide compares the inlet rating curve between the final design and the draft design. The diversion inlet rating curve for the final preliminary design is given on the left-hand side with the access bridge over the diversion inlet; the figure on the right-hand side is taken from the draft preliminary design without the access bridge over the diversion inlet.

Now, a reminder that the diversion inlet bridge was from an elevation of 1215.5 metres to 1219 metres, but what this comparison shows is that at an elevation of one surface elevation of 1216 metres, the diversion inlet flow is the same at 641 metres cubed per second.

So without the access bridge at an elevation of

1216, it was 641, and with the access bridge at an elevation of 1216, it's 641. That access bridge should have caused a reduction in the flow at an elevation of 1216.

When water hits a bridge, the friction from that impact reduces the total flow.

Next slide, please, slide Number 10.

Our Recommendation Number 2 was that the emergency spillway maximum discharge capacity is less than the diversion channel design flow.

As the storage dam is an extreme consequence dam, the emergency spillway should be capable of discharging the IDF, taking into account the routing effect of the reservoir without infringing on the minimum freeboard requirements. Spillway sizing should be based on the reservoir routing started with the IDF entering the reservoir when the reservoir is at full service level and routed up to the minimum freeboard level.

A reassessment of the emergency spillway should be considered to increase the discharge capacity.

Next slide, please.

We have accepted Recommendations 3, Points 2 and 4. Point 1 we've discussed. Point 3, more information should be provided on the diversion structure rating curve with various operation combinations of the

diversion inlet, service spillway, and auxiliary spillway.

A. MR. AUSTIN: Roger Austin speaking. So to clarify, Stantec's response to Point Number 3 was hydraulic information, including rating curves for the full operational range of critical design loadings and conditions for the diversion inlet service spillway and auxiliary spillway are presented in the Preliminary Design Report.

Additional operating conditions can be constructed utilizing the data presented for the three rating curves. This logic will be developed with the design of the control system.

Austin Engineering simply stresses that simplicity is of paramount importance. The operators will not have the familiarity of operating the structure under flood conditions, and therefore a simple operating procedure needs to be established for regulating the inflow into the structure and managing the diversion outflow spillways.

Next slide, please.

A. MS. KEYES: The response to Recommendation Number 4, paragraph 1, was accepted. Paragraph 2, an allowance for forest fire and climate change should be included in the flood flow determination.

And paragraph 3, an allowance to account for these uncertainties be included within the design flood prior to completing final design of the diversion structure components and sizing of the diversion inlet gates and final sizing of the emergency spillway.

A. MR. AUSTIN: To clarify, with regard to Point Number 2 or paragraph number 2, we accept that neither climate change or forest fire is typically added to the PMF analysis. However, we note that floods from 1879, 1897, and 1902 do not appear to be in the dataset and should form a basis for review of the overall size and magnitude of the flood.

With regard to paragraph Number 3, Stantec's response is: (as read)

"The proposed operations for the project are to close the diversion inlet gates to restrict flows to the diversion channel to 600 cubic metres per second and prevent overfilling of the reservoir. The emergency spillway has been designed to convey the required discharge from an uncontrolled PMF. It is our opinion that this assumption incorporates sufficient conservatism into the design."

Austin Engineering's concern here is that the operations to restrict flows to 600 cubic metres as indicated in this response; however the sizing of the spillway appears to be based on routing of the 480 cubic metres per second flow through into the reservoir to size the overall spillway. We recommend that during final design, the design of the reservoir emergency spillway consider routing of a 600 cubic metre per second intake flow as opposed to the 480 cubic metre per second intake flow.

Next slide, please.

A. MS. KEYES: Recommendation, the response to Recommendation Number 5 was accepted.

A. MR. AUSTIN: However, we have the following comments with regard to the stop logs. We note Stantec's response that: (as read)

"The diversion inlet sill elevation is positioned one and a half metres above the bed of the Elbow River, and the sill elevation corresponds to a discharge in the Elbow River with a recurrence interval of one to two years. The diversion inlet gates can be tested during low seasonal flows without risk of discharge to the channel and fish

stranding. Stop logs are therefore not required."

We note that this design assumption would not allow for future major maintenance of the gates. The addition of stop log slots at this point of the project would be a minor change to the overall design and would allow for future maintenance of these gates without requiring the installation of cofferdams and the disturbances they would cause and therefore recommend their inclusion in the final design.

Next slide, please.

Recommendations Number 6 and 7, Austin Engineering accepts Stantec's response.

Next slide, please.

Recommendation Number 8: "Flood Protection Between the Service Spillway and the Glenmore Dam," to which Stantec responded: (as read)

"SR1 will reduce downstream flooding during operation. Residual flooding may still occur downstream but will be substantially less then the current flood risk."

Austin Engineering acknowledges this reduction; however, we still recommend that flood maps should be created regardless to establish future construction elevations

downstream of SR1 as they will be subject to change once the SR1 reservoir goes into operation.

Next slide, please.

Recommendation Number 9, "Control Building Location." Austin Engineering accepts Stantec's response.

Next slide, please.

Recommendation Number 10: "Factor of safety of the storage dam and floodplain berm under pseudo-static loading."

Austin Engineering accepts Stantec's response. However, we note a fluvial deposit is located at Station 23 plus 175 in the area of the Unnamed Creek, and final design should likely include a check on the liquefaction settlement resulting from this particular formation.

Next slide, please. That is next slide, as well, please.

Recommendation Number 11, "Fracking Exclusion Zone." To this, Stantec's response includes: (as read)

"An exclusion zone was presented as a possible risk management strategy. However, the design of the dam is not contingent upon the establishment of an exclusion zone."

Austin Engineering accepts this response, however notes that Stantec has included an acceleration-based analysis which covers the hazards relating to seismically induced accelerations from fracking.

With regard to settlement triggered fracking, which could occur if fracking was conducted in close proximity to the dam, this risk will still be a residual risk.

Next slide, please.

With regard to Recommendation Number 12, Austin Engineering accepts Stantec's response.

Next slide, please.

With regard to Recommendation Number 13, Austin Engineering also accepts Stantec's response.

Next slide, please.

With regard to Recommendation Number 14, Springbank Road acting as a dam, Austin Engineering accepts Stantec's response.

For Recommendation Number 15, Stantec has responded that: (as read)

"As discussed in Section 10.4.2 of the Preliminary Design Report, the low-level works design capacity was selected based on the industry standards for evacuation times for the reservoir. No basis for increased capacity has been provided."

Austin Engineering accepts this response, though we note that there is no secondary means for draining the reservoir should a failure of the low-level outlet occur. And a significant reduction in the risk and operation to the structure can be realized from the addition of a second low-level outlet.

It is typical of dams to have a conduit for water supply and conveyance along with a low-level outlet for utilization during emergency, and we recommend the consideration for a second water conduit or low-level outlet be given during the final design.

Next slide please.

With regard to Recommendation 16: "Intake Screen on the Design Low-Level Outlet," Austin Engineering accepts Stantec's response.

Next slide please.

With regard to Recommendation Number 17, "Riprap on the Upstream Face of the Dam," Stantec has responded: (as read)

"The upstream face of the dam is subject to varying reservoir levels during filling and draining. This varying level will reduce the risks associated with progressive erosion from wind-driven events. The combination of

cohesive clays and vegetation will provide sufficient mitigation during the short exposure periods."

We accept this response; however, we caution that riprap along the crest of the dam would function during an event where water would be required to be stored within the reservoir at full service level or full supply level for a period of time during passage of a major flood. Riprap would still provide a benefit in this instance.

Next slide, please.

Recommendation Number 18: "Differential Settlement of the Dam," to which Stantec has responded: (as read)

"Differential settlement along the low-level conduit is addressed in Section 10.4.6.3 of the Preliminary Design Report. The final design will address estimated settlement and elongation along the conduits. Total settlement and camber will be used to design appropriate joint spacing in conduits and select the types of joint collars used."

We note that the current design includes a concrete low-level outlet works. Concrete does not typically perform well with large settlements, and we suggest

consideration for a more flexible conduit such as an HDPE pipe be considered during final design.

Next slide, please.

Recommendation Number 19: "Silt Removal Within the Off-Stream Reservoir," to which Stantec responded: (as read)

> "Removal of silt from the reservoir is not proposed. Introduction of roads and drainage ditches within the reservoir may aid in dewatering; however, the additional disturbance would cause a further loss of available habitat and plant communities which, in our opinion, would outweigh the value."

We agree that there will be additional disturbance caused; however, the benefits with regard to fish salvage and future sediment removal of designing the roads and access within the reservoir and constructing in the dry we believe will provide significant reduction in fish salvage times once the reservoir goes into operation.

Next slide, please.

Recommendation Number 20: "Dam Commissioning." We accept Stantec's response but note that a careful review should be undertaken by the Regulator as this reservoir

is planned to under go first fill without the design engineers necessarily on site.

Next slide, please.

We can -- two more slides to Recommendation 21. With regard to Recommendation 21, "Safety Management Plan," Austin Engineering accepts Stantec's response.

With regard to Recommendation 22, emergency "Plans and Response," Austin Engineering accepts Stantec's response.

And next slide, please.

With regard to Recommendation 23, "Dam Break Inundation Mapping," Austin Engineering accepts Stantec's response.

And next slide.

With regard to the operation, maintenance, and surveillance documentation, Austin Engineering accepts Stantec's response.

We may move to the end of the presentation.

Thank you very much.

Q. Thank you, Ms. Keyes. Thank you, Mr. Austin.

All right. So we'll go next to Dave Klepacki.

A. MR. KLEPACKI: Hello?

Q. Are you there?

A. MR. KLEPACKI: I am here. Can you hear me?

Q. I can hear you.

A. **MR. KLEPACKI: Thank you.**

Q. Dr. Klepacki, I'm referring you to your CV filed as Exhibits 263, your reports filed as Exhibits 263 and 264. Were these documents prepared by you or under your direction or control?

A. **MR. KLEPACKI: Yes, they were.**

Q. Are the documents accurate to the best of your knowledge and belief?

A. **MR. KLEPACKI: Yes, they are.**

Q. And do you adopt them as your evidence in this proceeding?

A. **MR. KLEPACKI: Yes, I do.**

Q. Dr. Klepacki, your CV, Exhibit 263, PDF 17, suggests that you're a resident of Bragg Creek; is that correct?

A. **MR. KLEPACKI: Yes, I am.**

Q. How long have you lived in Bragg Creek?

A. **MR. KLEPACKI: 31.6 years, while we're using points.**

Q. What do you do in Bragg Creek?

A. **MR. KLEPACKI: What do I do? I have raised six children here with my wife Amarin Dawn who owns The Heart cafe and yoga studio here with my stepdaughter. I'm actually here because the Wi-Fi is better in the cafe.**

All of our students attended Bragg Creek and

Springbank schools in their educational paths and were involved in youth sports in the Bragg Creek, Redwood Meadows, Springbank, and Calgary communities.

Amarin and I have been and continue to be deeply involved with the Bragg Creek, Redwood Meadows, and Springbank communities.

I have been involved in with the Bragg Creek Chamber of Commerce, the greater Bragg Creek Trails Association, Junior Forest Wardens, the Bragg Creek Community Church, and with very many community events and fundraising initiatives over the years.

Q. Thank you. Your CV also indicates that you have a PhD in geological sciences from the Massachusetts Institute of Technology; is that correct?

A. MR. KLEPACKI: That is correct.

Q. And you obtained your PhD in 1987; is that correct?

A. MR. KLEPACKI: That is correct.

Q. Your CV also indicates that you have worked as a geologist in various roles and position up to 2017; is that correct?

A. MR. KLEPACKI: That is correct, although the majority of my 32-year career in the oil and gas industry was as a geophysicist executing and interpreting seismic and potential field studies and as an executive in junior oil and gas companies.

Q. Can you give a brief overview of your professional experience?

A. MR. KLEPACKI: Yes, I can. I started my career within academia as an employee of the United States Geological Survey and following two years as an employee of Geotex Consultants of Vancouver. I was employed by the Geological Survey of Canada while pursuing my PhD at MIT from 1981 to 1985. I accrued 10 seasons of geological field studies during these years.

Following my academic studies, I worked for Exxon Production Research Company on various exploration and production projects around the world before being transferred to Esso Canada in 1989.

I was then employed by PanCanadian Petroleum, which was the precursor to Encana.

In 1998 I left the majors for a career with various junior and oil and gas companies as a consulting geophysicist and executive until retirement in 2017.

In the course of my career, I was responsible for technical projects, exploration and development plans, employees, budgets, contracting, service industries, regulatory approvals and government relations, both domestically and internationally. I also developed an interest in full-cycle resources economics and

environmental impacts, which led me to my current avocation in environmental studies.

Q. So since 2017, you've been working in your company called Essential Earth Mentoring LP; is that correct?

A. MR. KLEPACKI: Yes, that is.

Q. What does your company do and what's your role in it?

A. MR. KLEPACKI: I founded Essential Earth Mentoring as a sole proprietorship in 2017 when I retired. And this company was for consulting and mentoring on resource and conservation projects, the latest being the construction and operation of a local 1300-square-foot food-producing greenhouse, which was fun.

In 2018, my wife and I started a not-for-profit environmental awareness company called the Experience Journeys. One focus of the Experience Journeys are citizens science environmental studies involving local youth and residents that I currently supervise.

My work on the Elbow River has been voluntary and aside from each of these companies.

Q. Thank you, Dr. Klepacki. So your evidence on this topic block was presented in Exhibit 264, PDF 126. Would you please provide the Board an overview of your concerns?

A. MR. KLEPACKI: Yes, I will.

My report pertinent to Topic Block 3 is in Exhibit 264, PDF 1 through 6, and it's entitled "Erosion and River Bed Integrity At the Low-Level Outlet For the Springbank Off-Stream Reservoir Project." My report is about erosion of the Unnamed Creek downstream from the low-level outlet and into the Elbow River below the confluence.

Can I go ahead and have the document manager?

Q. Yes, please.

A. MR. KLEPACKI: Okay, thanks.

Q. You want, perfect, 264.

A. MR. KLEPACKI: That's correct.

First of all, I'd like to thank the Board, Mr. Chairman, and -- and Panel members and all of the other interested parties here for the opportunity to talk about the Elbow River and the impacts of the Springbank Off-Stream Reservoir Project upon the Elbow River.

This particular report, which is one of three that I've submitted, is actually pretty straightforward, I would say, and Mr. Ceroici actually covered some of the points that I'm interested in.

If we can go to page 2 of this report, here is a diagram taken from Drawing 73396A-111 in the Stantec general reservoir overview which was the report of

December 2020. And this shows the eastern side of the dam with the low-level outlet features that lead into the Unnamed Creek on the right-hand side of this image.

Can we go to the next, the following page, please, which is page 3? That's right.

The drawing in the upper image is a Google Earth image that shows the low-level outlet. The reservoir side, of course, is in the upper left-hand corner of the brown earthen dam structure, and the outlet works are between the two blue lines in the central part of the picture.

I put a couple of numbers in there, Numbers 1 and 2, that basically show the Unnamed Creek valley.

Picture Number 1, looking to the south is the picture that you see below the upper -- the upper picture. So, document manager, if you can just scroll down just a smidgen. That's it. Yeah.

So this is looking on the bank, looking south with the Unnamed Creek in the woods that you can see in the background.

Can we go to PDF page 4, please.

Yeah, photograph 2, again, is from up on the embankment looking to the southwest where the Unnamed Creek leads into the Elbow River in the background. We'll come back to other pictures of the

Unnamed Creek in a little bit.

If we go to the bottom, we can see that kind of snake-like creature coming -- or structure coming out of the dam and cutting through the field and leading into -- into the Unnamed Creek bed.

Now, if we can go to the next page, please, PDF Number 5, I believe. No, this is correct, I'm sorry, this is correct.

One of the concerns that I have is the volume that is going to be released in, you know, a 30- or 40-day period of the draining of the reservoir after a flow event. Again that's dependent upon the volume of water that's within the reservoir, but when I looked at the various flow scenarios, the highest that the low-level peak can do is 27 cubic metres per second which is that red line that you can see on the hydrograph.

But in reviewing some of the -- some of the other documentation, it looked like most of the discharges were aimed at somewhere around 12 cubic metres per second and towards the end of the 30- or 40-day period, tapering off down to, you know, two or three, with a relatively steep taper in the last few days.

My point with this diagram is that, even 12 cubic metres per second is a significant component of the total flow of the Elbow River. The hydrographs you see

in front of you are taken at the Highway 22 -- sorry, at Bragg Creek, and this is from Breyer Manuel 2006 master's thesis at the University of Calgary.

As you know, and as we've discussed, most of the flow does come from Bragg Creek and upstream so the flow at the area of discharge, if it's 12 cubic metres or 10 cubic metres, I mean that's almost going to be an additional Elbow River flow that's coming in to the Elbow River at that time, which will be in later July and August, given, again, a month or month and a half discharge.

So we can go to the next page, please.

You can see that -- on this diagram where the outlet works end, which is the blue lines, and where overland flow will begin, which is at the top of that arrow. That flow will run down the Unnamed Creek into the Elbow River, presumably doubling at least the size of the Elbow River downstream from the confluence.

Next, document handler, could you please bring up Exhibit 20, PDF page 79.

This is from the March 2018 project description by Stantec. In the lower part, you can see the mechanism for release of the low-level outlet and some energy dispersion structures.

If we can then go to Exhibit 10 and PDF page 2.

Here are some pictures that were taken in 2016 -- I've just got to check myself on that. I'm pretty sure that's the date -- and it shows the low-level creek down by the confluence with the Elbow River.

Now, Mr. Wood had mentioned earlier today that there is some riprap down by that confluence. But the purpose of my speaking right now is, I'm concerned that at 12 cubic metres per second or even worse if it was coming out at 27 cubic metres per second, that that riprap would not be sufficient to -- to prevent erosion and sending a significant amount of sediment and woody debris downstream.

I'm sorry, document handler, but if we could go back to my original diagram, which was 264, page 6. Yes. That's the one. And maybe just enlarge that diagram a bit.

So the concern I have is the erosion in the first half of that red arrow coming out of the outlet works, you know, with a lack of significant riprap, and then that water volume will have some inertia, and it will -- although I haven't done neither a hydrologic or a hydraulic model, but concerned about continued scour from the combined flows that would lead to that southern bluff that you can see in the middle part of

this picture and then continued down -- downstream.

We have questioned -- the Springbank's Concerned Landowners Group, I think, has questioned riprapping along the outlet -- the low-level outlet and the stream, and the purpose of this presentation is just to reinforce that need for erosion control along this lower segment of the Unnamed Creek.

That is my piece for this afternoon. Thank you.

Q. Thank you, Dr. Klepacki. And now we can go on to Mr. Dowsett.

Are you there? Mr. Dowsett? He was here before. There we go.

A. MR. DOWSETT: I was pushing Roger Austin's buttons.

Q. Mr. Dowsett, I'm referring you to your CV, Exhibit 260; your reports, Exhibit 259; and your opening statement. Were these documents prepared by you or under your direction or control?

A. MR. DOWSETT: Yes.

Q. Thank you. Are there any changes you would like to make to the document at this time?

A. MR. DOWSETT: Yes, I would.

Stantec noted in a March 10th reply response that the guidelines for emergency preparedness for flood emergencies, Alberta Environment 2003 had been

superseded by Alberta Dam and Canal Safety Directive 2018. I appreciate the correction.

I've reviewed these documents and I wish to indicate that, in my opinion, the directive is comprehensive and does represent best practice.

In support of this opinion, I can tell the panel that in 2012, in the consulting role, I was retained by ERCB, now ANCAP, to review emergency management systems implemented in major industrial countries, define gaps and make recommendations supporting best practice across Canadian jurisdictions. And as I'm out of date on the current requirements and, as a result, I included a summary of those components based on my experience in pages 9 and 10 of my report for the purpose of asking questions to ensure that appropriate EMS was in place.

In looking at the directive, it checks all the boxes for me, and I find the materials in my report are redundant.

Q. Okay. All right. So other than those changes, everything that you have presented, are they accurate to the best of your knowledge?

A. MR. DOWSETT: The only other thing I would suggest is that, when you look at inundation maps, the inundation maps represent the land contours at the time

they were prepared. And in looking at the City of Calgary, I think there was a comment with respect to the fact that the properties in Calgary have undergone some berms and changes. And the inundation maps, when I overlay them, they show water around homes. And if protection or contours have changed in that area, I was unaware of those and I would suggest that the City of Calgary may be -- that those properties may not actually be impacted during flooding.

Q. Okay.

A. MR. DOWSETT: But further to that, with respect to the residents of my concern, are those directly below the dam, and no measures have been in place there. And so I think those inundation maps provided by AEP are representative.

Q. All right. Thank you.

COURT REPORTER: Are what?

A. MR. DOWSETT: Representative.

THE CHAIR: Ms. Vespa, did you get that?

COURT REPORTER: I did. Thank you.

Q. MS. OKOYE: All right, Mr. Dowsett. So your CV, Exhibit 260, it indicates that you're a resident of Rocky View County; is that correct?

A. MR. DOWSETT: Yes, I am.

Q. And how long have you lived in Rocky View County? A

rough figure.

A. MR. DOWSETT: Over 30 years.

Q. Okay. Thank you. Could you please provide the Board with an overview of your professional experience and qualifications.

A. MR. DOWSETT: Well, I mean, quite frankly, I'm retired. And I did put together a fairly lengthy thing, a resume.

But I am a graduate of three-year program -- engineering technology program from Northern Alberta Institute of Technology, and I've taken a couple of years, two years of engineering, and I have gained a lot of experience.

I spent ten years working for Canadian Western Natural Gas, now ATCO. I spent about 16 and a half years working for the ERCB, now AER as a -- and I ended up my career there as a senior advisor on public safety, at which time I went into consulting and worked for a few companies, and was doing air dispersion modelling and risk assessment and then I started my own company. And I was building emergency response plans for many of the major oil and gas companies in Calgary. And I was doing a lot of regulatory hearing work at that time.

And I actually have to say, I told myself that I'd

have nothing -- the stress of these things, and I thought -- I was kind of hoping to stay away from any more regulatory hearings. And subsequent to that, I sold my company to a company that specialized in pipeline inspection and integrity programs. And I've been retired ever since.

Q. Okay. Thank you, Mr. Dowsett.

Document manager, could you please pull up the PowerPoint presentation for Mr. Dowsett.

A. MR. DOWSETT: I don't believe I have one, so I would like to make a statement. There is no PowerPoint.

Q. You submitted one -- but that's fine. You can make your statement, that is fine.

A. MR. DOWSETT: Yeah, no, I thought that that had been pulled.

First, I would like to say I am not a member of the SCLG. I do reside north of Highway 1, and I am above the Bow River.

While I worked extensively in safety, my background is not in dam safety, and I've prepared these materials on a voluntary basis. They're really for guidance for the community and I was asked to submit a report, and my report does not represent my testimony.

Translated, that means if you ask me questions, I will only answer nice questions.

An individual active in the Springbank Community Association, my wife, let the SCLG know that I had been involved in many regulatory hearings, and I was invited to SCLG meeting to provide advice on what a hearing would entail, and advise on finding accredited qualified people.

Ms. Hunter asked if I would look at Volume 1 project description. And after a quick review, it was clear to me that, for the design flood of 2013, SR1 would capture less than half the flood peak.

It was also clear that for a range of larger floods, I mean smaller than the design flood but of a larger size, even with mitigation by SR1, some flooding would continue to occur downstream of this dam.

In listening to discussion yesterday and, in review response provided by Stantec, it's clear that the applicant is also aware that continued flooding can occur.

It also seems to be the case that if problems occur during reservoir operations, the operational response will simply be to stop operations and flow the peak downstream.

The thing that struck me was that members of the

SCLG had a general view that SR1 would protect them from flooding. There seemed to be no awareness that some degree of flooding would continue after the dam was completed.

It seems that this technical understanding that we as people who have been working in reading charts and graphs and so on have had -- get from the technical side, had not really been adequately conveyed into the public arena.

Additionally, I was informed by Ms. Hunter that at about the time that the Board panel toured the site, she visited a number of residents below the dam, and they also indicated that they were unaware that some additional reoccurring flooding could occur.

The purpose of my report is primarily to ensure that this understanding is known and is in the record, and I think that that is the case now.

Those residents, the residents of concern for me are those directly below the dam and some other Springbank properties that are located downstream. A rough estimate of flood levels below SR1 associated with expected mitigated flows during flood operations suggest that for a 1 in 100-year flood that's upstream of the dam, mitigated downstream flows would reach levels of approximately 240 metres cubed per second

equivalent to levels associated with a 1 in 20-year flood. And for a 1 in 200-year flood, mitigated downstream flows would reach levels approximately 540 metres cubed per second which is equivalent to a 1 in 50-year flood.

So without looking any farther at larger releases, we are seeing the potential for flooding. It should be remembered that the driving force here, the driving frequency is the upstream frequency, and the numbers I was giving you are representative of the depth of the -- representative of the impingement inundation on the land.

In looking at peak flows, return frequencies, and AEP inundation maps, it appears and I believe supported by the applicant, that anticipated floods would result primarily in property damage.

Just change gears really quickly here.

I was able to catch just a very small portion of the comments made by the lady representing homeowners along the Elbow River in Calgary, and from the limited time that I listened to her, she expressed a very high level of anxiety about reoccurring floods.

From my perspective, from the perspective of looking at this operation from the perspective of societal risk, a dam, either an in-stream dam or

diversion dam located on the Elbow River, will provide significant social benefits to Calgary.

From the perspective of individuals along our river and their risk, it should be -- if this dam should be approved, I would really like to see a dialogue opened between the residents of the community and AT, and I believe they may be directly adversely affected under the current arrangement. And I think they need to be offered some alternatives that would allow them to enjoy their lives and properties without fear and anxiety of reoccurring floods.

And really what that comes down to is I would like to see these residents be provided a similar level of protection as those residents within Calgary. And that could be any number of ways to address that, and I think that -- and it's always been my view that when we're talking about individual risks and relationships to industrial projects, that that dialogue should take place between the residents and the project. I do not suggest that we just impose berms on them; I think it's something that needs to be discussed.

If we were just simply looking at this dam from the perspective of safety, it certainly would make my life a lot easier if it was just an in-stream dam that could capture all of the stream flows without being

able to look at whether we're capturing half or quarter. But that's not the case here, and I think we need to find reasonable solutions that will protect the public in these areas.

And I could go through the report; the only other major concern -- the math is very simple when you look at tracking the diversion rate from peak flow. You basically get the downstream peak, and I think there's agreement on that.

But when you start to look at the details of how this thing operates or performs under pressure, I did write a small Excel, very simple Excel spreadsheet that tracks rates and volumes, and there are some interesting things that come out of that. And we could look at the report briefly just to get a look at some of that, and if we could bring up the report, that would be great.

MS. OKOYE: So that would be Exhibit 259, please. Thank you.

A. MR. DOWSETT: If you go to page 3 of 14, so I apologize, I have the actual report page. So it will probably be 5.

Q. So PDF 5?

A. No, just page, the actual page number of the report, rather than the PDF page. If you just go down -- no,

my apologies.

Q. Are you looking for the hydrographs, Mr. Dowsett?

A. MR. DOWSETT: There's the first one. So the model, the Excel sheet that I have just to indicate, it does -- it's not a hydraulic model by anything -- by any means, but it does just track those volumes and inflows, time versus rate versus flow.

So it behaves in a very similar fashion. I had digitized -- because I did not have the real data, I had to digitize the values off the stuff, and I built a model that looks at every -- the 2005 and whatever hydrographs they had.

And you can see here that the model behaves in a very similar fashion, and it was pointed out by Stantec that the figure on the left, A3 in their report, is from Bragg Creek. The Figure 2 that I have is my representation of the same materials but at SR1. And you can see the peak rate's 1240, and if you go to the next page, please.

THE CHAIR: Ms. Vespa, are you getting this?

A. MR. DOWSETT: Am I going too fast? I apologize. I'll try and be a little more descriptive, sir.

THE COURT REPORTER: It's just you're breaking up sometimes, but I believe I'm getting what you're saying. I thought you said that you compared to the

Stantec report.

A. MR. DOWSETT: Yes.

THE CHAIR: Thank you, proceed, please.

A. MR. DOWSETT: Our reception here is -- our speed out here is a little bit rough. I think my wife is probably taking up some of the bandwidth, so anyway.

So if we can just scroll down the page here a bit.

So this graph shows -- so what I did was I mainly built the model a little bit so I could look at some sensitivity of how the rates affect the downstream hydrograph.

And I also built -- so this has two figures on it. Figure 3 shows the flood diversion hydrograph at SR1 for the 2013 flood, and Figure 4 provides the -- what I believe was the flows at Glenmore.

So you can see the peak at Glenmore is the same as the downstream peak line, and the top graph represents the dotted orange line in the -- that's the same pink line in the bottom graph. Because the -- in conjunction with each other, they are able to manage the flow.

So if you just then go to the next page, there are two hydrographs on there. And I just took a look at what level of increase in peak flow would we need before we start to see the flows below Glenmore. And

on the right-hand Figure 6, you will see on the pink line a little tiny bump up, and when we get to an 18 percent increase in the -- in the hydrograph peak, we will -- that is the first instance at which we expect to see a small -- the flow exceed 160 for Glenmore.

So to me, in looking at all of the data, I think that some sensitivity, in terms of the -- in terms of the flows that can handle -- that can be handled in this would be worthwhile taking a look at.

But otherwise, if we know that we are only going to have flows that represent the flood on record, then I believe the system will function.

If we increase that by about 18 percent, then I think things -- we start to reach that third operating set of parameters that Stantec had indicated.

So from my perspective, I would say that it's a very simple report. I am also concerned a little bit about the -- just one moment here, the commissioning. And there is a figure, if you go ahead two more pages, one moment -- and one more, no, back one. Right there, right there, 2.5 commissioning.

So I did take had a look at what happens on the little tiny figure on the right indicates the storage volume that the dam is filled to at a given time, and

on the left is the peak flow that would go downstream.

So in other words, what this is saying is that if we have the dam, we have about 40 million cubic metres of fluid in the dam, and we start to see operational issues. Then the peak, if you just go to the left and it will tell you that the peak at 40 million will be approximately 700 cubic metres per second.

So if this dam during the filling, and it seems to be the default position on operation, if there are problems with this dam, that the operator will simply stop the -- stop diversion, and the peak will go downstream. And at the point at which they stop diversion, those floods could go up, and they would go up quite rapidly.

With respect to the emergency response planning, one of the -- and I know that they will be done after the fact in dealing with sour gas, which is the time frames are a lot more condensed, and things happen a lot more rapidly. And there is a little bit more lead time here, but for water that is -- if they stop operations and we get a large piece of water coming down the river, there is very, very little time to respond to those people directly below the dam.

One of the questions strikes me as it may seem like a silly question, but how long does it take for a

rubber duck to float from Bragg Creek to SR1. And if we have good monitors at Bragg Creek and we do have the SCADA system, the supervisory control and data acquisition system, running, that we could have a little lead time to know what is coming at us. Simply looking down at the water at the station doesn't give us a lot of lead time, and I think the operational -- as indicated by Stantec, if we know that the water is going to remain fairly flat for a while, we may divert at a lower rate, but if we miss that peak, I think we get into trouble.

So I'm just raising this. There is some concern about having a SCADA system and a data acquisition system and knowing what's coming a little earlier and being able to respond in time to communicate with those folks located below the dam in a responsive fashion and in a responsive and meaningful fashion.

I believe that the emergency management system that was outlined by AEP is extremely sound.

The only other thing I might add with respect to emergency management is, I would like to see -- I don't really know what resources reside with the MD of Rocky View, and I would like to see what's called "unified command" between Rocky View and the City of Calgary with respect to managing flood emergencies.

And that, sir, is about my full input, and I'll leave it up to you on the weight you put on that.

MS. OKOYE: Thank you.

THE CHAIR: Thank you, Mr. Dowsett.

MS. OKOYE: Thank you, Mr. Dowsett. So they are available for cross, Mr. Chair. Thank you.

THE CHAIR: What's our order here? So we're just about 4:30.

We've got Stoney Nakoda, Calalta, Mr. Wagner. I don't expect that you have cross-exam; is that correct, Ms. Louden?

MS. LOUDEN: Yes, Mr. Chair, that's correct. We do not have any questions.

THE CHAIR: And Mr. Williams? He may not be online. Mr. Wagner.

MR. WAGNER: I have no cross.

THE CHAIR: Ms. Senek, do you have cross?

MS. SENEK: No, no cross, Mr. Chair, thank you.

THE CHAIR: And Mr. Cusano with Calgary River Communities Action Group?

MR. CUSANO: I do not, sir. Thank you very much.

THE CHAIR: So we do know that Mr. Fitch and Mr. Kruhlak Alberta Transportation, do have cross, and

I think you're allocated -- you asked for and been approved for 240 minutes if I have it right, which obviously would take us to the point where people might be annoyed with me going into the weekend.

So if -- I guess -- if there's one of the panel members in particular that you wanted to spend a few minutes with, we could do that now, or we could wait and begin your cross with Alberta Transportation on Monday morning.

MR. FITCH: Thank you, Mr. Chair. It's Gavin Fitch. Sorry, Ms. Okoye.

So Ms. Okoye confirmed for me that she had, obviously by oversight, neglected to provide me with a copy of the Austin Engineering PowerPoint presentation and actually, as well, Mr. Dowsett's, although now it's unclear whether he has one or not.

But in any event, normally, sometimes, anyways, it doesn't really matter because what you see in the PowerPoint presentation is just a condensed form of what you see in the main report.

In this case, though, that's not the case because, as you know, Mr. Chair, part of Alberta Transportation's reply submission was sort of a point-by-point response to the various recommendations by Austin Engineering who have now provided their own

response point by point. And so there's actually new material in the Austin report that we haven't seen before.

So we are not prepared to commence our cross-examination of Austin, and frankly, given that it's 4:20 on Friday, and it's been a long week, our preference is just to begin Monday morning.

And I know my friend Ms. Okoye is going to say that Mr. Austin is supposed to be on some dam site in B.C., and, in our submission, you know, the hearing is scheduled, it's SCLG's responsibility for having witnesses available. But it shouldn't really matter because the author of the report was Ms. Keyes. I haven't heard that she won't be available on Monday, and so I can just simply conduct my cross-examination on Ms. Keyes.

So -- and with regard to Mr. Klepacki, we were just going to deal with him on Topic Session 4, so there's not much left to do today, from our perspective.

THE CHAIR: I would agree, Mr. Fitch.

Ms. Okoye, we are ahead. I hadn't expected to rightly have gotten this far anyway by today or by this hour. So while I appreciate Mr. Austin is not available, I had fully expected that he was going to be

up Monday anyway, so I would agree with Mr. Fitch.

We will -- sorry.

MR. SECORD: Just one thing here. It's Richard Secord. I think it's not that Mr. Austin is not available, Mr. Chair. It's just that he's on a dam site and will likely have to phone in. He may not be on Zoom, but I do believe he may be able to phone in, depending upon how the cell coverage is.

A. MR. AUSTIN: Yes, that's correct. I'll be able to call in, but we won't have video likely.

MR. SECORD: I just wanted to clarify that.

THE CHAIR: Thank you, Mr. Secord. And depending on your reception, cell phones do provide Zoom video. You can maybe try to set that up. But Mr. Fitch, I assume that voice only would be acceptable?

MR. FITCH: Absolutely. No problem.

THE CHAIR: Okay. Thank you. I would agree. I mean, it's been a long week, but I would -- I would like to think that you'd agree that it's been a good week.

I've been impressed with the submissions, the panel members, the questioning. It's been professional. It's been very helpful for the Panel, and we do appreciate it.

I would like to, at the end of the first week, given the complexities of running a hearing of this size via virtual, thank Mr. Wiebe and MNP for a job well done getting speakers up while getting this all together in a hurry and also having our speaker views done properly, plus the document management folks with the NRCB -- today was Ms. Kaminski, who has done quite a bit of this, and Ms. Taylor, but also we've had Ms. Gagnon, Ms. Cundliffe, Ms. Decosemo at the helm as well. So I really appreciate all the work done by the document management folks.

So I think for today, that is it. Although, and also, given the virtual world, it's probably a little bit tricky, but, Ms. Vespa, thank you very much, and also Ms. DiPaolo.

MS. OKOYE: Mr. Chair --

THE CHAIR: Who was speaking?

MS. OKOYE: Just before we round up, I know that we got Mr. Austin and Ms. Keyes and adopt their presentation. And if we could get that marked as an exhibit, and Mr. Fitch is welcome to cross-examine them on that on Monday.

THE CHAIR: Yes. In fact, Ms. Friend, Mr. Kennedy, perhaps I think we had two other presentations; is that right, that were not marked yet

as well?

MR. KENNEDY: I have to say, we're following a practice or we seem to have adopted a practice that's rather new to me where documents seem to be filed and then marked as exhibits or documents to the proceeding without kind of formally coming in through the record. And it's unusual, at least to me; it's kind of outside of what I've experienced in proceedings.

That said, everybody gets notified every evening about the documents that are tabled. They form part of the record. And I am assuming that parties, if they took exception to the documents that were coming in, that we would hear about it early the next day.

Now, some documents are filed; I'm not quite sure when these PowerPoints came in, and -- but it sounds like we're managing that on the fly.

THE CHAIR: I would agree, Mr. Kennedy. Ms. Okoye, would those --

MR. SECORD: One point, sir, I think the -- what's arisen is the requirement in one of the Board's letters that documents be pre-loaded. And so I think that's the origin of the issue is that Ms. Friend needs to pre-load the exhibits and anything that we're referring to. So I think that's how these PowerPoints get to be sent to the NRCB.

But just with respect to the PowerPoints, as I understand it, there were three in total, and one of them deals with Dr. Fennell. So that certainly doesn't need to be dealt with today; that would be dealt with next week.

Mr. Fitch mentioned something about Mr. Dowsett's PowerPoint, but he clearly decided he didn't need to refer to it. So it seems to me that's a non-issue.

So the only matter to be discussed is the PowerPoint by Austin Engineering.

MR. KRUHLAK: It's Ron Kruhlak. I wasn't sure whether Mr. Frigo's PowerPoint was marked. I may have missed that.

MR. SECORD: It was. It was marked as Exhibit 351.

MR. KRUHLAK: Thank you, Mr. Secord.

THE CHAIR: Mr. Kennedy?

MR. KENNEDY: Yeah, again, it's a little unusual what -- normally during a live proceeding, I would be kind of marking down exhibits as they were entered into the proceeding and we'd start the day with entering any new exhibits or, you know, at various times during the day entering them. Whereas we seem to, when I started to do that for this proceeding, what I found was exhibits seemed to be growing and being entered without

that happening on the live record, you know, the virtual hearing.

And, again, I think it's manageable, but I think it's incumbent then on parties if they take exception with a document that seems to be coming into the record, that they raise it as Mr. Fitch raised the concern today so that a discussion can take place.

THE CHAIR: And I would say, you know, I think probably best practice is for counsels to be sending those to each other, rather than just waiting for someone to see it on the exhibit list which might help. I don't know if that's what happened on this one or not, but that would be helpful I would expect.

MS. OKOYE: Mr. Chair, the document has actually not been marked as exhibits.

So, like Mr. Secord pointed out, there's already pre-loaded stuff, so when you send it in to Ms. Friend, she would say, well, she will pre-load it, but not really mark it as an exhibit.

So really, they haven't been marked, that's why I'm asking for them to be marked.

THE CHAIR: Well, yes, but then they'd be entered, they're still being entered on the fly then.

MR. KENNEDY: I think that cat's out of the bag. I think we might as well mark the Exhibits. I mean

they're on the record; I don't know whether those have been posted to the website yet.

And I don't know, frankly, that I heard from Mr. Fitch or Mr. Kruhlak that they objected to the documents being marked. I think they did say -- I think Mr. Fitch made it clear that he would like some time and that there was some new evidence there, but...

MR. FITCH: Well, okay, it's Mr. Fitch again. I -- Mr. Chair, you asked or you suggested that best practice would be for counsel to just make sure when they want to provide a document to the NRCB for the next day's proceeding, that they provide a copy directly to counsel. And we have been doing that; this was just I'm sure an oversight. It's not, that's all that happened.

And I have no problem with the Austin PowerPoint being marked as an exhibit; in fact, it's now been spoken to by the two witnesses from Austin.

So, you know, I'm not objecting to it being marked as an exhibit; I was just simply objecting to the fact that due to oversight, we hadn't seen it previously, and it does contain some new information that we just need a bit of time over the weekend to review and figure out how we want to deal with it.

THE CHAIR: Okay. So I think -- good

discussion folks. I think we've cleared the air. And Mr. Kennedy, it looks like you have another point to make, though.

MR. KENNEDY: Well, and it's only this is to avoid the kind of challenge that Mr. Fitch has identified in terms of being able to prepare his cross. If there are further PowerPoints that are prepared for further topic areas, let's get them in early and get them circulated to counsel, even if they're not --

I mean it would be nice if they were provided at least to Board counsel, it might be that there's a delay in getting them to Ms. Friend but at least circulated to other counsel so counsel isn't caught flatfooted when those documents are tabled.

MS. FRIEND: Okay, the Austin PowerPoint will be Exhibit 370.

EXHIBIT 370 - AUSTIN POWERPOINT

THE CHAIR: Thank you, Ms. Friend.

MR. SECORD: And Ms. Friend, the other two PowerPoints that were sent to you you can delete because they're not being referred to. And my understanding is that Dr. Fennell I think is going to -- will send -- will combine his two sessions into one, and we will get that over to Mr. Fitch or Kruhlak; as we usually do, we copy everybody. I don't know what

happened.

So we'll get that off to all of the parties well before Dr. Fennell shows up, whenever that might be next week. And I think that will be -- then Mr. Wallis will have a PowerPoint. He always does, so we'll get that off as soon as we can.

And Allan Locke will not have a PowerPoint. So we'll make sure that everybody's got it well in advance, and if there's any issues, Mr. Fitch and Mr. Kruhlak and I have a long history, and I'm sure they'll let us know, and we can work things out.

THE CHAIR: Okay. Thank you everyone. Thanks for understanding, much appreciated.

Once again great week, have a good weekend. We'll see you Monday morning, sign-in 7:45 for 8:30 start. Thank you.

PROCEEDINGS ADJOURNED TO MARCH 29, 2021 AT 8:30 A.M.

Certificate of Transcript

We, the undersigned, hereby certify that the foregoing pages 1118 to 1360 are a complete and accurate transcript of the proceedings taken down by us in shorthand and transcribed from our shorthand notes to the best of our skill and ability.

Dated at the City of Calgary, Province of Alberta, on March 26, 2021.

"Lorelee Vespa"

Lorelee Vespa, CSR(A) CRR RPR
Official Court Reporter

"Deanna M. DiPaolo"

Deanna M. DiPaolo, CSR(A)
Official Court Reporter

- I N D E X -

VOLUME 5

EXHIBITS

UNDERTAKINGS GIVEN

1	UNDERTAKING - AS A CONDITION OF APPROVAL FOR THE	1208
2	SUBJECT PROJECT, TO ADVISE WHETHER AT WOULD RETAIN	
3	AN INDEPENDENT DAM ENGINEERING FIRM TO CONDUCT AN	
4	INDEPENDENT ASSESSMENT OF MC1 VERSUS SR1 TO	
5	PERFORM FLOOD MITIGATION EFFECTIVENESS AT VARIOUS	
6	FLOOD RATES AND HYDROGRAPHS AND OPERATING RISK	
7	ASSESSMENTS - REFUSED	
8		
9	UNDERTAKING - TO ADVISE IF THE GOA WILL ENGAGE	1217
10	WITH LOCAL FIRE DEPARTMENTS TO CHANGE POLICY AND	
11	ENABLE GRASS FIREFIGHTING SHOULD THE PROJECT BE	
12	APPROVED	
13		
14	UNDERTAKING - TO ADVISE HOW MUCH HIGHER THE WATER	1226
15	IS GOING TO BE IN THE WAGNER YARD FROM 70,000 DAM	
16	CUBES TO 77,000 DAM CUBES WHICH APPEARS TO BE THE	
17	LEVEL	
18		
19	UNDERTAKING - TO MAKE ENQUIRIES ADVISE WHETHER THE	1251
20	CELL PHONE ALERT SYSTEM COULD BE MADE AVAILABLE TO	
21	THE DAM SAFETY MEMBERS WHO ARE IN THE EMERGENCY	
22	RESPONSE PLAN	
23		
24		
25		

1	UNDERTAKING - TO ADVISE THE PERCENTAGE OF THE	1294
2	CATCHMENT AREA THAT MC1 WOULD CAPTURE SUBJECT TO	
3	CHECK WITH COUNSEL	
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