

**CSPG HYDROGEOLOGY DIVISION**

## **Calgary Zoo Flood Mitigation: Groundwater Management and Dewatering on an Island**

Speaker: Soren Poschmann, ISL Engineering's Water and Environment group

Location: Virtual

Date: Tuesday May 4<sup>th</sup>, 2021, 12:00-1:00 pm Mountain Time

### **ABSTRACT**

The Calgary Zoo, located primarily on St. George's Island at the confluence of the Bow and Elbow rivers, experienced flooding along with much of Southern Alberta in June 2013. The Calgary Zoo was inundated and without power in the early morning hours of June 21, having had less than 10 hours' notice to enact their flood operations plan. In that time, the Zoo evacuated as many animals as possible from the collection of more than 200 animals on the island. As initial recovery of the Zoo commenced, ISL Engineering and Land Services Ltd. was retained by The City of Calgary to study options on how to protect the Zoo from future flood events. Associated Engineering was engaged as a key partner following the planning stage.

As high ground and berms already existed on parts of St. George's Island, initial flood mitigation concepts focused on protecting the island from overland flooding. Flood protection berms and walls were conceived as suitable options to withstand the flooding effects while preserving as much functional space as possible for Zoo operations. The potential for flooding from groundwater sources required further study, however. As the flood mitigation design evolved, investigations and flood simulations confirmed the direct hydraulic connection between the Bow River and the groundwater in the underlying gravels — as river levels rose, so did groundwater levels. Consequently, proposed solutions would need to protect against both increases in groundwater elevation and overland flow.

The most effective solution to protect St. George's Island against flooding was to seal the island interior from overland flow and groundwater ingress. Enclosing the island's perimeter required installation of a barrier capable of penetrating the highly permeable fluvial cobbles and boulders that make up most of the island and riverbed, while ensuring a reasonably watertight seal in the impermeable bedrock below.

Recognizing that the barrier would not be completely watertight, a hydrogeological model informed the design of a dewatering system that had sufficient capacity to control groundwater levels expected from the 1:100 year flood event. The natural groundwater level within the contained area would be lowered each spring and summer to buffer against leakage and rainfall, such that the river flood pulse could pass without increasing groundwater elevations to critical levels. The dewatering system consists of ten pumps distributed throughout the island connected to outfalls that discharge to the Bow River. Although designed with a total pumping capacity of 165 L/s to handle the modelled groundwater inflows expected during the design flood, the system was also designed to be easily expandable to include larger or more pumps, if required.



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## **BIOGRAPHY**

Soren Poschmann is the Lead, Hydrogeology within ISL Engineering's Water and Environment group. Based in Calgary, AB, he provides hydrogeological and environmental expertise to clients throughout Western Canada. He has 14 years of comprehensive experience across multiple industries, including all levels of governmental agencies and industrial operations such as oil and gas, mining, pipelines and aggregate. He provides expertise on a wide range of projects such as water sourcing, dewatering, groundwater monitoring and quality assessments, environmental site assessments and general environmental management.