

## Project Profile

<b>Project Name:</b>	Best practices for construction and maintenance of earth dams in northeast BC
<b>Project Number:</b>	ES-Well-2019-01
<b>Proponent:</b>	University of British Columbia, Okanagan Campus (School of Engineering) Dr. Dwayne Tannant
<b>Funding Envelope:</b>	Engineering and Safety Research—Well, Facilities and Other
<b>Timeframe:</b>	August 22, 2018, to April 30, 2020

## Project objectives

The overall goal of the project is to establish best practices and promote consistency in the design and construction of earth dams used in the oil and gas industry. This will be done by researching best practices for dam construction and maintenance and raising awareness of the risks associated with current dam construction practices. Project objectives are as follows:

- Conduct fieldwork to evaluate factors causing slumping, cracking and seepage problems in dams in Northeast BC, and design and construction practices that prevent or contribute to these deficiencies
- Conduct laboratory tests to measure the mechanical properties of soils collected from selected dams in Northeast BC, including those under BCOGC or MFLNRORD regulatory control.
- Perform numerical analyses of selected dams using measured/assumed soil properties and dam geometries to evaluate design and construction methods that can best address cracking, slumping, and seepage issues by making comparisons between dams.
- Transfer knowledge of better construction practices for future dams and remediation/stabilization techniques for existing dams. The target audience will be dam owners, operators, and regulatory bodies.

## Project description

The project aims to assess the design and construction methods and other factors that are preventing, mitigating, or contributing to cracking, slumping, and seepage in earth dams used in Northeast BC to hold fresh water for oil and gas activities (and other uses). The project will collect and analyze characteristics of earth dams to identify current design and construction practices that contribute to the long-term stability of dams, and potential enhancements to these practices that can address issues that might cause safety concerns in dam performance (e.g., construction materials, freeze-thaw cycles).

## Project approach

The project involves the following five phases:

1. **Phase 1—Literature Review and Dam Information:** Identify approximately five earth dams to include in the study. Perform a comprehensive literature review of dam-related problems (and solutions) associated with construction and operation of earth-fill dams in northern climates.
2. **Phase 2—Field Data Collection:** Document evidence of issues (e.g., slumping, cracking and seepage), collect representative soil samples, and obtain aerial imagery using a UAV.
3. **Phase 3—Laboratory Data Collection:** Conduct laboratory tests to measure mechanical properties of soils collected from selected dams.
4. **Phase 4—Identify and Document Design and Construction Practices Related to Dam Safety:** Analyze stability issues using measured/assumed soil properties and as-built dam geometries to identify which design and construction methods work well, and improvements that can be made to current common practices.
5. **Phase 5—Knowledge Transfer of Best Practices for Construction and Remediation of Dams:** Complete reports and publications with recommendations for improvements to current dams and best practices for the construction of future dams in northeast BC. Carry out communication activities (e.g., presentation, workshop) covering best practices for dam construction and maintenance.

## Project deliverables

The deliverables from this project include the following:

1. Final report containing recommendations for best practices for the construction and maintenance of earth dams in Northeast BC given the soil type(s) found.
2. A paper for the Canadian Dam Association annual conference and a possible paper for the Canadian Geotechnical Journal.
3. Communications (e.g., presentation, workshop) to dam safety regulators within the BC Oil and Gas Commission and BC government as well as owner/operators of the dams on the research's findings and implications.