

EOESC329: 16 questions to help identify components of, and information in, a professional project report

To complete this homework you must read the redacted Piteau Report about groundwater hydrology of the area around the UBC Museum of Anthropology and vicinity. Work iteratively; read questions, read the report, consider questions, search the report ... This is a “normal” approach that professionals use with technical communications.

Title: geo methods

- 1) Pick all methods that consultants used to measure/infer the geologic structure of the study area?
 - a) Carrying out a mapping exercise along the cliffs at the beach.
 - b) Mapping surface geology all over the western portion of UBC campus
 - c) Using geophysical methods to “see” structures under the surface
 - d) Reviewing studies of the geologic history of the lower mainland
 - e) Analyzing core from the boreholes drilled at UBC
 - f) Reviewing documentation about foundations of buildings in the area

Title: slope stability

- 2) Which of the following factors affect slope stability at the Point Grey cliffs:
 - a) The amount of rainfall at YVR airport
 - b) The pumping rate of dewatering well 75-2
 - c) The density of the Quadra sand unit
 - d) The location of drainage stream channels
 - e) Presence of current buildings west (or north) of Marine Drive

Title: expected discharge

- 3) Based on the information given in this study, which factor(s) would lead you to expect to see groundwater discharge at Spanish Banks:
 - a) The low hydraulic conductivity of the upper till layer relative to that of the Quadra sand
 - b) The low density of the Quadra sand due to compression that it underwent during the last ice age
 - c) Low winter temperatures, which can cause water at seepage faces to freeze
 - d) The large topographic gradient between the beach at Spanish banks and the UBC campus
 - e) The relative position of sea level with respect to aquifer units.

Title: hydrostratigraphy

- 4) Which of the following best describes the hydrostratigraphy (the layering of hydrogeologic units) at the seepage zone along the cliff face in the study area?
 - a) A high permeability aquifer overlays a low-permeability aquitard
 - b) A low permeability aquitard overlays a high-permeability aquifer
 - c) A fine-grained unit overlays a coarse-grained unit
 - d) Both units are significantly permeable
 - e) Both units are not significantly permeable

Title: development

- 5) Evaluate which development would most likely lead to a decrease in slope stability of cliffs near the Museum of Anthropology:
 - a) Planting a number of trees along the cliff edge
 - b) The construction of a new parking lot between the museum and the cliff.
 - c) The installation of a new dewatering well in the near-by Quadra sand unit.
 - d) Re-filling of the leaky mirror-pond between the museum and the cliff.
 - e) Changing the beach below from mostly boulders to mostly sandy.

Title: geology 1

- 6) Which of the following best describes the geology of the study area (above sea level)?
 - a) Three geologic units consisting of pancake-like (perfectly flat) layers with equal thicknesses.
 - b) Four different units everywhere, each with thickness that varies with location
 - c) Three different geologic units that are tricky to distinguish because they tend to pinch out over short distances.
 - d) Three clearly distinguishable layered units with a 4th (upper) unit present everywhere except the north end of the study area.
 - e) One basic unit which has variable properties depending on location.

Title: isopleth map

- 7) Referring to the isopleth map of rainfall in the study area, which of the following statements is true:
- a) Rainfall increases most rapidly from north to south in the southernmost part of the Greater Vancouver Area
 - b) The central business area receives twice as much precipitation than UBC.
 - c) Some areas to the north of Burrard inlet see more than twice as much annual precipitation as the study area.
 - d) Vancouver International Airport can be expected to have a very similar amount of rainfall as UBC.
 - e) Rainfall depends less on topography and more on proximity to the ocean, rivers and lakes.

Title: stability prediction

- 8) Predict the implications for slope stability if over the next 10 years the CUSUM precipitation graph maintains a steep upwards slope:
- a) Slope stability will decrease because extra moisture will increase pore pressure in the Quadra sand
 - b) Slope stability will decrease because drying will relieve pore pressure in the Quadra sand
 - c) Slope stability will decrease because extra moisture content will increase the density of the Quadra sand.
 - d) Slope stability will increase because extra moisture will increase pore pressure in the Quadra sand
 - e) Slope stability will increase because drying will relieve pore pressure in the Quadra sand
 - f) Slope stability will increase because extra moisture content will increase the density of the Quadra sand.

Title: long term dewatering

- 9) Which of the following lines of evidence suggest that the dewatering wells installed in 1974 were still successful at pumping water out of the upper Quadra sand when this study was carried out:
- a) Water levels in wells installed in the upper Quadra sand have increased since 1974.
 - b) Seepage on the cliff face appears to be greater than it was prior to the installation of the dewatering wells.

- c) Seepage on the cliff face appears to be less than it was prior the installation of the dewatering wells.
- d) The borehole geophysical logs show clear signs of disturbance due to pumping in the Quadra sand.
- e) The borehole geophysical logs show no sign of disturbance due to pumping in the Quadra sand.

Title: recharge

- 10) Approximately what percentage of the precipitation in the study area infiltrates the ground as recharge?
- a) 5% b) 10% c) 18% d) 20% e) 30%

Title: drilling

- 11) How many drill holes were available within the official study area (check maps carefully to find the official study area)?
- a) 7 b) 10 c) 13 d) 18 e) 25

Title: boreholes

- 12) Based on the distribution of borehole data, which portion of the official study area are you MOST confident about, regarding subsurface geology?
- a) NE edge
 - b) SW edge
 - c) North eastern third
 - d) Central third
 - e) South western third

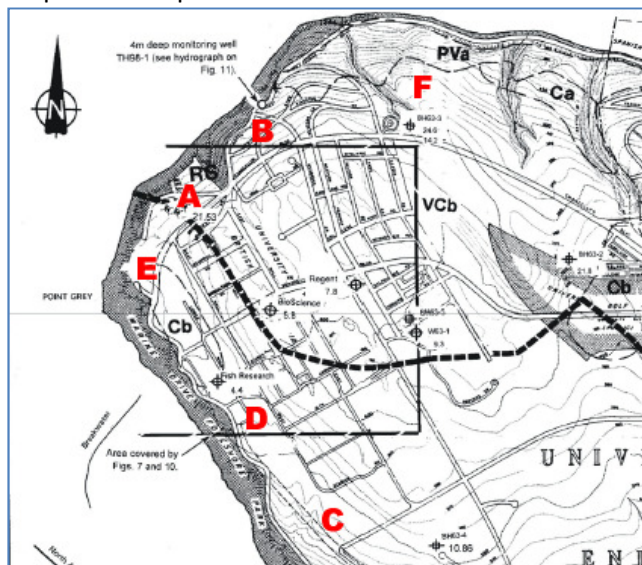
Title: gndwtr catchment

- 13) We want to know more about how much area serves as a source (or catchment) for the perched aquifer under the Museum. Which of the following questions is NOT fully answered in the report, but NEEDS to be addressed to help with this issue?
- a) Where is the topographic divide (height of land) inland of the museum?
 - b) What are elevations of the perched aquifer midway along the hydrogeological section A-A'?
 - c) What are elevations of the perched aquifer midway along the hydrogeological section B-B'?

- d) Can we improve the accuracy of the isopleths map in the vicinity of the Museum and points inland of it?
- e) How does water level in wells near the museum vary over an annual cycle?

Title: one more hole

14) If you had funding for one borehole to clarify ground water flow details within the official study area, where would you put it? Choose a location (red letters) from this map, which is a piece of Figure 2 in the report. This is as much about interpreting the maps as identifying a region in need of more data so, before answering, consider carefully where the study area is, and how the maps in the report are related.



- a) A b) B c) C d) D e) E f) F

Title: descriptive

15) Technical reports convey two types of information: (i) descriptive information based on precedent, observations, and measurements (ii) interpretive information which basically uses descriptive information and fundamental scientific knowledge to predict, anticipate, or make recommendations. Which portions of the report contain most of the descriptive information? (Some sections may include significant amounts of both types.)

- a) Introduction
- b) Physiography of the site
- c) Field program
- d) Geology and soils
- e) Groundwater
- f) Geotechnical assessment
- g) Conclusions

Title: interpretive

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