October 26, 2018

Colorado Department of Natural Resources
Division of Reclamation, Mining and Safety
Attn: Mr. Jared Ebert
1313 Sherman Street; Room 215
Denver CO, 80203

RE: List of MLRB Hearing Witnesses and Exhibits for North Weld County Water District, Lamb Lakes, File No. M-2018-039

Dear Mr. Ebert:

Following is a list of applicant witnesses for the scheduled Lamb Lakes Mined Land Reclamation Board Hearing.

1. Mr. Eric Reckentine
   District Manager, North Weld County Water District
   32825 CR 39
   Lucerne, Colorado 80646
   (970) 356-3020

   Mr. Reckentine represents the project applicant and may testify to application content, general property information, and other project related subjects. Mr. Reckentine may also provide rebuttal.

2. Mr. Richard Raines
   Water Resources Manager, Tri-Districts
   4424 Laporte Avenue
   Fort Collins, Colorado 80521
   (970) 218-2738

   Mr. Raines represents the project applicant and three of the property owners: North Weld County Water District, East Larimer County Water District, and Fort Collins-Loveland Water District. Mr. Raines may testify to application content, general property information, and other project related subjects and may also provide rebuttal.

3. Ms. Jennifer Petrzelka
   Water Resources Operations Manager, City of Greeley
   1001 11th Avenue, Second Floor
   Greeley, Colorado 80631
   (970) 350-9859

   Ms. Petrzelka represents the City of Greeley, one of the property owners, and may testify to application content, general property information, and other project related subjects. Ms. Petrzelka may also provide rebuttal.

4. Mr. Bill Schenderlein
   Project Manager, Blue Earth Solutions, LLC
   PO Box 2427
   Fort Collins, Colorado 80522
   (970) 227-2803

   Blue Earth Solutions, LLC is an engineering consulting firm that is working for the applicant to provide engineering and permitting support on the Lamb Lakes project. In addition to the permit content, general property information, and other project related subjects, Mr. Schenderlein will provide expert testimony on:
   - Hydrology
   - Hydraulics
   - General Civil Engineering

Following is a list of applicant exhibits for the scheduled Lamb Lakes Mined Land Reclamation Board Hearing and attached exhibits.

1. Public Record for DRMS File No. M-2018-039.

2. Preliminary Slope Stability Evaluation, Lamb Lakes. Earth Engineering Consultants, LLC October 22, 2018. (Attached)

If you have any questions regarding this submittal, please call me directly at (970) 227-2803.

Sincerely,
Blue Earth Solutions, LLC

William Schenderlein, P.E.
Project Manager

October 22, 2018

EARTH ENGINEERING CONSULTANTS, LLC

Blue Earth Solutions
P.O. Box 2427
Fort Collins, Colorado 80522

Attn: Mr. Bill Schenderlein (bill@blueearthsolutions.net)

Re: Preliminary Slope Stability Evaluation
Lamb Lakes
Fort Collins, Colorado
EEC Project No. 1182083

Mr. Schenderlein:

As requested, Earth Engineering Consultants, LLC (EEC) personnel have completed a preliminary slope stability evaluation for the Lamb Lakes in Fort Collins, Colorado. The intent of the slope stability evaluation is to develop information to assist the design team in determining the feasibility (from an embankment stability point of view) of draining the water from the ponds, so that work can then be carried out to improve the embankments for future reclamation. The preliminary slope stability evaluation was based on review of available subsurface information, and information provided by Blue Earth Solutions. A summary of the subsurface information attained through review, the information provided by Blue Earth Solutions, and the preliminary slope stability evaluation are included herein.

Project Information

The Lamb Lakes, composed of a system of three lakes, are generally located between West Vine Drive and Lawton Lane, and between Taft Hill Road and Shields Street in Fort Collins. We understand those lakes were developed as a result of mining for useable aggregates. We estimate the north lake was mined prior to 2000, and the middle and southern lakes mined circa 2000.

In a subsurface exploration report prepared prior to mining (Empire Laboratories, 1975), subsurface conditions are described to consist of a thin surficial mantle of silty topsoil, underlain by silty and/or clayey sand (overburden) which extended to depths of approximately 2½ feet to 4

4396 GREENFIELD DRIVE
WINDSOR, COLORADO 80550
(970) 545-3908 FAX (970) 663-0282

feet below ground surface. The overburden materials are described as being underlain by sand, gravel, cobbles and boulders which extended to bedrock at depths of approximately 13½ to 24½ feet below ground surface. Free water was recorded at depths ranging from about 2 to 9 feet.

Overburden soils in this area generally consist of Loveland Clay loam and Paoli fine sandy loam (Natural Resources Conservation Service, 2018). Those materials are listed as classifying as low plasticity clay (CL) and low plasticity silty clay (CL-ML) as defined by the Unified Soil Classification System (ASTM D2487, 2017).

Within the lakes, it is likely mining extended downward to the underlying bedrock and extended laterally to the then current mining boundaries. At the lateral extents, vertical cuts were likely. According to Blue Earth Solutions personnel, slopes are currently at near 3:1 (horizontal to vertical), and the bottom of the ponds are at about 20 feet below current site grades. We believe it is probable that once mining was completed, the slopes were developed with the overburden materials from the site. We understand future dewatering would occur from the toe of the existing slopes.

Slope Stability Evaluation

Based on the information outlined in the previous sections, the slope stability was evaluated assuming a lake depth of 20 feet deep, 3:1 interior slopes with flat backslopes and no surcharges. Only evaluation of the perimeter slopes was requested (the interior interconnect embankments were not evaluated). It was also assumed that the Cache La Poudre River would be at low flow when the lakes would be dewatered. Assumed subsurface conditions consisted of overburden soils to a depth of 4 feet below grade and underlain by sands and gravels which extended to bedrock at the bottom of the lakes. The interior slopes were assumed to consist of the site overburden materials. Soils properties assumed are outlined in Table 1.

Table 1: Assumed Soil Parameters

Material	Unit Weight	Effective Friction Angle, ϕ'	Effective Cohesion, c'	Total Friction Angle, ϕ	Total Cohesion, c
Overburden	115 pcf	25	100 psf	13	200 psf
Sand and Gravel	135 pcf	30	0 psf	30	0 psf

The stability analysis was evaluated using Morgenstern-Price method of slices modeled in SlopeW software provided by GeoStudio. The analysis was modeled using the multi-stage rapid drawdown method proposed by Duncan, Wright, and Wong (1990). The results of the slope stability analyses are summarized in Table 2 and illustrated in Figures 1 and 2.

Table 2. Summary of safety factors determined for slope stability.

Loading Condition	Safety Factor at Critical Slip Location
Rapid Draw Down	1.3

A minimum factor of safety of 1.3 to 1.5 is generally considered acceptable for slope stability of permanent improvements. The Colorado Division of Reclamation, Mining and Safety indicates a safety factor of 1.3 for non-critical structures and 1.5 for critical structures.

When evaluating feasibility, based on the safety factor determined, it should be recognized that the soil parameters selected, in our opinion, are considered reasonable, but conservative for soils in this area; however, actual conditions are expected to vary and relatively small changes in the soil types and parameters can significantly impact the safety factors determined. Therefore, it is explicitly understood that the evaluation included herein is strictly for preliminary purposes to evaluate the feasibility of dewatering the lakes for future improvements and is not to be relied upon for construction. We recommend contacting EEC to provide additional subsurface exploration, testing and evaluation prior to dewatering and construction activities.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,
Earth Engineering Consultants, LLC

Ethan P. Wiechert, P.E.
Senior Project Engineer

Reviewed by: David A. Richer, P.E.
Senior Geotechnical Engineer

References

ASTM D2487. (2017). *D2487-17 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).*

Empire Laboratories. (1975). *Report of a Mineral Resources Evaluation.* Fort Collins, Colorado.

Natural Resources Conservation Service. (2018, 10 17). Retrieved from Web Soil Survey: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

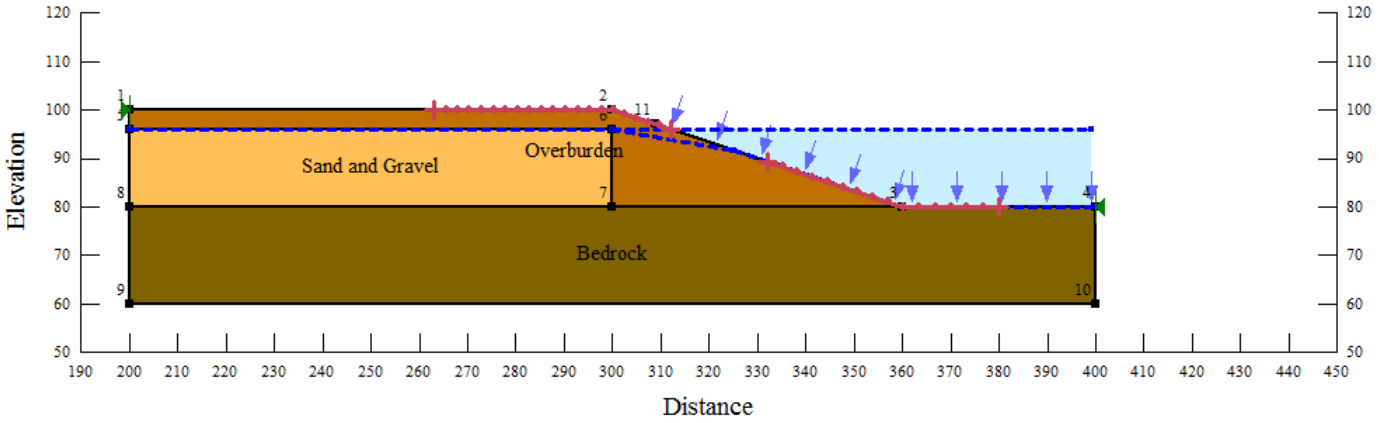

Figure 1: Geometry and subsurface section.

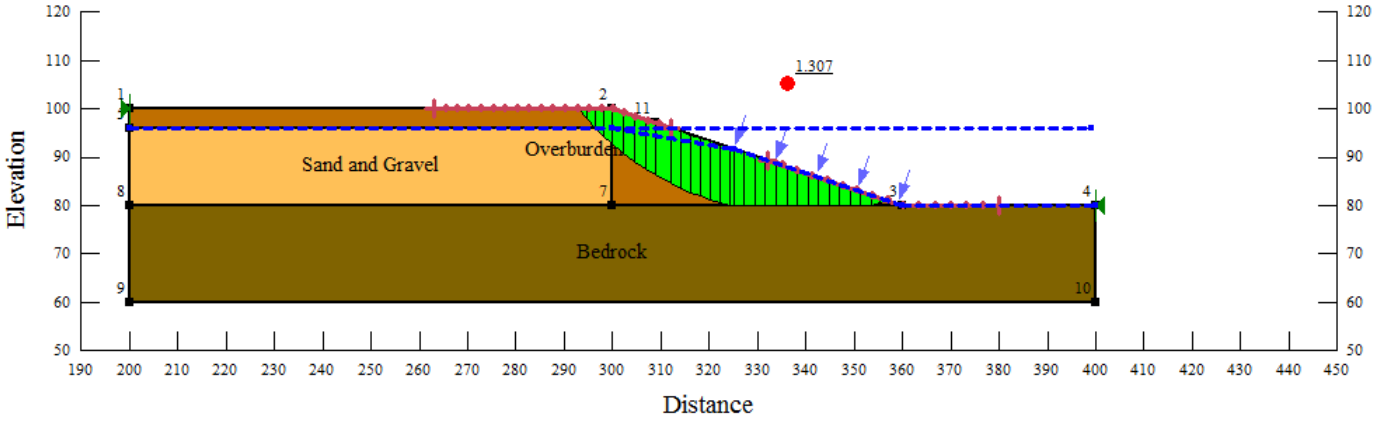

Figure 2: Critical slip surface.