



Project No. S9534-05-04
November 27, 2019

VIA ELECTRONIC MAIL

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Subject: TECHNICAL MEMORANDUM – LOCAL GEOLOGY
SHIFLER MINING AND RECLAMATION PROJECT
YOLO COUNTY, CALIFORNIA

Mr. Smith:

As requested, we have prepared this Technical Memorandum (TM) summarizing the local geologic conditions at the proposed Shifler Mining and Reclamation site located northeast of the intersection of County Roads 22 and 94B in Yolo County, California. The approximate site location is shown on the Vicinity Map, Figure 1. This TM is intended to provide a brief overview of the geologic conditions along the south bank of Cache Creek to aid in evaluating the potential for lateral stream migration and bank retreat toward the Shifler site to the south of Cache Creek.

BACKGROUND AND PURPOSE

Geocon previously prepared the following Slope Stability Evaluation report for the project: *Slope Stability Evaluation – Teichert Shifler Mining and Reclamation Project, Yolo County, California*, Geocon Project No. S9534-05-04, May 25, 2016. The purpose of our 2016 study was to evaluate subsurface conditions, evaluate pertinent geotechnical parameters, and to evaluate slope stability for proposed perimeter mining and reclamation slopes under static and dynamic (seismic) conditions with respect to the performance standards outlined in the Yolo County *Off-Channel Surface Mining and Reclamation Ordinances* (YCSMRO), and the California *Surface Mining and Reclamation Act* (SMARA). The Shifler site occupies approximately 320 acres south of Cache Creek and east of County Road 94B. Teichert proposes to excavate the site for gravel mining operations. The proposed mining excavations will be set back at least 300 feet south from Cache Creek. The site configuration and approximate proposed mining boundary are shown on the Site Plan, Figure 2. Based on the results of our 2016 study, we concluded that the proposed mining and reclamation slopes are anticipated to meet the performance standards set forth in the YCSMRO and SMARA. Our study considered proposed mining and reclamation slope conditions and also evaluated the potential for adverse seepage and resulting pit capture potential based on the existing and proposed conditions.

We attended a meeting with you and representatives of Yolo County on October 22, 2019. During the meeting, the technical review consultant for the County (Flow West Consultants) expressed concern that the potential for lateral southward migration of Cache Creek was not considered in the project's technical studies. Therefore, the County has requested an evaluation of the potential for southward lateral stream migration.

The purpose of this TM is to provide a brief overview of the geologic conditions along the south bank of Cache Creek to aid in evaluating the potential for lateral stream migration and bank retreat toward the Shifler site to the south of Cache Creek. This analysis will be performed by Cunningham Engineering.

GEOLOGIC CONDITIONS

Based on the *Geologic Map of the Late Cenozoic Deposits of the Sacramento Valley and Northern Sierran Foothills* (Helley and Harwood, 1985), Cache Creek and the Shifler site to the south are underlain by Holocene-aged stream channel deposits. These depositional and erosional deposits are associated with open, active stream channels and generally consist of unweathered gravel, sand, silt, and clay. On the south side of Cache Creek at the Shifler site, the average ground surface elevation ranges from approximately 102 feet to 110 feet. The surface geology at the Shifler site is characterized by a near-surface clay layer (termed “overburden”) that ranges in thickness between about 9 and 18 feet. This fine-grained, clay-rich overburden is typical of alluvial overbank deposits. The overburden is underlain by approximately 60 to 70 feet of gravelly soil generally consisting of sands and gravels with cobbles and some small boulders. This layer is typical of high-energy alluvial deposition. Beneath the sand/gravel strata are thick layers of cemented sandstone and clay.

We performed a site reconnaissance on November 1, 2019. Cache Creek is located within a broad alluvial channel (Photo 1). Adjacent to the Shifler site, the active (wetted) channel of Cache Creek currently flows along the south bank of the channel and has a thalweg elevation of approximately 76 feet¹. The active channel is underlain by coarse granular material consisting of sands and gravels with cobbles and small boulders, indicative of high-energy alluvial deposition in the active creek channel. This material is similar to the deeper alluvial soil at the Shifler site. Within this reach of the creek on the south side of the channel, at lower flows, the active creek channel is contained by a “lower bank” ranging in height from approximately 4 to 6 feet (see Photos 1 and 2). The lower bank is comprised of lightly cemented sandy soil that stands at inclinations ranging from approximately 1:1 to near-vertical. Above the lower bank is a broad floodplain area situated at an elevation of approximately 80 feet. The floodplain is relatively flat and contains significant riparian vegetation and large, mature trees (see Photos 1 and 2). The width of the floodplain ranges from approximately 10 feet (near CR 94B) to more than 200 feet near the eastern portion of the Shifler site (see Site Plan, Figure 2). The near-surface soil within the floodplain consists of predominantly fine sand and silt, which is indicative of lower-energy alluvial deposition. The floodplain is bounded by an “upper bank” ranging in height from approximately 20 to 25 feet (see Photos 1, 2 and 3). The inclination of the upper bank ranges from approximately 2:1 to 1:1. The soil of the upper bank consists of predominantly the clay-rich “overburden material” present throughout the Shifler site. The upper bank is heavily vegetated with grasses, shrubs, and mature trees. Slope armoring material consisting of rock, concrete rubble, asphalt rubble, and similar materials are present throughout the upper bank area (Photo 4).

CLOSURE


The soil and geologic descriptions provided in this TM are based on our review of published geologic mapping, available exploration logs, our geologic and geotechnical experience in the area, and observations made during our site reconnaissance on November 1, 2019. Our professional services are provided in general accordance with generally accepted geological principles and practices used in the site area at this time. No warranty is provided, express or implied.

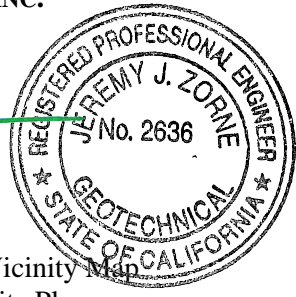
¹ Elevations based on *Preliminary Off-Channel Mining Plan for Shifler Property, Yolo County, California*, prepared by Cunningham Engineering, February 2016. Vertical Datum: NAVD 88

Please contact us if you have any questions regarding this TM.

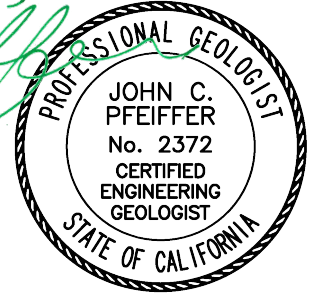
Respectfully Submitted,

GEOCON CONSULTANTS, INC.


Jeremy J. Zorne, PE, GE
Senior Engineer




John C. Pfeiffer, PG, CEG
Senior Geologist



Attachments: Figure 1, Vicinity Map
Figure 2, Site Plan
Photos 1 through 4