June 9, 2023 Project No. 31406662.000

Mr. Paul Lineberry
Zanker Road Resource Management, Ltd.
675 Los Esteros Road
San Jose, California 95134

RE: HYDROGEOLOGIC REVIEW FOR AREA OF PROPOSED STORMWATER BASIN, ZANKER MATERIAL PROCESSING FACILITY, SAN JOSE, CALIFORNIA

Dear Mr. Lineberry:

WSP USA Inc. (WSP) has prepared this letter to address a concern in the Limited Environmental Site Assessment prepared by Cornerstone Earth Group regarding the potential for increased mobilization of volatile organic compounds (VOC) in VOC-impacted groundwater due to stormwater infiltration associated with the proposed stormwater basin in the northwest corner (NW stormwater basin) of the Zanker Material Processing Facility (ZMPF) in San Jose (Figure 1). Based on our hydrogeologic review of the area of the proposed NW basin, including the extraction well G-4 and related piezometers PZ-1 through PZ-7 (Figure 2), it is our opinion that the construction and operation of the proposed NW stormwater basin will have minimal effect on VOC-impacted groundwater in the area of extraction well G-4 as detailed below.

Discussion

Proposed NW Stormwater Basin Description

The proposed NW stormwater basin will be constructed at the base of the landfill perimeter levee in the northwest area of the ZMPF site. The proposed NW stormwater basin will have a total capacity of approximately 8.4-acre feet (approximately 366,000 cubic feet or 2.7 million gallons) and a footprint of approximately 1.55 acres. To construct the proposed basin, up to three feet of soil will be excavated within the basin footprint.

Stratigraphy

The water-bearing sand that is monitored in the proposed NW stormwater pond area of ZMPF at well G-4 and nearby piezometer occurs within the saturated low-permeability Bay Mud clays at an elevation between approximately -10 and -20 feet MSL. The water-bearing sand contains two hydraulically connected sand layers: an upper sand, generally classified as a silty sand, and a lower sand, generally classified as a poorly graded sand. Less permeable silts and clays, typically ranging from less than one-half foot to eight feet in thickness, separate these two sands and are located above the uppermost sand layer to the ground surface. The construction of the proposed NW stormwater basin will be solely within less permeable silts and clay (Bay Mud) and not extend into the uppermost water-bearing sand layer. Based on the attached cross section (Conor Pacific, Figure 5), at least

seven feet of low permeable silts and clay will remain between the bottom of the proposed NW stormwater basin and the top of the uppermost water-bearing sand layer.

Groundwater in G-4 Area and Piezometers PZ-1 through PZ-7

Determinations of groundwater flow direction and velocity at ZMPF are based on the groundwater elevations calculated from quarterly depth to liquid measurements. Depth to water measurements in the piezometers are typically 2 to 5 ft below ground surface in the G-4 area. The piezometers target the sand layers of the upper water bearing zone, which can be influenced by confining pressure, and are therefore reflective of the potentiometric surface and not necessarily the shallow groundwater table. Based on the 2018 geotechnical borings, the static groundwater elevation was recorded at approximately 6 to 8 feet below the existing ground surface within the proposed basin footprint (ES Engineering Services, 2018). As the bottom of the proposed basin will be three feet below current grade, approximately 3 to 5 feet of unsaturated soil will be present between the base of the basin and first encountered groundwater.

The groundwater gradient is primarily directed to the southwest (Figure 2). In the vicinity of extraction well G-4, an inward gradient has been maintained almost consistently since groundwater extraction began in mid-2002 when ZRRML installed an automated groundwater extraction system to slowly but continually remove impacted groundwater from monitoring well G-4 (ZRRML, 2001). During the second half of 2022, the average daily extraction rate (excluding down time) was below 2.0 gallons per minute (gpm) and 152,704 gallons were removed. The approximate total volume of groundwater extracted from well G-4 since the system began operating in 2002 is approximately 3,100,000 gallons. The extracted water is primarily from the silty sand to sand layers in the uppermost water-bearing zone.

The hydraulic conductivity of the silty sand to sand in the uppermost water-bearing zone was determined from slug tests conducted in wells G-4 and G-5 in 1989. Hydraulic conductivities ranged from 1.7×10^{-2} centimeters per second (cm/sec) to 4.8×10^{-3} cm/sec, with a geometric mean of 7.8×10^{-3} cm/sec (Proposed Monitoring Program Owens-Corning Solid Waste Disposal Site, San Jose, California, EMCON, August 1992). Laboratory tests indicate that silty clays and clays (Bay Mud) that comprise the matrix of the shallow water-bearing zone have much lower permeabilities ranging from 7×10^{-7} cm/sec to 2×10^{-8} cm/sec (EMCON Associates, March 1989).

The groundwater linear velocity of the upper water bearing sand was calculated using the mean hydraulic conductivity of 7.8×10^{-3} cm/sec and an estimated effective porosity of 30 percent. The estimated groundwater linear flow velocity was approximately 1.0×10^{-4} cm/sec (108 feet per year) in October 2022, which is consistent with historical groundwater velocities. The groundwater linear velocity of the low permeable clay/silt Bay Mud using an average hydraulic conductivity of 3.6×10^{-7} cm/sec and similar effective porosity and hydraulic gradient is 4.6×10^{-9} cm/sec (0.0048 feet per year).

Organic Compounds

VOCs (primarily trichloroethene and its breakdown products) have been detected and characterized in groundwater in a small area north of the landfill. The VOC-impacts are limited to a buried sand channel located in the well G-4 area and at least 10 feet below ground surface. The source of the VOCs is likely offsite from an area to the east and upgradient of well G-4 (Golder Associates, October 2014), which predominantly migrates to the G-4 area from the upper water bearing zone. No known onsite sources of VOCs in the proposed NW stormwater basin have been identified.

During recent groundwater sampling activities in September 2022, trichloroethene (TCE) was detected in the sample collected from G-4 at a concentration of 310 µg/L. The concentration of one of the daughter products of TCE breakdown (cis-1,2-dichloroethene [cis-1,2-DCE]) was reported from well G-4 at a concentration of 66 µg/L. TCE was detected in the September 2022 sample from PZ-2 at a concentration of 2.3 µg/L. Cis-1,2-DCE was detected in PZ-2 at a concentration of 7.0 µg/L. Overall, the TCE concentration in PZ-2 has decreased from values typically between approximately 2,000 and 3,200 µg/L measured during the first six months of extraction system operation in 2002. TCE was detected in the September 2022 sample from PZ-5 at a concentration of 0.69 µg/L and cis-1,2-DCE at a concentration of 83 µg/L. As there is no known source of contamination in the shallow soil in the area, the concentrations of water in the low permeable material are anticipated to be similar to the concentrations in the upper water bearing zone.

Hydrogeologic Evaluation

The construction of the proposed NW stormwater basin will have minimal effect on groundwater flow direction or cause additional mobilization of VOC-impacted groundwater in the area of extraction well G-4. A minimum thickness of seven feet of low permeable material is anticipated to be present between the proposed NW stormwater basin and the upper water bearing zone based on previous investigations. Assuming a steady state infiltration rate, which can be approximated by the saturated hydraulic conductivity of the soil, minimal infiltration is expected from the proposed NW stormwater basin. Furthermore, as no known onsite sources are known to exist in this area, any infiltration will not mobilize additional VOCs from the subsurface.

The proposed NW stormwater basin will be constructed in the unsaturated zone. Based on the geotechnical borings, 3 to 5 feet of unsaturated soil will be present between the base of the basin and first encountered groundwater. Note that depth to groundwater can vary considerably depending on climatic conditions. Based on depth to water, infiltration, and location of the water bearing zones, changes to the overall groundwater flow direction are not anticipated from the proposed basin construction. Additionally, the G-4 extraction well will continue to operate and be the dominant influence on localized groundwater movement in the vicinity of the proposed NW stormwater basin.

The proposed NW stormwater basin may cause localized settlement and some consolidation in the upper low permeable material directly beneath the footprint of the basin (ES Engineering Services, 2018). The extent of the settlement is not anticipated to lead to significant consolidation. Should some consolidation occur in the saturated low permeable material, the sand layer beneath it will serve as a drainage layer for any leakage related to consolidation and prevent a significant increase in excess pore pressure. Therefore, no significant changes to the groundwater flow regime will occur. In addition, the water quality from the lower permeable material is anticipated to be similar to the water quality of the sand layers of the upper water bearing zones based on the known VOC source and not lead to significant changes in the overall water quality from consolidation.

Should you have any questions or require additional information, please do not hesitate to contact the undersigned at (408) 453-6100.

Sincerely,

WSP USA Inc.

George C. Wegmann, PG, CHG
Assistant Vice President, Geologist

CERTIFIED HYDROGEOLOGIST
GEORGE C. WEGMANN
No. 1060
Exp: 4/30/2025
STATE OF CALIFORNIA

Kris H. Johnson, PG, CEG
Vice President, Geologist

Attachments: Figure 1 – Site Location
Figure 2 – Groundwater Elevation Contours – October 28, 2022
Figure 5 – Geologic Cross Section B-B'

https://golderassociates.sharepoint.com/sites/161368/project files/7 correspondence/final/nw basin hydro review.docx

Aerial photography from Google Earth dated: February 23, 2014 .

SCALE: 0 1000 2000 FEET

CLIENT
ZANKER ROAD RESOURCE MANAGEMENT, LTD.
SAN JOSE, CALIFORNIA

CONSULTANT
GOLDER

YYYY-MM-DD	2018-07-20
PREPARED	KMM
DESIGN	KMM
REVIEW	TLV
APPROVED	TLV

PROJECT
ZANKER MATERIAL PROCESSING FACILITY
SAN JOSE, CALIFORNIA

TITLE
FIGURE 1
SITE LOCATION

PROJECT NO.
053-7482

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EXPLANATION

(-2.83)	Groundwater monitoring well showing groundwater elevation (Ft.-MSL); measured 10/28/22
(-1.42)	Groundwater piezometer showing groundwater elevation (Ft.-MSL); measured 10/28/22
(0.71)*	Leachate monitoring well showing landfill fluid elevation (Ft.-MSL); measured 10/28/22
(-0.23)*	Leachate extraction trench piezometer showing landfill fluid elevation (Ft.-MSL);
?	Groundwater elevation contour (Ft.-MSL); queried where uncertain
	Perimeter observation station
	On-site observation station
	Approximate fill area third and fourth quarter 2022
	Approximate direction of groundwater flow
*	Leachate fluid elevations were not used in constructing groundwater elevation contours
NA	Not accessible
NM	Not measured

NOTE: Well G-6 was decommissioned.

NOTE: This map was prepared using photogrammetric methods by Tetra Tech Geomatic Technologies in Lafayette, California. In areas of dense vegetation, accuracy of contours may deviate from accepted accuracy standards. The grid is based on the California Coordinate System, Zone III, NAD 1983. Elevations are based on NGVD 1929. Control survey performed by RJA Associates, Pleasanton, CA.
Topography date: 2/25/21.

0 300 600

CLIENT
ZANKER ROAD RESOURCE MANAGEMENT, LTD.
SAN JOSE, CALIFORNIA

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-09-14
PREPARED	BAS
DESIGN	KMM
REVIEW	KHJ
APPROVED	KHJ

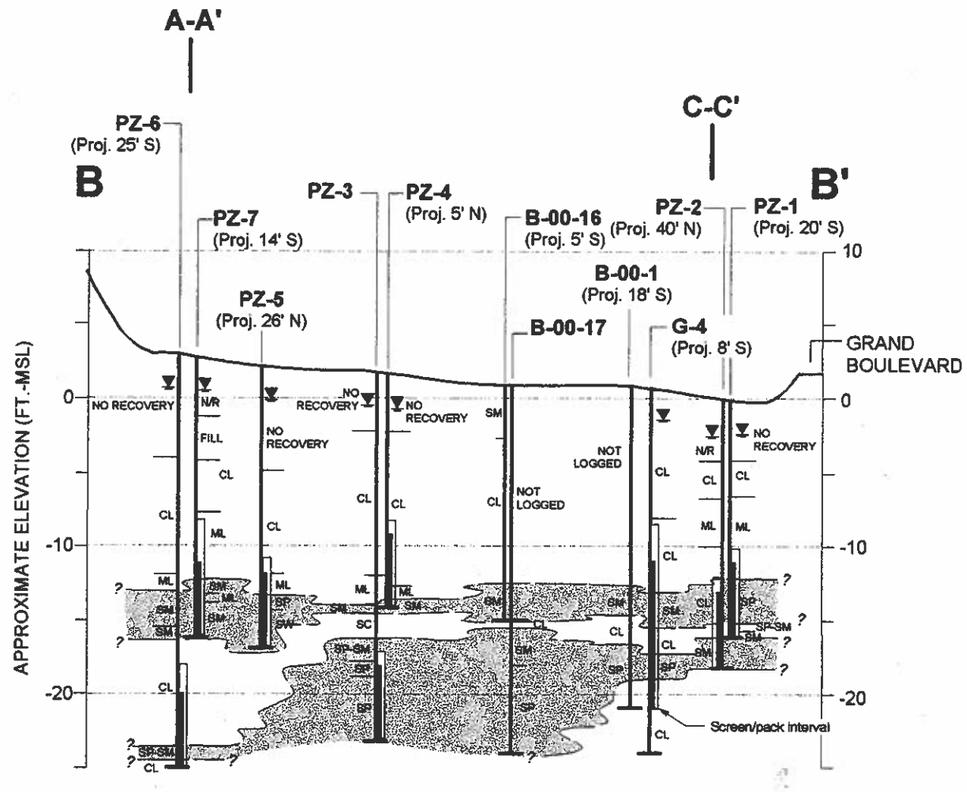
PROJECT
ZANKER MATERIAL PROCESSING FACILITY
SAN JOSE, CALIFORNIA

TITLE
FIGURE 2
GROUNDWATER ELEVATION CONTOURS - OCTOBER 28 2022

PROJECT No. 21455173 Rev.

Path: C:\Users\BStocek\AppData\Roaming\GCDS_use#\Temp-DwgAcPublish_47012\ | File Name: GWELEV 4Q2022 with piez.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
1 in
0



EXPLANATION

B-00-8 (Proj. 25' N) — Boring designation (Projected distance to line of cross section)

- Borehole
- Groundwater elevation (May 2, 2001)
- USCS symbol
- Geologic contact; queried where uncertain
- Bottom of borehole

CL, ML	Clay, silty clay, sandy clay; Silts
SC, SM, SP	Clayey sand; Silty sand; Sand

NOTE:
Boring B-00-7 moved up 3 feet due to inconsistencies in lithology with neighboring borings.

Conor Pacific

SCALE: 0 50 100 FEET
(HORIZONTAL - VE=5X)

ZANKER ROAD RESOURCE MANAGEMENT, LTD.
ZANKER MATERIAL PROCESSING FACILITY
SAN JOSE, CALIFORNIA

GEOLOGIC CROSS SECTION B-B'

FIGURE 5

PROJECT NO. ZMP106

I:\ZMP\106\FIGURES\XSEC-BBNEW.DSF 10/25/01