ATTACHMENT A

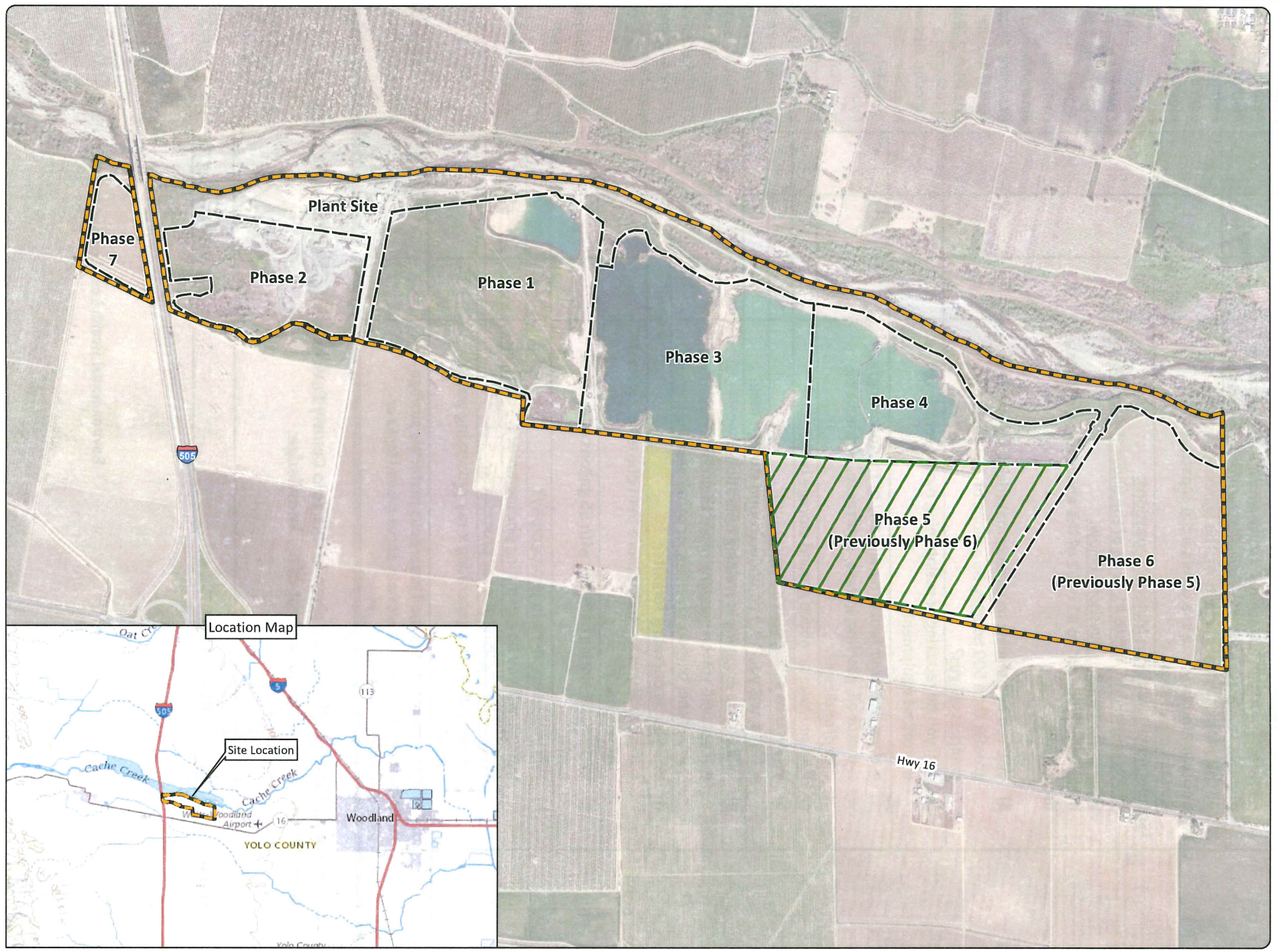


Figure 1

Site Plan

CEMEX Cache Creek
Yolo County, California

Legend:

- Rec Plan Boundary
- Phase Boundary
- Phase 5*

*Note: Dewatering will occur in Phase 5 and water will be pumped to Phase 4.

4/28/2023

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
USGS The National Map: National

0 500 1,000 2,000 Feet

Disclaimer: The data was mapped for planning purposes only. No liability is assumed for accuracy of the data shown.

Prepared by: Sage Thurmond, Compass Land Group
3140 Peacekeeper Way #102, McClellan Park, CA 95652

COMPASS LAND GROUP

COMPASS LAND GROUP

4235 FORCUM AVE
SUITE 100
MCCLELLAN, CA 95652
TEL: 916.825.4997
WWW.COMPASSLAND.NET

May 8, 2023

Ms. Elisa Sabatini
Manager of Natural Resources
Yolo County
292 West Beamer Street
Woodland, CA 95695

SUBJECT: CEMEX Cache Creek – Application for Phase 5 Dewatering

Dear Elisa,

On behalf of CEMEX Construction Materials Pacific, LLC. (CEMEX), we are pleased to submit the enclosed Application for "Extension or Modification of an Approved Permit" to request Yolo County approval to conduct mine dewatering in Phase 5 of the Solano Concrete Off-Channel Mine (Mine ID #91-57-0008) (see **Attachment A**). We have also enclosed a check in the amount of $13,799.08 to cover the initial application deposit. The proposed dewatering would consist of a pit-to-pit transfer of mine dewatering water from Phase 5 to Phase 4 where the water would recharge back into the aquifer.

Since 2021, CEMEX has struggled to remove the middle clay layers of the sand and gravel deposit using a combination of conventional excavators and the electric clamshell dredge. CEMEX has made best efforts to excavate the clay using excavators during low groundwater conditions. However, excavators still have limited reach and visibility and cannot effectively remove the full thickness of clay below water. Moreover, this wet excavation practice has exposed excavator and haul truck operators to safety hazards such as submerged working platforms, slippery and unstable footing, and associated access next to water. As the County is aware (through formal notification), in 2022 a CEMEX excavator-operator lost visible footing in the Phase 4 excavation area, resulting in the machine sinking to the bottom of the pond. Fortunately, the operator narrowly escaped and survived. CEMEX believes that these challenges and incidents can be avoided in the future by dewatering and using conventional equipment to remove the clays.

More recently, CEMEX has attempted to excavate the remaining clay below the groundwater table using the dredge. Because the dredge and its on-board screening circuits are not designed to excavate through clay, CEMEX has struggled with a reduced rate of production and unfavorable material quality at the processing plant. Without dewatering, CEMEX will continue to face these challenges and may be unable to maximize the sand and gravel recovery to the permitted mining depth. This is already true for the eastern end of Phase 4, where a portion of the available resources are constrained by clay layers that are not economically feasible to mine (unless CEMEX can return to the area to dewater and mine in the future). With County authorization to dewater Phase 5, CEMEX should be able to safely and efficiently remove the middle clay layers and maximize resource recovery to the full permitted depth of the deposit.

Section 10-4.412 (Dewatering) of the County Off-Channel Surface Mining Ordinance (OCSMO) provides that:

> *…No off-channel excavation shall use dewatering as a part of surface mining operations, unless site-specific technical analysis performed by a qualified Professional Engineer or Professional Geologist with experience in hydrogeology demonstrates that the proposed dewatering will not adversely affect off-site wells with respect to groundwater level and quality. The Professional Engineer or Professional Geologist shall demonstrate, using appropriate hydrogeologic analysis (i.e., using data-supported empirical, analytical, and/or numerical investigative tools), that the proposed dewatering activity will not adversely impact active off-site wells or other water resources (e.g., creeks and wetlands) within 1,000 feet of the proposed dewatering pit boundary.*

Andy Kopania, a Professional Geologist and Certified Hydrogeologist with EMKO Environmental, Inc. (EMKO), prepared the requisite technical analysis for CEMEX (see **Attachment B**). EMKO's analysis demonstrates that:

1. There are no off-site wells within 1,000 feet that would be affected;
2. Phase 4 has adequate capacity to accept the water from Phase 5;
3. The increased water level in the Phase 4 pond will act as a hydraulic barrier and prevent any effects along Cache Creek; and
4. The water pumped from Phase 5 to Phase 4 would beneficially recharge back into the upper and lower groundwater aquifers.

CEMEX would greatly appreciate County Planning Commission approval for dewatering to facilitate dry excavations in Phase 5 as early as June 2023. Please feel free to contact me at 916-825-4997 with any questions or additional information needs.

Sincerely,

Yasha Saber
Managing Partner
ysaber@compassland.net

Encl.

cc: Robert Cutter, CEMEX
Steve Grace, CEMEX

ATTACHMENT A
APPLICATION FOR EXTENSION OR MODIFICATION OF AN APPROVED PERMIT

EXTENSION OR MODIFICATION
OF
AN APPROVED PROJECT

Department of Community Services
292 West Beamer Street
Woodland, California 95695-2598

(530) 666-8775

Revised January 2023

County of Yolo

Taro Echiburú
DIRECTOR

DEPARTMENT OF COMMUNITY SERVICES

Planning, Building and Public Works
292 West Beamer Street
Woodland, CA 95695-2598
(530) 666-8775 FAX (530) 666-8156
www.yolocounty.org

Environmental Health
292 West Beamer Street
Woodland, CA 95695
(530) 666-8646

Integrated Waste Management
44090 CR 28 H
Woodland, CA 95776
(530) 666-8852

APPLICATION

Applicant Billing and Property Owner Information			
Applicant CEMEX Construction Materials Pacific, LLC.		Company (if applicable) Same	
Billing Address 4120 E. Jurupa Street, Suite 202			
City Ontario	State CA	Zip 91761	Daytime Phone 831-970-9559
Property Owner United Metro Materials, Inc and Solano Concrete Co Inc, together dba CEMEX			
Address 4120 E. Jurupa Street, Suite 202			
City Ontario	State CA	Zip 91761	Daytime Phone 831-970-9559

Project Information	
Assessor's Parcel No. See attached (immediately after this form)	Parcel size 1,902 acres
Property Address/Location 30288 CA-16, Madison, California 95653	
Existing use of property Sand and gravel mining and processing	
Tax Rate Area(s) (taken from property tax bill): 063019 and 063020	
Request Modify Mining Permit and Reclamation Plan ZF #95-093 to allow mine dewatering in Phase 5	
pursuant to Section 10-4.412 (Dewatering) of the County Off-Channel Surface Mining Ordinance.	

Required Signatures

I hereby make application for the above-referenced land use entitlement and certify that this application, other documents, and exhibits submitted are true and correct to the best of my knowledge and belief. **Should any information or representation submitted in connection with this application form be incorrect or untrue, I understand that Yolo County may rescind any approval or determination, or take other appropriate action.**

I hereby acknowledge that I have been informed of my right to make written request to the County to receive notice of any proposal by the County to adopt or amend a general or specific plan, or a zoning ordinance or other ordinance affecting building or grading permits, prior to action on said item.

I also certify that I am the owner of the above property or have attached the owner's written consent to file this application. If more than one, please attach a consent letter for each property owner. If owner refuses or is unable to sign, provide copy of lease, title report or other documentation. I understand that verification of property ownership or interests in the property or application may be required.

Applicant's/Owner's Signature	Digitally signed by Alejandro Ortiz-Robles Date: 2023.04.27 13:17:30 -07'00'	Date 4/27/2023

For Office Use Only		
Received by:	Gen Plan:	Fee Received:
Date Received:	Gen Plan Designation:	Receipt #
Assigned Planner:	Zoning:	File # ZF

PERMIT PROCESSING FEE AGREEMENT

I, the undersigned, hereby authorize the County of Yolo to process the permit request on the previous side of this application in accordance with the Yolo County Code. I (the land owner and/or the applicant) am depositing a minimum initial deposit to cover staff review, coordination, and processing costs related to my application request based on actual staff time expended and other direct costs, including, but not limited to, outside consultant services, county counsel charges, and materials costs in accordance with the adopted Yolo County Fee Resolution and the Project Cost Reimbursement Agreement attached to this application. This initial deposit will be held by the County in a deposit account to pay for staff time and other charges spent processing the application. I understand that such costs will be drawn from the deposit account and that I will be billed on a "time and materials" basis in order to maintain a positive account balance at all times during the review process. I further understand that no work will be performed on the project with a negative fund balance. By signing below, I agree to pay all permitting costs, including requests to supplement the deposit account, plus any accrued interest, if the applicant does not pay costs.

I agree not to alter the physical condition of the property during the processing of this application by removing trees, demolishing structures, altering streams, and grading or filling. I agree not to start construction of any new structures prior to permit approval. I understand that such alteration or new construction may result in the imposition of criminal, civil or administrative fines or penalties, or may result in the delay or denial of the project application.

FISH AND GAME REVIEW FEES: I understand that my application and/or any applicable environmental document for my project may be referred to the California Department of Fish and Wildlife (CDFW) for review and comment in accordance with the provisions of the California Environmental Quality Act. Should this review be required, I understand that I must pay all fees for the cost of CDFW review as required by Section 711.4 of the Fish and Game Code (currently $2,764.00 for Negative Declarations or $3,839.25 for Environmental Impact Reports, plus $50.00 County Clerk fee). Should these fees be required, I agree to remit a cashier's check or money order in the required amount, payable to the Yolo County Clerk, to the Planning Division prior to the posting of any Notice of Determination following project approval.

MITIGATION FEES OR REQUIREMENTS: I further understand that my project, if approved, may be subject to one or more mitigation fees including the following fees current as of 2022:

Yolo HCP/NCCP land cover fee*: $15,571 per acre of impact to all applicable land cover types
Yolo HCP/NCCP fresh emergent wetland fee*: $80,864 per acre of impact to fresh emergent wetland areas
Yolo HCP/NCCP valley foothill riparian fee*: $66,560 per acre of impact to valley foothill riparian areas
Yolo HCP/NCCP lacustrine and riverine fee*: $64,854 per acre of impact to lacustrine or riverine areas
Agricultural mitigation in lieu fee: $10,100 per acre of farmland converted (for projects less than 20 acres)
Inclusionary Housing in lieu fee: sliding scale for projects under 8/10 units ($1,292 for single family house)
**Fee amounts subject to change in March of each year per the conditions outlined in the Yolo HCP/NCCP*

AFFIDAVIT OF CERTIFIED PROPERTY OWNERS

I further certify that the attached list of property owners contains the names and addresses of all persons to whom all property is assessed as they appear on the latest available assessment roll of the County within the area described on the attached application and for a distance of three hundred feet (300) from the exterior boundaries of the property described on the attached application.

I certify under penalty of perjury that the foregoing is true and correct.

CERTIFICATION STATEMENT OF HAZARDOUS WASTE OR SUBSTANCE SITE

Pursuant to the requirements of Section 65962.5 of the California Government Code, I certify that the project site for the above entitlement is not located on the State list of identified hazardous waste/or hazardous substance sites.

Required Signatures

I hereby certify that I have read all the above information on this page. All this information is correct and I agree to abide by the requirements therein.

PROPERTY OWNER OR AUTHORIZED REPRESENTATIVE:

NAME Alejandro Ortiz Robles, CEMEX Construction Materials Pacific, LLC

SIGNATURE:  Digitally signed by Alejandro Ortiz-Robles
Date: 2023.05.04 08:32:30 -07'00' DATE 05/04/2023

INDEMNIFICATION AGREEMENT

As part of this application, applicant and real party in interest if different, agree to defend, indemnify, hold harmless, and release Yolo County, its agents, officers, attorneys, and employees from any claim, action, or proceeding brought against any of them, the purpose of which is to attack, set aside, void, or annul the approval of this application or adoption of the environmental document, which accompanies it. This indemnification obligation shall include but not be limited to: damages, costs, expenses, attorney fees, or expert witness fees that may be asserted by any person or entity, including the applicant, arising out of or in connection with the approval of this application, whether or not there is concurrent passive negligence on the part of Yolo County, its agents, officers, attorneys, or employees.

APPLICANT: Alejandro Ortiz Robles, CEMEX Construction Materials Pacific, LLC

Signature:  Digitally signed by Alejandro Ortiz-Robles
Date: 2023.04.27 13:18:02 -07'00'

Mailing Address: 4120 E. Jurupa Street, Suite 202, Ontario, CA 91761

REAL PARTY INTEREST: Same as Applicant
(If different from Applicant)

Signature:  Digitally signed by Alejandro Ortiz-Robles
Date: 2023.04.27 13:18:22 -07'00'

Mailing Address:

ENVIRONMENTAL / PROJECT SITE QUESTIONNAIRE

A. PROPOSED PROJECT SITE

1. Assessor Parcel Number(s): 025-450-001; 049-060-004 & 007; 049-070-004, 005, 006, 009, 010, 011, 019, 020, & 021
2. Location (nearest public road, cross street, community, etc): 30288 CA-16
3. Size of Assessor Parcel Areas(s): 1,902 ac sq. ft./acres.
4. Existing Land Use(s): Sand and gravel mining and processing
5. Existing Building(s) and Structure(s): Processing plant and accessory structures (e.g., shop)
6. Maximum Existing Slope Gradient (horizontal feet/each vertical feet):
   As per existing mining and reclamation plans; no changes to maximum gradients proposed.
7. Distinctive Physical Features (i.e. landslides, streams, faults): Cache Creek to north
8. Existing Vegetation: Grassland, cropland, riparian, marsh, ruderal, oak savanna (no change)
9. Existing Access Routes (if any): Existing driveway at 30288 CA-16
10. Existing Drainage Facilities/Direction: As per existing mining and reclamation plans (no change)
11. Existing Water Supply (if any): On-site wells Solano 1 and Solano 1a (no change)
12. Existing Sanitation Facilities (if any): Septic system services plant office (no change)
13. List and Describe all Existing Easements: Not applicable (no change)
14. Owner(s) of Mineral Rights: United Metro Materials Inc and Solano Concrete Co Inc., dba CEMEX
15. Existing Land Conservation Contract and/or other deed restrictions (if any):
    Not applicable

B. SURROUNDING PROPERTIES AND LAND USES

1. Land Uses (including type of crops if agricultural).

North: Creek / Agriculture South: Agriculture

East: Agriculture West: Agriculture

2. Buildings and Structures (indicate distance from project site).

North: N/A - creek South: ~30' to building on APN 049-070-008

East: ~750' to building West: ~1,700' to barn structure

3. Distinctive Physical Features and Vegetation.

North: Cache Creek South: Hwy. 16

East: Agriculture West: I-505 / Agriculture

4. Noise characteristics of the surrounding area (include significant noise sources: Aggregate processing, agricultural operations, roadway noise, wildlife, creek, etc.

C. PROPOSED SERVICES

1. **Drainage**

Describe how increased runoff will be handled (onsite and offsite):

No change - all water contained in mining pits

Will the project require the installation or replacement of storm drains or channels:

No

If yes, indicate length, size and capacity:

Not applicable

2. **Water Supply**

Estimate existing and proposed yearly water supply needs in acre feet or gallons:

No change

Water Wells or Water Purveyor: No change

If wells, attach a copy of a well water quantity and quality report from a testing lab. If water purveyor, attach a copy of a water availability letter from a purveyor.

Will the project require the installation or replacement of new water service mains? If yes, indicate length, size and capacity:

Not applicable

3. **Sanitation**

Sanitation will be provided by private onsite septic system or public sewers:

No change

If private system, attach a copy of a soils report and percolation test data (when required), and describe the proposed system (leech-field or seepage pit):

Not applicable

If public sewers, attach copy of a sewer availability letter from sanitary district. Will the project utilize existing sewer mains? If not, indicate length, size, and capacity:

Not applicable

Describe toxic and chemical wastes to be discharged and amount:

Not applicable

4. **Electricity**

What is the projected amount of electrical usage (peak Kw/hrs/day):

Max 100 hp pump = 74.6 Kw/hr x up to 24 hrs/day = ~1,790 Kw/hr/day. Avg = 12 hrs/day = 895 Kw/hr/day.

Do existing lines require an increase in number or size: No - serviced by existing lines at dredge anchor

Do any overhead electrical facilities require relocation? If so, describe:

No

Indicate length of new offsite electrical transmission and distribution facilities required to serve project (if applicable):

Not applicable

5. **Natural Gas**

Indicate expected amount of gas usage: Not applicable

Do existing gas lines have to be increased in size? If yes, please describe:

Not applicable

Do existing gas lines require relocation? If yes, describe:

Not applicable

Indicate length and size of new offsite gas mains (if applicable):

Not applicable

6. **Fire Protection**

Indicate number and size of existing and/or proposed fire hydrants and distance from proposed buildings:

No change

Indicate number and capacity of existing and/or proposed water storage facilities and distance from proposed buildings:

No change

April Meneghetti, REHS
Director of Environmental Health

County of Yolo

DEPARTMENT OF PLANNING, PUBLIC WORKS AND ENVIRONMENTAL SERVICES

Environmental Health Division
292 W. Beamer Street, Woodland, CA 95695
PHONE - (530) 666-8646 FAX - (530) 669-1448

ENVIRONMENTAL HEALTH LAND USE REVIEW SURVEY

A Building Permit Application may require a review from Yolo County Environmental Health (YCEH) to ensure the compliance with County, State and Federal laws and regulations. Please complete this survey and answer questions pertaining to each YCEH unit to the best of your knowledge, and submit it as part of your complete application. This survey should be completed by the property owner or the business operator.

Site address: 30288 CA-16	City: Madison	Zip code: 95653
Existing business? ☒ Yes ☐ No	If yes, name of business: Cache Creek Mine	
Property and/or owner of business name: CEMEX		
Phone number: 909-974-5569	Email: alejandro.ortizr@cemex.com	
Mailing address: 4120 E. Jurupa Street, Suite 202	City: Ontario	Zip code: 91761
Building Permit #: N/A	Project Description: (Please describe this building permit project as specifically as possible; such as "New house" or "Remodeling a house for use as an Office": Modify Mining Permit and Reclamation Plan ZF #95-093 to allow mine dewatering in Phase 5 pursuant to Section 10-4.412 (Dewatering) of the County Off-Channel Surface Mining Ordinance.	

EH Program	Environmental Health Questions:	YES	NO	N/A	*Why is this asked?*
ALL	Is this project for a commercial use?	X			*Some EH programs regulate only commercial facilities.*
SEPTIC SYSTEM: If on City Sewer System, check here: ☐ * *** Go to next EH Program. ONLY answer questions if a septic system exists on parcel - OR – the parcel will be serviced by a future septic system:**	Is a building/structure getting bigger; is the footprint of a building/structure is expanding out of the original footprint?		X		*Septic setbacks are required with adequate replacement area*
	Will this project include adding a structure/building/foundation to the land that will be an additional footprint?				*Septic setbacks are required with adequate replacement area*
	Will this project have a wastewater flow or will it alter the existing wastewater flow?				*Needs to meet septic installation requirements*
	Will this project change the wastewater flow in any way (decrease or increase)? *For example, adding bedrooms or potential sleeping rooms, or changing the use of the structure, such as residential to commercial*		X		*This will affect the existing septic system, and the system will need to be evaluated.*
	Grading permits only: will the project have an impact on the existing soils on the parcel?				*This could affect future septic system developments.*
	Is there an unused septic system on this parcel?		X		*Abandonment under permit is required.*

EH Program	Environmental Health Questions:	YES	NO	N/A	*Why is this asked?*
WELL / WATER USE: **If on City Water System or another approved Public Water System, check here: ☐ *** *** Go to next EH Program. ONLY Answer questions if a water well exists on this parcel:**	Will this project replace one structure for another that already has a well service connection? *For example, replacing a modular home with a new modular home.*				*If it is on city water, not an EH issue.*
	Will this project use an existing well service connection to the structure? *For example, remodeling a house or other structure that is already connected to the well.*		X		*No need for EH review if there is an existing service connection*
	Will this project require new piping to connect from a well or well water line to the project (i.e., a new connection)?				*The well should have an approved permit; if not, the well requires evaluation.* *There could be public water system or state small water system requirements.*
	• Will there be 15 or more buildings or physical structures supplied by this well?				
	• Will there be 5-14 buildings or physical structures supplied by this well?				
	• Does this well serve 25 or more people daily, at least 60 days per year (can be non-consecutive days)?				
	• Does the water system serve 25 or more year-long residents (year-long residents is at least 183 days/year)?		X		
	Is there an unused water well on this parcel?		X		*Abandonment under permit is required after 1 year of non-use.*
SOLID WASTE:	Will this project, or does activity on this parcel, result in handling yard trimmings, untreated wood wastes, natural fiber waste, or construction and demolition wood waste?		X		*Permit required*
	• If yes, will these materials be managed in a way which would allow them to reach 122 degrees Fahrenheit (i.e., composting, excessive storage times, etc.)?				
FOOD:	Will this project, or does activity on this parcel, result in retail food facility activities? *"Retail" means handling food for dispensing or sale directly to the consumer or indirectly through a delivery service. For example: storing, preparing, packaging, serving, vending or otherwise providing food (any edible substance incl. beverage and ice) for human consumption at the retail level.*		X		*Permit required, including a plan check prior to building permit issuance.*
POOL/SPA:	Will this project result in a public pool/spa? *A public pool/spa includes but is not limited to pools/spas located at hotels, motel, parks, apartments, schools, health clubs, etc.*		X		*Permit required, including a plan check prior to building permit issuance.*
BODY ART:	Will this project, or does activity on this parcel, result in tattooing, body piercing, or permanent cosmetics activities?		X		*Permit required, including a plan check prior to building permit issuance.*
WASTE TIRE:	Will this project, or does activity on this parcel, result in generating waste tires onsite?		X		*Permit required*
	Will this project, or does activity on this parcel, result in hauling 10 or more waste tires at a time?		X		

EH Program	Environmental Health Questions:	YES	NO	N/A	*Why is this asked?*
HAZARDOUS MATERIALS:	1. Will this project, or does any activity on this parcel, result in the handling or storing of any hazardous materials in a commercial capacity? * *Please note: a hazardous material is a chemical that is flammable, corrosive, reactive or toxic. This could include organic pesticides.*	X (no change)			*May be required by State law to submit a Hazardous Materials Business Plan to YCEH. Failure to comply with this requirement could result in fines of up to $2000.00/day. Business plans must be filed by going to the California Environmental Reporting System (CERS) website cers.calepa.ca.gov, creating an account, entering required hazardous materials information, and submitting the information for approval by YCEH. For assistance with CERS, or any other hazmat questions, call our office at 530.666.8646 and ask for a hazmat specialist.* *+ Tank installations require a plan review.*
	2. Will this project or does activity on this parcel generate hazardous materials waste in a commercial capacity? * *For example, used oil.*	X (no change)			
	*Supplemental Hazardous Materials questions: If you answered "yes" to #1 or #2 of the above HM questions, answer a) through j) questions below. If you answered "no" to #1 or #2 of the above HM questions, mark N/A. a) Will you be handling hazardous materials in quantities greater than 500 pounds, 55 gallons or 200 cubic feet of compressed gas?		X		
	b) Will you be repairing or maintaining motor vehicles or motorized equipment?		X		
	• If yes, will your facility handle any of the following: motor oil, gasoline, grease, antifreeze, hydraulic oil, and/or diesel?				
	c) Will you have an above ground storage tank?		X		
	d) Will you be selling motor vehicle fuel?		X		
	• If yes, will you have an underground storage tank? +				
	e) Will you be engaging in welding operations?		X		
	• If yes, will you be handling more than one cylinder of acetylene, oxygen, shielding or other welding gasses?				
	f) Will you be operating forklifts?		X		
	• If yes, will you be storing more than one extra cylinder of propane?				
	g) Will you be storing batteries with 55 gallons or more of acid?		X		
	h) Will you be engaging in photography?		X		
	• If yes, will you be generating photographic waste fluid?				
	i) Will you be engaging in x-ray processing?		X		
	• If yes, will you be generating x-ray processing waste fluid?				
	3. Are there unused/abandoned hazardous materials storage containers on this site? *For example, above-ground tanks or underground tanks or barrels.*		X		*Permit required for abandonments.*

I hereby certify that the information given in this Yolo County Environmental Health Land Use Survey document is true and correct to the best of my knowledge:

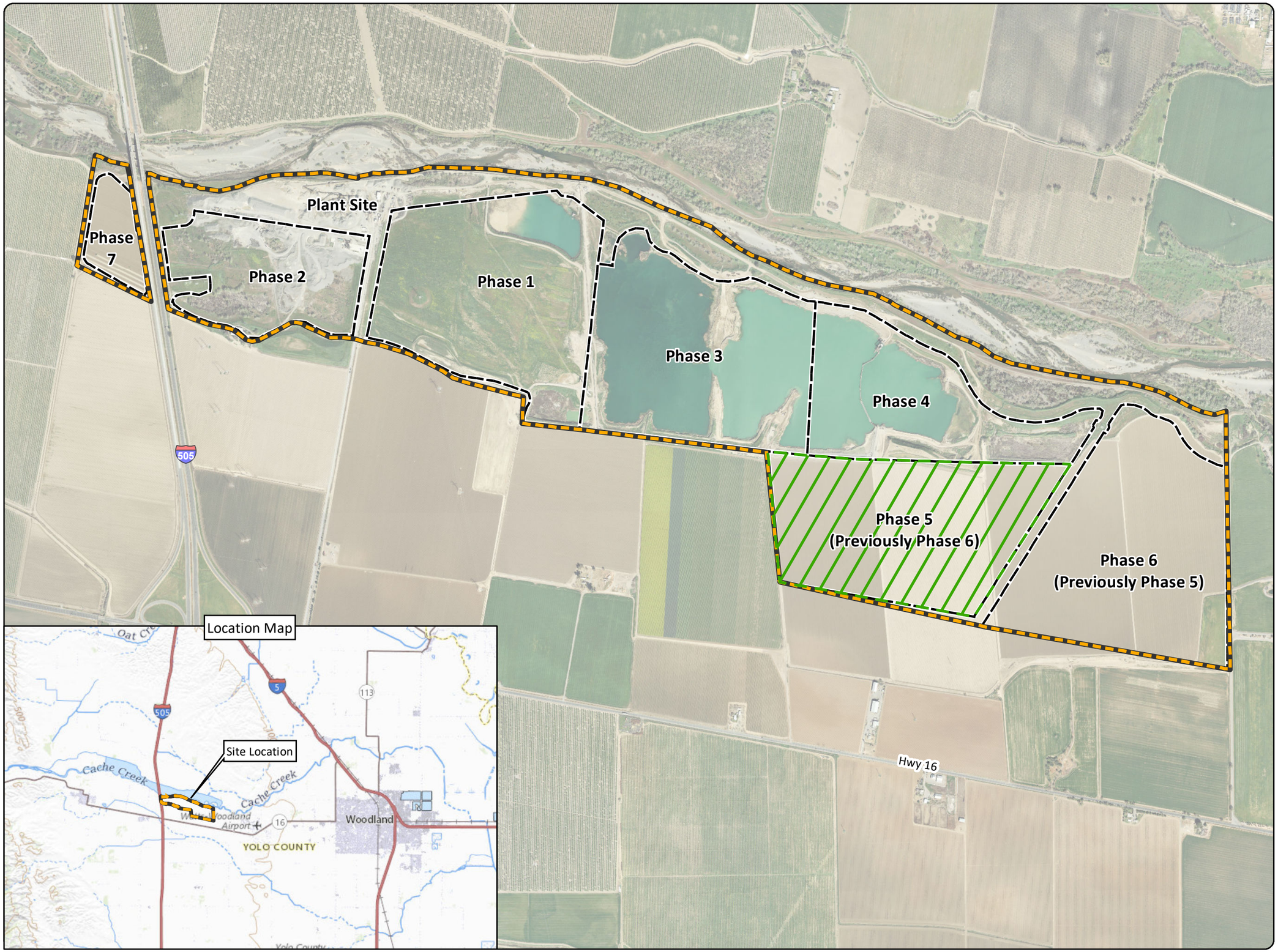
Signature: _____ Date: 04/27/2023

Print Name: Alejandro Ortiz Robles Title: VP Planning

Figure 1

Site Plan

CEMEX Cache Creek
Yolo County, California



Legend:

- Rec Plan Boundary
- Phase Boundary
- Phase 5*

*Note: Dewatering will occur in Phase 5 and water will be pumped to Phase 4.

4/28/2023

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
USGS The National Map: National

0 500 1,000 2,000 Feet

Disclaimer: The data was mapped for planning purposes only. No liability is assumed for accuracy of the data shown.

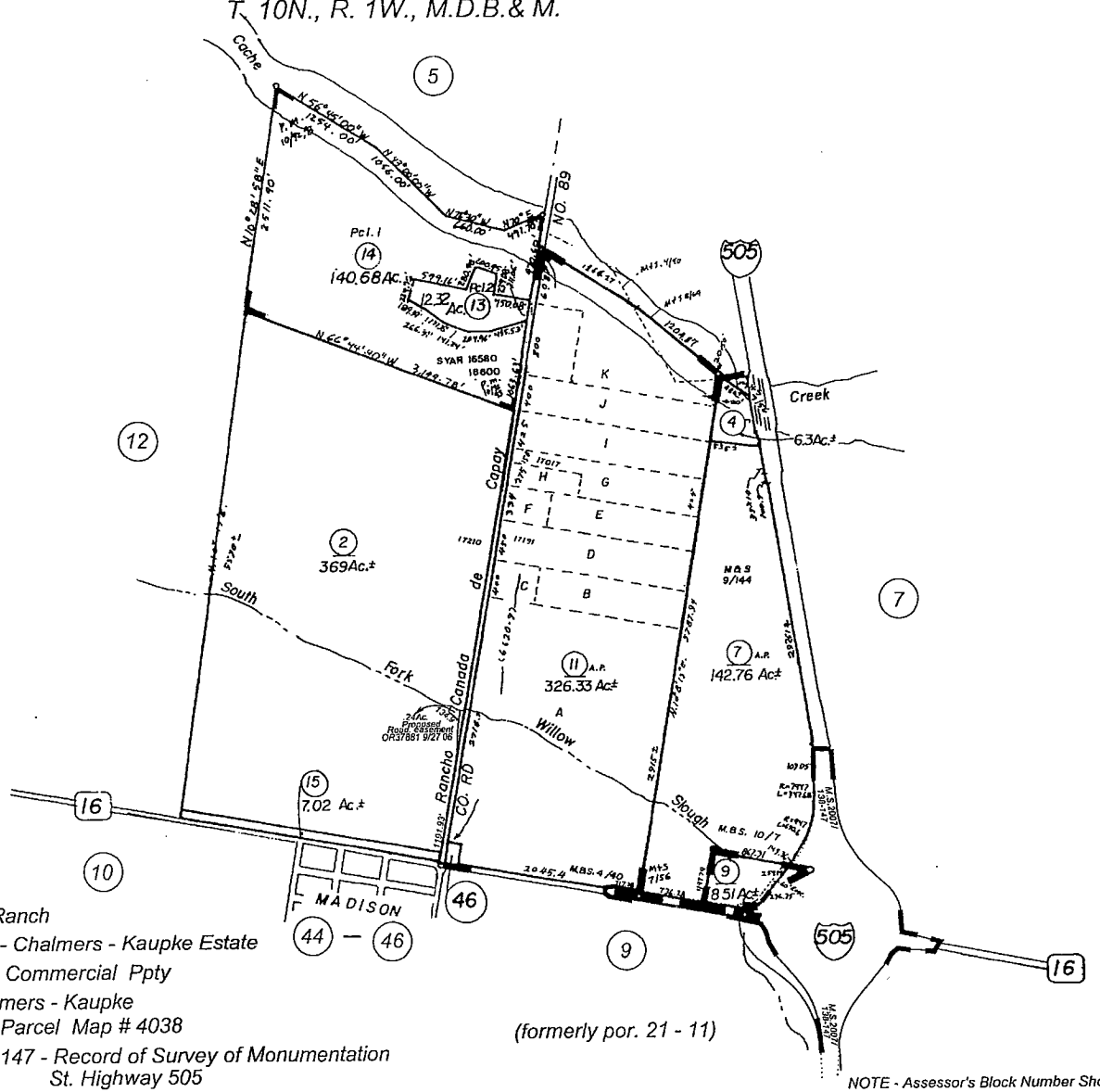
Prepared by: Sage Thurmond, Compass Land Group
3140 Peacekeeper Way #102, McClellan Park, CA 95652

COMPASS LAND GROUP

POR. RANCHO GUESISOSI, GORDON GRANT & POR. RANCHO CANADA DE CAPAY
T. 10N., R. 1W., M.D.B.& M.

CAUTION - These Maps ARE NOT to be used for legal descriptions.

49 - 06



W.O.208187C	10/10 07
W.O.207140N	9/7 06
W.O.202192N	12/31 01
WO 10968 G	2/19/98
WO 47198 B	2/19/98
WO 47199	10/10/78
WO 47097 L	9/7/78
WO 47088 D	8/11/78
WO 46772 L	7/3/78
WO 46705 L	7/31/78
WO 46710 D	7/26/78
WO 46690 D	7/26/78
WO 31 762	7/2/75
DOT 2692	1/30/95

— REVISIONS —

M.S. 4, Pg. 40 - Archer Ranch
M.S.Bk. 9, Pg. 143 - 144 - Chalmers - Kaupke Estate
M.S. Bk. 10, Pg. 7 - Kern Commercial Ppty
M.S. Bk. 7, Pg. 56 - Chalmers - Kaupke
P.M. Bk. 10, Pg. 92, 93 - Parcel Map # 4038
M.S. Bk. 2007, Pg. 138 - 147 - Record of Survey of Monumentation
St. Highway 505

(formerly por. 21 - 11)

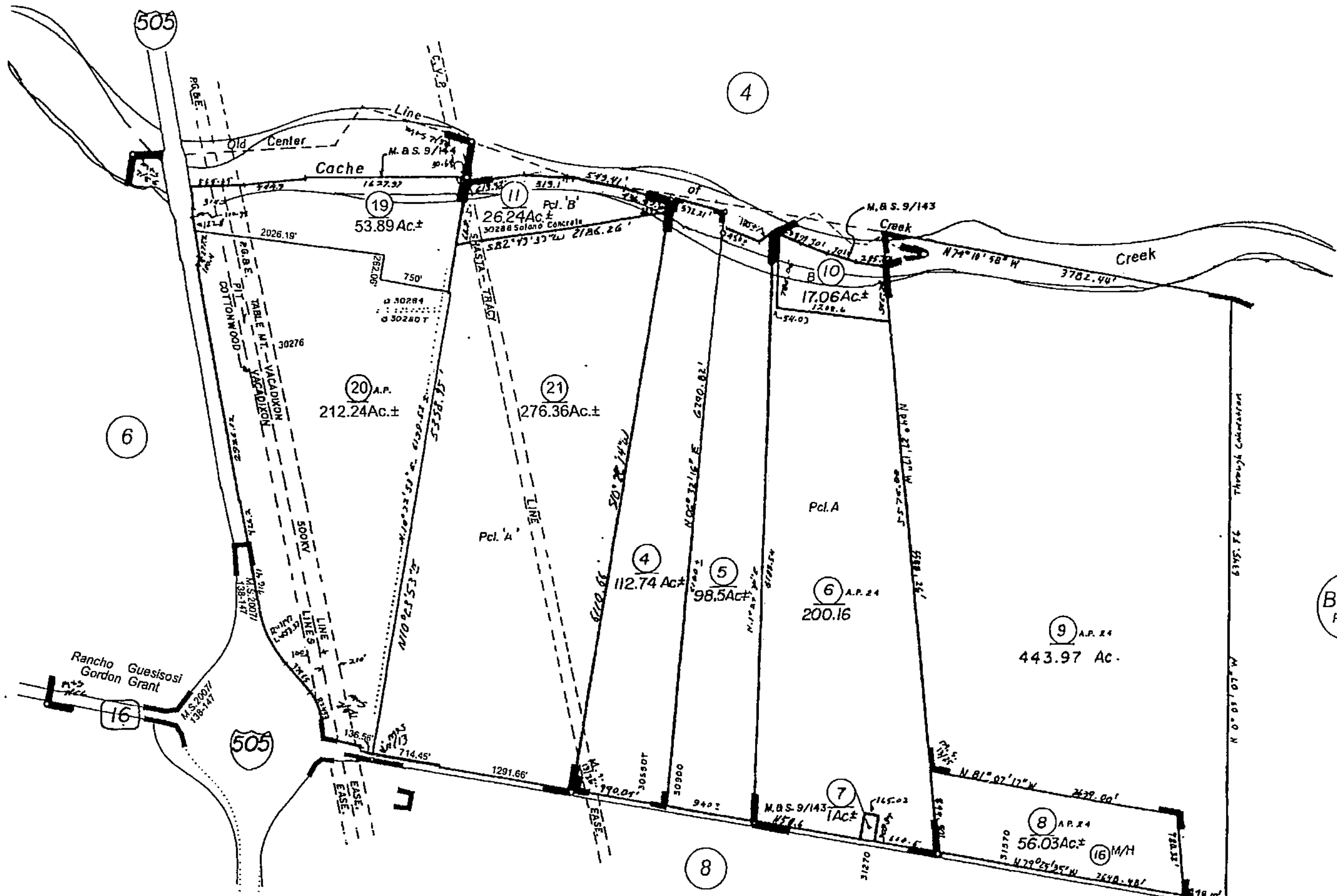
Assessor's Map Bk. 49, Pg. 06
County of Yolo, Calif.

NOTE - Assessor's Block Number Shown in Ellipses.
Assessor's Parcel Number Shown in Circles.

08 / 09

POR. RANCHO GUESISOSI, GORDON GRANT, T. 10N., R. 1W., M.D.B. & M.

CAUTION - These Maps ARE NOT to be used for legal descriptions.



W.O.208187C	10/10 07
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W/C. 5955M	2/28/81
WO 4842A	2/20/79
WO 4674L	7/31/78
WO 4673D	7/26/78
DDT 2692	11/30/75
DDT 2046	6/21/74

— REVISIONS —

M.S. Bk.9, Pg. 143 & 144 - Chalmers - Kaupke Estate
M.S. Bk. 11, Pg. 13 - Record of Survey of Survey of Hutson Property
M.S. Bk. 7, Pg. 56 - Chalmers & Kaupke
M.S. Bk. 13, Pg. 25 - Record of Survey
M.S. Bk. 13, Pg. 26 - Record of Survey
M.S. Bk. 2007, Pg. 138 - 147 - Record of Survey of Monumentation St. Highway 505

(formerly por. 21 - 11)

NOTE - Assessor's Block Number Shown in Ellipses.
Assessor's Parcel Number Shown in Circles.

Assessor's Map Bk. 49, Pg. 07
County of Yolo, Calif.

08/09

ATTACHMENT B
SITE-SPECIFIC DEWATERING ANALYSIS FOR PHASE 5 MINING

Site-Specific Dewatering Analysis
For Phase 5 Mining
CEMEX Cache Creek Facility
Yolo County, California

Prepared for:

Compass Land Group
3140 Peacekeeper Way, Suite 102
McClellan, California 95652

Prepared by:

EMKO Environmental, Inc.
551 Lakecrest Drive
El Dorado Hills, California 95762

March 23, 2023

Dr. Andrew A. Kopania
California Professional Geologist #4711
California Certified Hydrogeologist #HG31

Site-Specific Dewatering Analysis
For Phase 5 Mining
CEMEX Cache Creek Facility
Yolo County, California

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Site-Specific Dewatering Analysis
For Phase 5 Mining
CEMEX Cache Creek Facility
Yolo County, California

1.0 Introduction

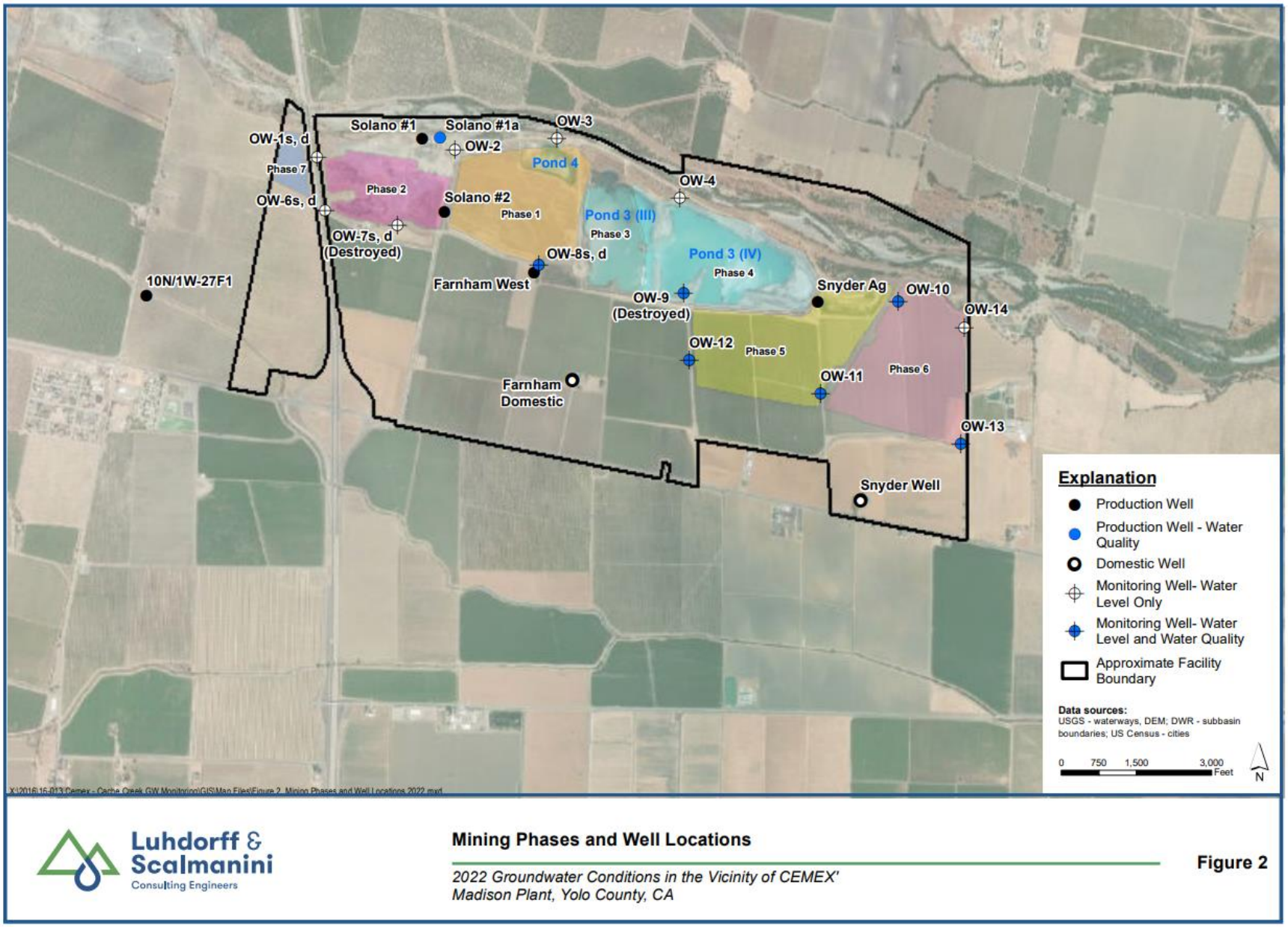
EMKO Environmental, Inc. has prepared this site-specific dewatering analysis for the CEMEX Cache Creek Facility in Yolo County, California (the "facility") to evaluate the use of pit-to-pit dewatering during mining in Phase 5. The location of the Cache Creek Facility is shown on Figure 1. Figure 2 shows the facility boundary and the extent of each phase, including Phase 5.

A clay unit, referred to as the mid-clay, is present between an upper and lower gravel. To efficiently mine and process the gravel deposits, the mid-clay must be stripped after the upper gravel has been mined to allow access to the lower gravel. To remove the mid-clay deposits, mining excavations within Phase 5 must be dewatered to allow access by conventional mining equipment, such as excavators, loaders, and scrapers because the dredge is unable to efficiently excavate through the clay. The water removed from the Phase 5 excavations will be pumped to Phase 4 and/or to recharge trenches installed within the Phase 5 area above the rim of the mining excavation. All water would remain onsite for beneficial uses and no water would be discharged offsite. The site-specific dewatering analysis considers dewatering to the base of the mid-clay deposit, and also dewatering to the full permitted mining depth in Phase 5.

This dewatering analysis is based on the requirements of the Yolo County Off-Channel Surface Mining Ordinance (OCSMO), in particular, Section 10-4.412 Dewatering. The analysis has been developed to identify the specific conditions under which the proposed dewatering activities will not adversely impact active offsite wells or other water resources within 1,000 feet of the proposed dewatering pit boundary. Effects are considered adverse if the reduction in simulated groundwater levels exceeds two feet below the average low groundwater level at any active offsite well located within 1,000 feet of the pit boundary or results in well failure. The analysis also considers potential effects on other water resources, including creeks and wetlands, and on water quality.

Section 2.0, below, provides a summary of subsurface conditions in Phase 5, with a focus on factors that affect hydrogeologic parameters. The methods used for, and the results of, the analytical drawdown assessment are presented in Section 3.0. A discussion of potential effects on other water resources and on water quality is in Section 4.0. Section 5.0 provides conclusions and recommendations.

Figure 1. Facility Location Map



Luhdorff & Scalmanini
Consulting Engineers

Mining Phases and Well Locations

2022 Groundwater Conditions in the Vicinity of CEMEX' Madison Plant, Yolo County, CA

Figure 2

2.0 Subsurface Conditions

To conduct the evaluation of the necessary pumping rate and related drawdown that may occur during dewatering of mining excavations in the Phase 5 area, an understanding of several parameters is necessary. Since the dewatering effort is focused on being able to mine the mid-clay deposit, the depth and thickness of the mid-clay must be understood. The thickness and aquifer properties of the gravel deposits above and below the mid-clay must also be identified. In addition, the depth to groundwater and seasonal variations need to be defined. Available information regarding these parameters is summarized in this section.

The Phase 5 area is underlain by approximately 10 feet to 20 feet of overburden material that consists of topsoil and clay. Prior to mining, these materials will be removed and stockpiled for use during future reclamation activities. Beneath the overburden material is an upper gravel layer, the mid-clay, and a lower gravel layer. The upper gravel layer can range in thickness from three feet to 20 feet. The mid-clay is two feet to 10 feet thick. The top of the mid-clay may be as shallow as 23 feet below ground surface (ft bgs) and as deep as 32 ft bgs. The bottom of the mid-clay deposit ranges in depth from 32 ft bgs to 42 ft bgs. Based on the available data, the mid-clay tends to be deeper to the north and shallower to the south. The lower gravel is typically 25 feet to 45 feet thick in the Phase 5 area. Beneath the lower gravel are clays of the Tehama Formation.

Field observations and grain size analyses of the gravel units indicate that they are gravelly coarse sands and sandy gravels. Figure 3 is a photograph of a small outcrop of the upper gravel near the northeast corner of the facility. Grain size analysis results for the upper and lower gravels in borings drilled in the Phase 5 area were provided by CEMEX (Cameron Rickard, February 17, 2023, personal communication) and are illustrated on Figure 4. The median grain size (the D_{50}) is greater than a #4 sieve (0.25 inch). Silts and clays (material passing through the #200 sieve) are typically between two percent and seven percent by weight.

The hydraulic conductivity of the gravels was estimated using empirical methods based on grain size (AQTESOLV, 2023). The hydraulic conductivity is the permeability of the gravel units to water and is an important aquifer property used to evaluate drawdown. The empirical methods typically use the grain or sieve size at which 10 percent and 60 percent of the material passes (referred to as the D_{10} and the D_{60}, respectively). The D_{10} values for the upper and lower gravels in the Phase 5 area range from 0.13 millimeters (mm) to 1.1 mm, while the D_{60} values range from 5.7 mm to 8.2 mm. Based on the empirical relationships, the hydraulic conductivity of the gravel units may be between 8.5 feet per day (ft/d) and 607 ft/d, with a median of 102 feet per day (ft/d). The computed results are presented in Appendix A.

The transmissivity of the gravels was estimated in two different ways. The transmissivity is a measure of how much water an aquifer can yield per unit area. Transmissivity values can be calculated by multiplying the hydraulic conductivity by the thickness of the aquifer. In this case, the thickness is the sum of the thickness of the upper and lower gravel units. For the borings that were used for the grain size analysis, the mean thickness of the upper and lower gravel units combined is about 45 feet. Thus, the transmissivity may range from approximately 385 ft^2/d to approximately 27,300 ft^2/d, with a median value of 4,590 ft^2/d.

The transmissivity can also be estimated based on the specific capacity of a well (Thomasson et al, 1960). The specific capacity of a well is defined as the pumping rate in gallons per minute (gpm) divided by the drawdown in feet (Domenico and Schwartz, 1990). Multiplying the specific capacity by a constant of 1.2 yields an estimated aquifer transmissivity value, in gallons per minute per foot (gpm/ft) (Thomasson et al., 1960). Since the empirical correlations based on grain size, discussed above, result in a fairly large range of potential transmissivity values, site-specific pumping information was also utilized to better constrain this aquifer property.

One of the facility supply wells, referred to as Solano #1, is located near the ready-mixed concrete plant in the northwest part of the facility (see Figure 2). This well produces groundwater from the gravel units above the Tehama Formation at a rate of approximately 500 gpm. Water level monitoring data reviewed for this analysis from the Solano #1 well (in Luhdorff & Scalmanini, 2022) indicate that the average drawdown when the well is pumping is about 12.5 feet. Thus, the estimated transmissivity is 48 gpm/ft, equivalent to 9,240 ft^2/d. The transmissivity value based on site-specific pumping data falls in the middle of the range estimated from the empirical grain size correlation methods described above, and is about twice the median value. Based on this analysis, a transmissivity value of 9,240 ft^2/d has been used for the drawdown analysis in Section 3.0, below, because it is based on actual site-specific pumping.

Previous studies have been conducted to identify the average high and low groundwater conditions at the facility (Luhdorff & Scalmanini, 2016 and 2017, respectively). Within the Phase 5 area, the average high groundwater level is approximately 108 feet above mean sea level at the NAVD88 datum (ft msl), while the average low groundwater level is approximately 102 ft msl. Short-term spikes and drops in the groundwater level may occur due to high rainfall periods and periods of low rainfall and higher than usual groundwater pumping. The peak groundwater level measured in the Phase 5 area since 2009 is just under 117 ft msl while the minimum groundwater level is about 98.5 ft msl. These short term excursions are irregular and the majority of measurements fall between the average high and low values cited above. However, it is important to note, for the context of the OCSMO requirements,

that there are times when the groundwater level at and adjacent to the Phase 5 area may drop more than two feet below the average low groundwater elevation due to causes unrelated to mining or dewatering.

As noted above, the mid-clay deposit varies in thickness and depth. The ground surface elevation is approximately 130 ft msl to 135 ft msl in the Phase 5 area. Thus, the elevation of the top of the mid-clay may be as shallow as 110 ft msl while the elevation of the base of the mid-clay may be as deep as 91 ft msl.

Figure 3. Upper Gravel Layer Exposed Near Northeast Corner of Facility

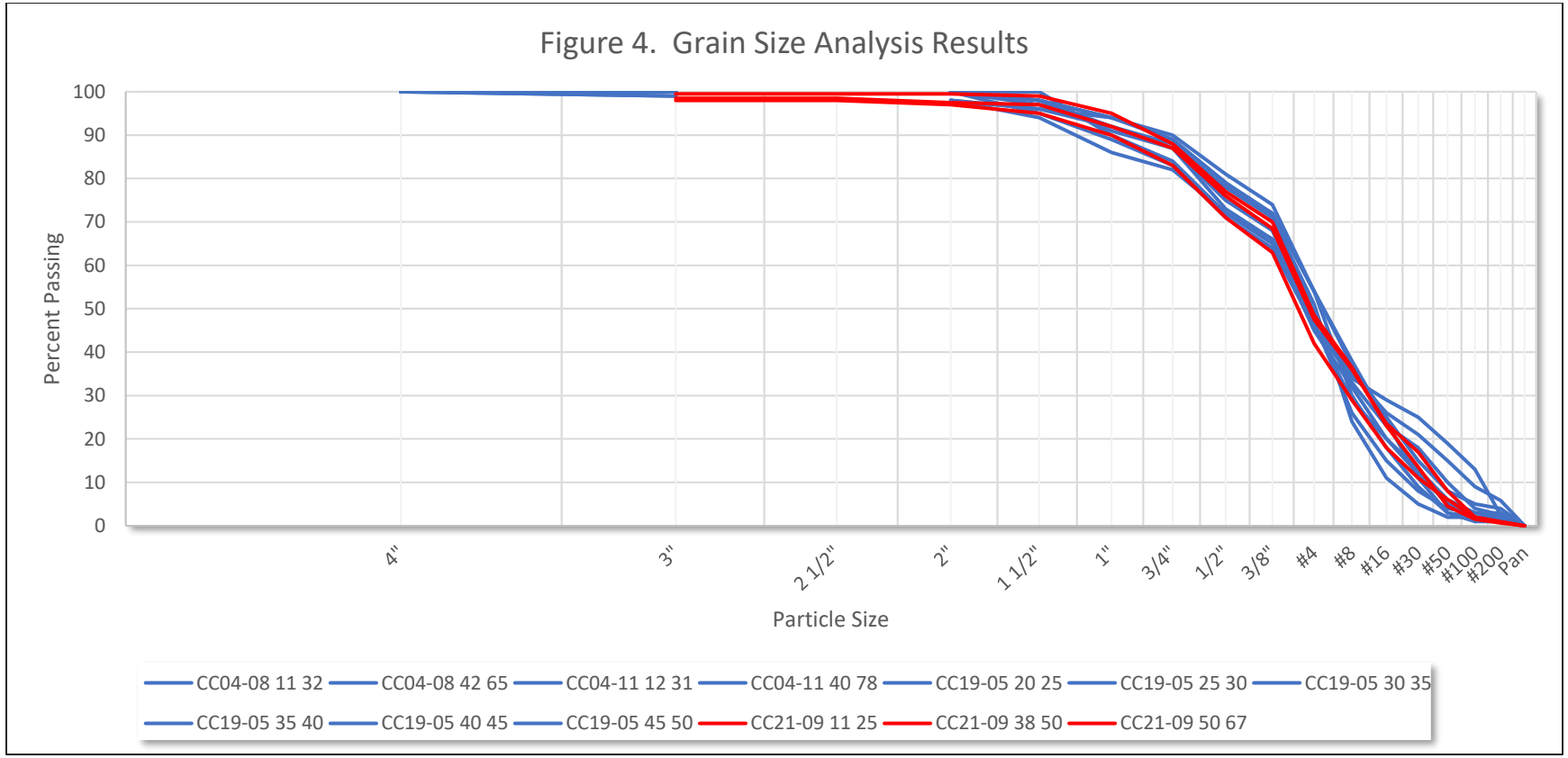


Figure 4. Grain Size Analysis Results
Percent Passing
100
90
80
70
60
50
40
30
20
10
0
4"
3"
2 1/2"
2"
1 1/2"
1"
3/4"
1/2"
3/8"
#4
#8
#16
#30
#50
#100
#200
Pan
Particle Size
CC04-08 11 32
CC04-08 42 65
CC04-11 12 31
CC04-11 40 78
CC19-05 20 25
CC19-05 25 30
CC19-05 30 35
CC19-05 35 40
CC19-05 40 45
CC19-05 45 50
CC21-09 11 25
CC21-09 38 50
CC21-09 50 67

3.0 Drawdown Assessment

An analytical model was developed to evaluate potential ranges of drawdown in the groundwater surface for various groundwater elevations and mining cell sizes. The analytical model is based on established hydrogeologic equations and methods, including the Theis non-equilibrium equation (Domenico and Schwartz, 1990). Due to certain idealized assumptions in the Theis non-equilibrium equation, the actual dewatering rate needed to achieve a certain level of drawdown, or the actual amount of drawdown at a given location due to a specified dewatering rate, is typically less than that predicted by the analytical solution. For example, if a low-permeability boundary is encountered, less water will be flowing toward the well from that location, so a lower pumping rate is needed to achieve a certain amount of drawdown or dewatering. Similarly, if a recharge boundary is encountered (e.g., the Phase 4 pond), the water levels in adjacent wells near the recharge boundary will remain higher than they would have for the same pumping rate if the recharge boundary was not present. Thus, the analytical model typically provides a conservative over-estimate of the actual dewatering rate and/or the amount of drawdown for a given dewatering rate.

Use of the Theis analytical solution requires that certain aquifer parameters be determined or estimated. These parameters include the transmissivity and the storativity, or storage coefficient, of the aquifer. The site-specific transmissivity value is identified in Section 2.0, above. Potential ranges for the storage coefficient in the unconfined gravels beneath Phase 5 may be between 0.05 and 0.25. An initial value of 0.15 was selected and a sensitivity analysis was conducted to assess the effect of varying the storage coefficient. At a pumping rate of 1,000 gpm and a transmissivity of 9,240 ft^2/day, increasing the storage coefficient by 67 percent, to 0.25, results in the predicted drawdown decreasing by 13 percent at a distance of 1,000 feet. Decreasing the storage coefficient 67 percent, to 0.05, results in the predicted drawdown increasing by 28 percent at a distance of 1,000 feet. Thus, the analytical solution is not substantially sensitive to the storage coefficient value and the initial value of 0.15 was retained for the analysis.

The analytical model developed for this site-specific dewatering analysis is used to estimate the dewatering rate and the adjacent drawdowns for mining to the base of the mid-clay deposit (Section 3.1) and for mining to the full permitted depth in Phase 5 (Section 3.2). Evaluation of the capacity of the Phase 4 pond and the ability to retain the pumped groundwater onsite is addressed in Section 3.3.

3.1 Dewatering to Base of Mid-Clay

Figure 5 shows the location of the preliminary mid-clay stripping area just south of the Phase 4 pond. The stripping area will initially encompass five acres but will then be expanded to 20 acres, as shown on Figure 6. To identify the potential dewatering rates needed for the preliminary mid-clay stripping area, the analytical model was used to

assess areas of five acres, 10 acres, and 20 acres. The simulated dewatering rates for 40-acre and 80-acre excavations are also included in the anticipation that, if the mid-clay can be successfully stripped in a dewatered excavation, then the stripping area would be expanded to the west and to the east along the north part of Phase 5 (referred to below as the northern tier excavations). Table 1 shows the predicted dewatering rates needed to lower the water table below the mid-clay (i.e., to an elevation of 91 ft msl) based on the average low groundwater condition of 102 ft msl, the average high groundwater condition of 108 ft msl, and the mean groundwater condition halfway between the average low and high elevations.

Table 1. Simulated Pumping Rates to Dewater to Bottom of Mid-Clay

Stripping Area (acres)	For Average High Groundwater (gpm)	For Average Low Groundwater (gpm)	For Mean Groundwater (gpm)
5	1,250	810	1,030
10	1,360	880	1,120
20	1,500	970	1,235
40	1,670	1,080	1,375
80	1,880	1,220	1,550

As noted above, and discussed further in Section 4.1, the initial stripping areas in the northern tier will be located just south of and adjacent to the Phase 4 pond. As the groundwater level is lowered, recharge from the Phase 4 pond will increase and provide more groundwater to the dewatered excavations. This additional recharge is anticipated to increase the actual pumping rates necessary to lower the water level in the stripping excavation by 30% to 50% for excavations that are adjacent to the Phase 4 pond. Table 2 shows the potential range of actual dewatering rates for the northern tier mining excavations adjacent to the Phase 4 pond. It is important to note that the increases in the pumping rates are needed exclusively to remove the increased recharge from the pond. The increased pumping rates do not remove additional groundwater from the gravel aquifer and, therefore, do not cause any additional increase in drawdown at locations outside of the excavation.

There are no offsite properties within 1,000 feet of the west, north, and east sides of Phase 5. Thus, there are no offsite wells in those directions that could be adversely affected by dewatering in Phase 5 and discharge to the Phase 4 pond.

Figure 5. Location of Initial Mid-Clay Stripping Area in Phase 5

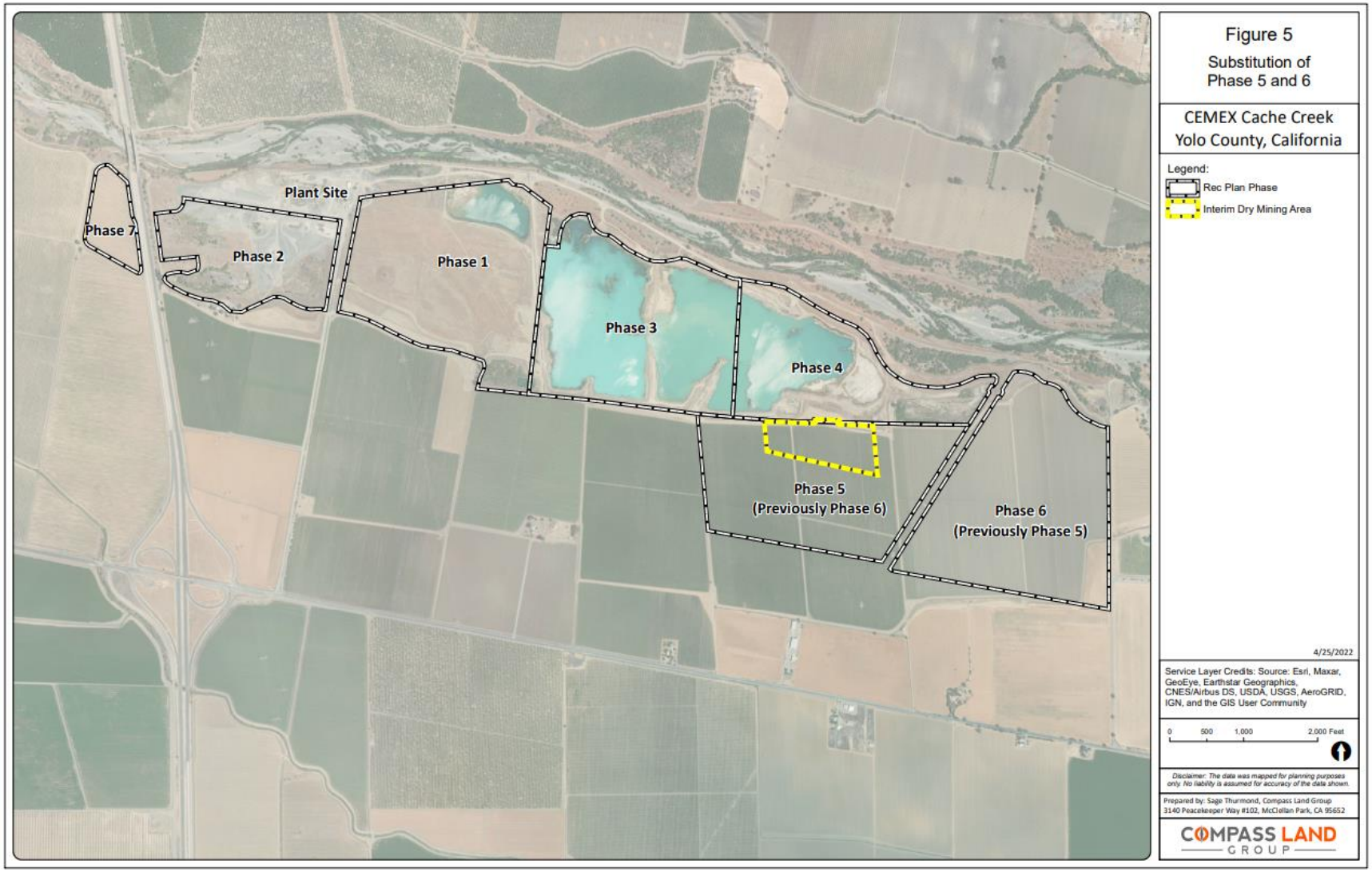


Figure 6. Phase 5 Initial Stripping Cut Design

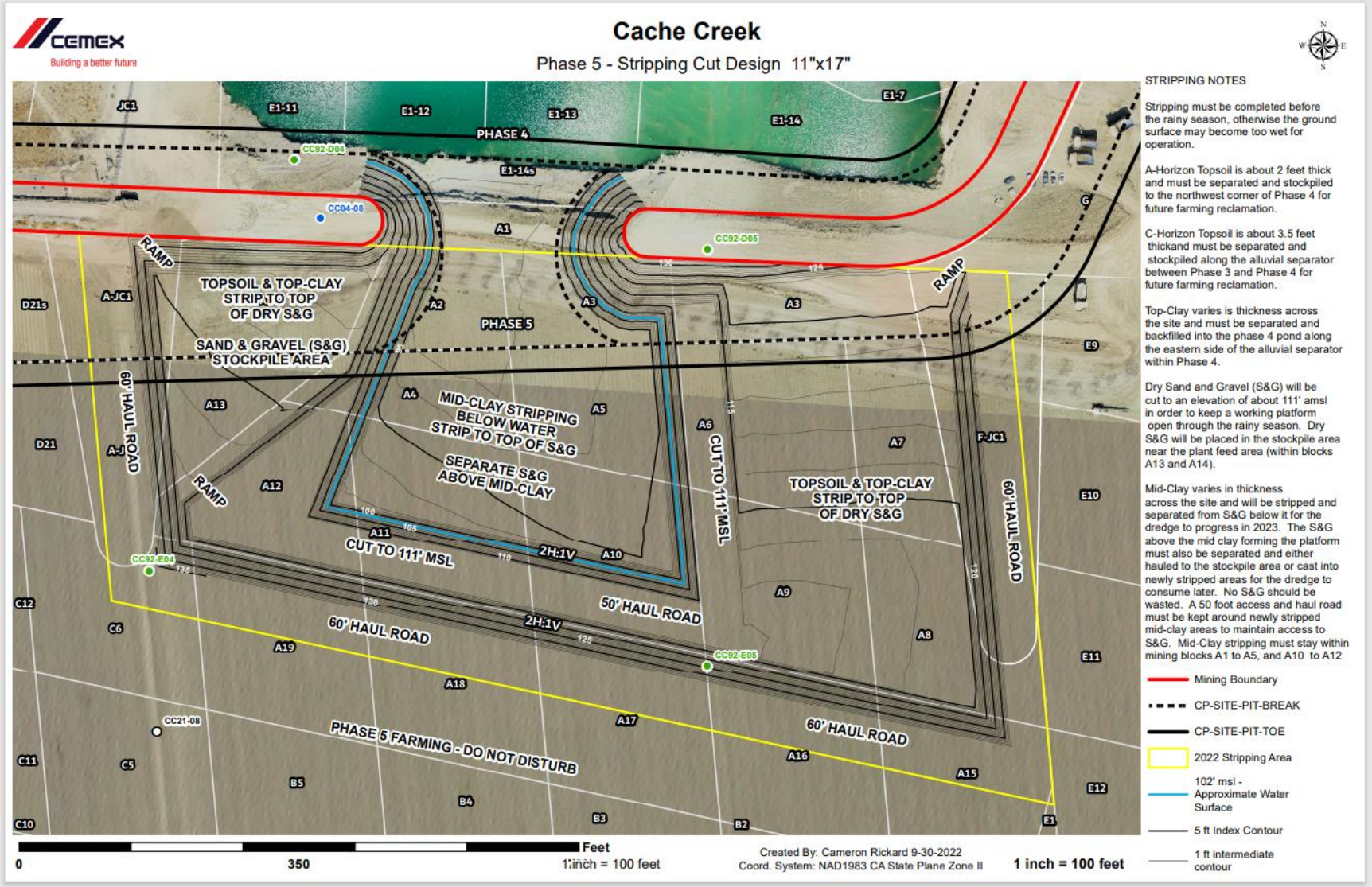


Figure 7. Part of Sheet M-04 Showing Distance from South Edge of Phase 5 to South Property Boundary

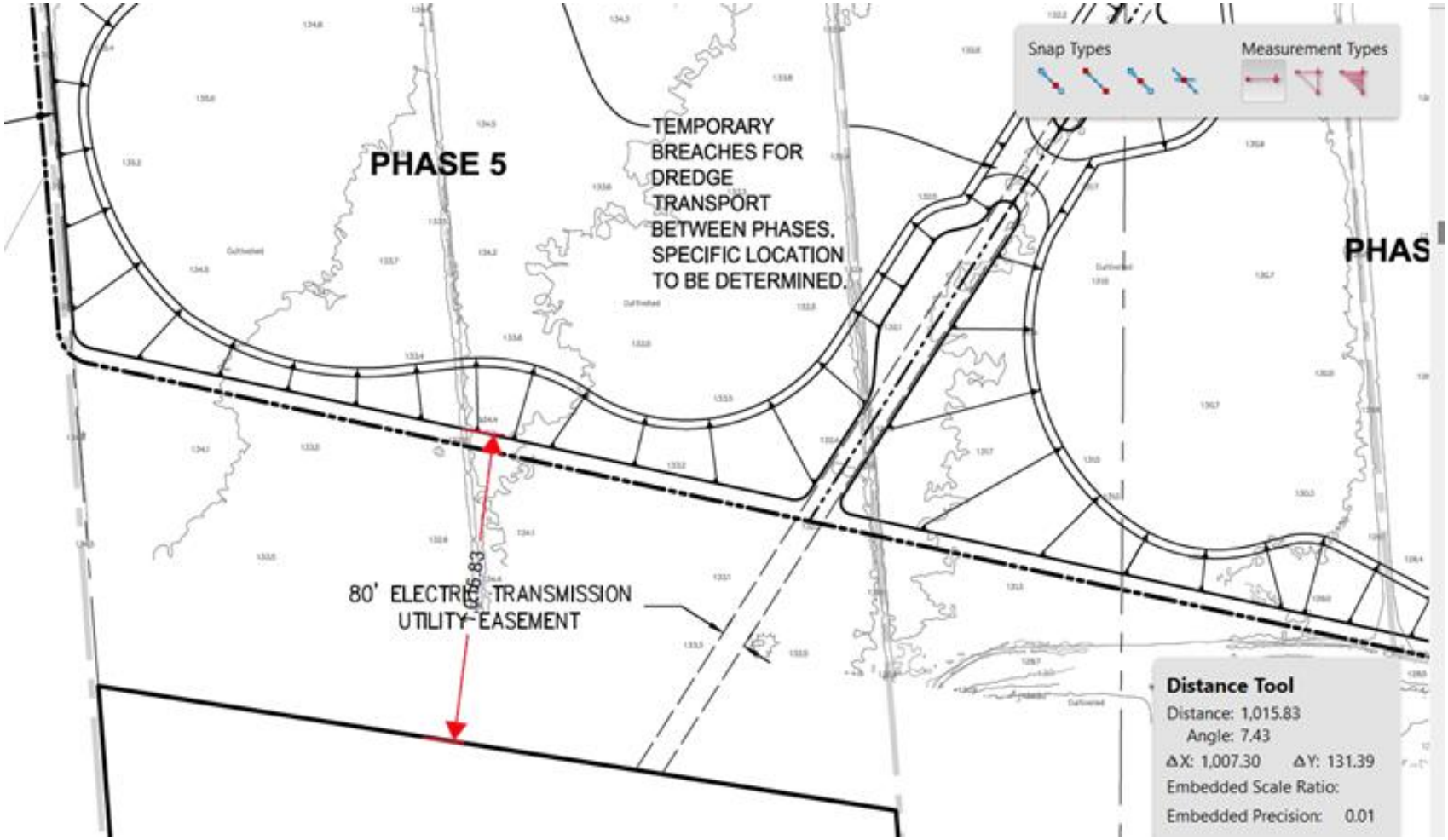


Table 2. Actual Anticipated Pumping Rates to Dewater to Bottom of Mid-Clay with Recharge from Phase 4 Pond to Northern Tier Excavations			
Stripping Area (acres)	For Average High Groundwater (gpm)	For Average Low Groundwater (gpm)	For Median Groundwater (gpm)
5	1,625 – 1,875	1,050 – 1,215	1,340 – 1,545
10	1,770 – 2,040	1,145 – 1,320	1,460 – 1,680
20	1,950 – 2,250	1,260 – 1,455	1,605 – 1,850
40	2,170 – 2,500	1,400 – 1,620	1,790 – 2,060
80	2,445 – 2,820	1,590 – 1,830	2,015 – 2,325

Figure 7 is taken from part of Sheet M-04 of the Off-Channel Mining Plan (Cunningham Engineering, 2021). As shown on Figure 7, the south boundary of the Phase 5 mining excavation is approximately 1,015 feet from the nearest property to the south. Information regarding active wells on the offsite property to the south of Phase 5 is not available from the California Department of Water Resources (DWR, 2023a and 2023b) and the U.S. Geological Survey (USGS, 2023). However, for the purpose of compliance with the conditions of the OCSMO with respect to pit-to-pit dewatering, there are no offsite properties, and thus no active offsite wells, located within 1,000 feet of the excavation area in Phase 5.

3.2 Dewatering to Full Permitted Depth

Mining in Phase 5 is permitted to extend to a depth of 70 ft bgs, which is equivalent to elevations of approximately 65 ft msl to 60 ft msl. The analytical model described above was used to evaluate the estimated dewatering rates for different size mining cells, based on the acreage of the initial mid-clay stripping areas. For the northern tier excavations, recharge from the Phase 4 pond would be greater than under the mid-clay stripping scenario described in Section 3.1, above, due to the dewatering of the lower gravel deposit. Table 3 shows the simulated dewatering rate necessary to mine to the full permitted depth in the northern tier excavations assuming that recharge from the Phase 4 pond would increase the necessary pumping rate by 50 percent. Note that the values on Table 3 are rounded to the next highest 25 gpm.

Table 3. Simulated Pumping Rates to Dewater to Permitted Mining Depth in Northern Tier of Phase 5			
Mining Cell Area (acres)	For Average High Groundwater (gpm)	For Average Low Groundwater (gpm)	For Mean Groundwater (gpm)
5	5,300	4,650	4,975
10	5,575	5,075	5,425
20	6,375	5,600	6,000
40	7,100	6,200	6,650
80	8,000	6,975	7,500

Table 4 shows the simulated dewatering rates for various size mining cells in the central and southern part of Phase 5 to be able to mine to the full permitted depth. The dewatering rates in Table 4 assume that a berm of native material is maintained between these cells and the northern tier excavations to minimize any recharge from the Phase 4 pond into the central and southern tiers. The values on Table 4 are rounded to the next highest 25 gpm.

Table 4. Simulated Pumping Rates to Dewater to Permitted Mining Depth in Central and Southern Part of Phase 5

Stripping Area (acres)	For Average High Groundwater (gpm)	For Average Low Groundwater (gpm)	For Mean Groundwater (gpm)
5	3,525	3,100	3,325
10	3,850	3,375	3,625
20	4,250	3,725	4,000
40	4,725	4,125	4,425
80	5,325	4,650	5,000

As noted above, for the purposes of compliance with the conditions of the OCSMO with respect to pit-to-pit dewatering, there are no offsite properties, and thus no active offsite wells, located within 1,000 feet of the excavation area in Phase 5.

3.3 Phase 4 Pond Capacity

The OCSMO requires that all groundwater that is pumped for pit-to-pit dewatering be retained onsite for beneficial uses. As described above, the groundwater from the Phase 5 excavations will be pumped to the Phase 4 pond and/or to recharge trenches that would be installed above the rim of the mining excavation within Phase 5. The analysis below considers whether the Phase 4 pond alone will have sufficient capacity to manage the water pumped from the Phase 5 mining area.

Once mining is completed in Phase 4, the pond will have an area of approximately 80 acres to 90 acres, an average water depth of 45 feet, and freeboard of approximately 25 feet, with a water volume of approximately 3,600 acre-feet. The existing natural groundwater flow is from west to east at a hydraulic gradient averaging about 0.0014 foot per foot (Luhdorff & Scalmanini, 2016, 2017, and 2022). As water is pumped into the Phase 4 pond during dewatering of Phase 5, the water level in the pond will rise. This rise in the pond water level will create a local increase in the hydraulic gradient in the upper and lower gravels. For this analysis, it is assumed that the maximum rise in the pond water level cannot exceed 20 feet, which will provide five feet of freeboard around the pond.

The rate at which the pond can recharge the local groundwater can be calculated using the Darcy's Law equation (Freeze and Cherry, 1979; Domenico and Schwartz, 1990):

$$Q = KiA.$$

Where Q is the volume of water flowing from the pond into the upper and lower gravel aquifers (in cubic feet per day), K is the hydraulic conductivity (in feet per day), i is the hydraulic gradient (in foot per foot), and A is the area of the pond perimeter (in square feet) through which water recharges the gravels.

Using the transmissivity of 9,240 ft^2/d and the average aquifer thickness of 45 feet discussed in Section 2.0, the hydraulic conductivity is 205 ft/d. Assuming that the rise in the groundwater surface caused by the recharge extends no more than 1,000 feet outward from the pond, which is the approximate width of the northern tier excavations plus the recommended berm of native material to the south, then the local hydraulic gradient will average 0.02 ft/ft (i.e., the 20-foot rise in the pond over the distance of 1,000 feet). If the water rises 20 feet in the pond, the total combined surface area of the north, east, and south edges of the pond will be about 425,000 ft^2.

Based on the values described above, the volume of water flowing from the pond would be a maximum of 1.74 ft^3/d, which is equivalent to 9,050 gpm. This rate would be achieved only if the water level in the pond increased 20 feet above the natural groundwater level. If the increase is less, then the rate of outflow would be less. As shown in Tables 1, 2, 3, and 4, the potential dewatering rates for Phase 5 may range from 810 gpm to 8,000 gpm. Therefore, the water pumped to the Phase 4 pond will not exceed the potential maximum rate of recharge, and all of the water pumped to the pond will be able to flow back into the groundwater aquifer. However, if necessary, recharge trenches will also be installed above the rim of the mining excavation within Phase 5. Recharge trenches would allow the groundwater pumped from the mining excavation to return to the aquifer, minimizing or preventing any drawdown from occurring outside of the Phase 5 area.

Groundwater recharge will be a beneficial use of the water pumped from the Phase 5 excavations to the Phase 4 pond.

4.0 Potential Effects on Other Water Resources and to Water Quality

In addition to requiring an assessment of the drawdown at active offsite wells, the OCSMO also requires an evaluation of potential adverse effects on other water resources and to water quality. A discussion of potential adverse effects on other water resources is presented in Section 4.1, below. Section 4.2 provides an evaluation of potential effects to water quality.

4.1 Potential Effects on Other Water Resources

Lowering of groundwater levels due to dewatering has the potential to affect surface water features that have a hydraulic connection to the groundwater. Such features may include wetlands and other groundwater-dependent ecosystems, ponds or lakes, and streams.

As discussed in Section 2.0, the average high groundwater elevation in the Phase 5 area is 108 ft msl, which is about 25 ft bgs. At that depth, the groundwater would not be in connection with wetlands or other groundwater-dependent ecosystems.

The nearest surface water features are the Phase 4 pond and Cache Creek. Wet mining is currently occurring in the Phase 4 pond. Surveyed water surface elevations provided by CEMEX (see Appendix B) indicate that the pond water elevations have varied from as high as 115 ft msl in early 2019 to as low as 100 ft msl in late 2022. The elevations and trends in water levels in the Phase 4 pond are comparable to or slightly higher than the water levels measured in monitoring well OW-10, which is the nearest monitoring point to the pond.

Water pumped from the Phase 5 mining excavations to allow access to remove the mid-clay will be pumped to the Phase 4 pond. As a result, the water level in the pond will be higher than the elevation of the adjacent groundwater. The increased water level in the pond will act as a hydraulic barrier and prevent any effects to the north of the pond, along Cache Creek.

The higher water level in the pond will also increase the hydraulic gradient, or slope, of the groundwater surface between the Phase 4 pond and the northern tier Phase 5 excavations. The increased hydraulic gradient will result in an increase in the rate at which groundwater flows between the pond and the excavation, which will increase the amount of water that must be pumped from the excavation during dewatering. Since the pond is only present on one side of the excavation, the rate of increased flow from the pond to the excavation is expected to be approximately 30 percent to 50 percent of the total dewatering rate, as discussed in Section 3.0 and shown in Table 2. The increase in the pumping rate is needed solely to capture the additional inflow from the Phase 4 pond. It will not cause any additional drawdown toward the west, south, and east, or at any offsite active well location.

4.2 Potential Effects to Water Quality

Water quality data from the Phase 4 pond and the nearest monitoring wells to Phase 5 are compiled in Appendix C. The nearest wells to Phase 5 are OW-9 (no longer present), OW-10, OW-11, and OW-12 (see Figure 2). The Phase 4 pond has been excavated into the same groundwater-bearing units in which the monitoring wells are screened.

The water within the Phase 4 pond (referred to as Pond #3(4) in Appendix C) has an alkaline pH, ranging from 8.32 to 9.18. Alkaline pH levels consistent with those observed in the Phase 4 pond are typical of open ponds and small lakes, due in part to uptake of carbon dioxide and release of oxygen by aquatic plant growth in the ponds, and to equilibration with the atmosphere (Hem, 1989; Livingstone, 1963). The total dissolved solids concentration ranges from 340 milligrams per liter (mg/L, equivalent to parts per million, or ppm) to 610 mg/L. Nitrate concentrations range from 1 mg/L to 32 mg/L. Metals which are sometimes present in aggregate mining ponds in the Central Valley, such as arsenic, iron, manganese, and mercury, are not present except for inconsistent detections of iron (Luhdorff & Scalmanini, 2022). Naturally-occurring iron within the minerals in the fines within sand and gravel deposits can be mobilized by alkaline pH values and low dissolved oxygen levels.

Table 5 compares the parameter ranges measured in Pond 4 with those for the monitoring wells. As with the Phase 4 pond, metals such as arsenic, iron, manganese, and mercury are not present in the monitoring wells except for inconsistent detections of iron (Luhdorff & Scalmanini, 2022).

Table 5. Summary of Water Quality Parameters from Monitoring Points Near Phase 5

Sample ID	pH Range	TDS Range (mg/L)	Nitrate Range (mg/L)
Phase 4 Pond	8.32 – 9.18	340 - 610	10 - 32
OW-9	7.31 – 7.7	440 - 710	21 - 68
OW-10	7.22 – 8.03	330 - 780	9 - 67
OW-11	7.54 – 8.28	600 - 860	44 - 88
OW-12	7.41 – 8.15	690 - 900	51 - 130

The pH levels in the groundwater are neutral to slightly alkaline and are lower than those in the Phase 4 pond. The groundwater TDS concentrations are higher than those in the pond but are consistent with historical levels measured in the early 1980s (see discussion of Everson [1985] in Luhdorff & Scalmanini [2022]). Elevated levels of nitrate are attributed to historical and ongoing agricultural activities throughout the region. The nitrate levels in the Phase 4 pond, which has been excavated into the same water-bearing gravel units in which the monitoring wells are installed, appear to be attenuated compared to those at the well locations. This may be due to uptake of the nitrate by aquatic plants that may form along the pond perimeter. Because the water within the Phase 4 pond has a direct hydraulic connection with the groundwater in the upper and lower gravels, discharge of the water pumped from Phase 5 will not have any potentially significant adverse effects on water quality.

5.0 Summary and Recommendations

This site-specific dewatering analysis has been prepared to identify conditions under which pit-to-pit dewatering can be conducted during stripping of the mid-clay deposit and potentially excavation to full depth of the bottom gravel unit within Phase 5 at the CEMEX Cache Creek Facility. The specific criterion upon which this analysis is based is the requirement in Section 10-4.412 Dewatering of the OCSMO that defines an adverse impact to active offsite wells as a reduction in simulated groundwater levels that exceeds two feet below the average low groundwater level at any well located within 1,000 feet of the pit boundary, or results in well failure. The analysis also considers potential effects on other water resources, including creeks and wetlands, and on water quality.

Aquifer parameters were identified using multiple methods, such as empirical correlations with grain size, actual pumping and drawdown data from the facility, and sensitivity analyses conducted during the analytical simulations. The analytical simulations were conducted using well-established hydrogeologic equations and methods. The water removed from Phase 5 will be pumped to the Phase 4 pond and/or to recharge trenches installed above the rim of the mining excavation within Phase 5.

The initial tier of excavations to remove the mid-clay would occur at the north end of Phase 5, just south of the Phase 4 pond. Recharge from the pond back into the dewatered excavations will cause the expected dewatering rates to be 30 percent to 50 percent higher than those that would be necessary if the excavations were not in close proximity to the pond, as shown in Table 2.

For the purposes of compliance with the conditions of the OCSMO with respect to pit-to-pit dewatering, there are no offsite properties, and thus no active offsite wells, located within 1,000 feet of the Phase 5 excavation boundary. Therefore, mining and dewatering to the full permitted depth of 70 ft bgs may occur throughout the Phase 5 mining excavation area, as long as the water pumped from the excavation remains onsite and is beneficially used in accordance with Section 10-4.412 of the OCSMO.

The Phase 4 pond will have adequate capacity to accept the water pumped from the Phase 5 excavations and recharge it back into the upper and lower gravel aquifers. Recharge trenches may also be installed above the rim of the mining excavation within the Phase 5 boundary. The recharge trenches would minimize or eliminate any drawdown outside of the Phase 5 limits. Recharging the groundwater is a beneficial use of the water produced by dewatering.

Dewatering in Phase 5 with discharge to the Phase 4 pond and/or the recharge trenches will not affect any other water resources, such as Cache Creek, and will not affect water quality.

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Appendix A

Hydraulic Conductivity Estimates Based on Grain Size

AQTESOLV

size and porosity data.

Data For Computing K From Grain Size Distribution		
D_{10} =	1.1	mm
D_{60} =	8.2	mm
Total Porosity (n) =	0.274	[-]
Gravitational Acceleration (g) =	9.8	m/s²
Kinematic Viscosity (v) =	1.2E-6	m²/s

1 inch = 25.4 mm
g = 9.8 m/s²
v = 1.2×10⁻⁶ m²/s at 13°C (55°F)

Hydraulic Conductivity (K) Estimated From Grain Size Data

D_{10} =	1.1	mm
D_{60} =	8.2	mm
C_U =	7.45	[-]
n =	0.274	[-]
g =	9.8	m/s²
v =	1.20E-6	m²/s

Method	K (m/s)	K (cm/s)	K (ft/d)
Hazen[1] (K_H)	n/a	n/a	n/a
Kozeny-Carmen[2] (K_{KC})	0.00214	0.214	607
Beyer[3] (K_B)	n/a	n/a	n/a
Wang et al.[4] (K_W)	n/a	n/a	n/a
Average	0.00214	0.214	607
Minimum	0.00214	0.214	607
Maximum	0.00214	0.214	607
Max/Min	1.00	1.00	1.00

[1] 0.1 mm ≤ D_{10} ≤ 3 mm; C_U ≤ 5
[2] silts, sands and gravelly sands
[3] 0.06 mm ≤ D_{10} ≤ 0.6 mm; 1 ≤ C_U ≤ 20
[4] 0.05 mm ≤ D_{10} ≤ 0.83 mm; 0.09 mm ≤ D_{60} ≤ 4.29 mm; 1.3 ≤ C_U ≤ 18.3

AQTESOLV

size and porosity data.

Data For Computing K From Grain Size Distribution		
D_{10} =	0.13	mm
D_{60} =	5.7	mm
Total Porosity (n) =	0.274	[-]
Gravitational Acceleration (g) =	9.8	m/s²
Kinematic Viscosity (v) =	1.2E-6	m²/s

1 inch = 25.4 mm
g = 9.8 m/s²
v = 1.2×10⁻⁶ m²/s at 13°C (55°F)

Hydraulic Conductivity (K) Estimated From Grain Size Data

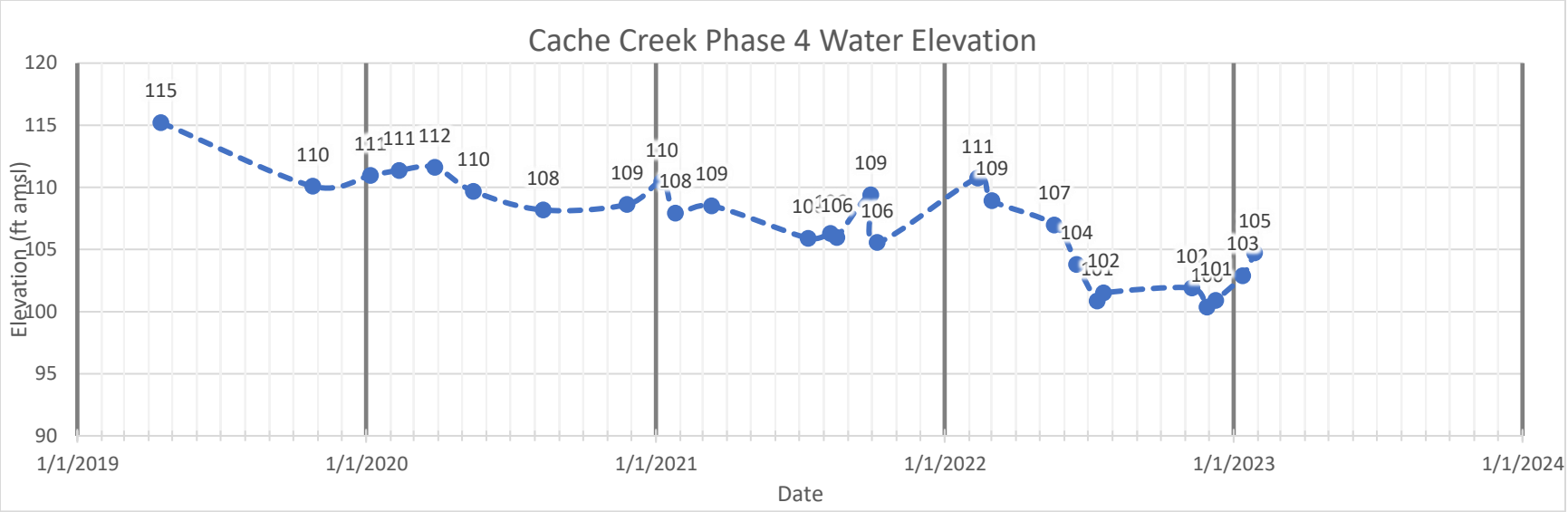
D_{10} =	0.13	mm
D_{60} =	5.7	mm
C_U =	43.85	[-]
n =	0.274	[-]
g =	9.8	m/s²
v =	1.20E-6	m²/s

Method	K (m/s)	K (cm/s)	K (ft/d)
Hazen[1] (K_H)	n/a	n/a	n/a
Kozeny-Carmen[2] (K_{KC})	2.99E-5	0.00299	8.48
Beyer[3] (K_B)	n/a	n/a	n/a
Wang et al.[4] (K_W)	n/a	n/a	n/a
Average	2.99E-5	0.00299	8.48
Minimum	2.99E-5	0.00299	8.48
Maximum	2.99E-5	0.00299	8.48
Max/Min	1.00	1.00	1.00

[1] 0.1 mm ≤ D_{10} ≤ 3 mm; C_U ≤ 5
[2] silts, sands and gravelly sands
[3] 0.06 mm ≤ D_{10} ≤ 0.6 mm; 1 ≤ C_U ≤ 20
[4] 0.05 mm ≤ D_{10} ≤ 0.83 mm; 0.09 mm ≤ D_{60} ≤ 4.29 mm; 1.3 ≤ C_U ≤ 18.3

Appendix B

Water Level Elevations in Phase 4 Pond


Cache Creek Phase 4 Water Elevation
Elevation (ft amsl)
120
115
110
105
100
95
90
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
Date
115
110
111
111
112
110
108
109
110
108
109
109
106
106
109
111
109
107
104
102
101
103
105

Phase 4 Pond Water Level Data

Time	Day	Elevation	Type
12:59:00 PM	4/16/2019	115.22	Kespry Topo
12:04:00 PM	10/25/2019	110.09	Kespry Topo
12:10:00 PM	1/6/2020	110.97	Kespry Topo
3:57:00 PM	2/11/2020	111.36	Kespry Topo
9:46:00 AM	3/27/2020	111.61	Kespry Topo
11:05:00 AM	5/15/2020	109.68	Kespry Topo
9:44:00 AM	8/11/2020	108.18	Kespry Topo
10:57:00 AM	11/25/2020	108.62	Kespry Topo
1:24:00 PM	1/8/2021	110.45	Kespry Topo
1:32:00 PM	1/25/2021	107.92	Kespry Topo
1:50:00 PM	3/12/2021	108.52	Kespry Topo
10:56:00 AM	7/12/2021	105.9	Kespry Topo
7:40:00 AM	8/9/2021	106.29	Kespry Topo
10:50:00 AM	8/17/2021	105.97	Kespry Topo
5:25:00 PM	9/29/2021	109.39	Kespry Topo
10:27:00 AM	10/7/2021	105.57	Kespry Topo
9:38:00 AM	2/11/2022	110.76	Kespry Topo
12:59:00 PM	3/1/2022	108.94	Kespry Topo
10:46:00 AM	5/19/2022	106.97	Kespry Topo
8:27:00 AM	6/16/2022	103.8	Kespry Topo
9:17:00 PM	7/12/2022	100.85	DredgePack
3:45:47 PM	7/20/2022	101.5	DredgePack
3:15:57 PM	11/9/2022	101.9	DredgePack
1:25:00 PM	11/28/2022	100.37	Kespry Topo
3:54:00 PM	12/9/2022	100.91	Kespry Topo
10:49:00 AM	1/12/2023	102.89	Kespry Topo
12:22:00 PM	1/27/2023	104.74	Kespry Topo

Appendix C

Water Quality Data Compilation

(From Luhdorff & Scalmanini, 2022)

Water Quality, Conventional Constituents
CEMEX - Cache Creek Mine, Yolo County, CA

(all units in mg/L, unless otherwise specified)

Sampling Point	Date	pH (standard pH-units)	TDS	EC (µS/cm)	Na	Ca	Mg	K	Cl	SO4	Alkalinity as CaCO3 HCO3	CO3	OH	Total	F	Hardness as CaCO3	NO3 as NO3	NO2 as N	MBAS	Coliform Total (MPN/100 mL)	Fecal	E. Coli
MCL[1]		*6.5/8.5*	*500*	*900*					*250*	*250*					2		45	1	*0.5*			
Pond #3 (4)	9/9/2008	**8.67**	420	720	80	26	43	2.9	67	46	210	28	<5.0	240	0.19	240	17	-	-	140	9.2	4.0
Pond #3 (4)	3/31/2009	**8.56**	440	810	63	34	40	2.4	64	47	250	17	<5.0	250	0.14	250	27	-	-	14	<1.8	<1.8
Pond #3 (4)	9/8/2009	**8.58**	390	680	69	24	38	2.6	70	49	210	23	<5.0	230	0.13	210	12	-	-	110	11	11
Pond #3 (4)	4/28/2010	8.32	420	740	67	31	42	2.4	57	41	240	<5.0	<5.0	240	0.13	250	20	-	-	220	110	79
Pond #3 (4)	9/20/2010	**8.52**	400	700	80	24	46	3.0	62	41	210	23	<5.0	230	<0.10	250	9.9	-	-	350	17	17
Pond #3 (4)	3/16/2011	8.36	430	710	66	34	44	2.3	61	44	250	<5.0	<5.0	250	<0.10	270	21	-	-	9.3	<1.8	<1.8
Pond #3 (4)	9/1/2011	**8.59**	400	730	87	23	51	3.6	63	43	220	28	<5.0	250	<0.10	270	15	-	-	79	13	4.5
Pond #3 (4)	3/27/2012	8.34	**500**	840	79	41	48	3.3	66	47	280	14	<5.0	290	0.16	300	25	-	-	140	13	13
Pond #3 (4)	9/20/2012	**8.50**	470	790	85	27	52	3.1	63	44	250	20	<5.0	270	0.16	280	12	-	-	920	4.5	4.5
Pond #3 (4)	3/26/2013	**8.50**	450	810	74	30	48	2.7	68	47	260	<5.0	<5.0	260	0.13	270	17	-	-	350	4.5	4.5
Pond #3 (4)	9/16/2013	8.48	440	840	83	25	47	3.1	68	48	250	23	<5.0	270	<0.10	260	15	-	-	540	7.8	7.8
Pond #3 (4)	3/25/2014	8.46	430	860	75	38	44	3.1	66	49	270	13	<5.0	280	0.11	280	21	-	-	170	17	17
Pond #3 (4)	9/15/2014	**8.96**	440	760	75	19	39	2.8	67	45	180	58	<5.0	240	0.16	210	5.7	-	-	220	8	4.5
Pond #3 (4)	3/24/2015	8.43	410	780	61	31	33	2.0	59	39	240	8	<5.0	250	0.26	210	9.5	-	-	170	23	23
Pond #3 (4)	9/22/2015	**9.00**	340	760	72	16	42	2.4	69	44	180	48	<5.0	220	0.14	210	2	-	-	350	33	33
Pond #3 (4)	3/22/2016	8.46	380	740	65	35	40	2.4	65	43	240	9.2	<5.0	250	0.18	250	8	-	-	240	8	11
Pond #3 (4)	9/12/2016	**9.18**	350	710	74	14	41	2.4	68	42	120	67	<5.0	190	0.22	210	1	-	-	130	33	33
Pond #3 (4)	3/15/2017	**8.51**	370	770	60	32	35	3.0	78	42	220	16	<5.0	240	0.14	220	8	-	-	23	7.8	7.8
Pond #3 (4)	9/26/2017	**8.70**	**520**	794	73	29	50	2.9	83	42	220	37	<4.1	260	0.15	280	11	-	-	>23	NR	5.1
Pond #3 (4)	3/8/2018	**8.55**	**570**	898	82	44	52	2.9	84	45	270	29	<4.1	300	0.099	320	21	-	-	12	NR	<1.1
Pond #3 (4)	9/4/2018	**9.09**	**540**	822	85	18	50	2.8	89	48	180	69	<4.1	250	0.12	250	14	-	-	>23	NR	<1.1
Pond #3 (4)	3/25/2019	**8.52**[4]	**520**	862	77	44	48	2.7	79	45	260	19	<4.1	280	0.12	310	25	-	-	>23	NR	3.6
Pond #3 (4)	9/5/2019	**8.71**[4]	**550**	802	87	21	54	2.8	89	51	230	35	<4.1	260	0.11	280	20	-	-	>23	NR	23
Pond #3 (4)	4/1/2020	**8.55**[4]	**570**	**914**	83	38	46	2.6	85	52	280	22	<4.1	300	0.13	280	32	-	-	>23	NR	<1.1
Pond #3 (4)	9/8/2020	**8.72**[4]	**530**	880	87	21	45	2.7	92	55	220	30	<4.1	250	0.15	240	18	-	-	>23	NR	3.6
Pond #3 (4)	2/22/2021	**8.57**[4]	**610**	**958**	95	40	45	2.7	97	62	270	23	<4.1	290	0.16	280	25	-	-	>23	NR	2.2
Pond #3 (4)	9/1/2021	**8.84**[4]	**580**	859	110	19	45	2.6	100	60	200	39	<4.1	240	0.13	230	11	-	-	>23	NR	1.1
Pond #3 (4)	3/23/2022	**8.64**[4]	**560**	863	91	37	47	3.2	90	52	250	28	<4.1	280	0.13	290	14	-	-	>23	NR	<1.1
Pond #3 (4)	8/9/2022	**8.79**[4]	**530**	842	97	21	50	3.2	99	56	220	34	<4.1	250	0.16	260	6.7	-	-	>23	NR	16

OW-9	5/14/1992	7.7	**507**	680	45.4	44.9	34.4	-	60.5	42.5	275	ND	-	-	0.1	268	21	-	ND	-	-	-
OW-9	7/12/1994	7.6	440	650	46	45	33	2	64	57	250	ND	ND	-	ND	250	22	ND	ND	-	-	-
OW-9[3]	7/14/1995	7.6	**540**	**1,000**	56	65	50	2.6	80	42	820	ND	ND	-	0.15	370	38	ND	ND	ND	ND	-
OW-9	7/2/1996	7.6	**570**	**1,100**	68	71	56	3	70	57	380	ND	-	380	0.1	430	**49**	ND	ND	4	ND	-
OW-9	2/24/2000	7.9	**630**	**980**	96	73	56	3.3	77	56	370	ND	ND	370	0.12	410	**46**	-	-	ND	ND	-
OW-9	9/11/2000	7.6	**610**	**1,000**	92	69	54	3.2	72	62	350			350	ND	390	**46**	-	-	ND	ND	-
OW-9	5/8/2001	7.6	**620**	**980**	77	42	61	3.1	110	92	330	ND	ND	330	0.14	360	**66**	-	-	ND	ND	-
OW-9	9/18/2001	7.7	**600**	**980**	92	72	55	2.9	69	62	370	ND	ND	370	ND	410	44	-	-	ND	ND	-
OW-9	5/16/2002	7.6	**620**	880	88	68	51	2.9	75	66	350	ND	ND	350	0.21	380	**54**	-	-	ND	ND	-
OW-9	9/19/2002	7.6	**690**	**1,100**	100	75	60	3.1	82	68	390	ND	ND	390	0.32	430	**68**	-	-	ND	ND	-
OW-9	4/21/2003	7.58	**550**	**1,000**	94	63	48	2.8	73	55	370	ND	ND	370	0.10	360	**47**	-	-	ND	ND	-
OW-9	9/16/2003	7.55	**620**	**940**	94	70	53	3.6	76	60	370	ND	ND	370	0.13	390	**48**	-	-	ND	ND	ND
OW-9	4/12/2004	7.52	**700**	**1,100**	97	74	60	2.9	87	69	400	ND	ND	400	0.18	430	**65**	-	-	ND	ND	ND
OW-9	9/22/2004	7.43	**680**	**1,100**	100	74	55	3.2	76	74	420	ND	ND	420	0.14	410	**59**	-	-	ND	ND	ND
OW-9	4/28/2005	7.62	**630**	**990**	99	66	50	2.9	72	57	380	<5.0	<5.0	390	0.15	370	**45**	-	-	<2	<2	-
OW-9	9/12/2005	7.49	**680**	**1,200**	120	77	58	3.5	82	70	440	<5.0	<5.0	440	0.14	430	**55**	-	-	<2	<2	-
OW-9	4/25/2006	7.88	**650**	**1,100**	110	71	52	2.8	67	57	380	<5.0	<5.0	380	0.15	390	**47**	-	-	<1.8	<1.8	-
OW-9	9/7/2006	7.35	**700**	**1,100**	98	63	49	2.5	80	63	430	<5.0	<5.0	430	0.16	360	**53**	-	-	<1.8	<1.8	<1.8
OW-9	4/3/2007	7.29	**650**	**1,100**	100	70	51	3.0	68	66	390	<5.0	<5.0	390	<0.10	390	**56**	-	-	<1.8	<1.8	<1.8
OW-9	9/13/2007	7.40	**700**	**1,000**	110	72	57	3.1	81	74	410	<5.0	<5.0	410	0.15	410	**59**	-	-	2.0	2.0	2.0
OW-9	4/10/2008	7.36	**620**	**1,100**	110	66	52	3.0	69	64	380	<5.0	<5.0	380	0.15	380	**46**	-	-	<1.8	<1.8	<1.8
OW-9	9/8/2008	7.48	**710**	**1,100**	120	76	58	3.4	75	68	420	<5.0	<5.0	420	0.15	430	**49**	-	-	<1.8	<1.8	<1.8
OW-9	3/30/2009	7.46	**700**	**1,100**	96	58	45	2.5	75	70	390	<5.0	<5.0	390	0.15	330	**49**	-	-	<1.8	<1.8	<1.8
OW-9	9/9/2009	7.31	**640**	**1,100**	110	66	55	3.0	75	68	390	<5.0	<5.0	390	<0.10	390	**51**	-	-	<1.8	<1.8	<1.8
OW-9	5/24/2010	7.38	**670**	**1,100**	110	65	51	3.0	66	58	380	<5.0	<5.0	380	0.14	370	**45**	-	-	<1.8	<1.8	<1.8
OW-9	4/4/2011	7.38	**700**	**1,100**	110	66	54	2.8	82	67	400	<5.0	<5.0	400	<0.10	390	**58**	-	-	<1.8	<1.8	<1.8
OW-9	4/3/2012	7.37	**690**	**1,200**	130	77	59	3.1	78	68	430	<5.0	<5.0	430	0.20	440	**52**	-	-	<1.8	<1.8	<1.8
OW-9	3/27/2013	7.31	**680**	**1,200**	110	69	57	2.9	78	68	410	<5.0	<5.0	410	0.15	410	**49**	-	-	<1.8	<1.8	<1.8
OW-9	3/26/2014	7.41	**620**	**1,100**	100	69	51	3.0	68	66	390	<5.0	<5.0	390	<0.10	380	**47**	-	-	<1.8	<1.8	<1.8
OW-9	3/24/2015	7.46	**580**	**1,100**	81	50	35	1.9	56	48	350	<5.0	<5.0	350	0.24	270	40	-	-	<1.8	<1.8	<1.8
Well Destroyed 2015Q2																						
OW-10	9/8/2008	7.46	**700**	**1,100**	110	67	64	2.7	80	66	380	<5.0	<5.0	380	0.17	430	**50**	-	-	<1.8	<1.8	<1.8
OW-10	3/26/2009	7.30	**610**	**940**	90	50	48	2.1	80	65	350	<5.0	<5.0	350	0.11	320	39	-	-	<1.8	<1.8	<1.8
OW-10	9/9/2009	7.30	**510**	870	90	44	45	2.1	75	56	290	<5.0	<5.0	290	0.11	300	27	-	-	<1.8	<1.8	<1.8
OW-10	5/24/2010	7.34	**570**	**910**	91	50	50	2.2	72	55	300	<5.0	<5.0	300	0.16	330	30	-	-	<1.8	<1.8	<1.8
OW-10	4/4/2011	7.38	**530**	820	79	43	44	1.9	72	54	280	<5.0	<5.0	280	0.11	290	26	-	-	<1.8	<1.8	<1.8
OW-10	4/3/2012	7.32	**670**	**1,200**	110	70	68	2.5	83	68	400	<5.0	<5.0	400	0.20	450	**49**	-	-	<1.8	<1.8	<1.8
OW-10	3/27/2013	7.22	**650**	**1,200**	99	63	65	2.6	86	66	390	<5.0	<5.0	390	0.37	420	**50**	-	-	<1.8	<1.8	<1.8
No Access Due to Wellhead Damage																						
OW-10	3/16/2017	7.51	330	700	61	32	31	1.7	66	37	210	<5.0	<5.0	210	0.24	210	9	-	-	<1.8	<1.8	<1.8
OW-10	3/7/2018	7.83	**760**	**1,150**	96	64	66	2.6	93	74	390	<8.2	<8.2	390	0.15	430	**73**	-	-	<1.1	NR	<1.1
OW-10	4/1/2019	7.89	**550**	**904**	84	47	46	2.2	74	52	310	<4.1	<4.1	310	0.20	300	20	-	-	<1.1	NR	<1.1
OW-10	4/2/2020	8.03[4]	**720**	**1,190**	110	59	60	2.3	97	73	390	<8.2	<8.2	390	0.12	400	**65**	-	-	<1.1	NR	<1.1
OW-10	2/22/2021	7.87[4]	**780**	**1,260**	100	63	63	2.5	100	82	400	<8.2	<8.2	400	0.15	420	**67**	-	-	<1.1	NR	<1.1
OW-10	3/22/2022	7.99[4]	**720**	**1,210**	110	65	57	2.6	100	79	380	<8.2	<8.2	380	0.12	400	43	-	-	1.1	NR	<1.1

OW-11	3/16/2017	7.54	**600**	**1,200**	94	66	47	3.0	87	68	400	<5.0	<5.0	400	0.12	360	44	-	-	<1.8	<1.8	<1.8
OW-11	11/1/2017	8.04	**640**	**1,170**	120	76	54	3.0	92	71	380	<8.2	<8.2	380	0.11	410	**59**	-	-	<1.1	<1.1	NR
OW-11	3/7/2018	7.83	**730**	**1,120**	100	69	54	2.8	93	73	380	<8.2	<8.2	380	0.14	390	**57**	-	-	<1.1	NR	<1.1
OW-11	9/4/2018	8.02	**720**	**1,220**	110	81	62	3.6	92	73	390	<8.2	<8.2	390	0.10	460	**59**	-	-	1.1	NR	<1.1
OW-11	4/1/2019	7.88[4]	**740**	**1,250**	110	76	54	3.0	100	84	400	<8.2	<8.2	400	0.11	410	**55**	-	-	<1.1	NR	<1.1
OW-11	9/5/2019	8.01[4]	**860**	**1,360**	130	92	69	3.2	110	90	440	<8.2	<8.2	440	<0.10	510	**70**	-	-	<1.1	NR	<1.1
OW-11	4/2/2020	8.11[4]	**750**	**1,320**	120	77	57	2.8	110	91	440	<8.2	<8.2	440	0.083	420	**62**	-	-	<1.1	NR	<1.1
OW-11	9/8/2020	8.18[4]	**820**	**1,390**	140	95	67	3.3	110	99	430	<8.2	<8.2	430	0.094	510	**74**	-	-	<1.1	NR	<1.1
OW-11	2/23/2021	8.09[4]	**720**	**1,360**	130	88	67	3.3	110	97	450	<8.2	<8.2	450	0.11	500	**68**	-	-	<1.1	NR	<1.1
OW-11	9/1/2021	8.28[4]	**770**	**1,230**	110	72	51	2.7	96	88	390	<8.2	<8.2	390	0.099	390	**69**	-	-	<1.1	NR	<1.1
OW-11	3/22/2022	7.77[4]	**770**	**1,240**	110	77	53	2.9	91	78	400	<8.2	<8.2	400	0.110	410	**62**	-	-	<1.1	NR	<1.1
OW-11	8/9/2022	7.93[4]	**770**	**1,290**	110	81	65	3.2	96	78	400	<8.2	<8.2	400	0.10	470	**88**	-	-	<1.1	NR	<1.1
OW-12	3/15/2017	7.41	**870**	**1,700**	110	90	67	2.9	180	120	460	<5.0	<5.0	460	0.11	500	**84**	-	-	<1.8	<1.8	<1.8
OW-12	11/1/2017	7.97	**690**	**1,240**	120	79	56	2.9	96	78	390	<8.2	<8.2	390	0.11	420	**76**	-	-	<1.1	<1.1	NR
OW-12	3/8/2018	8.06	**740**	**1,210**	120	77	60	3.1	93	78	390	<8.2	<8.2	390	0.14	440	**62**	-	-	<1.1	NR	<1.1
OW-12	9/4/2018	7.89	**780**	**1,230**	120	75	59	3.4	93	77	400	<8.2	<8.2	400	0.086	430	**51**	-	-	3.6	NR	<1.1
OW-12	4/1/2019	7.84[4]	**850**	**1,420**	120	84	65	3.0	120	100	420	<8.2	<8.2	420	0.110	480	**86**	-	-	<1.1	NR	<1.1
OW-12	9/5/2019	7.98[4]	**780**	**1,190**	110	75	57	2.9	92	74	400	<8.2	<8.2	400	0.17	420	**55**	-	-	<1.1	NR	<1.1
OW-12	4/2/2020	8.03[4]	**720**	**1,260**	120	75	56	2.8	98	84	420	<8.2	<8.2	420	0.089	420	**64**	-	-	<1.1	NR	<1.1
OW-12	9/8/2020	8.15[4]	**710**	**1,190**	110	73	50	2.7	89	78	380	<8.2	<8.2	380	0.11	390	**53**	-	-	9.2	NR	<1.1
OW-12	2/23/2021	8.06[4]	**690**	**1,190**	120	68	56	2.8	94	77	400	<8.2	<8.2	400	0.11	400	**54**	-	-	<1.1	NR	<1.1
OW-12	9/1/2021	8.23[4]	**710**	**1,180**	110	64	44	2.5	93	76	390	<8.2	<8.2	390	0.10	340	**59**	-	-	1.1	NR	<1.1
OW-12	3/22/2022	7.69[4]	**900**	**1,440**	130	94	63	3.3	97	81	420	<8.2	<8.2	420	0.084 J	500	**130**	-	-	<1.1	NR	<1.1
OW-12	8/9/2022	7.87[4]	**740**	**1,360**	130	120	130	5.9	100	83	410	<8.2	<8.2	410	0.079	810	**130**	-	-	<1.1	NR	<1.1