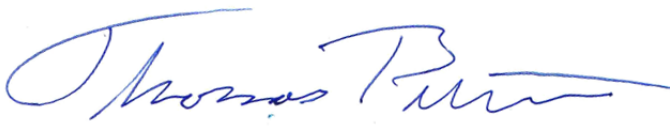


Sign-off Sheet

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Prepared by 
_____ (signature)

Thomas Butler, PG, CHG, CEG

Reviewed by _____
(signature)

Conan Monson, PE

Drinking Water Source Assessment

Water System

ZONE 7 WATER AGENCY

Alameda County

Water Source

CHAIN OF LAKES WELL 05

Assessment Date

April, 2014

California Department of Public Health
Drinking Water Field Operations Branch
Zone 7 Water Agency

TurboSWAP ID. B7
System No. 0110010
Source No. 017
PS Code 0110010-017

Assessment Summary

Assessment By	Zone 7 Water Agency	ID.	B7	County	Alameda
System Name	ZONE 7 WATER AGENCY			System No.	0110010
Source Name	CHAIN OF LAKES WELL 05	Source No.	017	PS Code	0110010-017
Completed by	Thomas Butler			Date	April, 2014

According to DHS records, this Source is Groundwater. This Assessment was done using the Default Groundwater System Method.

Description of System and Source

Zone 7 Water Agency (Zone 7) is a community water system and a wholesale water supplier serving approximately 235,000 Eastern Alameda County residents in the Cities of Dublin, Pleasanton and Livermore and the Dougherty Valley area of San Ramon. Zone 7 provides drinking water mostly through 27 turnouts to four retailer water systems (California Water Service Company, City of Livermore, City of Pleasanton, and Dublin San Ramon Services District). Zone 7 also provides drinking water to 12 direct users, including a local vineyard, hospital, and park. Additionally, Zone 7 provides untreated surface water to its agricultural users within its service area primarily for the irrigation of 3,500 acres of vineyards.

The primary source of Zone 7's supply is imported surface water from the State Water Project (SWP) which makes up over 80% of Zone 7's supply during a typical year. The SWP is a complex water storage and conveyance system consists of many reservoirs and aqueducts. This surface water originates as rain or snowmelt in the Sierra Nevada mountain range, then as water in rivers that flow into Sacramento-San Joaquin River Delta. Zone 7 receives its SWP water through its South Bay Aqueduct. Zone 7 also relies on local rainfall which is stored in Lake Del Valle and in the local groundwater basin. The California Department of Water Resources conducted a detailed sanitary survey of the watershed of the SWP every 5 years. The last sanitary survey was completed in 2011.

The groundwater source is the Livermore-Amador Valley Basin which is subdivided into 14 subbasins. The area of the Basin is approximately 42,000 acres. The Livermore-Amador Valley Basin stores natural recharge from precipitation and arroyos in the valley. Zone 7 also artificially recharges the Basin by releasing some surface water supplies into the arroyos. There are multiple land uses in the basin, including agricultural, industrial, municipal, and undeveloped. These land uses, and especially the water uses associated with them, can affect groundwater quality and quantity. Zone 7 completes a source water assessment for each of its well, as required by the California Department of Public Health.

The Chain of Lakes Well Field is located in the center of the Amador sub basin, a portion of the Main basin consisting of the highest quality and most productive aquifers in the Livermore-Amador Valley Basin. The Chain of Lakes Well Field will be developed to assist in meeting current drought and future water demands as well as to minimize groundwater drawdown in subbasins currently being utilized for the regional water supply.

Assessment Procedures

Stantec conducted the assessment of the source, Chain of Lakes Well No. 5, for the Zone 7 Water Agency. The assessment was based on multiple sources of information including the following:

- Historical water levels from production and monitoring wells.
- Lithologic cross sections developed from borehole logs.
- Lithologic and geophysical logs of the Chain of Lakes COL5 test boring, completed as a monitoring well.
- Design specifications for Chain of Lakes Well No. 5.
- The Zone 7 Water Agency Well Master Plan.
- The Zone 7 Water Agency Groundwater Management Plan.
- Environmental database records search conducted on April 22, 2014 by EDR, Inc.
- Review of historic topographic maps.

Assessment Summary

Assessment By Zone 7 Water Agency ID. B7 County Alameda
System Name ZONE 7 WATER AGENCY System No. 0110010
Source Name CHAIN OF LAKES WELL 05 Source No. 017 PS Code 0110010-017

Completed by Thomas Butler Date April, 2014

Review of historic aerial photographs.

Contents of this Assessment

Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Assessment Summary
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Vulnerability Summary
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Source Location Form
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Delineation of Water Protection Zones
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Physical Barrier Effectiveness Checklist
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Source Data Sheet
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Inventory of Possible Contaminating Activities
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Vulnerability Ranking
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Assessment Map

Vulnerability Summary

Assessment By Zone 7 Water Agency ID. B7 County Alameda
 System Name ZONE 7 WATER AGENCY System No. 0110010
 Source Name CHAIN OF LAKES WELL 05 Source No. 017 PS Code 0110010-017
 Completed by Thomas Butler Date April, 2014

THE FOLLOWING INFORMATION MUST BE INCLUDED IN THE SYSTEM CONSUMER CONFIDENCE REPORT

A source water assessment was conducted for the CHAIN OF LAKES WELL 05
 of the ZONE 7 WATER AGENCY water system in April, 2014.

The source is considered most vulnerable to the following activities not associated with any detected contaminants:

Mining operations - Historic

Discussion of Vulnerability

Although no contaminant have been detected in groundwater in the vicinity of the Chain of Lakes Wells, the source is vulnerable to activities in the area. The greatest risk to the source is nearby historic sand and gravel mining operations (vulnerability score 15). Since mining operations are for sand and gravel, there is minimal potential for the introduction of contaminants during mining. Active sand and gravel mining operations are also present but further from the COL 5 of site (vulnerability score of 13). The processing of aggregates associated with active mining could concentrate existing elements in wash water and tailings and pose a threat to surface and shallow ground water quality. Additionally, a nearby storm drain/detention facilities and artificial recharge (ponds) have the next highest vulnerability score (11). In consideration of these factors, COL 5 was designed with a seal that extends below the bottom of the adjacent historic and active gravel mines and surface/storm water sources and to a depth of 200 feet, minimizing the potential introduction of contamination.

The source is also susceptible to wells in the capture zone, which may provide conduits for surface contamination to reach the underlying aquifer. However, the majority of the wells in the vicinity have been installed relatively recently and are expected to have been completed in compliance with the Department of Water Resources California Well Standards Bulletins 74-81 and 74-90. Some wells were completed prior to 1970 and may not have been completed to these standards. Additionally, Environmental Data Resources Inc. provided a review of federal, state, and local government agencies of potentially contaminating activities in the area surrounding the well. This assessment indicted that one site (Airport/Lost Positas Golf Course) was present and within the 10 year time of travel zone (B10) of the well. It was identified as Notify 65, which are all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agencies and no other information was given concerning the potential incident.

A copy of the complete assessment may be viewed at:

Zone 7 Water Agency
 100 North Canyons Parkway
 Livermore, CA 94551

You may request a summary of the assessment be sent to you by contacting:

Angela O'Brien
 Water Quality Engineer
 925-454-5748
 aobrien@zone7water.com

Delineation of Water Protection Zones

Assessment By Zone 7 Water Agency ID. B7 County Alameda
 System Name ZONE 7 WATER AGENCY System No. 0110010
 Source Name CHAIN OF LAKES WELL 05 Source No. 017 PS Code 0110010-017

Completed by Thomas Butler Date April, 2014

Method Used to Delineate Protection Zones

X 1. Calculated Fixed Radius

2. Modified Calculated Fixed Radius (Attach documentation for direction of ground water flow.)
3. More Detailed Methods
4. Arbitrary Fixed Radius (For use only by or permission of DHS)

Maximum Pumping Rate of Well (Q) 1,500 gallons/minute
2,420 acre feet/year
105,400,500 cubic feet/year

Effective Porosity 0.20 Default Value

Screened Interval of Well 120 feet Default Value

Protection Zone	Calculated Value	Minimum Value	Radius of Protection Zone
Zone A - 2 Year TOT*	1,672 Feet	600 Feet	1,672 Feet
Zone B5 - 5 Year TOT*	2,644 Feet	1,000 Feet	2,644 Feet
Zone B10 - 10 Year TOT*	3,739 Feet	1,500 Feet	3,739 Feet

*TOT = Time of Travel

Physical Barrier Effectiveness (PBE)

Assessment By Zone 7 Water Agency ID. B7 County Alameda
 System Name ZONE 7 WATER AGENCY System No. 0110010
 Source Name CHAIN OF LAKES WELL 05 Source No. 017 PS Code 0110010-017

Completed by Thomas Butler Date April, 2014

Parameter	Possible Points	This Source	Score
Type of Aquifer Confinement			
1. Unconfined, Semi-confined, Fractured Rock, Unknown Aquifer	0		
2. Confined	50	X	50
Pathways of Contamination (All Aquifers)			
Presence of Abandoned or Improperly Destroyed Wells			
1. Present within Zone A (2 year TOT distance)	Yes	0	
	No	5	
	Unknown	0	X
2. Present within Zone B5 (2 -5 year TOT distance)	Yes	0	
	No	3	
	Unknown	0	X
3. Present within Zone B10 (5-10 year TOT distance)	Yes	0	
	No	2	
	Unknown	0	X
Hydraulic Head (Confined Aquifers)			
What is the relationship in the hydraulic head between the confined aquifer and the overlying unconfined aquifer? (i.e. does the well flow under artesian conditions?)			
1. Head in confined aquifer is higher than head in unconfined aquifer under all conditions.	20		
2. Head in confined aquifer is higher than head in unconfined aquifer under static conditions.	10		
3. Head in confined aquifer is lower than or same as head in unconfined aquifer under static conditions.	0	X	0
4. Unknown	0		
Well Construction (All Aquifers)			
Sanitary Seal (Annular Seal) Depth <u>200</u> feet	None of less than 20 feet	0	
	Between 20 and 50 feet	6	
	50 feet or greater	10	X
	Unknown	0	
Surface Seal (concrete cap)	Not present or improperly constructed	0	
	Watertight, slopes away from well at least 2' laterally in all directions	4	X
	Unknown	0	

Physical Barrier Effectiveness (PBE)

Assessment By Zone 7 Water Agency ID. B7 County Alameda
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Completed by Thomas Butler Date April, 2014

Parameter	Possible Points	This Source	Score
Well Construction (All Aquifers)--continued			
Flooding potential at well site	Subject to localized flooding (i.e. in low area or unsealed pit or vault) or within 100 year flood plain	0	
	Not subject to flooding	1	X
	Unknown	0	
Security at well site	Not secure	0	
	Secure	5	X
	Unknown	0	

Score	Effectiveness
0 to 35	Low
36 to 69	Moderate
70 to 100	High

Maximum Score = 100

Score 70

Effectiveness High

Inventory of Possible Contaminating Activities (PCA Inventory)

Assessment By Zone 7 Water Agency **ID.** B7 **County** Alameda
System Name ZONE 7 WATER AGENCY **System No.** 0110010
Source Name CHAIN OF LAKES WELL 05 **Source No.** 017 **PS Code** 0110010-017

Completed by Thomas Butler **Date** April, 2014

PCA (Risk Ranking)	PCA in Zone A	PCA in Zone B5	PCA in Zone B10	*	Comments
Commercial/Industrial Activities					
Automobile - Body shops (H)	N	N	N		
Automobile - Car washes (M)	N	N	N		
Automobile - Gas stations (VH)	N	N	N		
Automobile - Repair shops (H)	N	N	N		
Boat services/repair/refinishing (H)	N	N	N		
Chemical/petroleum pipelines (H)	N	N	N		
Chemical/petroleum processing/storage (VH)	N	N	N		
Dry cleaners (VH)	N	N	N		
Electrical/electronic manufacturing (H)	N	N	N		
Fleet/truck/bus terminals (H)	N	N	N		
Furniture repair/manufacturing (H)	N	N	N		
Home manufacturing (H)	N	N	N		
Junk/scrap/salvage yards (H)	N	N	N		
Machine shops (H)	N	N	N		
Metal plating/finishing/fabricating (VH)	N	N	N		
Photo processing/printing (H)	N	N	N		
Plastics/synthetics producers (VH)	N	N	N		
Research laboratories (H)	N	N	N		
Wood preserving/treating (H)	N	N	N		
Wood/pulp/paper processing and mills (H)	N	N	N		
Lumber processing and manufacturing (H)	N	N	N		
Sewer collection systems (H in Zone A, otherwise L)	N	Y	Y		
Parking lots/malls [>50 spaces] (M)	N	Y	Y		
Cement/concrete plants (M)	N	N	N		
Food processing (M)	N	N	N		
Funeral services/graveyards (M)	N	N	N		
Hardware/lumber/parts stores (M)	N	N	N		
Appliance/Electronic Repair (L)	N	N	N		
Office buildings/complexes (L)	N	N	N		
Rental Yards (L)	N	N	N		
RV/mini storage (L)	N	N	N		

Y = Yes N = No U = Unknown
*** = A contaminant potentially associated with this activity has been detected in the water supply.**

Inventory of Possible Contaminating Activities (PCA Inventory)

Assessment By Zone 7 Water Agency **ID.** B7 **County** Alameda
System Name ZONE 7 WATER AGENCY **System No.** 0110010
Source Name CHAIN OF LAKES WELL 05 **Source No.** 017 **PS Code** 0110010-017

Completed by Thomas Butler **Date** April, 2014

PCA (Risk Ranking)	PCA in Zone A	PCA in Zone B5	PCA in Zone B10	*	Comments
Residential/Municipal Activities					
Airports - Maintenance/fueling areas (VH)	N	N	N		
Landfills/dumps (VH)	N	N	N		
Railroad yards/maintenance/fueling areas (H)	N	N	N		
Septic systems - high density [>1/acre] (VH in Zone A, otherwise M)	N	N	N		
Sewer collection systems (H in Zone A, otherwise L)	N	Y	Y		
Utility stations - maintenance areas (H)	N	N	N		
Wastewater treatment plants (VH in Zone A, otherwise H)	N	N	N		
Drinking water treatment plants (M)	N	Y	N		
Golf courses (M)	N	N	Y		
Housing - high density [>1 house/0.5 acres] (M)	N	Y	Y		
Motor pools (M)	N	N	N		
Parks (M)	N	N	N		
Waste transfer/recycling stations (M)	N	N	N		
Apartments and condominiums (L)	N	N	N		
Campgrounds/Recreational areas (L)	N	N	N		
Fire stations (L)	N	N	N		
RV Parks (L)	N	N	N		
Schools (L)	N	N	N		
Hotels, Motels (L)	N	N	N		
Agricultural/Rural Activities					
Grazing [> 5 large animals or equivalent per acre] (H in Zone A, otherwise M)	N	N	N		
Concentrated Animal Feeding Operations [CAFOs] as defined in federal regulation 1 (VH in Zone A, otherwise H)	N	N	N		
Animal Feeding Operations as defined in federal regulation 2 (VH in Zone A, otherwise H)	N	N	N		
Other Animal operations (H in Zone A, otherwise M)	N	N	N		
Farm chemical distributor/application service (H)	N	N	N		
Farm machinery repair (H)	N	N	N		
Septic systems - low density [<1/acre] (H in Zone A, otherwise L)	N	N	N		

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Inventory of Possible Contaminating Activities (PCA Inventory)

Assessment By Zone 7 Water Agency **ID.** B7 **County** Alameda
System Name ZONE 7 WATER AGENCY **System No.** 0110010
Source Name CHAIN OF LAKES WELL 05 **Source No.** 017 **PS Code** 0110010-017

Completed by Thomas Butler **Date** April, 2014

PCA (Risk Ranking)	PCA in Zone A	PCA in Zone B5	PCA in Zone B10	*	Comments
Agricultural/Rural Activities					
Lagoons/liquid wastes (H)	N	N	N		
Machine shops (H)	N	N	N		
Pesticide/fertilizer/petroleum storage & transfer areas (H)	N	N	N		
Agricultural Drainage (H in Zone A, otherwise M)	N	N	N		
Wells - Agricultural/ Irrigation (H)	N	N	N		
Managed Forests (M)	N	N	N		
Crops, irrigated [Berries, hops, mint, orchards, sod, greenhouses, vineyards, nurseries, vegetable] (M)	N	N	N		
Fertilizer/Pesticide/Herbicide Application (M)	N	N	N		
Sewage sludge/biosolids application (M)	N	N	N		
Crops, nonirrigated [e.g., Christmas trees, grains, grass seeds, hay, pasture] [includes drip-irrigated crops] (L)	N	N	N		
Other Activities					
NPDES/WDR permitted discharges (H)	N	N	N		
Underground Injection of Commercial/Industrial Discharges (VH)	N	N	N		
Historic gas stations (VH)	N	N	N		
Historic waste dumps/landfills (VH)	N	N	N		
Illegal activities/unauthorized dumping (H)	N	N	N		
Injection wells/dry wells/sumps (VH)	N	N	N		
Known Contaminant Plumes (VH)	N	N	N		
Military installations (VH)	N	N	N		
Mining operations - Historic (VH)	Y	Y	Y		Historic sand and gravel.
Mining operations - Active (VH)	N	Y	Y		Sand and gravel
Mining - Sand/Gravel (H)	N	Y	Y		Sand and gravel
Wells - Oil, Gas, Geothermal (H)	N	N	N		
Salt Water Intrusion (H)	N	N	N		
Recreational area - surface water source (H)	N	N	N		
Underground storage tanks - Confirmed leaking tanks (VH)	N	N	N		
Underground storage tanks - Decommissioned - inactive tanks (L)	N	N	N		

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Assessment By Zone 7 Water Agency **ID.** B7 **County** Alameda
System Name ZONE 7 WATER AGENCY **System No.** 0110010
Source Name CHAIN OF LAKES WELL 05 **Source No.** 017 **PS Code** 0110010-017

Completed by Thomas Butler **Date** April, 2014

PCA (Risk Ranking)	PCA in Zone A	PCA in Zone B5	PCA in Zone B10	*	Comments
Other Activities					
Underground storage tanks - Non-regulated tanks [tanks smaller than regulatory limit] (H)	N	N	N		
Underground storage tanks - Not yet upgraded or registered tanks (H)	N	N	N		
Underground storage tanks - Upgraded and/or registered - active tanks (L)	N	N	N		
Above ground storage tanks (M)	N	N	N		
Wells - Water supply (M)	N	Y	Y		
Construction/demolition staging areas (M)	N	N	Y		
Contractor or government agency equipment storage yards (M)	N	N	N		
Dredging (M)	N	N	N		
Transportation corridors - Freeways/state highways (M)	N	N	Y		
Transportation corridors - Railroads (M)	N	N	N		
Transportation corridors - Historic railroad right-of-ways (M)	N	N	N		
Transportation corridors - Road Right-of-ways [herbicide use areas] (M)	N	N	N		
Transportation corridors - Roads/Streets (L)	Y	Y	Y		
Hospitals (M)	N	N	N		
Storm Drain Discharge Points (M)	Y	Y	Y		
Storm Water Detention Facilities (M)	Y	Y	Y		
Artificial Recharge Projects - Injection wells [potable water] (L)	N	N	N		
Artificial Recharge Projects - Injection wells [non-potable water] (M)	N	N	N		
Artificial Recharge Projects - Spreading Basins [potable water] (L)	N	N	N		
Artificial Recharge Projects - Spreading Basins [non-potable water] (M)	Y	Y	Y		Lakes used to infiltrate excess storm water.
Medical/dental offices/clinics (L)	N	N	N		
Veterinary offices/clinics (L)	N	N	N		
Surface water - streams/lakes/streams (L)	Y	Y	Y		
Wells - monitoring, test holes (L)	Y	Y	Y		

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Vulnerability Ranking

Assessment By Zone 7 Water Agency ID. B7 County Alameda

System Name ZONE 7 WATER AGENCY System No. 0110010

Source Name CHAIN OF LAKES WELL 05 Source No. 017 PS Code 0110010-017

Completed by Thomas Butler Date April, 2014

Zone	PCA (Risk Ranking)	*	PCA Risk Points	Zone Points	PBE Points	Vulnerability Score
A	Mining operations - Historic (VH)		7	5	1	13
B5	Mining operations - Active (VH)		7	3	1	11
B5	Mining operations - Historic (VH)		7	3	1	11
A	Artificial Recharge Projects - Spreading Basins [non-potable water] (M)		3	5	1	9
A	Storm Drain Discharge Points (M)		3	5	1	9
A	Storm Water Detention Facilities (M)		3	5	1	9
B5	Mining - Sand/Gravel (H)		5	3	1	9
B10	Mining operations - Active (VH)		7	1	1	9
B10	Mining operations - Historic (VH)		7	1	1	9

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