REGIONALSAN
TAKING THE WASTE OUT OF WATER
Sacramento Regional County Sanitation District

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October 26, 2015

Mr. Marty Hartzell
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, California 95670-6114

Subject: **Sacramento Regional County Sanitation District Comments on the Tentative Waste Discharge Requirement for the Sacramento Regional Wastewater Treatment Plant**

Mr. Hartzell:

The Sacramento Regional County Sanitation District (Regional San) is providing comments on the Tentative Waste Discharge Requirement (WDR) and Monitoring and Reporting Program (MRP) for Sacramento Regional Wastewater Treatment Plant (SRWTP) solids management and associated facilities.

In general, Regional San supports the Tentative WDR and MRP but provides the attached comments for consideration. The requested revisions are summarized as follows:

- There are significantly more requirements in the proposed new MRP, which will require additional effort to implement. In order to allow sufficient time to implement the new requirements and reporting formats, Regional San requests confirmation that the 2015 annual report due February 1, 2016 is based on the existing MRP (R5-2003-0076).
- Remove water quality criteria or objectives (WDR Tables 2 and 4) because it is inappropriate to directly compare leachate and SSB supernate concentrations to water quality objectives.

Propose a list of monitoring wells to be removed from the MRP based on historical data and well log analysis to ensure an adequate monitoring coverage would be provided by the remaining monitoring wells.

- Propose expanding the use of C-DLD 1 for stockpiling soil from the Echo Water Project to include stockpiling excavated materials from the conversion of C-DLD 5 to an active L-DLD. The conversion of C-DLD 5 will be completed before the Echo Water Project construction is completed.
- Additional comments and clarifications are provided in Attachment 1.

Regional San appreciates the opportunity to review and provide comments on the Tentative Draft of the WDR and associated documents. If you have any questions, please contact Anna Johnson (johnsonan@sacsewer.com, 916-875-9198).

Sincerely,

Ruben Robles

Ruben Robles, P.E.
Director of Regional San Operations

RR: AJ/dg

cc: Amy Ha, CVRWQCB
Mitchell Maidrand, Regional San
Anna Johnson, Regional San
Hsinying Liu, Regional San

Attachments: 1 - Regional San Comments on the Tentative WDR and MRP
2 – Evaluation of Monitoring Wells and Proposed List of Wells for Removal from the MRP, LSCE, October 23, 2015.

Attachment 1:

Regional San Comments on the Tentative Draft of the WDR and MRP

WDR

Findings

1) Page 1, Paragraph 2 – Item g. should be corrected from January 2013 to November 2013 Standard Provisions and Reporting Requirements.

2) Page 3, Paragraph 8 - Add to the Unit Classification & Status table for the SSBs that they are "Unclassified, Active, Exempt under tit. 27 § 20090(a).

3) Page 3, Paragraph 8 – Correct hydraulic conductivity of low permeability soil used for Grit and Screenings Landfill from $10x10^{-6}$ cm/sec. to $1x10^{-6}$ cm/sec.

Unit	Area	Liner/LCRS[1] Components[2]	Unit Classification & Status
C-DLD 1 and C-DLD 5[3]	82 acres	Unlined. Cover system - evapotranspirative cover.	Class II, Closed in 2004.
L-DLD 2 to L-DLD 4[3]	123 acres	Single Composite Liner – one foot compacted clay subgrade, 60-mil HDPE, 12-inch blanket LCRS.	Class II, Active.
SSBs (20 ponds)	125 acres	Unlined surface impoundment.	Unclassified, Active. Exempt under Title 27 § 20090(a)
Grit and Screenings Landfill[4]	23 acres	Ten unlined disposal trenches. Cover system - two feet foundation soils, one foot low permeability soil with $1\sout{0}x10^{-6}$ cm/sec hydraulic conductivity, one foot vegetative cover soil.	Class III, Closed in 1994.

4) Page 4, Paragraph 13 – Revise the following section for clarity as it may appear that primary and secondary sludge is *directly* discharged into the digesters.

13. The Discharger proposes to continue to discharge anaerobically digested ~~primary and secondary~~ sludge to the SSBs. The digested sludge has about 0.4% to 3% solids. The solids are composed of about 50% to 80% volatile solids.

5) Page 4, Paragraph 14 – Revise the following sentence for clarification.

14. The Discharger also proposes to redirect return flow from the BRF to the SSBs. Currently, approximately 35% ~~A portion~~ of the digested sludge ~~from the wastewater treatment plant digesters, typically discharged directly to the SSBs,~~ is routed to the BRF for processing to

produce a pelletized fertilizer, and the rest is discharged to the SSBs. The BRF uses polymer to dewater then thermally dries the digested sludge to EPA 503b Class A quality. Secondary effluent from the wastewater treatment plant is also used in the dryer exhaust for cooling and particulate removal. The BRF then returns the centrate ~~from the centrifuge~~ as BRF return flow to the plant via a sanitary drain and the City Interceptor. ~~or to the SSBs. This BRF return flow may contain trace amounts of polymer from dewatering.~~ The BRF return flow contains significantly less solids and reduced ammonia concentration than digested sludge. ~~When compared to digested sludge the BRF return flow contains significantly less solids, and a reduced ammonia concentration (448 mg/l versus 1,000 mg/l in the digested sludge) due to dilution of the digested sludge with secondary effluent.~~ When the BRF is not operating, digested sludge flow normally going to the BRF is sent to the SSBs.

6) Page 5 and 6, Paragraph 18 and Table 2- It is inappropriate to compare the liquid supernate concentrations directly to water quality objectives/water quality criteria because the standards apply to the groundwater underneath the SSBs - not the supernate concentrations. Accordingly, Regional San requests that the last sentence describing comparison of liquid supernate concentrations to MCLs and WQOs, and the associated columns in Table 2 to be removed.

18. The Discharger provided 2014 monitoring data in the 2014 Annual Monitoring Report for SSBs waste constituents including SSB liquid supernate and digested sludge discharged to the SSBs, as shown on Tables 1 and 2. ~~The liquid supernate concentrations are compared to California primary maximum contaminant levels (primary MCLs), the lowest applicable water quality objective (WQO) for groundwater for protection of drinking water beneficial use for domestic and municipal supply wells, and the background groundwater quality at the site.~~

Table 2 – SSB Supernate 2014 Average Concentrations

			~~Water Quality Criteria (WQC)/Water Quality Objective (WQO)~~	
		SSB Average	~~**WQC/ WQO**~~	~~**Reference**~~ [1, 2, 3, 4]
Total Dissolved Solids (TDS)	mg/L	1,100	~~500~~	~~CDPH Secondary MCL~~
Specific Conductivity	µmhos/cm	3,900	~~900~~	~~CDPH Secondary MCL~~
Ammonia Nitrogen	mg/L	430	~~30~~	~~USEPA Health Advisory~~
Nitrate	mg/L	0.1	~~10~~	~~USEPA Primary MCL~~
Nitrite	mg/L	1.1	~~1.0~~	~~CDPH Primary MCL~~
Chloride	mg/L	140	~~250~~	~~CDPH Secondary MCL~~
Sulfate	mg/L	200	~~250~~	~~CDPH Secondary MCL~~

~~1. CDHS = California Department of Public Health~~
~~2. USEPA = United States Environmental Protection Agency~~
~~3. IRIS RfD = Integrated Risk Information System, Reference Dose~~
~~4. MCL = Maximum Contaminant Level~~

7) Page 5, Paragraph 19 - Reference to the term "high concentration of" should be removed. Further, comparison of supernate concentration levels to water quality objectives/criteria is inappropriate, is indicated in the comment above.

19. Solids discharged into the SSBs contain ~~high concentration of~~ ammonia, total nitrogen, chloride, sulfate, and total phosphorus (Table 1).

8) Page 5, Paragraph 19 – Suggest deleting SSB supernate constituent concentrations as compared to secondary MCLs because criteria/objective is not applicable directly to the supernate. In fact, supernate is collected and returned to the plant headworks for treatment.

19. …~~Additionally, SSB supernate concentrations of total dissolved solids (TDS) and specific conductivity remain above the associated secondary MCLs by more than double (Table 2).~~ SSB supernate is aerated and diluted with stormwater lowering concentrations of potential constituents of concern~~, however, the dilution is not enough to reduce TDS and specific conductivity below the MCLs~~.

9) Page 6 and 7, Paragraph 20 and Table 4 - L-DLD Leachate is not discharged to groundwater as it is collected and returned to the plant headworks for treatment. Thus, it is inappropriate to compare the L-DLD leachate to water quality objectives/criteria. Regional San requests removing the last sentence describing comparison of liquid supernate concentrations to MCLS and WQOs, and the associated columns in Table 4.

20. The Discharger provided 2014 monitoring data in the 2014 Annual Monitoring Report for biosolids harvested from the SSBs discharged to the L-DLDs and L-DLD leachate, as shown in Tables 3 and 4. ~~The liquid leachate concentrations are compared to California primary maximum contaminant levels (primary MCLs), the lowest applicable water quality objective~~

~~(WQO) for groundwater for protection of drinking water beneficial use for domestic and municipal supply wells, and the background groundwater quality at the site.~~

Table 4 – L-DLD Leachate 2014 Average Concentrations

Constituent	Units	LDLDs Average	~~Water Quality Criteria (WQC)/Water Quality Objective~~	
			~~WQC/ WQO~~	~~Reference[1, 2,3, 4]~~
Total Dissolved Solids (TDS)	mg/L	4,600	~~500~~	~~CDPH Secondary MCL~~
Specific Conductivity	µmhos/cm	10,400	~~900~~	~~CDPH Secondary MCL~~
Ammonia	mg/L	0.1	~~30~~	~~USEPA Health Advisory~~
Nitrate	mg/L as N	1,100	~~10~~	~~USEPA Primary MCL~~
Nitrite	mg/L	60	~~1.0~~	~~CDPH Primary MCL~~
Chloride	mg/L	100	~~250~~	~~CDPH Secondary MCL~~
Sulfate	mg/L	1,200	~~250~~	~~CDPH Secondary MCL~~
Arsenic	µg/L	11	~~10~~	~~CDPH Primary MCL~~
Phosphorus	mg/L	2.3	~~0.00014~~	~~U.S. EPA IRIS RfD~~

~~1. CDHS = California Department of Public Health~~
~~2. USEPA = United States Environmental Protection Agency~~
~~3. IRIS RfD = Integrated Risk Information System, Reference Dose~~
~~4. MCL = Maximum Contaminant Level~~

10) Page 7, Paragraph 21 – Remove "continue to have high" from the first sentence and modification for clarification. As commented above, it is inappropriate to compare SSB harvested solids and the L-DLD leachate to water quality objectives/criteria. L-DLD Leachate is not discharged to groundwater as it is collected and returned to the plant headworks for treatment.

21. Biosolids harvested from the SSBs ~~continue to~~ have ~~high concentrations of~~ ammonia, total nitrogen, chloride, sulfate, and total phosphorus (Table 3) similar to the digested sludge; although, generally the concentrations in the ~~. The~~ biosolids ~~concentrations~~ are lower than the digested sludge. ~~Additionally, average concentrations of leachate from the L-DLDs show levels of TDS, specific conductivity, nitrate, nitrite, chloride, and sulfate above primary and secondary MCLs (Table 4).~~

11) Page 6 and 7, Table 1, 2, 3, &4 – Revise data using ½ reporting limit for Non-Detect (ND) values. Otherwise, if data is not revised, add a footnote that states "Nitrate and nitrite values are most likely based on reporting limits, and not actual results.

Table 1 – SSB Waste Discharge
Digested Sludge 2014 Average Concentrations

Constituent	Units[1]	Average Concentration
Ammonia	mg/kg	63,000
Nitrate	mg/kg	~~5~~ 2.78
Nitrite	mg/kg	~~3~~ 0.05
Chloride	mg/kg	7,000
Soluble Sulfate	mg/kg	1,300

Arsenic	mg/kg	5.4
Total Nitrogen	mg/kg	125,000
Total Phosphorus	mg/kg	28,000

1. Sample was reported on a dry weight basis

Table 2 – SSB Supernate 2014 Average Concentrations

Constituent	Units	SSB Average	Water Quality Criteria (WQC)/Water Quality Objective (WQO)	
			WQC/ WQO	Reference[1, 2,3, 4]
Total Dissolved Solids (TDS)	mg/L	1,100	500	CDPH Secondary MCL
Specific Conductivity	µmhos/ cm	3,900	900	CDPH Secondary MCL
Ammonia Nitrogen	mg/L	430	30	USEPA Health Advisory
Nitrate	mg/L	~~0.1~~ 0.05	10	USEPA Primary MCL
Nitrite	mg/L	~~1.1~~ 0.98	1.0	USEPA Primary MCL
Chloride	mg/L	140	250	CDPH Secondary MCL
Sulfate	mg/L	200	250	CDPH Secondary MCL

Table 3 – L-DLD Waste Discharge
SSB Harvested Biosolids 2014 Average Concentrations

Constituent	Units[1]	Average Concentration
Ammonia	mg/kg	13,500
Nitrate	mg/kg	~~1.0~~ 0.44
Nitrite	mg/kg	~~1.0~~ 0.05
Chloride	mg/kg	2,300
Soluble Sulfate	mg/kg	800
Arsenic	mg/kg	~~9.0~~ 8.71
Total Nitrogen	mg/kg	51,000
Total Phosphorus	mg/kg	34,000

1. Sample was reported on a dry weight basis

Table 4 – L-DLD Leachate 2014 Average Concentrations

Constituent	Units	LDLDs Average	Water Quality Criteria (WQC)/Water Quality Objective (WQO)	
			WQC/ WQO	Reference[1, 2,3, 4]
Total Dissolved Solids (TDS)	mg/L	4,600	500	CDPH Secondary MCL
Specific Conductivity	µmhos/cm	10,400	900	CDPH Secondary MCL
Ammonia	mg/L	0.1	30	USEPA Health Advisory
Nitrate	mg/L as N	1,100	10	USEPA Primary MCL
Nitrite	mg/L	~~60~~	1.0	CDPH Primary MCL

		0.05		
Chloride	mg/L	100	250	CDPH Secondary MCL
Sulfate	mg/L	1,200	250	CDPH Secondary MCL
Arsenic	µg/L	11	10	CDPH Primary MCL
Phosphorus	mg/L	2.3	0.00014	U.S. EPA IRIS RfD

1. CDHS = California Department of Public Health
2. USEPA = United States Environmental Protection Agency
3. IRIS RfD = Integrated Risk Information System, Reference Dose
4. MCL = Maximum Contaminant Level

12) Page 5, Paragraph 19 – The WQC/WQO in the tables (Table 2 and 5) list the lowest secondary MCL for TDS, specific conductivity, chloride and sulfate. However, these secondary MCLs are ranges, with three different values for the "Recommended," "Upper," and "Short Term" ranges. The State Water Board has recognized that the Recommended as well as the Upper values are applicable water quality objectives. At the very least, the table should be revised to reflect both the Recommended and Upper values for these four constituents. For example, when TDS is compared to the Upper value from title 22, the average SSB supernate is only 63 mg/L above the applicable secondary MCL of 1000 mg/L. When TDS is compared to the Upper value from Title 22, the average SSB supernate is only 63 mg/L above the applicable secondary MCL of 1000 mg/L. If WQC/WQO are to remain, request they are revised to reflect both the Recommended and Upper values from title 22 for TDS, specific conductivity, chloride and sulfate.

Table 2 – SSB Supernate 2014 Average Concentrations

Constituent	Units		Water Quality Criteria (WQC)/Water Quality Objective (WQO)	
		SSB Average	WQC/ WQO	Reference [1, 2,3, 4]
Total Dissolved Solids (TDS)	mg/L	1,100	500/1000 (upper)	CDPH Secondary MCL/ Title 22 MCL
Specific Conductivity	µmhos/cm	3,900	900/1,600 (upper)	CDPH Secondary MCL/ Title 22 MCL
Ammonia Nitrogen	mg/L	430		
Nitrate	mg/L	0.1	10	USEPA Primary MCL
Nitrite	mg/L	1.1	1.0	CDPH Primary MCL
Chloride	mg/L	140	250/500 (upper)	CDPH Secondary MCL/ Title 22 MCL
Sulfate	mg/L	200	250/500 (upper)	CDPH Secondary MCL/ Title 22 MCL

1. CDHS = California Department of Public Health
2. USEPA = United States Environmental Protection Agency
3. IRIS RfD = Integrated Risk Information System, Reference Dose
4. MCL = Maximum Contaminant Level

13) Page 8, Paragraph 28 - Include source of information for hydraulic conductivity of the native soils underlying the waste management units.

14) Page 9, Paragraph 35 – Request to revise section for clarification.

35. The site is on a low-lying alluvial basin at the confluence of Morrison, Beacon and Laguna Creeks. Currently, Morrison, Beacon, and Laguna Creeks converge on the north side of the property and drain westerly into the Beach-Stone Lakes Basin. ~~This~~ The Beach-Stone Lakes Basin lies within the Morrison Creek, Cosumnes River and Mokelumne River watersheds as well as the Sacramento-San Joaquin Delta. ~~discharges to the Sacramento and Mokelumne Rivers.~~

15) Page 14, Paragraph 56 – Request to revise section for clarification.

56. Approximately 8 acres of the 23-acre landfill received grit, screenings, ash, and inert construction wastes. The landfill, closed in 1994, had a capacity of about 1.16 million cubic yards; however, only an estimated 36,000 cubic yards of waste was placed within the 8 acres that was used. The landfill is covered by a 1-foot vegetative layer, a 1-foot thick low permeability layer, and a foundation layer with a minimum thickness of two feet.

16) Page 15, Paragraph 61 – Request to revise section for clarification.

61. In general, the SSBs receive inflows of digested sludge while supernatant and sludge are discharged and harvested from the SSBs. Digested sludge is discharged into the SSBs via one of two digested sludge pipes located at the bottom of each pond. Each SSB receives digested sludge based on a computer control strategy and operator input that regulates the total volume ~~limiting the quantity of digested sludge inflow~~ into each SSB~~. The automated control system fills each SSB~~ in sequential order. ~~to the maximum allowable value.~~ The operating levels in each SSB pond are maintained at 14.0 feet above msl with approximately 3.5 feet of freeboard at the level of the supernate outflow pipe. The Battery II and III SSBs are also equipped with overflow pipes (at 15.0 feet above msl) which provide approximately 2.5 feet of freeboard that discharge liquid to a metering structure and back to the wastewater treatment plant headworks as additional protection.

17) Page 19, Paragraph 79 – Request to revise section for clarification.

79. The Discharger closed C-DLDs 1 and 5 using an evapotranspirative (ET) cover and lined the runoff zones using a 45-mil polypropylene liner as described in Findings 70 and 71. The ET cover consisted of vegetating existing DLD 1 and 5 soils. The cover was graded to drain by increasing existing slopes to a nominal 1 percent (%). Runoff from the final cover would continue to be captured and routed to the treatment plant headworks. The primary mechanism of an ET cover for minimizing infiltration of rainwater is uptake of moisture by evaporation and plant transpiration. The vegetation for the final cover ~~consists~~ had consisted of a mixture of various grasses and forbs listed in Table 7, but was subsequently changed (see Item 86).

18) Page 21, Paragraph 86 – Request to revise section for clarification.

86. The Discharger utilized two different seed mixes to reseed two 10-acre test plots to revegetate C-DLDs 1 and 5 final cover from fall 2010 through spring 2011. Based on the results of test plots, the remaining C-DLD cover areas were revegetated in November 2012 with a seed mix composed of Tall wheatgrass, Perennial rye, California brome, and Slender wheatgrass. The Discharger established the target vegetative cover through the application of broadleaf specific herbicides to reduce competition with broadleaf weeds and utilized haying practices (cutting, baling and removing) to promote the target perennial grass species while discouraging less desirable annual grasses and broadleaf weeds.

19) Page 21, Paragraph 87 – Revise section for clarification and consistency with previous finding.

87. A May 2013 vegetation survey indicated healthy seed germination and substantial first season growth. During a subsequent vegetation survey in June 2014, roots were observed throughout the test pits to depths of 37-inches and 48-inches. Additionally, the percent cover of target species in C-DLDs 1 and 5 were 108% and 60%, respectively. The June 2014 vegetation report concluded that the high absolute percent cover of target species achieved in less than 2 years following the reseeding effort is encouraging. The Discharger will continue weed control measures at C-DLDs 1 and 5 to reduce the occurrence of non-target species. Based on the results of the assessments, the Discharger will continue using the plant species listed in Item 86 (Tall wheatgrass, Perennial rye, California brome, and Slender wheatgrass) ~~Table 7~~ and regularly inspecting the C-DLDs to remove non-target plant species for the C-DLDs 1 and 5 cover systems.

Hereby Ordered Provisions

1) Page 26 – 42, Provisions A.5, B.3, C.15, D.10, D.11, E.10, F.4, G.7, and H.24 are not necessary and are duplicative. Regional San recommends that all specific references be eliminated and that only Provision H.1 remain. Provision H.1 incorporates all provisions by incorporating by reference Standard Provisions and Reporting Requirements. By identifying them individually, as well as generally, arguably it creates the potential to be found in non-compliance for multiple permit provisions.

2) Page 28, Provision C.3 and Page 30, Provision 13. a., b., and d. – Replace the term "immediate" with a specific time frame, such as "within 24 hours," or some other specific time frame that is appropriate to ensure that there is a clear understanding with respect to when reporting needs to occur. The term "immediate" is subjective and difficult to determine compliance.

3. The Discharger shall ~~**immediately**~~ notify Central Valley Water Board staff by telephone and email within 24 hours, and ~~**immediately**~~ take measures to regain SSB capacity in the event that freeboard levels are equal to or less than 2.0 feet.

3) Page 31, Paragraph 7 - Revise section to expand the use of C-DLD 1 for Echo Water construction activities to include stockpiling of excavated materials from the conversion of C-DLD 5 into an active L-DLD. The conversion of C-DLD 5 will be completed before construction of the Echo Water Project is completed.

7. C-DLDs 1 and 5 may be converted to active L-DLDs using similar procedures to L-DLD 2 to 4 as detailed in Finding 67. Prior to lining a DLD, the Discharger shall excavate existing biosolids, waste materials, and native soil to a minimum depth of five-feet. The Discharger may use a portion of C-DLD 1 for stockpiling excavated materials from the conversion of C-DLD 5 to an active L-DLD. Detailed plans will be included in the Construction Plans to be submitted for review and approval.

4) Page 34, Paragraph 13 – Revise section to allow the Discharger to pilot various plant species for optimum results, including the original mixture listed in Table 7, based on what was experienced with C-DLD 1 and C-DLD 5.

a. Install a final evapotranspirative cover system. The Discharger will pilot different mixtures of grasses and forbs, including those listed in Table 7. The final selected mixture of plant species will be used to vegetate ~~consisting of vegetating~~ the existing DLD soils ~~with a mixture of various grasses and forbs listed in Table7~~.

5) Page 35, Paragraph 16 – Revise section to be consistent with Finding 86.

16. All vegetation shall be maintained over C-DLDs to maximize uptake of moisture in the DLD soils. The closure vegetation shall include the plant species listed in Finding 86 (Tall wheatgrass, Perennial rye, California brome, and Slender wheatgrass). ~~Table 7 of Finding 79.~~

6) Page 35, Paragraph 19 – Revise section to expand the use of C-DLD 1 for Echo Water construction activities to include stockpiling of excavated materials from the conversion of C-DLD 5 into an active L-DLD. The conversion of C-DLD 5 will be completed before construction of the Echo Water Project is completed.

19. Temporary construction activities associated with the EchoWater Project on C-DLD 1 include stockpiling soil and installing and maintaining a haul road for construction equipment. C-DLD 1 final cover materials may not be removed from C-DLD 1 during temporary construction operations. The Discharger may use a portion of C-DLD 1 for stockpiling excavated materials from the conversion of C-DLD 5 to an active L-DLD. Detailed plans will be included in the Construction Plans to be submitted for review and approval. The Discharger shall continue to maintain C-DLD 1 during construction and repair any areas of ponding.

7) Page 41, Provision H.18.c. - Footnote 2, delete reference to drinking water standards and agricultural water quality goals. Substitute as follows: "Compare to Basin Plan water quality objective, including narrative and numeric."

[2] Compare to Basin Plan water quality objectives, ~~including drinking water standards, agricultural water quality goals, etc.~~ including narrative and numeric.

8) Page 42, Provision H.18.g.iii. - The parenthetical should be deleted as it is not applicable to the term Best Practicable Treatment or Control.

iii. How current treatment ~~and~~ or control measures are justified as Best Practicable Treatment or Control ~~(i.e., what justifies not implementing additional measures)~~;

9) Page 42, Provision H.18.g.v. - To be consistent with the terminology contained in Resolution 68-16, the revision should be revises as follows:

v. Why allowing existing and/or anticipated degradation is ~~in the best interest of~~ to the maximum benefit to the people of the state.

MRP

1) General – Confirm that the new reporting format is not required to be implemented until the first semi-annual report following adoption of the permit, due August 1, 2016. The 2015 Annual Report will not have many of the new monitoring requirements.

2) Page 2, A. Monitoring – Delete "All metals analyses shall be for dissolved metals", as the analysis methods are case-dependent. This will also affect historical continuity of the monitoring data, except for groundwater monitoring.

(3rd paragraph) The discharger should report all trace concentrations that between the detection limit and the practical quantitation limit. ~~All metals analyses shall be for dissolved metals~~.

3) Page 2, 1. Groundwater Monitoring – Request to modify this section to address the following:
    1) Propose to remove extraction wells from the groundwater monitoring system, based on consultant recommendations (included). Currently, the extraction wells are monitored for elevation only, and these elevation readings are affected by the operation of the extraction pump and do not represent static conditions.
    2) If the extraction wells remain as part of the groundwater monitoring system, clarify this section so that it does not require monitoring as per Table 1. As mentioned above, the extraction wells are currently sampled for elevation only, and each extraction well is paired with a detection monitoring well. The detection monitoring wells are sampled as per Table 1.
    3) MW-223, 233, 235, and 236 are extraction wells, and should be labeled accordingly. Remove reference to "detection" for these wells.
    4) Additionally, propose to remove MW-339 from detection monitoring system based on consultant recommendation (included). A review of the historical data shows that the water levels and water quality from this well is duplicated by MW-335.

Page 5, Table 1 - Modify footnotes in Table 1 for clarification as follows:

Table 1: Groundwater Monitoring

Parameters[4,5]	Units	Monitoring	Reporting
Field Parameters			
Groundwater Elevation	Feet & 100ths, M.S.L.	Quarterly	Semi-Annually
Temperature	^{o}F	Semi-Annually	Semi-Annually
Specific Conductance pH	µmhos/cm	Semi-Annually	Semi-Annually
Turbidity	Number	Semi-Annually	Semi-Annually
	Turbidity units	Semi-Annually	Semi-Annually
Monitoring Parameters			
Total Dissolved Solids	mg/L	Semi-Annually	Semi-Annually
Chloride	mg/L	Semi-Annually	Semi-Annually
Nitrate as Nitrogen	mg/L	Semi-Annually	Semi-Annually
Arsenic	µg/L	Semi-Annually	Semi-Annually
Chromium	µg/L	Semi-Annually	Semi-Annually
Constituents of Concern[5]			
Cadmium	µg/L	Annually	Annually
Calcium	mg/L	Annually	Annually
Copper	µg/L	Annually	Annually
Magnesium	mg/L	Annually	Annually
Potassium	mg/L	Annually	Annually
Total Alkalinity	mg/L	Annually	Annually
Total Kjeldahl Nitrogen	mg/L	Annually	Annually
Nickel	µg/L	Annually	Annually
Sodium	mg/L	Annually	Annually
Zinc	µg/L	Annually	Annually
Sulfate	mg/L	Annually	Annually
Nitrite as Nitrogen	mg/L	Annually	Annually
Inorganic Parameters[2]	mg/L	5 Years	5 Years
Trace Metals[3]	µg/L	5 Years	5 Years

[1] The Discharger shall measure the groundwater elevation in each well **semi-annually**, determine groundwater flow direction, and estimate groundwater flow rates in the uppermost aquifer and in any zones of perched water and in any additional portions of the zone of saturation monitored. The results shall be reported semi-annually, including the times of expected highest and lowest elevations of the water levels in the wells, pursuant to Title 27, section 20415(e)(15).

[2] Inorganic parameters shall include: Ammonia as Nitrogen, Phosphate, and Total Organic Carbon.

[3] Trace Metals shall include: Barium, Cobalt, Lead, Mercury, Molybdenum, Selenium, Silver, and Vanadium.

[4] Extraction wells shall be monitored as specified in Section A.8 for corrective action and are not part of the detection monitoring system.

[5] All metals will be reported as dissolved.

4) Page 6, 3. Unsaturated Zone Monitoring c, page 6 – Add "has been determined a leak in the containment structures" and replace "immediately" with "within 24 hours" for clarification of requirements (refer to comments on Provision C.3 and C.13 a. b. and d.)

3. c. …If liquid is detected in a previously dry pan lysimeter and it is determined to be a leak, the Discharger shall follow the procedures in the WDRs under "C. Facility Specifications" and shall ~~**immediately**~~ sample within 24 hours and test the liquid for Field and Monitoring Parameters listed in the following table.

5) Page 15, 8. Corrective Action Monitoring - Propose to remove the extraction wells from the groundwater monitoring system, based on consultant recommendations (included). Currently, the extraction wells are monitored for elevation only, and these readings are affected by the operation of the extraction pump. If corrective action monitoring is still required, then modify this section for clarification, so that it does not require monitoring as per part A.1, Table 1 of the MRP. The extraction wells are currently sampled for elevation only, and each extraction well is paired with a detection monitoring well.

8. Corrective Action Monitoring - The Discharger shall conduct corrective action monitoring to demonstrate the effectiveness of corrective action in accordance with Title 27, section 20430 and this MRP. Groundwater monitoring wells that are in a corrective action monitoring program shall be monitored ~~in accordance with the groundwater monitoring requirements in parts A.1 of this MRP, except as modified in this part of the MRP for any additional constituents or modified monitored frequencies.~~ for elevation only.

6) Page 16, B. Reporting Requirements - Confirm that entering of all monitoring data and monitoring reports into Geotracker is day-forward, and clarify when data needs to be entered relative to submittal of the semi-annual and annual reports. Request that entry in Geotracker to occur within 30 days following submittal of reports to the Regional Board.

7) Page 22, C. 6. Point of Compliance – Recommend deleting MW-228R, MW-233, and MW-235 as they are extraction wells and monitored for elevation only.

Cell or Module	Point of Compliance Monitoring Wells
Closed Landfill	~~MW-228R~~, MW-324
C-DLD 1	MW-232, MW-305
L-DLD 2	MW-239
L-DLD 3	~~MW-233~~, MW-303, MW-315, MW-322, MW-323, MW-329, MW-330, MW-331, MW-336, MW-337, MW-341

L-DLD 4	~~MW-233~~, MW-303, MW-315, MW-322, MW-323, MW-329, MW-330, MW-331, MW-336,MW-337, MW-341
C-DLD 5	~~MW-235~~, MW-307, MW-317, MW-338
SSB Battery I	MW-223, MW-238
SSB Battery II	MW-240, MW-241
SSB Battery III	MW-242, MW-243, MW-225

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CONSULTING ENGINEERS

GROUNDWATER RESOURCES
HYDROLOGY · DEVELOPMENT · MANAGEMENT

Memorandum

DATE: October 23, 2015 PROJECT: 14-7-072

TO: Hsinying Liu and Anna Johnson, Regional San

FROM: Barbara Dalgish

SUBJECT: **EVALUATION OF MONITORING WELLS AND PROPOSED LIST OF WELLS FOR REMOVAL FROM THE MONITORING AND REPORTING PROGRAM**

In response to the request made by Regional San staff to LSCE (personal communication, Hsinying Liu, Sept 18, 2015), the following memorandum evaluates and presents a preliminary list of potential monitoring wells that may be considered for removal from the Monitoring and Reporting Program (MRP). The basis of these recommendations includes spatial proximity of the monitoring wells to each other, and determining if the water quality and/or water level record(s) of proximal wells resemble each other. If wells that are close to each other spatially have similar water quality and water level values, they are considered to be redundant wells and are included in the list of recommended potential monitoring wells for consideration to be removed from the MRP monitoring network. The current monitoring well network (based on the 2003 MRP) is presented in **Figure 1**.

For purposes of this monitoring well evaluation, the monitoring wells in the current monitoring network[1] are delineated into four spatial units as seen in **Figure 2**. The four unit areas are discussed briefly below along with the identification and discussion of proximal well pairings with regard to basic water quality constituents of interest (chloride, nitrate, and TDS).

UNIT A

This area is located in the northern portion of Regional San, and contains seven (7) monitoring wells in the monitoring network plus four wells that were sampled for the 2014 annual report. The table below lists all of the wells in the unit, and identifies any proximal well pairings:

[1] Based on the 2003 MRP, and supplemented by eight additional wells from the 2014 Annual Site Monitoring Report (Sacramento Regional Wastewater Treatment Plant Solids Disposal Facilities, 2014 Annual Site Monitoring Report, Prepared by Anna Johnson, Hsinying Liu, and Manuel A. Ramirez, January 2015).

Unit A Monitoring Wells	Proximal Well Pairing
MW-106R	MW-106R/MW-223
MW-219R	
MW-220	MW-220/MW-301
MW-223	MW-106R/MW-223
MW-226R	
MW-227R	
MW-301	MW-220/MW-301
MW-217 (from 2014)	
MW-218 (from 2014)	
MW-238 (from 2014)	
MW-239 (from 2014)	

There are two locations of proximal well pairings as seen in **Figure 3**. These two areas contain the well pairs of MW-106R/MW-223 and MW-220/MW-301.

MW-106R/MW-223

These two wells are located at the northeastern corner of SSB Battery I. MW-106R has a total well depth of 19.5 feet, a screened interval of 9-19 feet, and is considered to be completed in the Shallow Saturated Zone (SSZ), whereas MW-223 has a total well depth of 56 feet, with a screened interval of 36-56 feet, and is also considered to be completed in the SSZ. There are differences in water quality for these two wells for chloride, nitrate, and TDS. There are also small differences in water level values at this site, with MW-106 having slightly higher water elevations compared to MW-223. Neither well is recommended for removal at this time[2].

MW-220/MW-301

These two wells are located on the southwestern edge of SSB Battery I. MW-220 has a total well depth of 50 feet, a screened interval of 40-50 feet, and is completed in the SSZ. MW 301 has a total well depth of 62 feet, a screened interval of 51.5-61.5, and is considered to be completed in the First Aquifer (FA). The depths and nitrate concentrations of these two wells are similar, as are their groundwater elevation measurements, but their chloride and TDS concentrations are different. Neither well is recommended for removal at this time.

[2] Regional San staff has noted that MW-106R is subject to sanding and is periodically dry. It is not recommended at this time to remove MW-106R because it still provides depth-dependent information when combined with MW-223's data. MW-106R, when it is not dry, provides first encountered groundwater conditions, which is useful information for the MRP.

UNIT B

This area is located in the southwestern portion of Regional San, and contains ten (10) monitoring wells plus four wells that were sampled for the 2014 annual report. The table below lists all of the wells in the unit, and identifies any proximal well pairings:

Unit B Monitoring Wells	Proximal Well Pairing
MW-221R	
MW-222R	MW-222R/MW-316
MW-225	
MW-235*	MW-235/MW307/MW-317; MW-332/MW-338
MW-307*	MW-235/MW307/MW-317; MW-332/MW-338
MW-316	MW-222R/MW-316
MW-317	MW-235/MW307/MW-317; MW-332/MW-338
MW-326	
MW-332*	MW-235/MW307/MW-317; MW-332/MW-338
MW-338	MW-235/MW307/MW-317; MW-332/MW-338
MW-240 (from 2014)	
MW-241 (from 2014)	
MW-242 (from 2014)	
MW-243 (from 2014)	

*According to the 2003 MRP's Table 4, these wells are for "elevation data only".

There are two locations of proximal well pairings as seen in **Figure 4**. These two areas contain the well pairings of MW-222R/MW-316 and the group of wells containing MW-235/MW-307/MW-317 and MW-332/MW-338.

MW-222R/MW-316

These two wells are located to the west of the SSB Battery III. MW-222R has a total well depth of 50 feet, a screened interval of 40-50 feet, and is completed in the SSZ. MW-316 has a total well depth of 85.5 feet, a screened interval of 75-85 feet, and is completed in the FA. The nitrate concentrations of these two wells are similar, as are their water level measurements, but their well depths, and chloride and TDS concentrations are different. Neither well is recommended for removal at this time.

MW-235/MW307/MW-317; MW-332/MW-338

This group of wells contains two groups of wells in the same vicinity to the east of SSB Battery III – the first group, MW-235/MW307/MW-317 is slightly north of the second group, MW-332/MW-338. MW-235 has a total well depth of 40 feet, a screened interval of 25.2-40.2 feet, and is completed in the SSZ. MW-307 has a total well depth of 70 feet, a screened interval of 60-70 feet, and is completed in the FA. MW-317 has a total well depth of 79 feet, a screened interval of 63-73 feet, and is completed in the FA. MW-235 has different chloride, nitrate, and TDS concentrations compared to MW-307/MW-317, but its record ends in 1996 and this well is only used for water level measurements. MW-307 and MW-317 have very similar depths, screened intervals, and chloride, nitrate, and TDS concentrations, but MW-307's record ends in 1996 and MW-317's record starts in 1997. MW-307 is only used for water level measurements at this time. The water level measurements in MW-307 are very different from MW-317 and MW-235, in that they are discontinuous and up to 30 feet lower during some periods, likely due to the fact that it is an extraction well. These lower water levels do not represent static conditions. **It is recommended that MW-307 be considered for removal from the monitoring network.** The southern pair of wells, MW-332 and MW-338, has well depths of 89 feet and 80 feet respectively, with screened intervals of 69-84 and 65-75 feet respectively, and both are completed in the FA. Their depths, as well as chloride, nitrate, and TDS concentrations are similar, although MW-332's record only spans from April 2000 to August 2001. MW-332's water level measurements are different from MW-338, whose water levels closely resemble those seen in MW-235 and MW-317. The water levels in MW-332 are discontinuous and vary widely, sometimes over 40 feet lower than MW-338, likely due to the fact that it is an extraction well. These lower water levels do not represent static conditions. **It is recommended that MW-332 be considered for removal from the monitoring network**. Although MW-317 and MW-338 are spatially close to each other, and completed at very similar depths, their chloride and TDS concentration records are different; therefore neither is recommended for consideration of removal from the monitoring network at this time.

UNIT C

This area is located in the south-central portion of Regional San, and contains thirty-one (31) monitoring wells. The table below lists all of the wells in the unit, and identifies any proximal well pairings:

Unit C Monitoring Wells	Proximal Well Pairing
MW-228R*	MW-228R/MW-306/MW-324
MW-229R	MW-229R/MW-308/MW-321
MW-232	MW-232/MW-305
MW-233*	MW-233/MW-303/MW-322
MW-236R*	MW-236R/MW-313/MW-320
MW-237	
MW-303*	MW-233/MW-303/MW-322
MW-305	MW-232/MW-305
MW-306*	MW-228R/MW-306/MW-324
MW-308*	MW-229R/MW-308/MW-321
MW-310	
MW-313*	MW-236R/MW-313/MW-320
MW-315*	MW-315/MW-323
MW-320	MW-236R/MW-313/MW-320
MW-321	MW-229R/MW-308/MW-321
MW-322	MW-233/MW-303/MW-322
MW-323	MW-315/MW-323
MW-324	MW-228R/MW-306/MW-324
MW-325	
MW-328*	MW-328/MW-335; MW-333/MW-339
MW-329*	MW-329/MW-336
MW-330*	MW-330/MW-337
MW-331*	MW-331/MW-340/MW-341
MW-333*	MW-328/MW-335; MW-333/MW-339
MW-334*	
MW-335	MW-328/MW-335; MW-333/MW-339
MW-336	MW-329/MW-336
MW-337	MW-330/MW-337
MW-339	MW-328/MW-335; MW-333/MW-339
MW-340	MW-331/MW-340/MW-341
MW-341	MW-331/MW-340/MW-341

*According to the 2003 MRP's Table 4, these wells are for "elevation data only".

There are ten locations of proximal well pairings as seen in **Figure 5**. These ten areas contain between two and four different wells. The sets of wells are discussed briefly below.

MW-228R/MW-306/MW-324

This set of wells is located in the north-central part of the Unit C area delineation (**Figure 5**). MW-228R has a total well depth of 45 feet, a screened interval of 28.5-43.5 feet, and is completed in the SSZ. MW-306 has a total well depth of 63 feet, a screened interval of 50-60

feet, and is completed in the FA. MW-324 has a total well depth of 63 feet, a screened interval of 51-61 feet, and is completed in the FA. MW-306's water quality record ends in 1996 and MW-324's record begins in 1997. MW-306 and MW-324 have very similar well completions, and chloride, nitrate, and TDS concentrations. Although MW-228's water quality record also ends in 1996, its chloride, nitrate, and TDS concentrations are different from the deeper wells' records. The water level measurements for MW-306 are discontinuous and vary greatly, sometimes lower than MW-228 and MW-324 by ten to twenty feet, due to the fact that MW-306 is used as an extraction well. These lower water levels do not represent static conditions. For these reasons, **it is recommended that MW-306 be considered for removal from the monitoring network**.

MW-229R/MW-308/MW-321

This set of wells is located in the south-central part of the Unit C area delineation (**Figure 5**). MW-229R has a total well depth of 55 feet, a screened interval of 38.5-53.5 feet, and is completed in the SSZ. MW-308 has a total well depth of 69 feet, a screened interval of 59-69 feet, and is completed in the FA. MW-321 has a total well depth of 68.5 feet, a screened interval of 58-68 feet, and is completed in the FA. MW-308's water quality record ends in 1996 and MW-321's record begins in 1997. MW-308 and MW-321 have very similar well completions and chloride, nitrate, and TDS concentrations. MW-229R's water quality record is similar with respect to nitrate compared to MW-308/321, but different for chloride and TDS. The water level measurements in MW-308 are discontinuous and have measurements over ten feet lower than MW-229 and MW-321, due to the fact that MW-308 is used as an extraction well. These lower water levels do not represent static conditions. **It is recommended that MW-308 be considered for removal from the monitoring network**.

MW-232/MW-305

This pair of wells is located in the northwest of the Unit C area delineation (**Figure 5**). MW-232 has a total well depth of 44 feet, a screened interval of 29.6-43.1 feet, and is completed in the SSZ. MW-305 has a total well depth of 74 feet, a screened interval of 51.5-61.5 feet, and is completed in the FA. Despite their difference in well completion depth, their water quality records are similar for nitrate. The concentrations of chloride and TDS are different, although their chloride and TDS trends are similar. Their water level measurements are very similar, but neither well is recommended for removal at this time.

MW-233/MW-303/MW-322

This set of wells is located in the southwestern portion of the Unit C area delineation (**Figure 5**). MW-233 has a total well depth of 80 feet, a screened interval of 34-49 feet, and is completed in the SSZ. MW-303 has a total well depth of 80 feet, a screened interval of 56-66 feet, and is completed in the FA. MW-322 has a total well depth of 65.5 feet, a screened interval of 55-65 feet, and is completed in the FA. Both MW-233 and MW-303 have water quality records that end in 1996; MW-322's water quality record begins in 1997. Despite their difference in well

completion depths, MW-233 and MW-303/MW-322 have similar concentrations of chloride, nitrate, and TDS. The water level measurements in these three wells are different – MW-303 has measurements that are up to thirty feet lower than MW-233 and MW-322, and there are occasions when MW-233 has water level measurements up to ten feet higher than MW-322. MW-303's water level record is discontinuous and varies greatly compared to the other two wells, due to the fact that it is used for extraction. These lower water levels do not represent static conditions. **It is recommended that MW-303 be considered for removal from the monitoring network**.[3]

MW-236R/MW-313/MW-320

This set of wells is located in the northeastern portion of the Unit C area delineation (**Figure 5**). MW-236R has a total well depth of 47.5 feet, a screened interval of 37-47 feet, and is completed in the SSZ. MW-313 has a total well depth of 66 feet, a screened interval of 56-66 feet, and is completed in the FA. MW-320 has a total well depth of 75 feet, a screened interval of 56-66 feet, and is completed in the FA. The water quality record for MW-236 ends in 1995; the water quality record for MW-313 ends in 1996; and the water quality record for MW-320 starts in 1997. The water quality records for MW-313 and MW-320 are similar to eachother, but MW-236's water quality records show differences for chloride, nitrate, and TDS. The water level measurements in MW-313 are much lower than both MW-236 and MW-320 (by about twenty feet or less) due to the fact that it is an extraction well. These lower water levels do not represent static conditions. **It is recommended that MW-313 be considered for removal from the monitoring network**.

MW-315/MW-323

This pair of wells is located in the central portion of the Unit C area delineation (**Figure 5**). MW-315 has a total well depth of 78 feet, a screened interval of 62.5-78 feet, and is completed in the FA. MW-323 has a total well depth of 78 feet, a screened interval of 62.5-77.5 feet, and is completed in the FA. MW-315's water quality record ends in 1996 and MW-323's water quality record begins in 1997. Their water quality records are similar for chloride, nitrate, and TDS. The water level measurements in MW-315 are discontinuous and vary greatly (above and below MW-323 water levels by up to twenty feet) due to the fact that it is used as an extraction well. These variable water levels do not represent static conditions. **It is recommended that MW-315 be considered for removal from the monitoring network**.

MW-329/MW-336

This pair of wells is located just north of the central portion of the Unit C area delineation (**Figure 5**). MW-329 has a total well depth of 83 feet, a screened interval of 61-76 feet, and is

[3] Combining the two proximal sets of wells MW-233/MW-303/MW-322 and MW-331/MW-340/MW-341 was considered to reduce the number of wells in that area since the two proximal sites are about 350 feet apart. The water quality at the two sites is similar for TDS, but differs for chloride and nitrate, so it is recommended to keep the two sites monitored.

completed in the FA. MW-336 has a total well depth of 72 feet, a screened interval of 55-65 feet, and is completed in the FA. Despite being completed slightly lower than MW-336, MW-329's water quality records are similar to MW-336's for chloride, nitrate, and TDS when they overlap in 2000 and 2001. MW-329's water quality record ends in 2001, while MW-336's record continues. The water level measurements in MW-329 vary compared to those seen in MW-336 usually by about five feet. MW-329 is used as an extraction well, and its variable water levels do not represent static conditions. **It is recommended that MW-329 be considered for removal from the monitoring network**.[4]

MW-330/MW-337

This pair of wells is located in the central portion of the Unit C area delineation (**Figure 5**). MW-330 has a total well depth of 81 feet, a screened interval of 63-78 feet, and is completed in the FA. MW-337 has a total well depth of 76 feet, a screened interval of 65-75 feet, and is completed in the FA. MW-330 and MW-337 have very similar well completions. Their water quality records are similar to eachother for chloride, nitrate, and TDS when they overlap in 2000 and 2001. MW-330's water quality record ends in 2001, while MW-337's record continues. The water level measurements in MW-330 vary compared to those seen in MW-337 usually by between 15 and 25 feet. MW-330 is used as an extraction well, and its variable water levels do not represent static conditions. **It is recommended that MW-330 be considered for removal from the monitoring network**.

MW-331/MW-340/MW-341

This set of wells is located in the southwestern portion of the Unit C area delineation (**Figure 5**). MW-331 has a total well depth of 80 feet, a screened interval of 61-76 feet, and is completed in the FA. MW-340 has a total well depth of 78 feet, a screened interval of 65-75 feet, and is completed in the FA. MW-341 has a total well depth of 75 feet, a screened interval of 65-75 feet, and is completed in the FA. All three wells have similar well completions. MW-331's water quality record ends in 2001, but MW-340 and MW-341 have water quality continuing from 2000 to 2014. MW-331 has similar water quality to MW-341, but despite their proximity and same screened interval, MW-340 and MW-341 have very different chloride and nitrate concentrations. The water level measurements in the three wells are different – MW-340 and MW-341 have similar water levels, but are up to two feet different from eachother. MW-331 has much more variable water level measurements, sometimes having water levels lower than MW-340/MW-341 by up to twenty feet. These lower water levels seen in MW-331 do not represent static conditions, as this well is used for extraction. **It is recommended that MW-331 be considered for removal from the monitoring network**.

[4] Combining the two proximal pairs MW-329/MW-336 and MW-330/MW-337 was considered to reduce the number of wells in that area since the two proximal sites are about 350 feet apart. The water quality at the two sites varies for chloride, nitrate and TDS, so it is recommended to keep the two sites monitored.

MW-328/MW-335; MW-333/MW-339

This set of wells is located in the north-central portion of the Unit C area delineation (**Figure 5**). MW-328 has a total well depth of 71 feet, a screened interval of 50-70 feet, and is completed in the FA. MW-335 has a total well depth of 70 feet, a screened interval of 55-65 feet, and is completed in the FA. MW-333 has a total well depth of 77 feet, a screened interval of 49.5-69.5 feet, and is completed in the FA. MW-339 has a total well depth of 70 feet, a screened interval of 55-65 feet, and is completed in the FA. All four of these wells have similar well completions. The water level measurements in MW-328 and MW-333 are variable compared to MW-335 and MW-339 and do not represent static conditions since both wells are used for extraction. Both MW-333 and MW-328 have very brief water quality records starting in 2000 and ending in 2001. MW-335 and MW-339 have water quality records that start in 2000. In terms of chloride, despite differences in absolute concentration in their early records, MW-335 and MW-339 have very similar concentration values starting in 2008 to present. Their nitrate concentrations show similar trends over time and similar concentrations since 2008. Their TDS trends are very similar over time, although their concentrations differ slightly in 2009. Because these two wells are showing similar water level and water quality trends and values, it is recommended that one be considered for removal from the monitoring network. Since MW-339 is close to MW-335, **it is recommended that MW-339 be considered for removal from the monitoring network. It is also recommended that MW-328 and MW-333 be considered for removal from the water level monitoring network.**

UNIT D

This area is located in the southeast portion of Regional San, and contains six (6) monitoring wells. The table below lists all of the wells in the unit, and identifies any proximal well pairings:

Unit D Monitoring Wells	Proximal Well Pairing
MW-309	
MW-311	
MW-312	
MW-314	
MW-318	
MW-319	

There are no proximal well pairings in Unit D as seen in **Figure 6**.

CONCLUSIONS

The following is a list of recommendations (summarized in **Table 1** attached):

1) MW-307 be considered for removal from the monitoring network for both water levels and water quality
    a. MW-307 is used for extraction and its water level measurements do not represent static conditions; MW-317 should be used for water level measurements in the FA at this location.
    b. MW-307 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-317
2) MW-332 be considered for removal from the monitoring network for both water levels and water quality
    a. MW-332 is used for extraction and its water level measurements do not represent static conditions; MW-338 should be used for water level measurements in the FA at this location.
    b. MW-332 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-338
3) MW-306 be considered for removal from the monitoring network for both water levels and water quality
    a. MW-306 is used for extraction and its water level measurements do not represent static conditions; MW-324 should be used for water level measurements in the FA at this location.
    b. MW-306 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-324
4) MW-308 be considered for removal from the monitoring network for both water levels and water quality
    a. MW-308 is used for extraction and its water level measurements do not represent static conditions; MW-321 should be used for water level measurements in the FA at this location.
    b. MW-308 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-321
5) MW-303 be considered for removal from the monitoring network for both water levels and water quality
    a. MW-303 is used for extraction and its water level measurements do not represent static conditions; MW-322 should be used for water level measurements in the FA at this location.
    b. MW-303 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-322
6) MW-313 be considered for removal from the monitoring network for both water levels and water quality

   a. MW-313 is used for extraction and its water level measurements do not represent static conditions; MW-320 should be used for water level measurements in the FA at this location.
   b. MW-313 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-320
7) MW-315 be considered for removal from the monitoring network for both water levels and water quality
   a. MW-315 is used for extraction and its water level measurements do not represent static conditions; MW-323 should be used for water level measurements in the FA at this location.
   b. MW-315 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-323
8) MW-329 be considered for removal from the monitoring network for both water levels and water quality
   a. MW-329 is used for extraction and its water level measurements do not represent static conditions; MW-336 should be used for water level measurements in the FA at this location.
   b. MW-329 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-336
9) MW-330 be considered for removal from the monitoring network for both water levels and water quality
   a. MW-330 is used for extraction and its water level measurements do not represent static conditions; MW-337 should be used for water level measurements in the FA at this location.
   b. MW-330 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-337
10) MW-331 be considered for removal from the monitoring network for both water levels and water quality
   a. MW-331 is used for extraction and its water level measurements do not represent static conditions; MW-341 should be used for water level measurements in the FA at this location.
   b. MW-331 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-341
11) MW-339 be considered for removal from the monitoring network for both water levels and water quality
   a. The water levels and water quality in MW-339 are similar to those found in MW-335 and since they are very close spatially to one another (about 300 feet), it is recommended that one be chosen for the monitoring network.
12) MW-328 be considered for removal from the monitoring network for water levels

a. MW-328 is used for extraction and its water level measurements do not represent static conditions; MW-335 should be used for water level measurements in the FA at this location.
b. MW-328 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-335

13) MW-333 be considered for removal from the monitoring network for water levels
a. MW-333 is used for extraction and its water level measurements do not represent static conditions; MW-335 should be used for water level measurements in the FA at this location.
b. MW-333 is currently not used for water quality monitoring, as its water quality is similar to nearby MW-335

Most of the wells recommended to be considered for removal from the monitoring network are wells used for extraction. These wells are not currently monitored for water quality, but they should also be discontinued for measuring water levels, since the water levels measured in them are affected by pumping and do not represent static conditions. The wells are not consistently on or off during the water level measurement event, and so their hydrograph presents conflicting information (sometimes the water level elevation represents a pumping water level and sometimes a static water level). Routine extraction well maintenance is sufficient for determining what the pumping drawdowns and well capacities are for the extraction wells. **Water level measurements in the extraction wells that are taken during the semi-annual sampling events are not useful for hydrograph and groundwater elevation contour map purposes.** Groundwater elevation contour maps using water levels that may represent either pumping or static conditions are inconsistent with other wells on the property, limiting the usefulness of the contour map for determining groundwater flow direction and amount. The extraction wells are paired with other monitoring wells that provide more useful aquifer-specific water level information that should be used for long-term hydrographs and groundwater contour maps.

At this time, pairs of wells that are completed in the SSZ and FA are suggested to remain being monitored together. The two wells completed at different depths provide a vertical discretization that is useful for characterizing groundwater conditions and observing the vertical movement and variability of constituents' concentrations over time.

Table 1 Recommended Wells for Removal From MRP

Well	Screened Interval[1]	Zone Monitored	Monitoring Program			
			Water Level		Water Quality	
			Current	Proposed	Current	Proposed
MISCELLANEOUS FIRST AQUIFER WELLS						
North Side Wells						
339	55-65	55-65	x	Remove	x	Remove
FIRST AQUIFER CAP WELLS						
North Side Wells						
303	56-66	60-75	x	Remove	-	-
306	50-60	60-75	x	Remove	-	-
313	56-66	60-75	x	Remove	-	-
315	62-78	62-80	x	Remove	-	-
328	50-70	50-70	x	Remove	-	-
329	61-76	61-76	x	Remove	-	-
330	63-78	63-78	x	Remove	-	-
331	61-76	61-76	x	Remove	-	-
333	49-70	49-70	x	Remove	-	-
South Side Wells						
307	60-70	60-75	x	Remove	-	-
308	59-69	60-75	x	Remove	-	-
332	69-84	69-84	x	Remove	-	-

[1] Feet below ground surface.

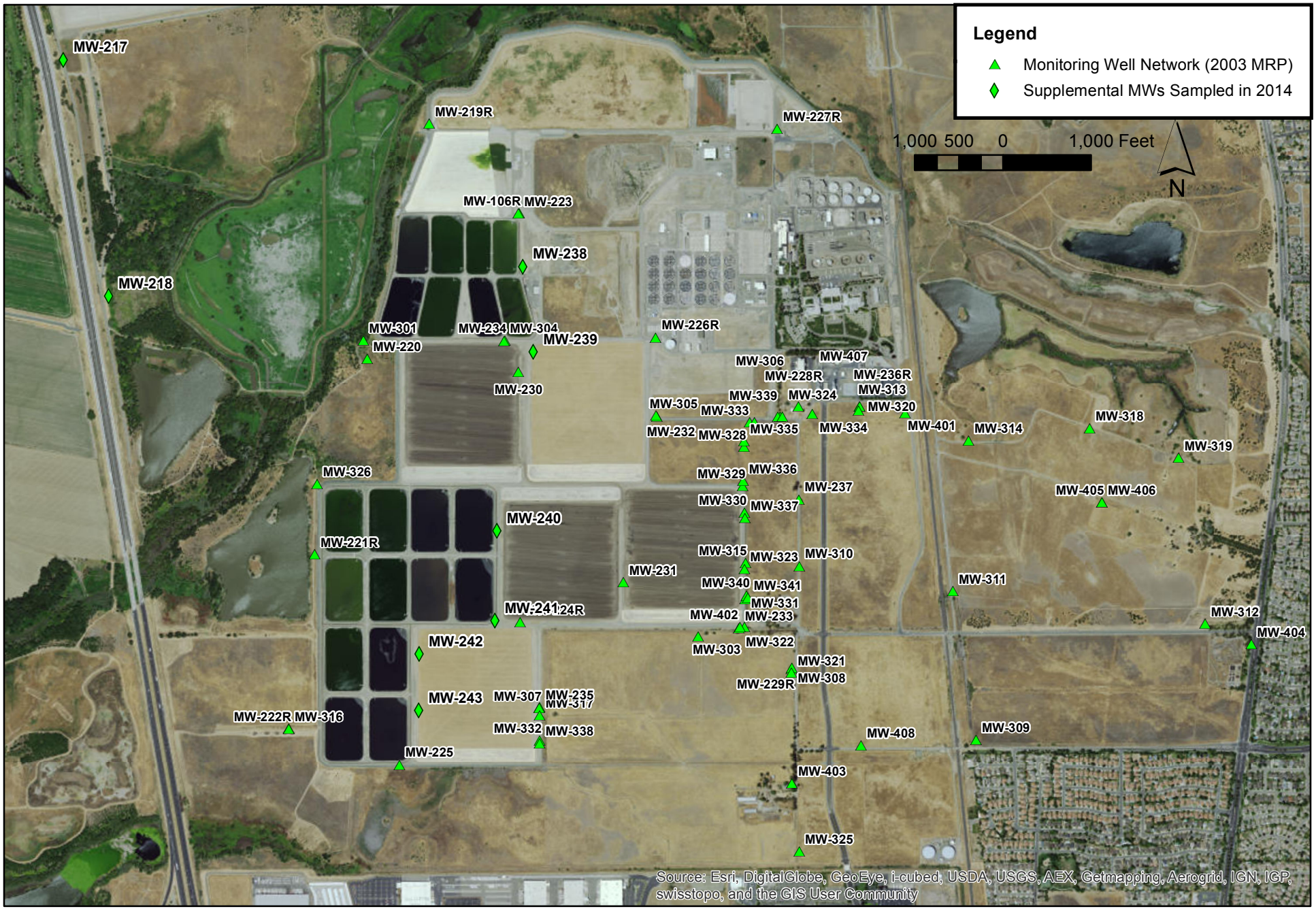

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Figure 1
Location Map
Current Monitoring Well Network

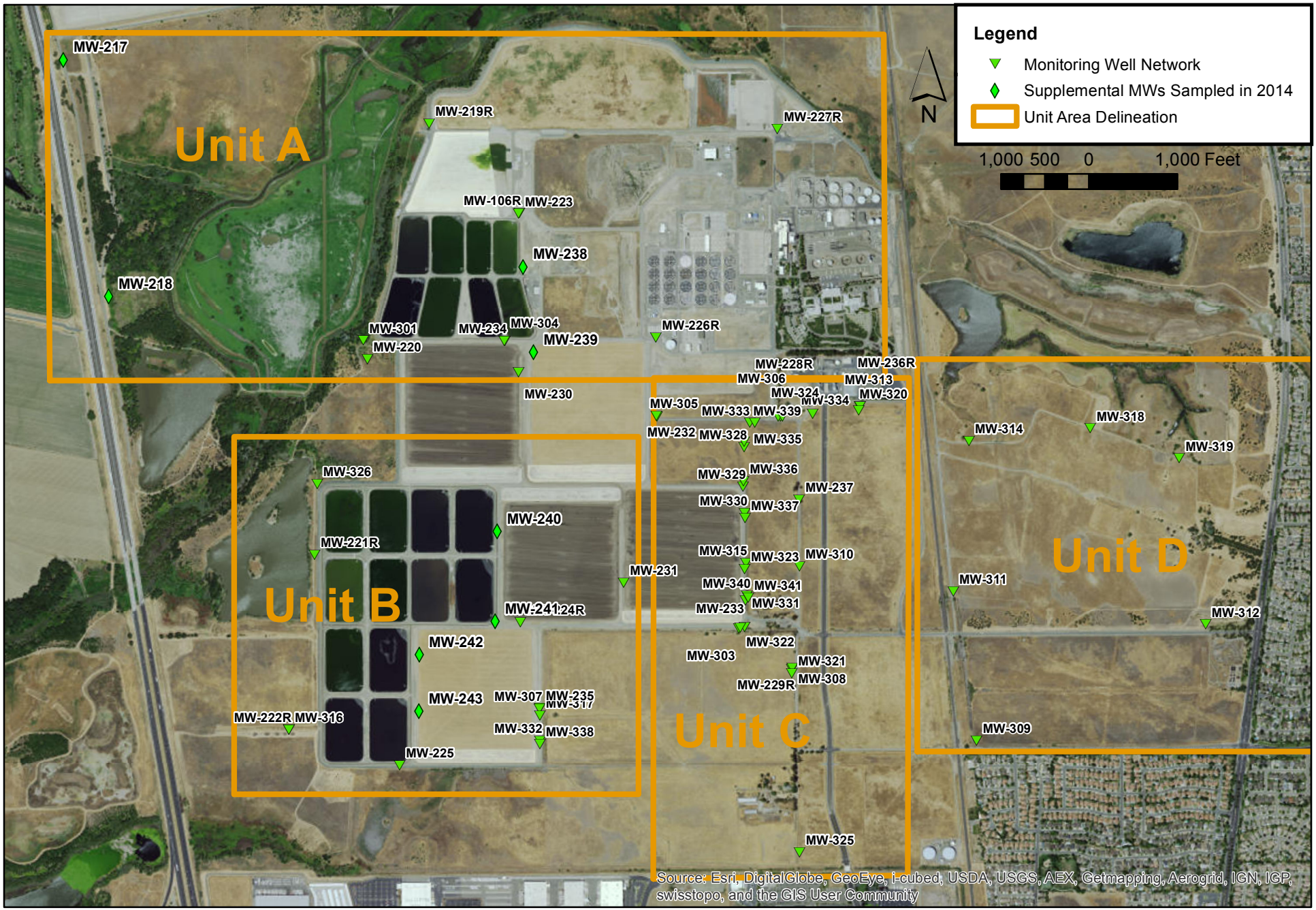

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Figure 2
Current Monitoring Well Network
Unit Area Delineation for Analysis

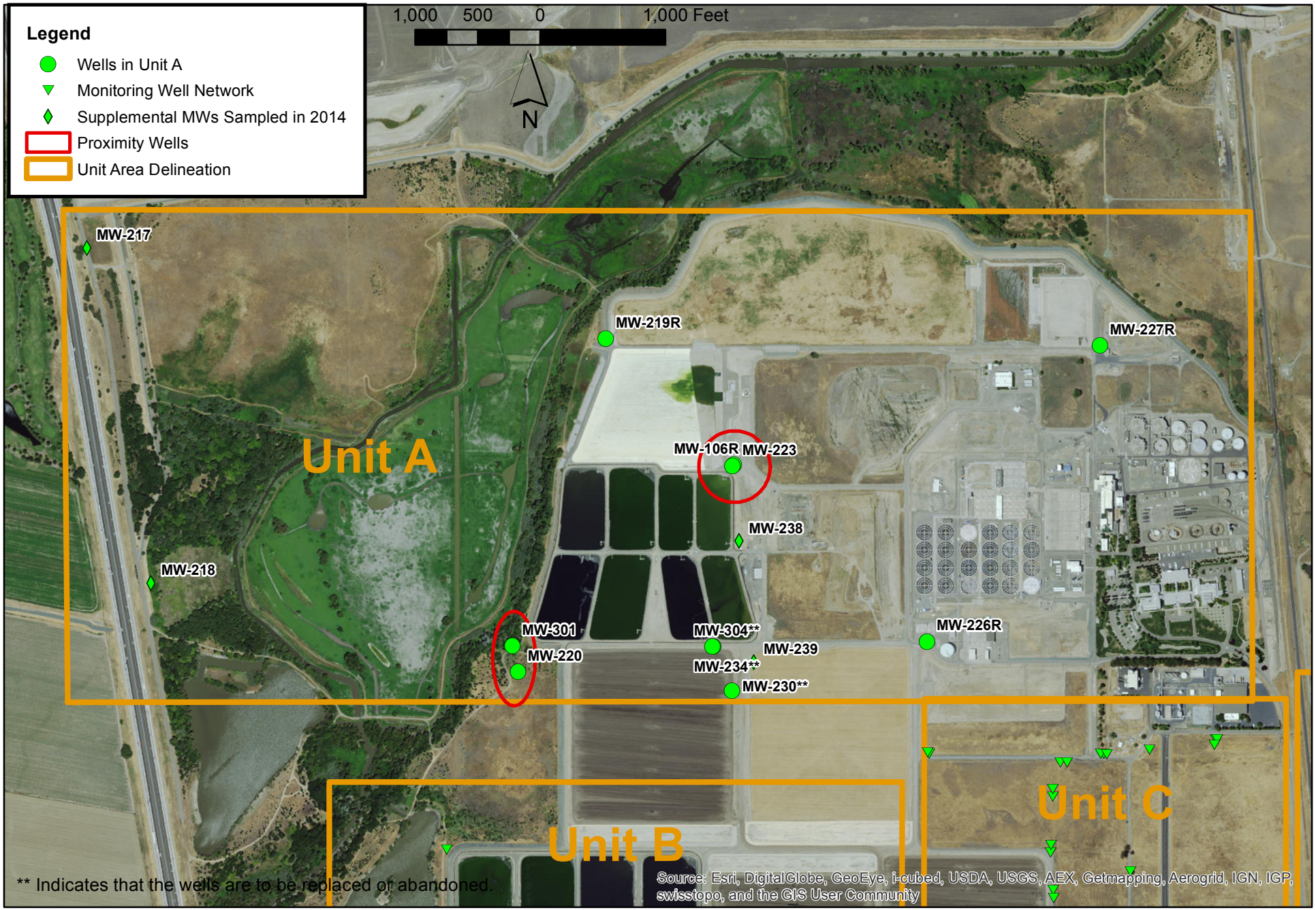

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Figure 3
Current Monitoring Well Network
Wells in Unit A

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Figure 4
Current Monitoring Well Network
Wells in Unit B

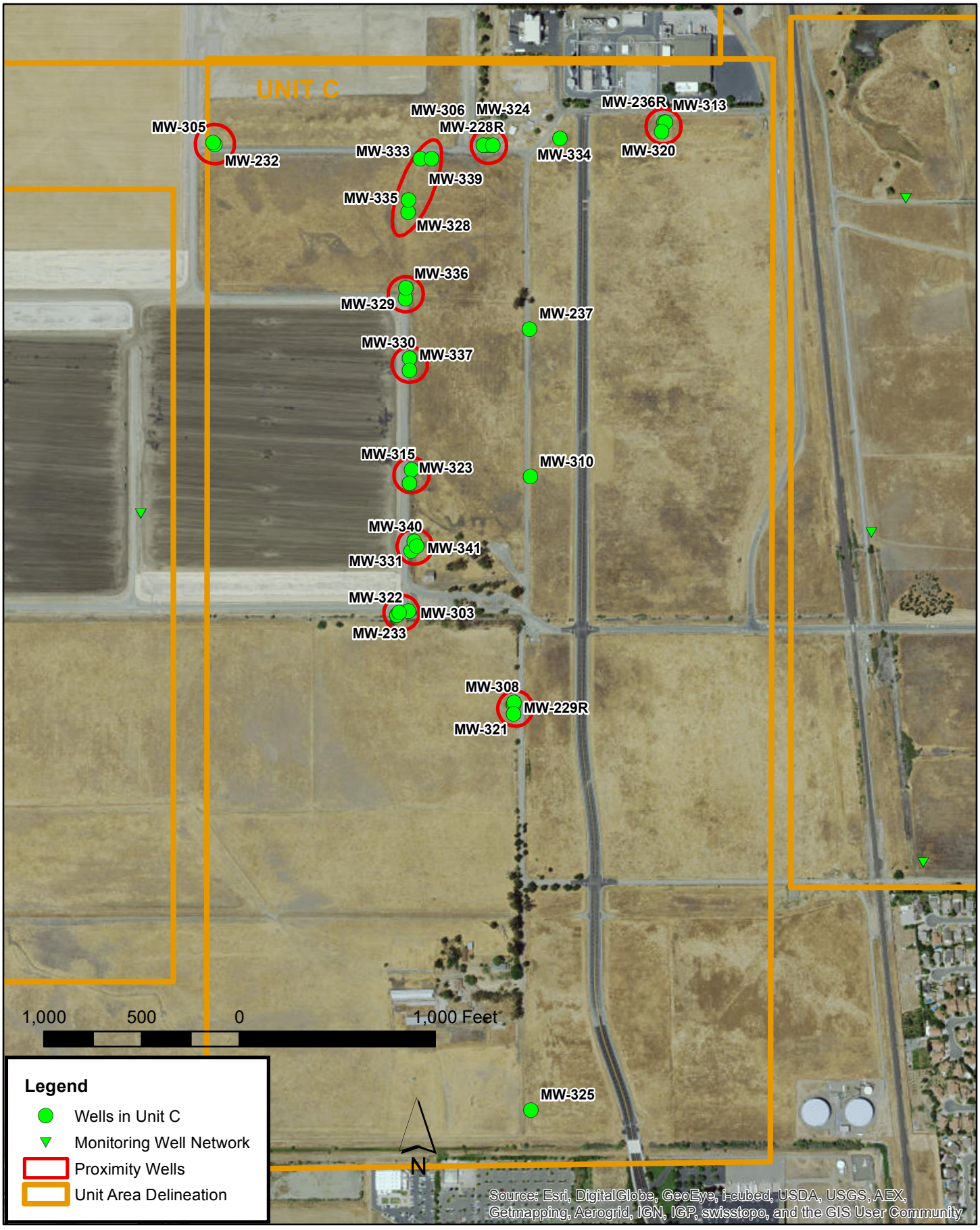

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Figure 5
Current Monitoring Well Network
Wells in Unit C

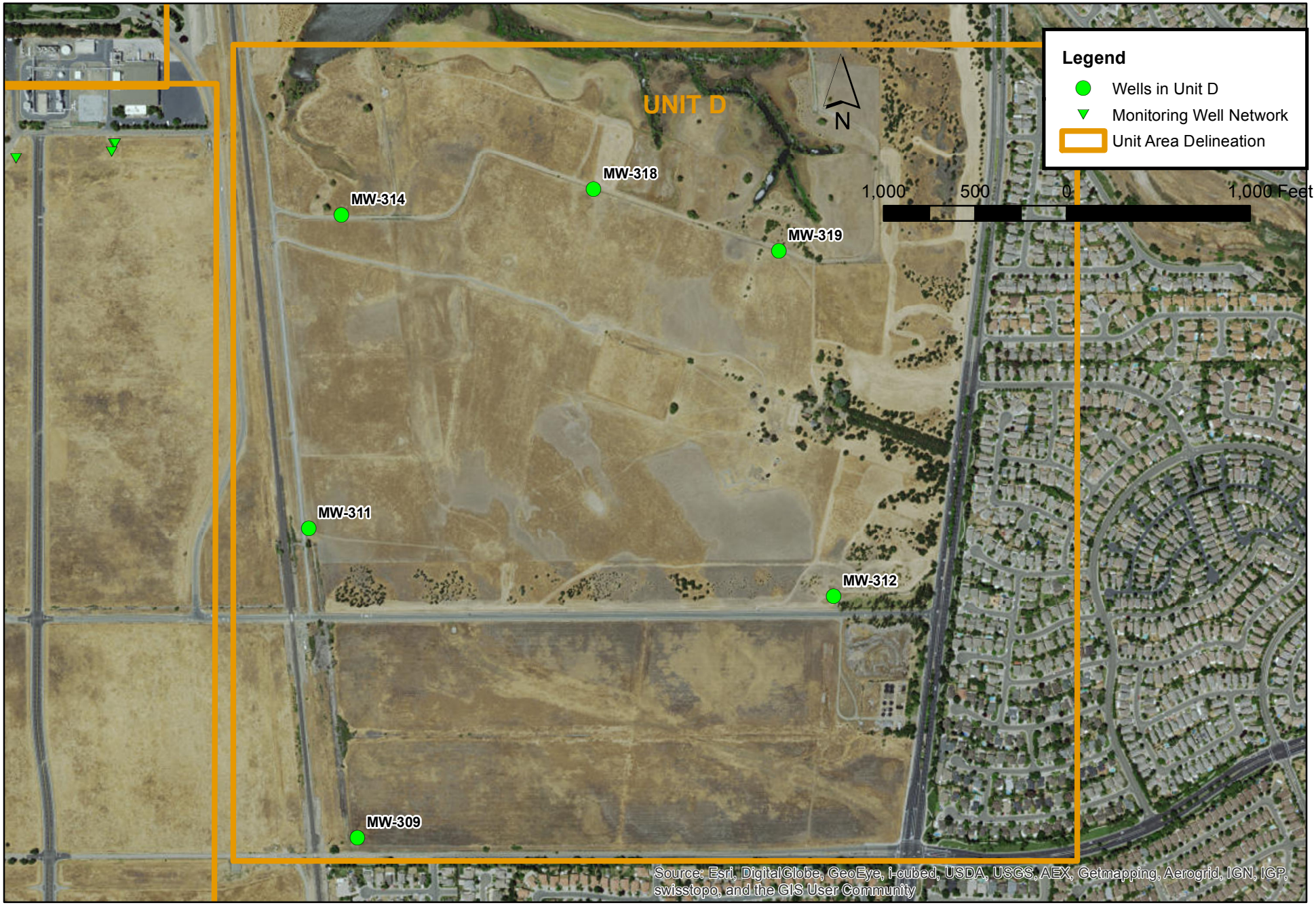

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Figure 6
Current Monitoring Well Network
Wells in Unit D