Tuesday, February 21, 2023 at 3:30 PM
Valley Sanitary District Board Room
45500 Van Buren St., Indio, CA 92201

EAST VALLEY RECLAMATION AUTHORITY
AGENDA

The East Valley Reclamation Authority meeting is open to the public and conducted in person. In addition to attending in person, members of the public may view and participate in meeting via the following:

Zoom link: https://us06web.zoom.us/j/84193305704

Meeting ID: 841 9330 5704

To address the Board of Directors during the virtual live session via zoom, please email the Clerk of the Board at hgould@valley-sanitary.org or, alternatively, during the specific agenda item or general comment period (i.e. non-agenda items), please use the "raise your hand" function in zoom in order to be recognized by the Clerk of the Board in order to provide comments in real time.

The Clerk of the Board will facilitate to the extent possible any email requests to provide oral testimony that are sent during the live meeting. Members of the public may provide Oral testimony in person or during the virtual live session and are limited to three minutes each. To address the Board in person please complete speaker request card located at in the Board Room and give it to the Clerk of the Board.

If you are unable to provide comments during the meeting, written public comments on agenda or non-agenda items may be submitted by email to the Clerk of the Board at hgould@valley-sanitary.org. Written comments must be received by the Clerk of the Board no later than 11:00 a.m. on the day of the meeting.

1. **CALL TO ORDER**

2. **PLEDGE OF ALLEGIANCE**

3. **ROLL CALL**

4. **PUBLIC COMMENT**

5. **CONSENT CALENDAR**
   Consent calendar items are expected to be routine and noncontroversial, to be acted upon by the Board of Directors at one time, without discussion. If any Board member requests that an item be

removed from the consent calendar, it will be removed so that it may be acted upon separately.

5.1 Approve Meeting Minutes of September 9, 2022
Recommendation: Approve

6. ADMINISTRATIVE ITEMS

6.1 Elect Board Officers for Calendar Year 2023
Recommendation: Action

6.2 Adopt Resolution 2023-23 Appointing an Administrator and Alternate Administrator for the East Valley Reclamation Authority
Recommendation: Approve

6.3 Fiscal Year 2021-22 Audited Financial Statements
Recommendation: Receive and File

6.4 Fiscal Year 2022-23 Mid-Year Budget Report
Recommendation: Receive and File

6.5 Receive and Discuss the Final Geophysical Survey Report by Geoscience
Recommendation: Discuss

6.6 Receive and Discuss the Hydrogeologic Evaluation and Preliminary Injection Well Modeling Report Prepared by Todd Groundwater
Recommendation: Discuss

6.7 Receive and Discuss Draft Recycled Water Feasibility Study Presentation prepared by Carollo Engineers, Inc.
Recommendation: Discuss

7. GENERAL MANAGER'S REPORT

8. AUTHORITY BOARD MEMBER COMMENTS AND / OR QUESTIONS

9. ADJOURNMENT

POSTED February 16, 2023
Holly Gould
Clerk of the Board
East Valley Reclamation Authority

PUBLIC NOTICE

In compliance with the Americans with Disabilities Act, access to the Board Room and Public Restrooms has been made. If you need special assistance to participate in this meeting, please contact Valley Sanitary District (760) 235-5400. Notification 48 hours prior to the meeting will enable the District to make reasonable arrangements to ensure accessibility to this meeting (28 CFR 35.102-35.104 ADA TITLE II). All public records related to open session items contained on this Agenda are available upon request at the Administrative Office of Valley Sanitary District located at 45-500 Van Buren Street, Indio, CA 92201. Copies of public records are subject to fees and charges for reproduction.

ITEM 5.1
ACTION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Holly Gould, EVRA Clerk of the Board**
SUBJECT:	**Approve Meeting Minutes of September 9, 2022**

Suggested Action
Approve

Strategic Plan Compliance

Fiscal Impact
None

Environmental Review
This does not qualify as a project for the purposes of CEQA.

Background
The minutes of the East Valley Reclamation Authority meeting held September 6, 2022.

Recommendation
Approve

Attachments
06 Sep 2022 EVRA Minutes.edited.pdf

UNOFFICIAL UNTIL APPROVED BY EAST VALLEY RECLAMATION AUTHORITY
EAST VALLEY RECLAMATION AUTHORITY

SPECIAL MEETING
September 6, 2022
MINUTES

President Dennis Coleman called to order the Regular Meeting of the East Valley Reclamation Authority at 9:37 a.m. in the Valley Sanitary District Board Room at 45-500 Van Buren Street, Indio, California.

1. CALL TO ORDER

1.1 Roll Call

Directors Present:
President Dennis Coleman *(Valley Sanitary District)*
Vice President Glenn Miller *(City of Indio)*
Secretary Elaine Holmes *(City of Indio)*
Treasurer William Teague *(Valley Sanitary District)*

Staff Present:
Beverli Marshall – General Manager, *Valley Sanitary District*
Reymundo Trejo – General Manager, *Indio Water Authority*
Holly Gould – EVRA Clerk of the Board, *Valley Sanitary District*
Ron Buchwald – Engineering Services Manager, *Valley Sanitary District*
Brian Kinder – Manager of Finance & Customer Service*, Indio Water Authority*

1.2 Pledge of Allegiance

2. PUBLIC COMMENT - NONE.

3. CONSENT CALENDAR

3.1 Minutes of June 29, 2022. **Recommendation:** Approve

It was moved by Vice President Miller, seconded by Treasurer Teague, to **APPROVE** the Consent Calendar as submitted, 3-0. Secretary Holmes abstained from the vote due to her absence at the meeting.

4. ADMINISTRATIVE ITEMS

4.1 Authorize the Valley Sanitary District General Manager to Execute a Professional Services Agreement with Todd Groundwater to Complete a Groundwater Model Under and Around Valley Sanitary District in an Amount Not to Exceed $87,295

An analysis completed by the East Valley Reclamation Authority (EVRA) determined that a groundwater injection system at the VSD Water Reclamation Facility to recharge the Indio Subbasin is possible. To further analyze the project's viability, EVRA staff recommends a more micro-level analysis of the Subbasin. Todd Groundwater is the consultant that completed the Indio Groundwater Subbasin Alternative Plan. Due to their access to the data needed to complete the analysis, using Todd Groundwater is the more efficient and cost-effective way of achieving the report. The total cost of the contract is $87,295. The approximate timeline for this report is 12 months, with a draft report by February 2023.

It was moved by Vice President Miller, seconded by Secretary Holmes, and unanimously carried by roll call vote to **APPROVE** the VSD General Manager to execute a professional services agreement with Todd Groundwater in an amount not to exceed $87,295.

4.2 Authorize the Valley Sanitary District General Manager to Execute a Professional Services Agreement with Carollo Engineers, Inc. to Complete An Updated Comprehensive Recycled Water Master Plan in an Amount Not to Exceed $368,583

An updated Comprehensive Recycled Water Master Plan (RWMP) is needed to further analyze the project's viability and the feasibility of other recycled water projects. Given current and projected drought conditions, projects impractical in previous analyses need to be re-evaluated in preparation for the CEQA process. Carollo Engineers, Inc. completed a recycled water feasibility study for the City of Indio and is familiar with the geographical and economic conditions. Having Carollo conduct the analysis is a more efficient and cost-effective way to update the report. The total cost of the contract is $368,583.

It was moved by Secretary Holmes, seconded by Treasurer Teague, and unanimously carried by roll call vote to **APPROVE** the VSD General Manager to execute a professional services agreement with Carollo Engineers, Inc. in an amount not to exceed $368,583.

4.3 Authorize the City of Indio City Manager to Execute a Professional Services Agreement with CA Consulting Services LLC to Provide Recycled Water Program Management Services in an Amount Not to Exceed $80,000

The EVRA Board recently adopted the FY 2022-23 budget of nearly $950,000 to develop a comprehensive recycled water master plan, a groundwater model, research grant funding opportunities, and local recycled water customers. The EVRA staff will require highly qualified professional engineering resources to support this effort. The Indio Water Authority recently solicited proposals for technical advisory and engineering program management services. A panel of local public agencies evaluated the proposals. It ranked CA Consulting Services, LLC as the highest firm to provide as-needed Technical Engineering and Program Management services. Based on the recent solicitation and the highly qualified recycled water experts, the EVRA staff requested a scope of services and budget to support recycled water program management support services. CA Consulting Services, LLC submitted a scope of work and cost proposal of $80,000 and a term of 18 months. The scope of work includes monthly communications and program management support, technical review of a recycled water master plan analysis to be prepared by Carollo Engineers, technical review of a groundwater model for a potential IPR project that Todd Groundwater will develop, support with discussions with local tribes, support with cross connection shut-down testing, review of retrofit requirements for potentially converting the Eagle Falls Golf Course to recycled water irrigation, reviewing and assisting in pursuing grant funding opportunities, providing Recycled Water On-Site Supervisor Training as required for new use sites, and any other support as needed.

It was moved by Vice President Miller, seconded by Secretary Holmes, and unanimously carried by roll call vote to **APPROVE** the Indio City Manager to execute a professional services agreement with CA Consulting Services LLC in an amount not to exceed $80,000.

4.4 Adopt Resolution 2022-22 Determining That a Commercial Food Waste Diversion Program is an Appropriate Activity of the East Valley Reclamation Authority

The East Valley Reclamation Authority (EVRA) is a joint powers authority that was established in 2013 with powers and operational activities identified in the Joint Exercise of Powers Agreement (JEPA). The JEPA defines the Operations of EVRA as “the tertiary or enhanced treatment of water supplied to the Authority by VSD to be delivered to IWA for its use, and such other activities as the Board may determine from time to time ."In response to Senate Bill (SB) 1383, which requires restaurants and residents to dispose of food waste separately from regular trash, The City approved its Sustainability Plan and 2022 Annual Work Plan with identifying Goal 3 Zero Waste, which includes supporting the business community by working with restaurants to develop a food waste diversion program. VSD adopted its 2020 Strategic Plan identifying Objective 2.1: Increase recycling and reuse of resources and byproducts and Objective 6.2: Increase regional collaboration. The United States Environmental Protection Agency has identified anaerobic digestion at wastewater treatment facilities as a beneficial solution to reducing greenhouse gas emissions by capturing the methane produced by the food waste destruction process, creating renewable biogas that can reduce energy costs at the treatment facility; and reduce the cost of hauling food waste to landfill sites that are often a significant distance from the origination point. Resolution 2022-22 will expand EVRA's operational activities to include a food waste diversion program as an efficient vehicle to enable the City and VSD to discuss the viability of a joint program for mutual benefit.

It was moved by President Coleman, seconded by Treasurer Teague, and unanimously carried by roll call vote to **ADOPT** Resolution No. 2022-22, determining that a commercial food waste diversion program is an appropriate activity of the East Valley Reclamation Authority.

5. GENERAL MANAGERS’ REPORT

Reymundo Trejo, IWA General Manager, stated that he would have an update from Geoscience for the meeting.

6. AUTHORITY BOARD MEMBER COMMENTS AND/OR QUESTIONS - NONE

7. ADJOURN

There being no further business to discuss, the meeting was ***ADJOURNED*** at 10:32 a.m.

Holly Gould
EVRA Clerk of the Board
Approved:

ITEM 6.1
ACTION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Dr. Beverli A. Marshall, VSD General Manager**
SUBJECT:	**Elect Board Officers for Calendar Year 2023**

Suggested Action
Action

Strategic Plan Compliance

Fiscal Impact
There is no fiscal impact.

Environmental Review
This does not qualify as a project for the purposes of CEQA.

Background
At the first meeting of each calendar year the Board of Directors elects the officers: President, Vice President, Secretary, and Treasurer. Traditionally, the President and Vice President are from different agencies and the previous year's Vice President transitioning to the President role.

The Vice President for 2022 was Director Dennis Coleman from Valley Sanitary District. As Director Coleman did not run for re-election, the traditional transition is not an option.

Recommendation
Staff recommends that the Board elect the officers for the East Valley Reclamation Authority for Calendar Year 2023.

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EVRA

East Valley Reclamation Authority

ITEM 6.2
RESOLUTION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Dr. Beverli A. Marshall, VSD General Manager**
SUBJECT:	**Adopt Resolution 2023-23 Appointing an Administrator and Alternate Administrator for the East Valley Reclamation Authority**

Suggested Action
Approve

Strategic Plan Compliance

Fiscal Impact
There is no fiscal impact.

Environmental Review
This item does not qualify as a project for the purposes of CEQA.

Background
In accordance with Section 4.3, the term for this officer shall be no longer than one calendar year from January 1 to December 31. Staff recommends that these positions be reappointed by the Board at the beginning of each calendar year at the same time as it elects its Board officers.

The current Administrator is Beverli A. Marshall, VSD General Manager, and Reymundo Trejo, IWA General Manager. Based on Dr. Marshall's impending resignation from VSD, the logical choice is to appoint Reymundo Trejo as the Administrator and Ron Buchwald, VSD District Engineer, as the Alternate Administrator.

Recommendation
Staff recommends that the Board of Directors adopt Resolution 2023-23 appointing an Administrator and Alternate Administrator for the East Valley Reclamation Authority.

Attachments
Resolution 2023-23.pdf

RESOLUTION NO. 2023-23

RESOLUTION OF THE BOARD OF DIRECTORS OF THE EAST VALLEY RECLAMATION AUTHORITY APPOINTING AN ADMINISTRATOR AND AN ALTERNATE ADMINISTRATOR

WHEREAS, the East Valley Reclamation Authority (the "Authority") is a joint powers authority duly organized and existing under and pursuant to Articles 1 through 4 (com1mencing with Section 6500), Chapter 5, Division 7, Title 1 of the California Government Code (the "Act") pursuant to that certain Joint Exercise of Powers Agreement, dated as of December 18, 2013, (the "Joint Powers Agreement"), by and between the City of Indio (the "City") and the Valley Sanitary District (the "District");

WHEREAS, the Board of the Authority desires to appoint an administrator and an alternate administrator to carry out the administrative and signatory functions of the East Valley Reclamation Authority;

NOW, THEREFORE, THE EAST VALLEY RECLAMATION AUTHORITY DOES HEREBY RESOLVE, DETERMINE AND ORDER AS FOLLOWS:

Section 1. The above recitals, and each of them, are true and correct.

Section 2. The Authority hereby appoints Reymundo Trejo of Indio Water Authority as Administrator and Ron Buchwald of Valley Sanitary District as Alternate Administrator of East Valley Reclamation Authority.

Section 3. This Resolution shall take effect February 21, 2023.

PASSED, APPROVED, and **ADOPTED** this 21st day of February 2023, by the following roll call vote:

AYES:
NAYS:
ABSENT:
ABSTAIN:

____
EVRA Board President

ATTEST:

____
EVRA Board Secretary

ITEM 6.3
ACTION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Brian Kinder, IWA Manager of Finance & Customer Service**
SUBJECT:	**Fiscal Year 2021-22 Audited Financial Statements**

Suggested Action
Receive and File

Strategic Plan Compliance

Fiscal Impact
No fiscal impact associated with this report.

Environmental Review
This item does not qualify as a project for the purposes of CEQA.

Background
The East Valley Reclamation Authority (EVRA) is required to have an independent auditor conduct a financial audit each fiscal year. For the fiscal year ending June 30, 2022, the firm of Lance, Soll & Lunghard LLP conducted the audit. It is their opinion that the annual financial reports present fairly in all material respects, the financial position of EVRA and the reports are in conformity with accounting principles generally accepted in the United States.

Financial Highlights

- Total Net Position for EVRA totaled $760,721, an increase of $442,286 from the prior year.
- Total revenues from operating and nonoperating came in at $446,336. The revenue increase mostly came from agency contributions which are classified as nonoperating revenue.
- Operating expenses totaled $4,050, a decrease of $863 from the prior year.
- Capital investment for the Recycled Water Injection Project came in at $132,336, an increase of $6,170 from the prior year.

The auditors has no findings for this fiscal year.

Recommendation
Staff recommends that the Board of Directors receive and file the Audited Financial Statements for the Fiscal Year Ending June 20, 2022.

Attachments
Final 2021-22 Audited Financial Statements.pdf

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EVRA
East Valley Reclamation Authority

SUBMITTAL TO THE JOINT POWERS AUTHORITY
EAST VALLEY RECLAMATON AUTHORITY

Board of Directors Meeting
February 21, 2023

FROM: EVRA JPA Staff

SUBJECT: Fiscal Year 2021-22 Audited Financial Statements

RECOMMENDED MOTION: Receive and File

SUMMARY: The East Valley Reclamation Authority (EVRA) is required to have an independent auditor conduct a financial audit each fiscal year. For the fiscal year ending June 30, 2022, the firm of Lance, Soll & Lunghard LLP conducted the audit. It is their opinion that the annual financial reports present fairly in all material respects, the financial position of EVRA and the reports are in conformity with accounting principles generally accepted in the United States.

Financial Highlights

- Total Net Position for EVRA totaled $760,721, an increase of $442,286 from the prior year.
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- Operating expenses totaled $4,050, a decrease of $863 from the prior year.
- Capital investment for the Recycled Water Injection Project came in at $132,336, an increase of $6,170 from the prior year.

The auditors had no findings for this fiscal year.

Prepared by:
Brian M Kinder
IWA Manager of Finance and
Customer Service

	Account Number	Dollars
Costs associated with this action		$0.00
Current Fiscal Year Budget		$0.00

Legal Review		N/A
Indio Water Authority Review	Reymundo Trejo, P.E.	
Valley Sanitary District	Dr. Beverli Marshall	

LSL

EAST VALLEY RECLAMATION AUTHORITY

JUNE 30, 2022

FINANCIAL STATEMENTS

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FINANCIAL STATEMENTS

JUNE 30, 2022

EAST VALLEY RECLAMATION AUTHORITY

FINANCIAL STATEMENTS

FOR THE YEAR ENDED JUNE 30, 2022

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INDEPENDENT AUDITORS' REPORT

To the Board of Directors
East Valley Reclamation Authority
Indio, California

Report on the Financial Statements

Opinions

We have audited the accompanying financial statements of East Valley Reclamation Authority, (the "Authority") as of and for the year ended June 30, 2022, and the related notes to the financial statements, which collectively comprise the Authority's basic financial statements as listed in the table of contents.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Authority, as of June 30, 2022, and the changes in financial position and cash flows thereof for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinions

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the Authority and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audits. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the Authority's ability to continue as a going concern for twelve months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if, there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards* we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Authority's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the Authority's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

Other Reporting Responsibilities

Required Supplementary Information

Management has omitted the management's discussion and analysis that accounting principles generally accepted in the United States of America require to be presented to supplement the basic financial statements. Such missing information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. Our opinion on the basic financial statements is not affected by this missing information.

To the Board of Directors
East Valley Reclamation Authority
Indio, California

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated December 7, 2022 on our consideration of the Authority's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Authority's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Authority's internal control over financial reporting and compliance.

Lance, Soll & Lunghard, LLP

Brea, California
December 7, 2022

EAST VALLEY RECLAMATION AUTHORITY

STATEMENT OF NET POSITION
JUNE 30, 2022

Assets:		
Current Assets:		
Cash and investments	$	628,325
Accrued interest receivable		260
Total Current Assets		628,585
Noncurrent Assets:		
Capital assets - not being depreciated		132,336
Total Noncurrent Assets		132,336
Total Assets		**760,921**
Liabilities:		
Current Liabilities:		
Accounts payable		200
Total Current Liabilities		200
Total Liabilities		**200**
Net Position:		
Investment in capital assets		132,336
Unrestricted		628,385
Total Net Position	**$**	**760,721**

The notes to financial statements are an integral part of this statement.

EAST VALLEY RECLAMATION AUTHORITY

STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION FOR THE YEAR ENDED JUNE 30, 2022

Operating Expenses:	
General and administrative	$ 800
Contractual services	3,250
Total Operating Expenses	**4,050**
Operating (Loss)	(4,050)
Nonoperating Revenues:	
Investment earnings	(3,664)
Contributions from member agencies	450,000
Total Nonoperating Revenues	**446,336**
Change in Net Position	442,286
Net Position - Beginning	318,435
Net Position - Ending	**$ 760,721**

The notes to financial statements are an integral part of this statement.

EAST VALLEY RECLAMATION AUTHORITY

STATEMENT OF CASH FLOWS
FOR THE YEAR ENDED JUNE 30, 2022

Cash Flows from Operating Activities:		
Cash paid for general and administrative costs	$	(800)
Cash paid to suppliers for contractual services		(3,681)
Net Cash (Used for) Operating Activities		**(4,481)**
Cash Flows from Non-Capital Financing Activities:		
Contributions from member agencies		450,000
Net Cash Provided by Non-Capital Financing Activities		**450,000**
Cash Flows from Capital and Related Financing Activities:		
Acquisition and construction of capital assets		(6,170)
Net Cash (Used for) Capital and Related Financing Activities		**(6,170)**
Cash Flows from Investing Activities:		
Investment earnings		(3,878)
Net Cash (Used for) Investing Activities		**(3,878)**
Net (Decrease) in Cash and Cash Equivalents		435,471
Cash and Cash Equivalents, July 1		192,854
Cash and Cash Equivalents, June 30	**$**	**628,325**

Reconciliation of Operating Loss to Net Cash Used for Operating Activities:		
Operating loss	$	(4,050)
Adjustments to reconcile operating loss to net cash used for operating activities:		
Increase in accounts payable		(431)
Total Adjustments		(431)
Net Cash Used for Operating Activities	**$**	**(4,481)**

Non-Cash Investing Activities:		
Unrealized loss on investments	$	(3,665)

The notes to financial statements are an integral part of this statement.

Note 1: Summary of Significant Accounting Policies

a. Organization

The East Valley Reclamation Authority (EVRA) was created in December 2013 by a Joint Exercise of Powers Agreement (Agreement) between the Valley Sanitary District (VSD) and the City of Indio through the Indio Water Authority (IWA).

The purpose of the EVRA is to develop and implement a planning, programming, funding, construction, and operation strategy for a joint reclaimed/recycled water facility which will provide either recycled water for non-potable use or treated water for groundwater replenishment, and to engage in any other transactions authorized by the Agreement.

According to the agreement, the VSD is responsible for wastewater treatment of municipal sewage as required by permit issued by the California Regional Water Quality Control Board and the IWA is responsible for the conveyance, distribution, and treatment of water necessary to comply with standards for potable use and groundwater replenishment.

The Board of Directors (Board) consists of four members. Two members are appointed by the legislative body of the VSD and two members are appointed by the legislative body of the IWA. Only currently active members of the legislative bodies of the City and VSD may be appointed to the Board. The Board is authorized to exercise those powers necessary or reasonably convenient to carry out the purposes of the Agreement. The President of the Board is selected from among the members of the Board and alternate each calendar year between VSD and the City. The President of the Board is the ex officio member of all standing committees and has the general powers and duties of management of the EVRA.

The Board may adopt, from time to time, such policies, procedures, bylaws, rules and regulations for the conduct of the EVRA's affairs as deemed necessary. The Agreement shall remain in effect unless the Board approves the dissolution of the EVRA. However, the Agreement may not be terminated, and no Member Agency may withdraw its membership until all outstanding obligations of the EVRA have been paid in full or provision has been made for payment in full. In the event of dissolution or termination of the EVRA, the assets of the EVRA shall be distributed to the Members in such manner as shall be determined by the Board.

The books and records for EVRA are maintained by the Indio Water Authority Finance Department at 83101 Avenue 45, Indio, California 92201.

b. Measurement Focus and Basis of Accounting

EVRA reports its activities as an enterprise fund, which is used to account for operations that are financed and conducted in a manner similar to a private business enterprise, wherein the intent of EVRA is that the costs of providing goods or services to the general public on a continuing basis be financed or recovered primarily through user charges. The user charges will primarily consist of charges for operation and maintenance costs which will also include any ongoing costs to lease or purchase real property to accommodate the reclaimed/recycled water facility.

An enterprise fund is accounted for using the economic resources measurement focus and the accrual basis of accounting. This means that all assets and liabilities (whether current or noncurrent) associated with the activity are included on the Statement of Net Position. The Statement of Revenues, Expenses, and Changes in Net Position reflects revenues in the accounting period in which they are earned, and expenses are recognized in the period incurred.

Note 1: Summary of Significant Accounting Policies (Continued)

Operating revenues, such as charges for services, result from exchange transactions associated with principal activity of the fund. Exchange transactions are those in which each party receives and gives up essentially equal values. Non-operating revenues, such as subsidies, taxes, and investment earnings result from non-exchange transactions or ancillary activities. Amounts paid to acquire capital assets are capitalized as assets in the enterprise fund financial statements. Proceeds of long-term debt are recorded as a liability in the enterprise fund financial statements. Amounts paid to reduce long-term indebtedness of the enterprise fund are reported as a reduction of the related liability.

c. Use of Estimates

The financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America and may include amounts based on estimates and assumptions by management. Actual results could differ from those amounts reported.

d. Capital Assets

Capital assets are recorded at cost where historical records are available and at estimated historical cost where no historical records exist. Contributed capital assets are valued at their acquisition value at the date of the acquisition. Generally, capital asset purchases in excess of $5,000 are capitalized if they have an expected useful life of three years or more.

The following schedule summarizes capital asset useful lives:

Machinery, equipment and vehicles	3-20 years
Improvements	40 years
Infrastructure	40 years
Water walls and pumps	70 years

Depreciation is computed using the straight-line method over the estimated useful life of the asset in the financial statements.

e. Net Position

Governmental Accounting Standards Board (GASB) Statement No. 63 adds the concept of Net Position, which is measured on the full accrual basis.

Net Position is divided into three captions under GASB Statement No. 63. These captions apply only to Net Position as determined at the government-wide and proprietary fund level, and are described below:

Net Investment in Capital Assets describes the portion of net position, which is represented by the current net book value of the EVRA's capital assets, less the outstanding balance of any debt issued to finance these assets.

Restricted describes the portion of net position which is restricted as to use by the terms and conditions of agreements with outside parties, governmental regulations, laws, or other restrictions which the EVRA cannot unilaterally alter. These principally include charges for services and contribution from members received for use on capital projects and debt service requirements.

Unrestricted describes the portion of net position which is not restricted as to use.

Note 2: EVRA Project and Financing

On December 2013, the IWA, and the VSD formed the Joint Exercise of Powers Agreement for EVRA, with the mission of augmenting local water resources by maximizing beneficial water reuse. The purpose of the Joint Powers Authority is to develop and implement a planning, programming, funding, construction, and operation strategy for a joint reclaimed/recycled water facility to replenish highly treated recycled water in the groundwater basin via injection wells.

For FY 22-23, EVRA will collaborate with regulatory agencies to seek the services of a consulting firm to develop a groundwater model required for the Engineer's Report approval, as part of the development phase of the project. EVRA will also seek the services of a technical advisor and outreach firm to begin the stakeholder outreach and public engagement process for the project. The project schedule is anticipated to be from Fall 2021 to Spring 2028.

Note 3: Cash and Investments

EVRA's funds are included as part of the City of Indio Water Authority's cash. EVRA currently does not have any investments. The EVRA has $628,325 invested in the City's pooled cash fund. Future EVRA investments may be deposited within the City of Indio's investment portfolio and will be subject to the City's investment policy. Disclosures regarding the City's investment portfolio are included in the City's Annual Comprehensive Financial Report.

Note 4: Member Contributions

Members paid the following amounts during the fiscal year ended June 30, 2022:

Member	Contributions from Member Agencies
City of Indio through the Indio Water Authority	$ 225,000
Valley Sanitary District	225,000
Totals	$ 450,000

Note 5: Commitments and Contingencies

In the normal course of operations, the members have been subjected to certain routine litigation matters which are relevant to EVRA. The ultimate outcome of these lawsuits is not presently determinable; however, in the opinion of management, the amount of losses that might be sustained, if any, would not materially affect the financial position of EVRA.

LSL

December 7, 2022

To the Board of Directors
East Valley Reclamation Authority
Indio, California

We have audited the financial statements of East Valley Reclamation Authority (the "Authority") for the year ended June 30, 2022. Professional standards require that we provide you with information about our responsibilities under generally accepted auditing standards and *Government Auditing Standards*, as well as certain information related to the planned scope and timing of our audit. We have communicated such information in our letter to you dated April 28, 2022. Professional standards also require that we communicate to you the following information related to our audit.

Significant Audit Matters

Qualitative Aspects of Significant Accounting Practices

Management is responsible for the selection and use of appropriate accounting policies. The significant accounting policies used by the Authority are described in the notes to the financial statements. No new accounting policies were adopted, and the application of existing policies was not changed during fiscal year 2021-2022. We noted no transactions entered into by the Authority during the year for which there is a lack of authoritative guidance or consensus. All significant transactions have been recognized in the financial statements in the proper period

Accounting estimates are an integral part of the financial statements prepared by management and are based on management's knowledge and experience about past and current events and assumptions about future events. Certain accounting estimates are particularly sensitive because of their significance to the financial statements and because of the possibility that future events affecting them may differ significantly from those expected. Certain financial statement disclosures are particularly sensitive because of their significance to financial statement users. The financial statement disclosures are neutral, consistent, and clear.

The financial statement disclosures are neutral, consistent, and clear.

Significant or Unusual Transactions

Management is responsible for the policies and practices used to account for significant or unusual transactions. No significant unusual transactions have occurred during fiscal year 2021-2022.

Difficulties Encountered in Performing the Audit

We encountered no significant difficulties in dealing with management in performing and completing our audit.

LSL

To the Board of Directors
East Valley Reclamation Authority
Indio, California

Corrected and Uncorrected Misstatements

Professional standards require us to accumulate all known and likely misstatements identified during the audit, other than those that are trivial, and communicate them to the appropriate level of management. We are pleased to report that no such misstatements were identified during the course of our audit.

Disagreements with Management

For purposes of this letter, a disagreement with management is a financial accounting, reporting, or auditing matter, whether or not resolved to our satisfaction, that could be significant to the financial statements or the auditor's report. We are pleased to report that no such disagreements arose during the course of our audit.

Management Representations

We have requested certain representations from management that are included in the management representation letter dated December 7, 2022.

Management Consultations with Other Independent Accountants

In some cases, management may decide to consult with other accountants about auditing and accounting matters, similar to obtaining a "second opinion" on certain situations. If a consultation involves application of an accounting principle to the Authority's financial statements or a determination of the type of auditor's opinion that may be expressed on those statements, our professional standards require the consulting accountant to check with us to determine that the consultant has all the relevant facts. To our knowledge, there were no such consultations with other accountants.

Other Audit Findings or Issues

We generally discuss a variety of matters, including the significant events or transactions that occurred during the year, business conditions affecting the Authority and business plans and strategies that may affect the risks of material misstatements, the application of accounting principles and auditing standards, with management each year prior to retention as the Authority's auditors. However, these discussions occurred in the normal course of our professional relationship and our responses were not a condition to our retention.

Other Matters

The following new Governmental Accounting Standards Board (GASB) pronouncements were effective for fiscal year 2021-2022 audit:

GASB Statement No. 87, *Leases.*

GASB Statement No. 89, *Accounting for Interest Cost Incurred before the End of a Construction Period.*

GASB Statement No. 97, *Certain Component Unit Criteria, and Accounting and Financial Reporting for Internal Revenue Code Section 457 Deferred Compensation Plans.*

LSL

To the Board of Directors
East Valley Reclamation Authority
Indio, California

The following GASB pronouncements are effective in the following fiscal years' audits and should be reviewed for proper implementation by management:

Fiscal year 2023

GASB Statement No. 91, *Conduit Debt Obligations.*

GASB Statement No. 94, *Public-Private and Public-Public Partnerships and Availability Payment Arrangement.*

GASB Statement No. 96, *Subscription-Based Information Technology Arrangements.*

Fiscal year 2024

GASB Statement No. 99, *Omnibus 2022.*

GASB Statement No. 100, *Accounting Changes and Error Corrections.*

Fiscal year 2025

GASB Statement No. 101, *Compensated Absences.*

Restriction on Use

This information is intended solely for the use of the Board of Directors and management of the Authority and is not intended to be, and should not be, used by anyone other than these specified parties.

Very truly yours,

Lance, Soll & Lunghard, LLP

Brea, California

INDEPENDENT AUDITORS' REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

To the Board of Directors
East Valley Reclamation Authority
Indio, California

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the East Valley Reclamation Authority (the "Authority"), as of and for the year ended June 30, 2022, and the related notes to the financial statements, which collectively comprise the Authority's basic financial statements, and have issued our report thereon dated December 7, 2022.

Report on Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered the Authority's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Authority's internal control. Accordingly, we do not express an opinion on the effectiveness of the Authority's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements, on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or, significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses or significant deficiencies may exist that were not identified.

Report on Compliance and Other Matters

As part of obtaining reasonable assurance about whether the Authority's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the financial statements. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

PrimeGlobal
Lance, Soll & Lunghard, LLP | 203 N. Brea Blvd., Suite 203 | Brea, CA 92821 | Phone: 714.672.0022

To the Board of Directors
East Valley Reclamation Authority
Indio, California

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Authority's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Authority's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Lance, Soll & Lunghard, LLP

Brea, California
December 7, 2022

SCHEDULE OF FINDINGS
JUNE 30, 2022

SECTION I – CURRENT YEAR FINDINGS

No matters were reported.

SECTION II – PRIOR YEAR FINDINGS

No matters were reported.

INDIO WATER AUTHORITY
A COMPONENT UNIT OF THE CITY OF INDIO, CALIFORNIA

STATEMENT OF NET POSITION
PROPRIETARY FUND
JUNE 30, 2022
(with comparative totals for June 30, 2021)

		2022	2021
Assets:			
Current Assets:			
Cash and investments		$ 53,597,637	$ 47,690,233
Restricted cash with fiscal agents		321,456	320,952
Accounts receivable		3,662,176	3,999,186
Accrued interest receivable		73,207	10,113
Inventories		68,043	91,117
Prepaid costs		692,322	652,467
Total Current Assets		58,414,841	52,764,068
Noncurrent Assets:			
Capital assets - not being depreciated		2,778,865	2,707,682
Capital assets - net of accumulated depreciation	146,533,551.00	146,533,551	152,651,945
Total Noncurrent Assets		149,312,416	155,359,627
Total Assets	0.025	**207,727,257**	**208,123,695**
Deferred Outflows of Resources:	3,663,338.78		
Deferred charge on refunding		912,881	978,087
Pension deferrals		1,075,399	1,126,864
OPEB deferrals		1,699,663	1,739,272
Total Deferred Outflows of Resources		**3,687,943**	**3,844,223**
Liabilities:			
Current Liabilities:			
Accounts payable		1,462,465	1,170,681
Accrued liabilities		1,003,205	839,174
Accrued interest		472,894	499,966
Retentions payable		-	5,070
Deposits payable		447,120	415,213
Compensated absences - due in one year		282,610	278,022
Bonds payable - due in one year		2,260,000	2,155,000
Total Current Liabilities		5,928,294	5,363,126
Noncurrent Liabilities:			
Compensated absences		53,132	52,269
Bonds payable		45,603,205	47,919,217
Net pension liability		5,845,113	7,826,781
Net other post-employment benefits liability		10,460,409	9,759,042
Total Noncurrent Liabilities		61,961,859	65,557,309
Total Liabilities		**67,890,153**	**70,920,435**
Deferred Inflows of Resources:			
Pension deferrals		2,560,061	18,871
OPEB deferrals		82,066	103,427
Total Deferred Inflows of Resources		**2,642,127**	**122,298**
Net Position:			
Net investment in capital assets		101,449,211	106,263,497
Restricted for debt service		321,456	320,952
Unrestricted		39,112,253	34,340,736
Total Net Position		**$ 140,882,920**	**$ 140,925,185**

The notes to financial statements are an integral part of this statement.

Note 2: Cash and Investments (Continued)

The Authority has the following recurring fair value measurements as of June 30, 2022:

Investments	Fair Value	Uncategorized	Level 2
Cash and investments pooled with the City of Indio	$ 47,920,335	$ 47,920,335	$ -
Held by Bond Trustee:			
Money Market Funds	321,456	-	321,456
	$ 48,241,791	$ 47,920,335	$ 321,456

Note 3: Investment Income and Unrealized Loss on Investments

The Authority records its investments at fair value, in accordance with GASB Statement No. 31 and GASB Statement No. 72. The fair value adjustment for the fiscal year ended June 30, 2022 resulted in an unrealized loss on investments in the amount of $935,125, which is reported as a component of investment income for the year. The details of investment income are as follows:

Interest earned on investments	$ 451,740
Unrealized loss on fair value of investments	(1,386,865)
Interest revenue, reported	$ (935,125)

Note 4: Capital Assets

Capital asset activity for the fiscal year ended June 30, 2022 is as follows:

	Balance at July 1, 2021	Additions	Deletions	Balance at June 30, 2022
Structure and improvements	$ 14,982,420	$ -	$ -	$ 14,982,420
Machinery and equipment	3,242,422	27,111	-	3,269,533
Vehicles	2,213,601	356,002	(122,884)	2,446,719
Utility distribution system	293,696,618	1,462,924	-	295,159,542
Total Cost of depreciable assets	314,135,061	1,846,037	(122,884)	315,858,214
Less accumulated depreciation:				
Structures and improvements	3,917,378	374,642	-	4,292,020
Machinery and equipment	2,899,783	54,738	-	2,954,521
Vehicles	1,653,797	174,349	(122,884)	1,705,262
Utility distribution system	153,012,158	7,360,702	-	160,372,860
Total accumulated depreciation	161,483,116	7,964,431	(122,884)	169,324,663
Net depreciable assets	152,651,945	(6,118,394)	-	146,533,551
Capital assets not depreciated:				
Construction in process	998,972	100,243	(29,060)	1,070,155
Land	1,708,710	-	-	1,708,710
Total capital assets not depreciated	2,707,682	100,243	(29,060)	2,778,865
Capital assets, net	$ 155,359,627	$ (6,018,151)	$ (29,060)	$ 149,312,416

ITEM 6.4
ACTION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Brian Kinder, IWA Manager of Finance & Customer Service**
SUBJECT:	**Fiscal Year 2022-23 Mid-Year Budget Report**

Suggested Action
Receive and File

Strategic Plan Compliance

Fiscal Impact
There is no fiscal impact associated with this report.

Environmental Review
This item does not qualify as a project for the purposes of CEQA.

Background
The fiscal year 2022-23 budget for the EVRA was adopted on June 29, 2022. A Midyear Budget Report is presented to the Board for review and approval for period ending December 31, 2022.

Recommendation
Staff recommends that the Board of Directors receive and file Mid-Year Budget Report for Fiscal Year 2022-23.

Attachments
Final FY2022-23 Midyear Budget Report.pdf

INDIO water authority | **VALLEY SANITARY DISTRICT**

EVRA

East Valley Reclamation Authority

SUBMITTAL TO THE JOINT POWERS AUTHORITY
EAST VALLEY RECLAMATON AUTHORITY

Board of Directors Meeting
February 21, 2023

FROM: EVRA JPA Staff

SUBJECT: Fiscal Year 2022-23 Midyear Budget Report

RECOMMENDED MOTION: Receive and File

SUMMARY: The fiscal year 2022-23 budget for the EVRA was adopted on June 29, 2022. A Midyear Budget Report is presented to the Board for review and approval for period ending December 31, 2022.

Prepared by:

Brian M Kinder
IWA Manager of Finance and
Customer Service

	Account Number	Dollars
Costs associated with this action		$0.00
Current Fiscal Year Budget		$0.00

Legal Review		N/A
Indio Water Authority Review	Reymundo Trejo, PE	
Valley Sanitary District	Dr. Beverli Marshall	

EVRA

East Valley Reclamation Authority

Dr. Beverli Marshall
Valley Sanitary District
General Manager

Reymundo Trejo, P.E.
Indio Water Authority
General Manager

February 21, 2023

Honorable Board of Directors
East Valley Reclamation Authority
45-500 Van Buren Street
Indio, CA 92201

SUBJECT: FY 2022-23 Midyear Budget Report

Board members:

The attached Midyear FY2022-23 Budget Report summarizes EVRA's financial condition as of December 31, 2022.

When the FY 2022-23 Budget was adopted on June 29, 2022 the Board increased the agency contributions budget to $400,000. The additional contributions and the existing fund balance are being used to fund operations and the Recycled Water Injection Project. CA Consulting was selected to provide technical engineering and program management services for the project, Todd Ground Water, Inc. was selected to update the Hydrologic model, and Carollo Engineers, Inc. was selected to update the Recycled Water Master Plan (RWMP). At Midyear no additional funding or budget adjustments are recommended to cover expenditures.

EVRA is looking forward to a productive fiscal year 2022-23. EVRA will continue to explore available funding opportunities for projects that promote the recharging of the underground acetifier.

Included attachments:
ATTACHMENT A – Revenue and Expenditure Summary

IT IS RECOMMENDED that the EVRA Board of Directors receive and file this report along with Attachment A.

Respectfully submitted,

Dr. Beverli Marshall,
Valley Sanitary District
General Manager

Reymundo Trejo, P.E.
Indio Water Authority
General Manager

EAST VALLEY

RECLAMATION AUTHORITY

Fiscal Year 2022-2023
Budget Report
Revenue and Expenditure Summary
from July 1, 2022 to December 31, 2022

	Budget FY 2022-23	Adjusted Budget FY 2022-23	Year to Date as of December 31, 2022
REVENUE			
Indio Water Authority	$ 200,000	$ 200,000	$ -
Valley Sanitary District	200,000	200,000	-
Total Revenue	$ 400,000	$ 400,000	$ -
REVENUE SUMMARY			
Source of Funds			
Annual Contribution $200K (Each Agency)	400,000	400,000	-
Unrestricted Fund Balance	760,721	760,721	-
Interest	-	-	4,856
Reserve	-	-	-
Total Source of Funds	$ 1,160,721	$ 1,160,721	$ 4,856
EXPENSES / USE OF FUNDS			
Board Stipends	$ 2,400	$ 2,400	400
Professional Services/ Legal Services	10,000	10,000	-
Recycled Water Injection Project	921,330	921,330	-
Audit Fees	3,500	3,500	-
Travel and Training	2,500	2,500	-
Dues and Publications	2,000	2,000	-
Office Supplies	600	600	-
Total Expenditures/Use of Funds	$ 942,330	$ 942,330	$ 400

ITEM 6.5
DISCUSSION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Dr. Beverli A. Marshall, VSD General Manager**
SUBJECT:	**Receive and Discuss the Final Geophysical Survey Report by Geoscience**

Suggested Action
Discuss

Strategic Plan Compliance

Fiscal Impact
The total authorized contract amount was $86,824 and is included in the EVRA operating budget.

Environmental Review
This analysis does not qualify as a project for the purposes of CEQA. Should the project move forward, the appropriate CEQA process will be conducted.

Background
On July 20, 2020, the EVRA Board of Directors authorized a contract with Geoscience to conduct a geophysical survey to determine the feasibility of utilizing treated effluent to recharge the local groundwater basin using either spreading or injection wells. The resulting analysis was that spreading was not a feasible option but that injection wells would be geologically possible.

The next step in the analysis was to determine if any of the discharged treated effluent was passively entering the basin through the stormwater channel as it travelled to the Salton Sea. Geoscience has concluded the analysis and determined that there is very little passive recharge occurring due to the thick clay layer that exists both under the reclamation plan and the stormwater channel.

The final report was included in the analysis conducted by Todd Groundwater and Carollo Engineers as part of the further assessment of the feasibility of non-potable water (NPW) and indirect potable water (IPW) reuse options.

Recommendation
Staff recommends that the Board receive and discuss the final Geophysical Survey Report by Geoscience and provide direction.

Attachments
Final_EVRA_Perc_Eval_TM2_221116.pdf

EVALUATION ON FATE OF SURFACE DISCHARGE FROM VALLEY SANTARY DISTRICT WATER RECLAMATION FACILITY TO WHITEWATER RIVER CHANNEL

Prepared For: East Valley Reclamation Authority

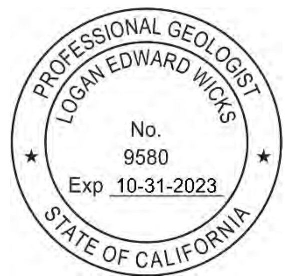
November, 2022

GEOSCIENCE Support Services, Inc. | P (909) 451-6650 | F (909) 451-6638
620 Arrow Highway, Suite 2000, La Verne, CA 91750 | Mailing: P.O. Box 220, Claremont, CA 91711
www.gssiwater.com

GEOSCIENCE

THIS TECHNICAL MEMEORANDUM IS RENDERED FOR EAST VALLEY RECLAMATION AUTHORITY AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

THIS DOCUMENT HAS BEEN CHECKED FOR COMPLETENESS, ACCURACY, AND CONSISTENCY BY THE FOLLOWING PROFESSIONALS:



Logan Wicks, PG
Project Geohydrologist
PG No. 9580

Brian Villalobos, PG, CHG. CEG
Principal
CHG No. 794

EVALUATION ON FATE OF SURFACE DISCHARGE FROM VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY TO WHITEWATER RIVER CHANNEL

CONTENTS

FIGURES

No. Description Page

(Inset in Text)

FIGURES (continued)

TABLES

No. **Description** **Page**

(Inset in Text)

EVALUATION ON FATE OF SURFACE DISCHARGE FROM VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY TO WHITEWATER RIVER CHANNEL

1.0 EXECUTIVE SUMMARY

The Indio Water Authority (IWA) has completed several investigations to determine the feasibility of using discharge from the Valley Sanitary District (VSD) Water Reclamation Facility to recharge groundwater supplies. Since the 1950s, VSD has discharged treated wastewater under permit, into the Whitewater River Channel (WRC) shown on Figure 1. The existing discharge point is located at the northeast portion of the VSD site (Figure 2). With an increasing service area and number of connections, the amount of discharge into the channel has increased. Current estimates indicate that a groundwater replenishment project could possibly recharge up to 7.7 million gallons per day (MGD).

The East Valley Reclamation Authority (EVRA), comprised of IWA and VSD, retained Geoscience Support Services, Inc. (Geoscience) to evaluate local data, review previous studies, and explore groundwater recharge options that will utilize treated effluent from VSD's Water Reclamation Facility as the recharge source. The ultimate purpose of this investigation was to develop a better understanding of available groundwater recharge options, including indirect potable reuse (IPR) through surface spreading or injection.

Previous studies have illustrated the complexity of the geology surrounding and underlying the project site. The presence of fine-grained lakebed deposits near the surface of the VSD site would impede or preclude water from the surface from recharging the targeted Upper and Lower Aquifer systems. Therefore, surface recharge is likely not a viable option within the mapped lakebed deposits (see Figure 3-3 below for estimated extent of lakebed deposits). Additional work is needed to verify site-specific, subsurface hydrogeologic conditions at the VSD site.

This study focuses on the potential fate of surface water discharged from the VSD to the unlined WRC. The conceptual hydrogeologic model of the area includes upper channel deposits which rest on lakebed silts and clays, creating and separating the Semi-Perched Aquifer from the underlying Upper Aquifer. An initial analysis was conducted to determine whether percolating surface water stays within the Semi-Perched Aquifer or migrates vertically downward through gaps in the lake clays to recharge the Upper and/or Lower Aquifers. Results of the analysis indicate that recharge to the Upper Aquifer from VSD discharge is likely insignificant and therefore not a viable source for groundwater recovery. It is more likely that surface water travels laterally within the channel deposits and exits the basin as surface flow.

2.0 INTRODUCTION

2.1 Background

The Indio Water Authority (IWA) services approximately 38 square miles of the Coachella Valley in Riverside County, and is located approximately 120 miles east of Los Angeles and 30 miles east of the City of Palm Springs (Figure 1). Much of this service area is also covered by Valley Sanitary District (VSD), which formed in 1925 under the California Sanitary Act of 1923. VSD is responsible for the collection and treatment of municipal sewage as required by permits issued by the California Regional Water Quality Control Board (RWQCB).

Ten cities, including Indio, make up the geographic area known as the “Coachella Valley.” As the largest city in the Coachella Valley, Indio has a growing population of approximately 85,000 residents. With nearly 23,500 service connections and eight major annual festivals and events that bring thousands more visitors each year to the continually growing IWA system, IWA’s water needs continue to increase. Near the end of 2013, IWA and VSD formed a Joint Powers Agreement for East Valley Reclamation Authority (EVRA) with the main objective to augment local water resources through beneficial water reuse.

Geoscience Support Services, Inc. (Geoscience) has been tasked with determining the feasibility of an indirect potable reuse (IPR) aquifer recharge system to benefit the local water reuse program. The VSD facility receives wastewater which is then treated and discharged into the Whitewater River Channel (WRC). The WRC is a soft bottom channel, meaning that the bottom of the channel is comprised of native wash and windblown sand material. The discharged wastewater continuously flows at or near the channel surface for five miles to the area just upstream of the Coachella Sanitary District Wastewater Treatment Plant (CTP). The greatest surface flow occurs within approximately 3 miles of the VSD facility but does appear to continue along the surface to the CTP. The purpose of this study is to verify findings from previous studies, increase understanding of aquifer systems in the project area, and evaluate the potential fate of the 7.7 million gallons of treated wastewater discharged from the VSD facility to the WRC.

2.2 Previous Work

Over the past two decades, IWA has completed numerous planning level reports that focused on creating supplemental water supplies by recharging the Indio Sub-basin with either treated imported water or with highly treated recycled water from the VSD facility. Most reports identified lakebed sediments in the areas near the VSD and subsequently underlying the WRC. Report findings and recommendations from 2005 to present include:

- The 2005 report by Lee & Ro, Inc. (Lee & Ro) provided recommendations regarding the proposed VSD plant expansion. Five borings were drilled in late March 2005 to explore subsurface conditions, which confirmed low permeability materials representing the Semi-Perched Aquifer.

- The 2008 report by Petra Geosciences, Inc. (Petra) completed a desktop study and described areas within the City of Indio that might be suitable for aquifer recharge through surface infiltration to both the Upper and Lower Aquifers, without the use of injection wells. Petra identified five potential areas that may allow surface infiltration to recharge the Upper Aquifer, two of which would also provide recharge to the Lower Aquifer. Follow-up field data collection was recommended to determine subsurface conditions.

- The 2009 reports by Petra presented results for the Phase 1 hydrogeologic investigation to assess Posse Park as a potential site for artificial recharge facilities. Data from this investigation concluded that artificial recharge to the Lower Aquifer by surface spreading is not feasible due to the thickness of low permeability sediments; the vertical percolation of water spread at the surface would be stopped before reaching the Lower Aquifer. Based on geologic maps, well data, and geophysical surveys, the 2009 Petra report suggested that groundwater storage is likely feasible in parts of Fargo Sub-basin. However, water quality in Fargo Sub-basin is poor.

- In 2018, Petra completed a study for an area immediately north of Posse Park, in the City of Indio, as a potential site for artificial recharge facilities. Borings encountered a thick layer of clay at approximately 240 feet below ground surface (ft bgs). Geological maps and geophysical logs confirmed faulting as a broad zone, hundreds of feet wide, potentially acting as barriers to groundwater flow to the south. Surface spreading of water would not recharge into the Lower Aquifer beneath the valley area from this location.

- The 2018 report by Hazen and Sawyer found that groundwater recharge via spreading or injection is a favorable recycled water alternative and recommended 1) conducting percolation testing and soil borings near the evaporation ponds at the VSD facility to confirm hydrogeologic findings and adequacy for percolation, and 2) consideration of groundwater recharge via injection if surface spreading is not feasible.

- The 2020 report prepared by Geoscience utilized previous studies and local data to develop a better understanding of available groundwater recharge options, including IPR through surface spreading or injection. Injection wells were recommended as the most viable option for recharging treated wastewater into the targeted aquifers because the fine-grained, low permeable lake-bed sediments would inhibit downward percolation from surface water spreading.

- In 2020, Geoscience also conducted a geophysical investigation to identify faults in the area under the VSD facility. The study concluded that there is a probable series of faults or fault zone trending northwest along the eastern-northeastern portion of the VSD facility. The faults are relatively thin and are not active but may still impact groundwater flow from injection wells.

Despite previous studies, data available within and along the WRC is either non-existent or very limited.

2.3 Purpose and Scope

In the conceptual geohydrologic model, Geoscience differentiates three separate aquifers: the overlying Semi-Perched Aquifer, the Upper Aquifer, and the underlying Lower Aquifer. Upper channel deposits, comprising the Semi Perched Aquifer, consist of a series of thin saturated sands, silts, and clays. This unit is separated from the underlying Upper Aquifer by lakebed clays. Surface water may percolate from the channel bottom into the subsurface and remain in the Semi-Perched Aquifer or continue to percolate vertically down into the Upper Aquifer through gaps in lakebed clays. The purpose of this study is to provide a preliminary assessment of the potential fate of water discharged at the surface of the WRC and determine whether a significant volume of discharged water reaches the Upper Aquifer, which might then be recovered to supplement current water supply. The current study is based on previously collected data.

The scope of work for this study includes:

- A review of lithologic logs and any relevant data available in the vicinity of the WRC. This included published and unpublished data for the evaluation of aquitard extent.

- Production of lithologic cross-sections using data reviewed from previous studies. . The cross-sections were used to evaluate the potential extent of the aquitards that separate the Semi-Perched Aquifer from the Upper Aquifer.

- Preparation of finding and recommendations.

2.4 Sources of Data

The data collection effort began with obtaining available data from IWA and VSD. This included:

- Groundwater production reports provided by IWA
- Well static water levels and pumping levels provided by IWA
- Groundwater quality data provided by IWA
- Video survey reports provided by IWA
- Well logs from DWR and the Geoscience well log database

- Effluent discharge data from VSD
- Treatment plant effluent water quality provided by VSD
- Past reports from Hazen & Sawyer, Lee & Ro, and Petra

A complete list of references is provided in Section 6.0 of this technical memorandum.

3.0 GEOHYDROLOGY

To assess the recharge feasibility of an area, the geohydrology must first be determined. This is key to understanding if an area is suitable for groundwater recharge and what type of recharge is most appropriate. The geologic history around the VSD site is very complex. This area has been deformed by the San Andreas Fault, which caused uplift of the Indio Hills and extensive subsidence of the valley floor. These processes have defined the recent (Pleistocene to present) sedimentation of this area. Regional and site-specific geohydrology is discussed in the following sections.

3.1 Regional Geohydrologic Setting

The study area is located in the southeastern Coachella Valley, which is in the northern portion of the Salton Trough and in the Colorado Desert Geomorphic Province (CDGP) (Figure 1). The CDGP encompasses a northwest trending area stretching from Palm Springs to Imperial Valley, also referred to as the Salton Trough (Norris and Webb, 1990). Deposited sediments are estimated to be 2 to 5 miles thick (Biehler, et. al., 1964; Fuis and Kohler, 1984; Kohler and Fuis, 1986). Weathered material from the surrounding Transverse Peninsular Ranges and deposits from the Colorado River have filled the basin with sediments since at least the late Miocene (Petra, 2018). The Salton Trough formed by crustal extension, starting as a half-graben basin followed by bounding of the San Andreas fault zone to the northeast and the San Jacinto fault zone to the southwest (Powell, 1993; Proctor, 1968; Stock and Hodges, 1989).

3.2 Groundwater and Aquifer Systems in the Project Area

Much of the current geohydrologic understanding for the area surrounding the City of Indio comes from the Department of Water Resources' (DWR) 1964 study, Bulletin 108, which includes descriptions of geologic and hydrostratigraphic units. Figure 1 from Bulletin 108 (DWR, 1964), shown below as Figure 3-1, illustrates a generalized hydrostratigraphic section in the vicinity of the VSD site. As shown, the main hydrostratigraphic units include:

- The Semi-Perched Aquifer,
- The Upper Aquifer,
- An aquitard, and
- The Lower Aquifer.

Figure 3-1 also shows the generalized thicknesses of the units, including near-surface sediments from approximately 0 to 100 ft bgs of fine-grained lake-bed deposits which are known to impede the vertical movement of groundwater. According to Petra (2018), the Lower Aquifer in the study area is likely present within the Palm Springs Lower Formation rather than the Ocotillo Conglomerate as stated in the DWR hydrostratigraphic sequence below.

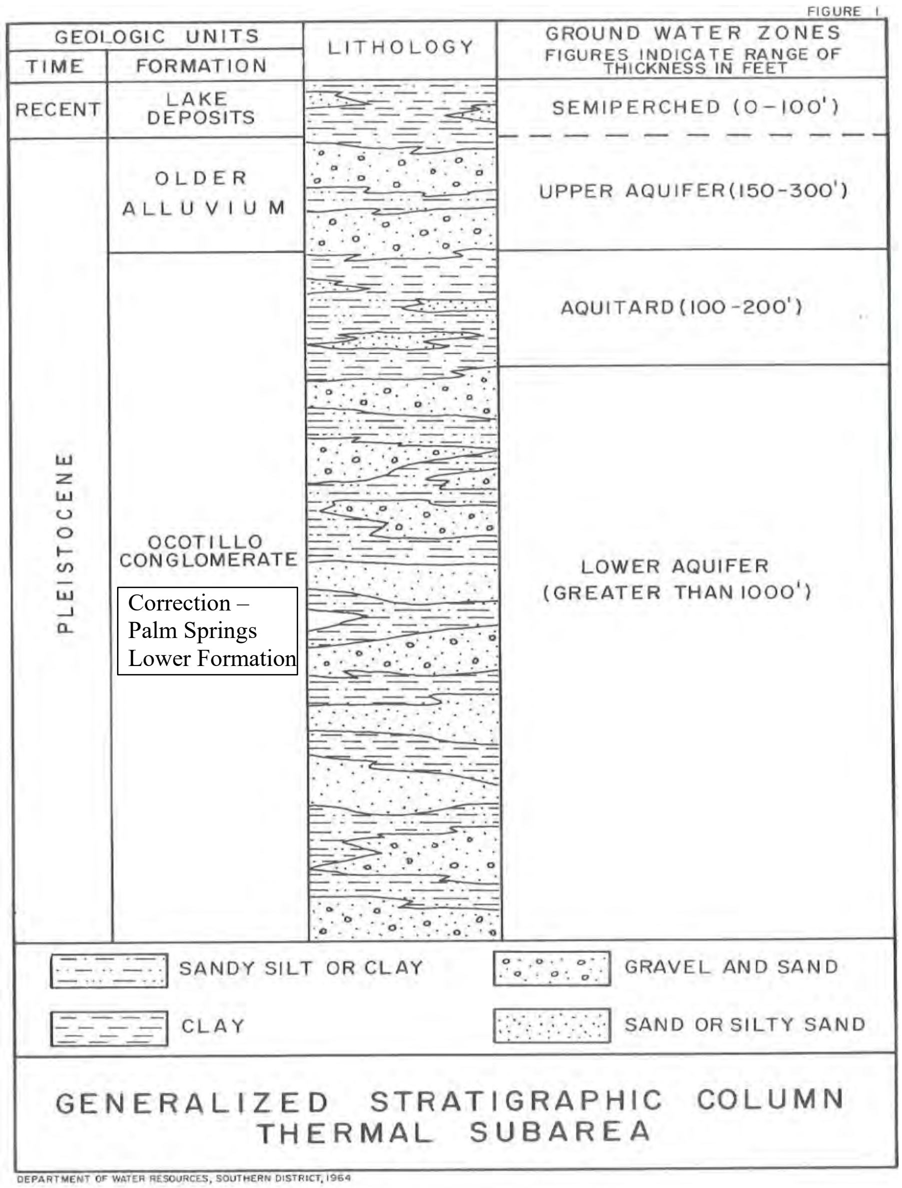


Figure 3-1. Generalized Stratigraphic Column in the Vicinity of the Project Site

(Source: Figure 1 from DWR, 1964)

3.2.1 Semi-Perched Aquifer

The Semi-Perched Aquifer is made up of late Pleistocene to Holocene Lake Cahuilla deposits, which consist of interbedded sands, silts, and clays. The last high stands related to ancient Lake Cahuilla reached an elevation over 50 ft above mean sea level (amsl) (Suitt, 1996). Water levels in this aquifer are typically between 6 and 20 ft bgs under natural conditions, and the aquifer is reported to be between 0 and 100 ft thick (DWR, 1964). These thinly interbedded lake deposits restrict the vertical movement of water. Therefore, surface water does not percolate quickly or deeply. The area west of the Coachella Canal is outside the apparent extent of the Semi-Perched Aquifer. According to Petra (2018), shallow monitoring wells show the Semi-Perched Aquifer at deeper levels – contrary to DWR's depiction. More work is necessary to understand the extent of the Semi-Perched Aquifer. Water quality in the Semi-Perched Aquifer is generally considered to be poor, likely due to return flows from extensive agriculture in the valley.

3.2.2 Upper Aquifer

In the project area, the Upper Aquifer is located below the Semi-Perched Aquifer, with alternating sequences of alluvial and lake deposits from approximately 150 to 300 ft bgs (Petra, 2018). In this area, this aquifer was initially developed for agriculture use. Historically, wells completed in this aquifer typically had good production yields. However, due to over pumping and degraded water quality, few wells are solely screened in this aquifer today. The last IWA well to be installed in the Upper Aquifer was abandoned in 2007, in part due to poor water quality.

3.2.3 Aquitard

An aquitard is defined as a fine-grained unit that separates two groundwater aquifers. Aquitards impede vertical groundwater migration from an upper aquifer to a lower one. When assessing groundwater recharge potential, it is important to understand the extent and thickness of any aquitards present in the project area. In the area of the VSD facility, an aquitard unit has been identified. Reported thickness of the aquitard is between 100 to 200 ft. The lateral extent, however, is not well defined. With regards to potential recharge to the Lower Aquifer, this aquitard likely acts as a capping unit for the Lower Aquifer – preventing injected recharge from migrating upward and containing the recharge in the preferred Lower Aquifer. Similarly, any recharge to the Upper Aquifer in this area would be restricted from traveling downward to the Lower Aquifer.

3.2.4 Lower Aquifer

The Lower Aquifer is made up of interbedded fine- and coarse-grained materials. The Lower Aquifer reaches depths greater than 1,000 ft (DWR 1964). This aquifer is the primary source of groundwater for the Valley. This lower unit is primarily recharged from the infiltration of surface water in the western region, where the aquitard is missing. Artificial recharge projects have targeted the Lower Aquifer to mitigate falling groundwater levels. This western area of the Valley is underlain by material that represents undifferentiated Upper and Lower Aquifer.

3.3 Hydrogeologic Cross-Sections

Information on the Semi-Perched Aquifer near the WRC is available from five borings conducted during the 2005 geotechnical investigation by Lee & Ro at the VSD site. This study indicates that most of the soil material in the upper 70 ft is low permeability clay, organic clay, silt, or organic silt. The inset figure below is a geologic cross-section constructed from the 2005 boring data. The clay/silt layers appear to be continuous at two separate depths, one from approximately 10 to 20 ft bgs (representing a 10-ft continuous low permeability layer) and the second from approximately 30 to 60 ft bgs (representing a 30-ft continuous low permeability layer). Groundwater was encountered in the borings at various depths and likely represent groundwater levels from the Semi-Perched Aquifer.

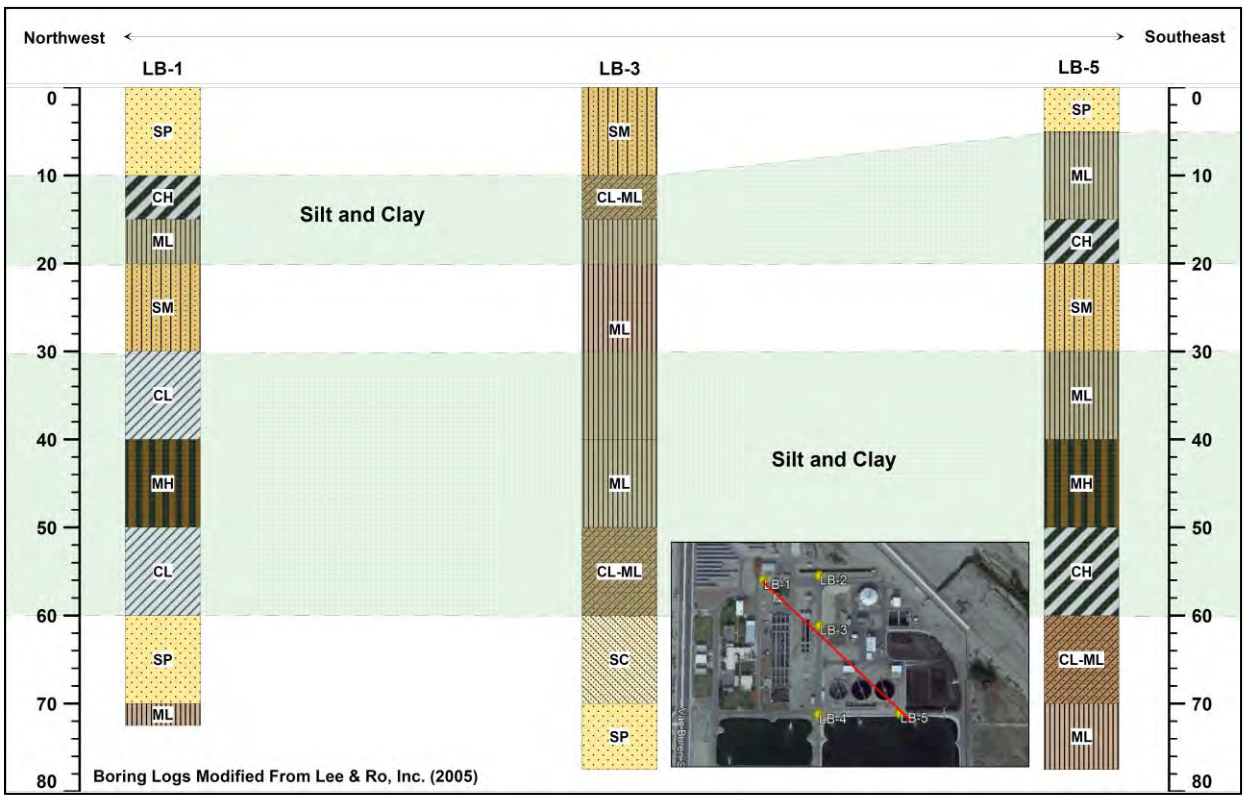


Figure 3-2. Generalized Cross-Section Underlying the VSD Site (LB-1 to LB-5)

These same sediments were also identified on the lithologic cross-sections constructed for this evaluation (see Figures 2 and 3). These cross-sections are regional, but also illustrate the subsurface conditions along the WRC to 200 ft bgs. The shallow fine-grained sediments are likely the Pleistocene to Holocene lakebed deposits of Lake Cahuilla, which were identified by DWR (1964) within 100 ft bgs of much of the Coachella Valley (see Figure 3-3 below).

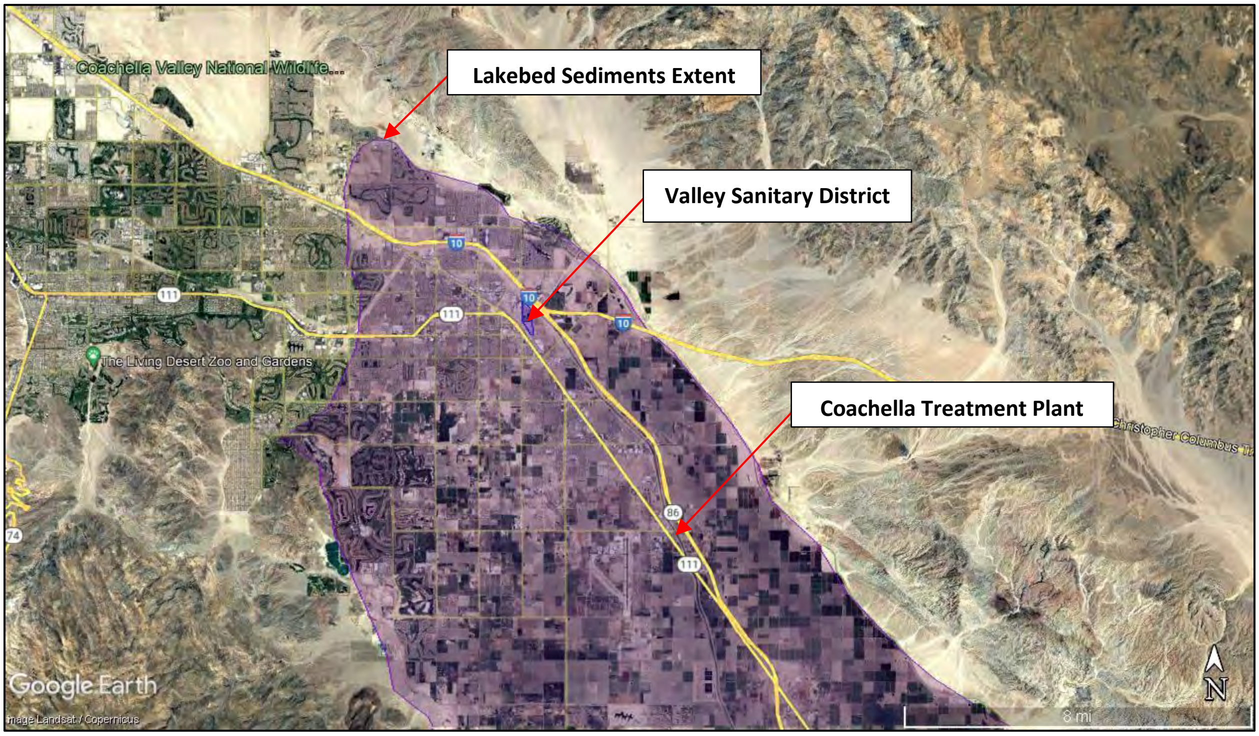


Figure 3-3. Extent of Semi-Perched Aquifer and Lakebed Sediments

(Source: Figure 1 from DWR, Bulletin 108, Plate 5)

These and other previous investigations provide some information regarding the extent and existence of the shallow lakebed sediments beneath the WRC in the area. Review of the available data shows that the fine-grained lakebed deposits near the surface of the WRC are extensive enough to not allow significant recharge to the Upper or Lower Aquifer systems, even if there are some gaps in the aquitard separating the Semi-Perched Aquifer from the underlying Upper Aquifer. This would agree with USGS WRC gauge data[1], which suggests that there is nearly four-times more outflow to the Salton Sea than inflow above the VSD.

[1] USGS 2021 gage data collected at gages 10259540 and 10259300: https://maps.waterdata.usgs.gov/mapper/index.html

4.0 QUANTITATIVE ANALYSIS OF POTENTIAL RECHARGE TO UPPER AQUIFER USING DARCIAN EQUATIONS

Previous studies and this study have shown that lakebed sediments are extensively prevalent in this area and most likely underlie much of the area immediately below the WRC deposits. However, data along or within the WRC are not available. Therefore, hypothetical scenarios of potential percolation or recharge to the Upper Aquifer from surface water between the VSD and CTP was made using Darcy's Equation, the equation for groundwater flow perpendicular to a bedding plane (see equation below), and approximate wetted area along the WRC.

$$K_{ze} = \frac{\sum d_i}{\sum \frac{d_i}{K_{zi}}}$$

Where:

K = Effective Vertical Conductivity
d = Layer Thickness

To calculate the specific flux term for the conductivities through the various sediment units (silty or sandy), assumptions of the thickness and hydraulic head of each unit were made. Three hypothetical layers were used to calculate the vertical flow. Their assumed thicknesses and range of hydraulic conductivities (derived from typical values presented in literature) are summarized in the following table.

Table 4-1. Scenario Layer and Hydrogeologic Assumptions

Layer	Assumed General Lithology	Hydraulic Conductivity Range ft/d		Layer Thickness ft	Water Level ft bgs
Channel Deposits	Mixed Sand and Gravel	1.98E-01	1.70E+03	10	0
Lakebed Sediments (Semi-Perched Aquifer)	Clay	2.83E-06	1.33E-03	70	25
Upper Aquifer	Fine Sand	5.67E-02	5.67E+01	100	60

Using the information in the tables above and the equation for groundwater flow perpendicular to bedding, we can estimate the potential volume of water that is percolated through the layers. The confining properties of the lakebed sediments above the Upper Aquifer are the controlling factor for percolating groundwater. In other words, if lakebed sediments are present, very little groundwater can percolate and recharge the Upper Aquifer. This is due to the low vertical hydraulic conductivities associated with the types of materials in the lakebed sediments (i.e., silts and clays). However, where lakebed sediments are absent, groundwater may be able to percolate to the Upper Aquifer.

While the lithologic cross-sections indicate that the fine-grained lakebed sediments underlying the entire WRC reach from the VSD to the CTP (approximately 28,000 ft or 5.30 miles), aerial imagery shows variation in the density of riparian vegetation along this reach. This could be related to the intermittent addition of surface runoff from surrounding agricultural fields, or it could be an indicator of less or more permeable sediments underlying the river channel. The presence of underlying sands and gravels may allow surface water to percolate downward quickly, causing less surface water to be available for vegetation. Conversely, lakebed sediments (i.e., intermittent layers of silts and clays) may be associated with denser vegetation because surface flow is restricted from percolating. However, even in the reaches that appear to have less vegetation, surface water is still visible.

In order to provide a range of potential recharge along the WRC stretch from the VSD to the CTP, several hypothetical scenarios were evaluated. Scenario A assumes the entire length of the WRC is underlain by lakebed sediments (i.e., the Semi-Perched Aquifer). Scenario B assumes 50% is underlain by lakebed sediments while 50% is directly underlain or in communication with sands and gravels of the Upper Aquifer. Scenario C assumes 75% underlain by lakebed sediments and 25% by sands and gravels. Within each scenario, high and low estimates were developed by assuming a wetted channel thickness of 5 ft or 10 ft. Using the information outlined above, ranges of hypothetical recharge to the Upper Aquifer were calculated for the reach of the WRC between the VSD and the CTP. Results are summarized in the following table. These results are hypothetical and need to be verified through field investigation.

Table 4-2. Hypothetical Recharge Results

Scenario	Low (Acre-ft per Year)	High (Acre-ft per Year)
A	0.002	2
B	0.608	1,233
C	0.304	617

5.0 DISCUSSION AND RECOMMENDATIONS

The VSD discharge location to the WRC is located within a geologically complex area of the Salton Trough which has been subject to compressional and extensional forces from the San Andreas and San Jacinto fault systems. Changes in climatic conditions over geologic time have created ancient lakes, as evidenced by fine-grained lacustrine deposits in the area. Hydrostratigraphic units below the VSD site include a Semi-Perched Aquifer, Upper Aquifer, aquitard, and Lower Aquifer.

Based on the cross-sections show on Figures 2 and 3, which were constructed for this report, and previous study results, lakebed sediments likely underlie most of the area around the WRC, from VSD to CTP and down to the Salton Sea. These sediments are typically fine-grained and have a low permeability. Downward percolation from any surface water would be impeded by these sediments and likely move through the Semi-Perched Aquifer laterally toward the Salton Sea. Evidence of meandering gaps in the Semi-Perched Aquifer are also identified in the figures. These areas likely have more coarse sediments but do not appear to extend through the lakebed sediments.

Although there may be “gaps” in the lakebed sediments underlying the portion of WRC between the VSD and the CTP, they do not appear to provide an obvious downward flow path from the surface to the Upper Aquifer in any significant quantities. In order to quantitatively model what these gaps may be contributing to the underlying units, hypothetical scenarios were constructed using simplifying assumptions and equations for downward flow. The range of recharge is mostly controlled by the amount of lakebed sediments and channel width. The amount of groundwater recharge to the Upper Aquifer from surface water discharged by the VSD is estimated to range from less than 1 acre-ft per year (AFY) to a maximum of approximately 1,200 AFY. This maximum equates to approximately 14% of the total volume discharged from the VSD (assumed 8,625 AFY of discharge from VSD). However, these are hypothetical scenarios which are not fully substantiated from the data collected for this analysis. Furthermore, it is very unlikely that the channel deposits are only located beneath the visible surface water. It is much more likely that those deposits extend much farther laterally, which could provide enough groundwater storage to accommodate a significant portion of the water discharged from the VSD. USGS gage data along the WRC indicates that nearly four times the amount of surface water is discharged to the Salton Sea than enters the reach of the WRC above the VSD. This suggests that discharge water may be traveling laterally within the channel deposits and exiting the basin as surface flow. The estimates presented here also do not consider evapotranspiration (ETo), which is estimated at 6.76 ft per year for the Indio area.

Based on our interpretation of the data used for the cross-sections and simple Darcian calculations, results of this initial analysis indicate that recharge to the Upper Aquifer from VSD discharge is likely insignificant and therefore not a viable source for groundwater recovery.

Although collected data and initial analysis presented suggest that insignificant volumes of VSD discharge water recharges the Upper Aquifer, a more focused field investigation with monitoring wells and pumping tests could be conducted to verify or refine these initial estimates.

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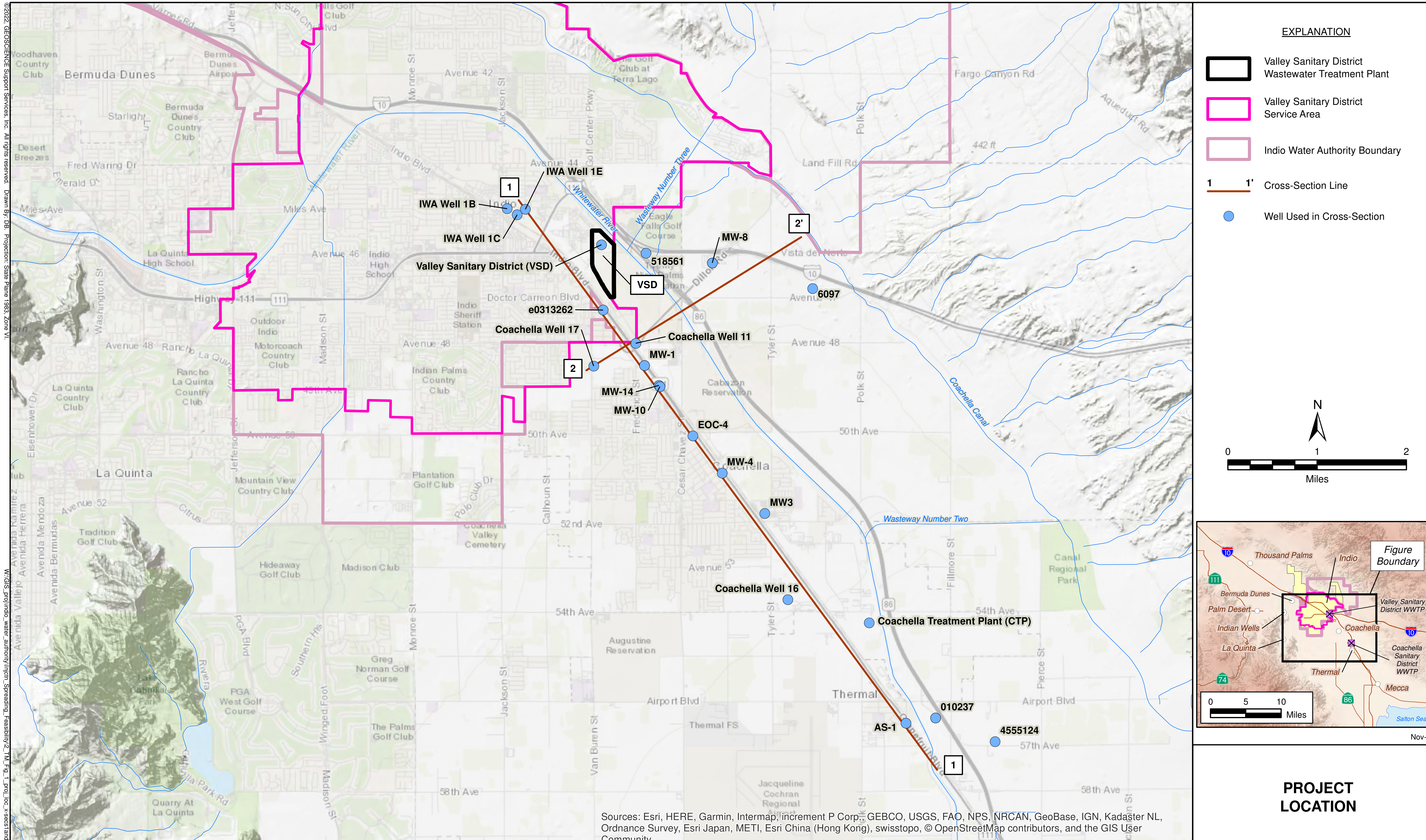
FIGURES



PROJECT LOCATION

GEOSCIENCE

EAST VALLEY RECLAMATION AUTHORITY

EVALUATION ON FATE OF SURFACE DISCHARGE FROM VALLEY SANITATION DISTRICT WATER RECLAMATION FACILITY

FIGURE 1

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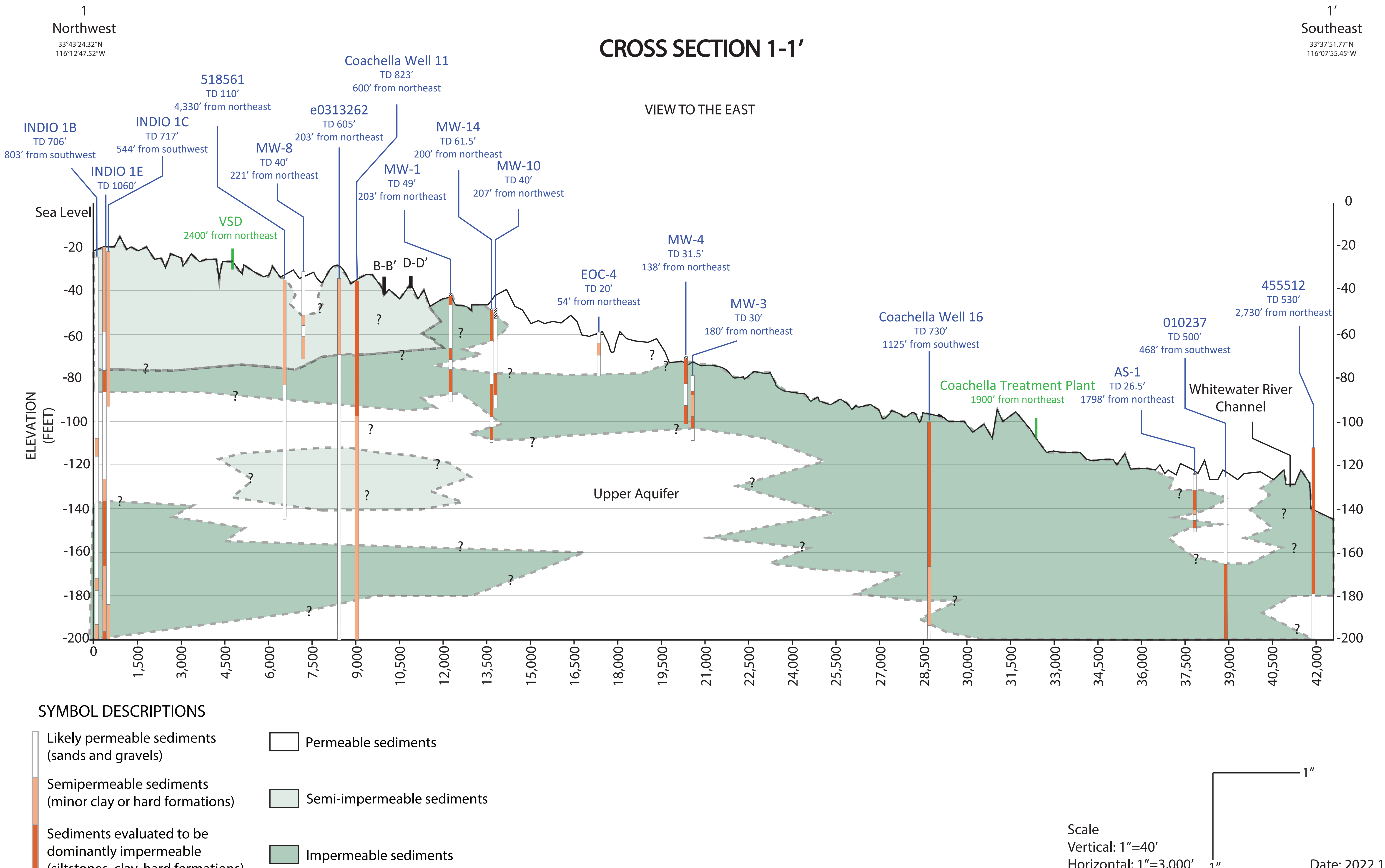

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Southeast
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TD 706′
803′ from southwest
INDIO 1E
TD 1060′
INDIO 1C
TD 717′
544′ from southwest
518561
TD 110′
4,330′ from northeast
MW-8
TD 40′
221′ from northeast
e0313262
TD 605′
203′ from northeast
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TD 823′
600′ from northeast
MW-1
TD 49′
203′ from northeast
MW-14
TD 61.5′
200′ from northeast
MW-10
TD 40′
207′ from northwest
VSD
2400′ from northeast
B-B′
D-D′
EOC-4
TD 20′
54′ from northeast
MW-4
TD 31.5′
138′ from northeast
MW-3
TD 30′
180′ from northeast
Coachella Well 16
TD 730′
1125′ from southwest
Coachella Treatment Plant
1900′ from northeast
AS-1
TD 26.5′
1798′ from northeast
010237
TD 500′
468′ from southwest
455512
TD 530′
2,730′ from northeast
Whitewater River Channel
Upper Aquifer
Sea Level
ELEVATION (FEET)
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-60
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-100
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-160
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SYMBOL DESCRIPTIONS
Likely permeable sediments (sands and gravels)
Semipermeable sediments (minor clay or hard formations)
Sediments evaluated to be dominantly impermeable (siltstones, clay. hard formations)
Permeable sediments
Semi-impermeable sediments
Impermeable sediments
Scale
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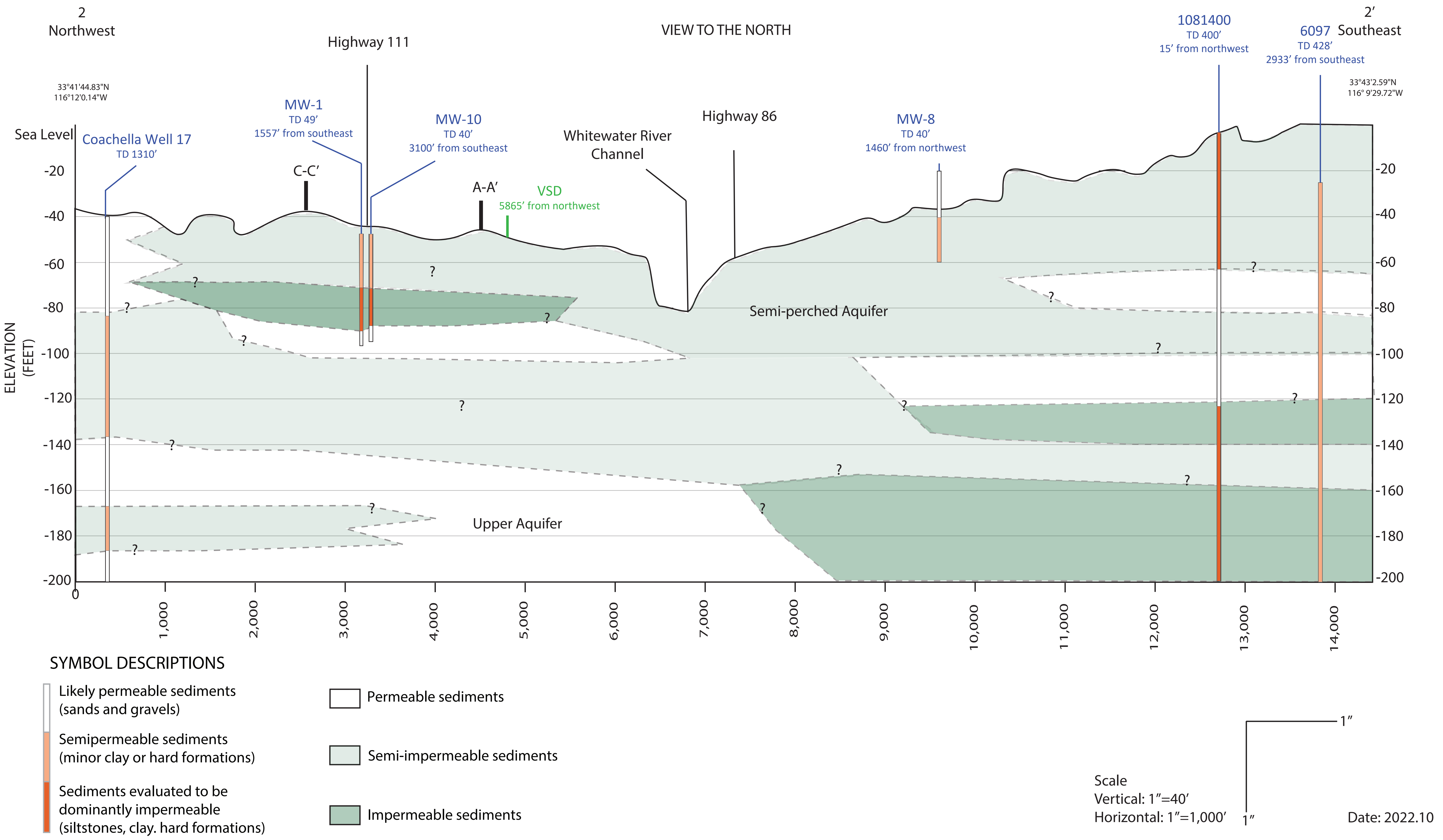
Horizontal: 1″=3,000′
1″
1″
Date: 2022.10

CROSS SECTION 2-2′



GEOSCIENCE

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ITEM 6.6
DISCUSSION

Valley Sanitary District

DATE: February 21, 2023

TO: East Valley Reclamation Authority

FROM: Dr. Beverli A. Marshall, VSD General Manager

SUBJECT: Receive and Discuss the Hydrogeologic Evaluation and Preliminary Injection Well Modeling Report Prepared by Todd Groundwater

---

Suggested Action
Discuss

Strategic Plan Compliance

Fiscal Impact
The total cost of the study was authorized not to exceed $87,295 and will be paid from existing EVRA funds.

Environmental Review
This phase of the Recycled Water Project does not qualify as a project for the purposes of CEQA. Should the project move forward, the CEQA process will be initiated as appropriate.

Background
At the September 6, 2022, EVRA meeting, the Board of Directors authorized Valley Sanitary District's General Manager to execute a contract with Todd Groundwater to complete a groundwater model under and around Valley Sanitary District reclamation plant to determine if groundwater injection was a viable option for recycled water.

After several months of data gathering, analysis, and discussions with staff from both Valley Sanitary District and Indio Water Authority, the consultants have prepared the attached report. Based on the analysis, the consultants concluded that a single 2MGD well or two 2MGD wells, for a total of up to 4MGD, of recycled water could be injected into the aquifer under the Valley Sanitary District reclamation plant.

The results of this study were shared with Carollo Engineers to be incorporated as part of the feasibility study authorized by the EVRA Board at the September 6, 2022, meeting.

Recommendation
Staff recommends that the Board receive and discuss the Hydrogeologic Evaluation and Preliminary Injection Well Modeling Report prepared by Todd Groundwater and provide direction to staff.

Attachments
Todd Groundwater VSD Hydrogeologic and Modeling Evaluation Report with all Attachments 1-17-2023.pdf

HYDROGEOLOGIC EVALUATION AND PRELIMINARY INJECTION WELL MODELING

EVRA GROUNDWATER REPLENISHMENT PROJECT
VALLEY SANITARY DISTRICT INDIO CALIFORNIA

January 2023

TODD GROUNDWATER

2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
510.747.6920
www.toddgroundwater.com

SIGNATURE PAGE

Daniel J. Craig, PG, CHG

Senior Hydrogeologist

Arden Wells, PG

Associate Geologist

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EXECUTIVE SUMMARY

Valley Sanitary District (VSD) was formed in 1925 to collect and treat wastewater in its service area. In 2022 VSD retained Todd Groundwater (Todd) to perform a hydrogeologic evaluation and preliminary groundwater modeling study of the feasibility and effectiveness of a Groundwater Replenishment-Reuse Project (GRRP) at or near the treatment plant.

The hydrogeologic evaluation includes a review and documentation of local study area geology and aquifer characteristics, including thicknesses of aquifer and aquitard layers and aquifer permeability and storage properties, an inventory of known wells in the study area, mapping of groundwater levels and recent trends, and an evaluation of general groundwater quality in the project area.

The hydrogeologic information was evaluated with respect to the feasibility and potential performance of a RW injection well project. The hydrogeologic data also was subsequently used in development of a local three-dimensional groundwater flow model of the area around the site. The local three-dimensional groundwater flow model was constructed to simulate groundwater flow in the study area, and potential subsurface flowpaths of the injected RW. The model was constructed using the United States Geological Survey MODFLOW code, a widely used and accepted numerical groundwater flow model. The model accounts for local aquifer properties and groundwater flow conditions within the cities of Indio and Coachella and adjacent areas, and it simulates the effects of numerous groundwater production wells operated in the study area. The local model was calibrated to observed groundwater elevations and trends in the study area with good calibration results, then used to simulate preliminary injection well operations. Two injection well alternatives were simulated and predicted changes in groundwater elevations. Subsurface flowpaths to downgradient areas and production wells were estimated. The flowpath simulations also provide preliminary estimates of RW retention times and contributions to downgradient wells as required for a GRRP ER and DDW permit.

Summary of Local Hydrogeologic Conditions

VSD is situated in the east-valley area of the Indio Groundwater Subbasin of the greater Coachella Valley Groundwater Basin. Study area aquifers in the vicinity are composed of interbedded coarse-grained sand and finer-grained silt and clay sediments deposited from alluvial fan, stream wash, and lacustrine sources. The sediments extend to depths exceeding 1,500 feet near the center of the valley. A shallow aquifer zone occurs at depths of approximately 100 to 300 feet below ground surface (ft bgs) and consists of sand layers interbedded with local fine-grained deposits. A continuous silt and clay layer is present at a general depth interval of approximately 300 to 500 ft bgs and forms a regional aquitard that separates the shallow and deeper aquifers. The presence of this continuous aquitard limits the effectiveness of recharge at the ground surface (such as via surface ponds), necessitating the use of deep injection wells to replenish recharge large amounts of RW to the aquifers. A deep aquifer zone underlies the regional aquitard and extends from depths of approximately

500 to 1,500 ft bgs. The deep zone is the primary water supply aquifer pumped by many municipal wells in the study area including those operated by IWA, the Coachella Water District (CWD), and Coachella Valley Water District (CVWD). A few municipal supply wells and several domestic and small water system (SWS) wells also pump from the overlying shallow aquifer.

The San Andreas Fault zone occurs just east of the VSD site and comprises a main fault trace and series of en-echelon splays. Based on a recent seismic geophysical investigation performed at and near the VSD site, several fault splays are present beneath the eastern portions of the VSD site (Geoscience, 2022). These local fault splays may offset the shallow and deep aquifer zones causing a partial barrier to local groundwater flow. Groundwater elevations on the east side of the faults are likely higher than those on the west side as has been observed in water level data from wells in other areas of the Indio subbasin.

Groundwater occurs at depths of around 80 to 100 ft bgs in the study area. Groundwater elevations in the shallow aquifer are generally between 10 to 20 feet higher than in the deep aquifer. The flow direction in the shallow and deep aquifers is generally from north-to-south through the study area, with an inferred local component of flow from northeast-to-southwest in the area between the Indio Hills and the VSD WRP site. Groundwater elevations in the shallow and deep aquifer have been relatively stable since 2010, with no significant increasing or decreasing trends. Groundwater levels in the aquifers are locally influenced by pumping wells, with cones of depression around the larger producing supply wells. Short-term seasonal trends are observed in monthly water level data with declines during the dry (summer) pumping season and recovery during wet (winter) season.

Groundwater production within the study area occurs primarily via municipal pumping, with additional private pumping for domestic, small water system, and irrigation use. CVWD meters municipal and private pumping and maintains records for 22 municipal and private wells in the VSD study area. Municipal groundwater production has remained relatively stable since 2010, with slight increases in pumping from nearby IWA production wells between 2016 and 2021. Total average annual production from nearby IWA wells (within the VSD study area) has been around 10,000 acre-feet per year (AFY), while average production from nearby CWD wells (within the Study area) has been around 7,000 AFY. Pumping rates of private wells are generally lower, from less than 100 up to several hundred AFY.

Groundwater recharge from surface sources is limited as no major surface water bodies other than the intermittent Whitewater River and (presumably lined) ornamental lakes are present in the study area. Minor return flow of irrigation water and pipe leaks likely occurs, although the estimated amount of these return flows in the study area is assumed to be small. Most groundwater inflow to the study area occurs as subsurface flow from areas of the Indio Subbasin north of VSD. Local replenishment via injection of RW could provide a significant supplemental source of recharge to the Indio and Coachella areas.

Groundwater quality in the deep aquifer is generally good, with most total dissolved solids (TDS) concentrations between 200 and 300 milligrams per liter (mg/L) and nitrate (as NO_3)

concentrations generally below 10 mg/L and significantly lower than the Maximum Contaminant Limit (MCL) for nitrate-NO3 of 45 mg/L.

Groundwater Flow Model Simulations

A four-layer local MODFLOW groundwater flow model was constructed and used to simulate baseline groundwater flow conditions and operations of a potential injection well system at the VSD site. The groundwater flow model was constructed based on site-specific aquifer depths and thickness characteristics, representative aquifer hydraulic properties, measured groundwater levels, and metered groundwater production wells.

The model was calibrated to current observed shallow and deep aquifer groundwater elevations then used to predict future groundwater level responses and subsurface flow paths of injected RW. The model is well-calibrated to groundwater elevations across the study area, and it accurately simulates subsurface flow conditions and the effects of pumping wells. Groundwater in the deep aquifer flows at a rate of approximately 0.4 foot/day under current conditions.

Two injection simulations were performed using a hypothetical well sited in the southern portion of the VSD site. The well was simulated injecting at rates of 2.0 and 4.0 MGD. The simulations indicate that for the 2.0 MGD injection scenario, groundwater elevations in the deep aquifer may rise by 22 feet near the injection well. Forward flowpaths were calculated to determine the direction and flow rate of injected RW. The flowpaths reveal the expected radial flowpath away from the injection well, with subsequent flow to the south. The presence of the partial flow barrier created by the local fault zone limits the pressure response and flow of injected water to the east. Due to the impedance of the low-permeability regional clay aquitard, simulated flowpaths from the injection well also remain in the deep aquifer and do not move upward into the shallow aquifer. Nearby shallow wells such as the Carver Tract wells are not predicted to receive injected RW. Travel times from the injection well to the nearest CWA wells southwest of VSD are on the order of 20 to 30 years, thus satisfying DDW retention time requirements.

For the 4.0 MGD injection scenario, groundwater elevations in the deep aquifer are predicted to rise by 42 feet near the injection well. Due to model cell head averaging, the actual hydraulic head increase in an injection well would be greater and, depending on the well's hydraulic efficiency, the head in the well could potentially rise to or above the ground surface. Accordingly, if high injection rates are desired, consideration should be made for designing an injection well facility that allows for pressure above the ground surface. Forward flowpaths for the 4.0 MGD scenario show greater radial spreading away from the injection well than for the 2.0 MGD scenario. However, the injected RW remains west of the local fault and does not move upward into the shallow aquifer. Travel times from the injection well to the nearest CWA wells southwest of VSD decrease to around 20 years but meet DDW retention time requirements.

Conclusions

Based on the hydrogeologic evaluation, the local aquifer conditions are conducive to operation of a deep RW injection system. The deep aquifer is approximately 500 to 1,000 feet thick and has moderate to high permeability. The deep aquifer is hydraulically separated from the shallow aquifer by the thick and continuous regional clay aquitard. Groundwater elevations have been generally stable for the past 10 years and the ambient hydraulic head in the deep aquifer is around 100 ft bgs, indicating that the deep aquifer has capacity for injection and storage in the aquifer. There are several domestic and SWS wells that may be subject to regulatory constraints, but if these wells completed in the shallow depth aquifer they may be isolated from the deep zone and may not receive any injected RW. Several deeper CWA wells are further south of the VSD site. Existing IWA wells are generally north of the site.

The local MODFLOW model was calibrated to measured groundwater flow conditions and accurately simulates flow in the shallow and deep aquifers. Preliminary injection simulations of a hypothetical injection well in the southern VSD site indicate the deep aquifer has the capacity to accept several MGD of RW. Predicted groundwater flowpaths of the injected RW indicate that the water remains in the deep aquifer and does not migrate upward into the overlying shallow aquifer and nearby shallow domestic/SWS Wells

Nearby deep CWA wells are located south of the VSD site and may receive some of the injected RW. However, based on the simulated travel times, these wells are several decades downgradient of possible onsite injection locations, therefore meeting DDW minimum retention time requirements for the CWA wells.

Recommendations

The following recommendations are provided for next steps in the GRRP planning, permitting, and system design process:

- The ownership, construction, and operational status of several nearby domestic and SWS wells, including the Cabazon and Carver Track wells, should be further investigated.
- CWA should be engaged to confirm the status of their municipal wells in the study area, particularly nearby wells south of VSD. Data gaps regarding construction specifications for nearby CWA should be addressed.
- Additional hydrogeologic site investigations should be considered to confirm the hydraulic barrier effects of the fault splays identified in the 2022 Geoscience investigation. These could include additional geophysical surveys and/or the installation measurement and testing and monitoring wells. Monitoring wells installed on the eastern and western sides of the estimated fault zone could be monitored and pump tested to confirm the barrier effects of the faults.
- Deep aquifer exploratory borings should be completed as monitoring or test wells to confirm aquifer characteristics at the site, providing more confidence in siting and design of a full-scale injection well.

- Several of these monitoring wells could serve as compliance monitoring points for the DDW GRRP Permit Application.
- The injection well(s) location(s) and operational scenario and flow rates should be refined, and updated model simulations performed to confirm aquifer capacity, response, and injected RW flowpaths.

1. INTRODUCTION

Valley Sanitary District (VSD) was formed in 1925 to collect and treat wastewater in its service area. Over the years, the wastewater treatment plant has been expanded and upgraded; the VSD Water Reclamation Plant (WRP) currently treats approximately 6.5 million gallons per day (MGD).

VSD, along with the Indio Water Authority (IWA), formed a Joint Powers Authority (East Valley Reclamation Authority - EVRA) to evaluate the beneficial re-use of water by developing a reclaimed and recycled water (RW) system. One of the re-use alternatives under evaluation is replenishment of the local groundwater supply via injection of treated recycled water into the deep aquifer. In 2022 IWA retained Geoscience Inc. to conduct an initial study of site hydrogeologic conditions and conduct a geophysical survey of potential faulting near the site. In 2022 VSD retained Todd Groundwater (Todd) to perform this hydrogeologic evaluation and preliminary groundwater modeling study of the feasibility and effectiveness of a Groundwater Replenishment-Reuse Project (GRRP) at or near the wastewater treatment plant. The hydrogeologic and modeling study includes some of the technical evaluations required for permitting of a GRRP by the California State Water Resources Control Board's Division of Drinking Water (DDW) and the Regional Water Quality Control Board Colorado River Region (RWQCB). Should the project move further into the planning and permitting stages, a GRRP Engineering Report (ER) will be developed for submission to the DDW. The hydrogeologic studies and modeling simulations described herein are some of the required elements of the ER that will be needed for DDW permitting of the GRRP.

The hydrogeologic evaluation includes a review and documentation of local geology and aquifer characteristics (including thicknesses of aquifer and aquitard layers and aquifer permeability and storage properties), an inventory of known wells in the study area, mapping of groundwater levels and recent trends, and an evaluation of general groundwater quality in the study area. Most of the information used in the hydrogeologic evaluation was developed as a part of the Indio Groundwater Subbasin 2022 Alternative Plan Update (Alternative Plan Update) prepared by the Indio Subbasin Groundwater Sustainability Agencies of which IWA is a member agency. The hydrogeologic information was evaluated with respect to the feasibility and potential performance of a RW injection well project.

The hydrogeologic data also were used in development of a local three-dimensional groundwater flow model of the area around the site. The local three-dimensional groundwater flow model was constructed to simulate local groundwater flow and subsurface flowpaths of the injected RW. The model was constructed using the United States Geological Survey MODFLOW code, a widely used and accepted numerical groundwater flow model. Some of the local model characteristics and input parameters are based on the Indio Subbasin regional MODFLOW model prepared for the Alternative Plan Update, with local refinements around the VSD site. The model accounts for local aquifer properties and groundwater flow conditions within the cities of Indio and Coachella and adjacent areas, and it simulates the effects of numerous groundwater production wells operated in the study area. The local model was calibrated to observed groundwater elevations and trends in the study area with good calibration results, then used to simulate preliminary injection well operations. Two injection alternatives were simulated and predicted changes in groundwater elevations. Subsurface flowpaths to downgradient areas and production wells were estimated. The flowpath simulations also provide preliminary estimates of RW retention times and contributions to downgradient wells as required for a GRRP ER and DDW permit.

This report documents the results and key findings from the hydrogeologic and modeling evaluations. The report is organized as follows:

- Section 2 – Local hydrogeologic conditions in the vicinity of VSD
- Section 3 – Groundwater flow model construction and calibration approach, data sources, model inputs, and results of model simulations
- Section 4 – Conclusions and recommendations for next steps for the GRRP project.

2. LOCAL HYDROGEOLOGIC CONDITIONS

This section describes the hydrogeologic conditions in the vicinity of VSD, including information on nearby municipal and private groundwater production wells, local hydrostratigraphy, groundwater production, groundwater levels and flow, and groundwater quality.

2.1. VSD Facility

VSD is located at 45-500 Van Buren Street in Indio, California. It is situated in the east-valley area of the Indio Subbasin (DWR Groundwater Subbasin 7-021.01) which is a portion of the greater Coachella Valley Groundwater Basin (DWR Basin No. 7-021) (DWR, 2003). The VSD WRP site is in the eastern portion of the Indio Subbasin, just west of the Whitewater River channel (**Figure 1**).

The VSD facility currently consists of an activated sludge treatment plant and oxidation ponds. The two treatment processes combined currently give the treatment plant a total treatment capacity of 12.0 million gallons per day (MGD). Current (2022) treatment volumes average around 6.5 MGD. VSD is in the process of upgrading treatment technologies with plans to implement advanced treatment in the future.

2.2. VSD Study Area

To focus the data collection, evaluation, and modeling efforts, an approximately 30-square mile (mi^2) study area centered around the VSD WRP was selected. The VSD study area is shown in **Figure 1**. The study area extends from approximately two miles northwest (upgradient) and three miles south (downgradient) of the VSD facility. The study area is oriented in the general direction of groundwater flow (north-to-south) and includes numerous (active and inactive) IWA, Coachella Water District (CWD), and Coachella Valley Water District (CVWD) municipal production wells, and private domestic, small water system (SWS), and irrigation wells.

2.3. Existing Wells

Groundwater production within the study area occurs primarily via municipal, domestic, and irrigation pumping. The presence of municipal and domestic drinking water supply wells within a specified distance of a GRRP project will trigger regulatory constraints that limit the maximum recycled water contribution to the drinking water supply well. Minimum requirements for RW retention time in the subsurface also must be met for GRRPs.

Table 1 lists information on the ownership, location, and depths of nearby known municipal wells, and **Table 2** provides information on nearby private wells in the Study area. **Figures 2** and **3** show the locations and generalized depths of the known municipal and private wells, respectively. Most of the well information was obtained from a well inventory database developed as a part of the Alternative Plan Update. The well database was compiled from records on-file with the California Department of Water Resources (DWR), well records kept by CVWD, and well information provided by IWA and CWA.

As shown on the tables, some wells have relatively complete records on ownership and construction (total well depths and screened intervals), and some have pumping, depth to groundwater, and groundwater quality data. Other wells have incomplete information and well ownership and construction are unknown.

On **Tables 1 and 2** and **Figures 2 and 3**, the municipal and private wells are grouped into four depth categories based on well depth and construction:

- Wells shallower than 500 feet below ground surface (ft bgs). These wells are assumed to be completed solely in the shallow aquifer.
- Wells with upper screen depths less than 500 ft bgs but with total depths greater than 500 ft bgs, and presumably completed in both the shallow and deep aquifer.
- Wells with upper screen depths greater than 500 ft bgs, completed only in the deep aquifer.
- Wells without construction information.

Municipal production wells in the study area are generally screened in the lower portions of the aquifer with screen intervals ranging from 500 to 1,200 feet-bgs. Known domestic and SWS wells are generally shallower, less than 500 feet deep. Screen intervals of private irrigation wells are both shallow and deep, ranging from 200 to 1,200 feet-bgs.

Figure 2 shows the municipal wells in the study area with the color coding that indicates their available construction information as listed in **Table 1**. The municipal wells shown on the map are labeled using their local (Agency) well name. However five of the IWA wells do not have a local well name in the project database; these wells are labeled with their State Well Number (SWN) and can be identified through cross-checking Table 1.

The IWA wells are generally located north and west of VSD, noting that several IWA wells are located less than one mile from the VSD site. All CVWD wells are several miles west of the VSD site and are unlikely to be significantly affected by potential RW injection. All CWA wells are located south, southeast, or southwest of VSD, with three CWA wells (Nos. 11, 17, and an unnumbered CWA well) less than one mile south of the site. Note unnumbered near-site CWA well has State Well Number 05S08E31E01S. In the 2022 Geoscience report, CWA well Nos. 11 and 17 were identified in the but the un-numbered CWA well was not listed or shown in the report. No construction information is available for the unnumbered CWA well; however, this well reportedly produces a large amount of groundwater (see **Section 2.8**). Construction information for this well and other CWA and IWA wells with unknown information should be obtained. Given that the prevailing groundwater flow direction is to the south, nearby CWA wells south of VSD are most likely to be affected and thus warrant careful monitoring and analysis consistent with regulatory requirements. These wells also are most likely to receive benefits from RW injection in terms of sustainable groundwater levels and storage.

As shown in **Table 2** and **Figure 3**, less information is available on well ownership and construction for private wells in the study area. Private wells listed in **Table 2** and shown on **Figure 3** are labeled with their owner's name, if available, or with their SWN if ownership information is not available. The private wells include domestic and small water system (SWS) wells, primarily completed in the shallow aquifer, and irrigation wells (agriculture and golf) completed in the shallow and/or deep aquifers (see further discussion of aquifer zones in **Section 2.4**).

Several private wells are just to the south of the VSD site. These include two shallow aquifer wells owned by the Carver Tract SWS, a shallow aquifer private well 05S07E25R01S (ownership unknown), and the "Cabazon" well adjacent to VSD. The Cabazon well, likely a shallow domestic well serving the property adjacent to VSD, was identified by VSD staff and maps of its location were provided to Todd (VSD, 2022). Review of the project well database indicates that no information on this well is available. While these wells are downgradient (south) of a potential injection well at the VSD site, they are likely shallow (pending confirmation), and may not be affected by or receive RW that is injected into the deep aquifer, due to the presence of the regional clay aquitard that separates the shallow and deep aquifers (see below).

The well inventory provides locations and construction of nearby wells that may be affected by RW injection. As indicated on Figures 2 and 3, some of these wells (including several domestic/SWS wells and three CWA wells) are relatively close to the VSD facility. Potential effects in terms of RW contribution to a supply well or RW residence time in the aquifer prior to interception by a supply well would potentially trigger regulatory constraints and affect the design and/or operation of the GRRP project. Potential residence time and recycled water contribution to nearby wells is further evaluated using the local groundwater flow model (Section 3).

2.4. Hydrostratigraphy and Aquifer Zones

The hydrostratigraphy of the Indio Subbasin and VSD study area has been previously characterized in numerous studies by the United States Geological Survey (USGS, 2014), DWR (2003, 1964), Indio Subbasin GSAs (2021), and other researchers. Alluvial aquifers in the vicinity of VSD are composed of interbedded coarse-grained and finer-grained fan, stream wash, and lacustrine deposits. Based on available well driller's logs, the thickness of alluvial deposits in the vicinity of VSD exceeds 1,500 feet near the center of the valley and consists of predominantly coarse-grained gravels and sands, constituting the aquifer system that is the main source of water supply in the region. Shallow and deeper aquifers are separated locally by fine-grained (silt and clay) deposits including a thick and continuous "regional clay aquitard" present across the study area.

In 2022, IWA conducted a study of local aquifer conditions in the study area. The work included review of lithologic logs for wells and performance of a surface geophysical survey in the VSD site area. The results of these investigations are documented in a *Subsurface Geophysical Survey Investigation Report* (Geoscience, 2022) included as **Attachment A**. The report included two hydrogeologic cross-sections; the locations of these are shown on **Figure 4** along with two cross sections prepared by Todd.

Geoscience Cross Section A-A' is aligned roughly north-south and crosses the VSD property. Geoscience Cross Section B-B' is aligned roughly east-west and is located approximately ½ mile south of the VSD property. In brief, these cross-sections illustrate the shallow and deep aquifer zones, the inter-lying aquitard, and construction of nearby wells. Cross Section B-B' also illustrates several fault splays identified from the geophysical survey present that are beneath the eastern portion of the VSD site. The presence of these faults and potential effects on local groundwater flow are further discussed below.

For this study, available DWR Well Completion reports with lithologic logs were reviewed to confirm local hydrostratigraphic conditions in the study area. Two additional cross-sections were constructed to augment the Geoscience evaluation. As shown on **Figure 4**, Cross-Section C-C' trends roughly east-west, subparallel to Geoscience Cross-Section B-B', and is located approximately one mile north of the VSD site. Cross-Section D-D' trends roughly north-south, subparallel to Geoscience Cross-Section A-A', and is located approximately 1.5 miles west of the VSD site. Collectively, the two Geoscience cross-sections and two Todd cross sections provide good coverage of aquifer characteristics up-gradient, cross-gradient, and down-gradient of the VSD site.

Cross-Sections C-C' and D-D' are shown on **Figures 5** and **6**. Borehole lithologic logs from DWR Well Completion Reports were reviewed to determine the lithologies and depth intervals of the Study area aquifer and aquitard zones. Interpretations of aquifer and aquitard depths and thickness as illustrated on the new cross-sections are consistent with those provided by Geoscience. The shallow aquifer zone occurs to a depth of approximately 300 feet and is continuous across the study area. Lithologic descriptions of the shallow aquifer materials indicate that they are predominantly fine to coarse sand. Based on reported yields of wells completed in the shallow aquifer, the sediments have moderate to high permeability.

Underlying the shallow aquifer is the regional clay aquitard that occurs at depths of between approximately 300 and 500 ft bgs with thicknesses varying between 100 and 200 feet. Deposited as ancestral lakebed deposits, the aquitard is composed predominantly of lacustrine clay with minor sand stringers and is continuous across the study area. The regional aquitard forms a low permeability confining unit that hydraulically separates the shallow and deep aquifer zones (Indio GSAs, 2021). Indicators of the hydraulic separation include different water level trends and large elevation differences between the shallow and deep aquifer zones. Some deep aquifer wells further south in the valley are artesian, also indicating effective confinement of the deep zone.

The deep aquifer occurs below 500 feet bgs and extends to around 1,500 feet bgs. This zone is predominantly comprised of moderate to high permeability sand, although several clay layers are present at various depths between 500 and 1,300 feet bgs. Regardless, as illustrated on the four cross-sections, the deep aquifer consists of at least 500 feet of moderate to high permeability sands, capable of producing (or receiving via injection) well over 1,000 gallons per minute (gpm) from wells.

2.5. FAULT ZONES

The southern portion of the Indio Subbasin is bordered on the east by the Indio Hills, Mecca Hills, and Little San Bernardino Mountains. The San Andreas Fault Zone trends along the base of the hills and forms the eastern boundary of the subbasin, separating the Indio Subbasin from the Desert Hot Springs Groundwater Subbasin to the east. As shown by the orange lines on **Figure 4,** the San Andreas Fault Zone comprises a series of en-echelon (approximately parallel) fault planes. In the northern portion of the Indio Subbasin, additional faults (including the Garnet Hill and Banning Faults) also have been mapped along the east side of subbasin.

The faults along the east side of the subbasin form partial but effective barriers to the lateral movement of groundwater. This effect is revealed by differences in groundwater levels on either side of the Banning, Garnet Hill, and San Andreas Faults. For example, the groundwater level contour maps in the Alternative Plan Update (see Chapter 4 figures; Indio GSAs, 2021) shows differences of as much as 200 feet across the Garnet Hill Fault. Hydraulic barriers are formed by offsetting aquifer layers and by formation of clay-rich fault gouge along the fault plane(s) creating a low-permeability barrier.

In the Salton Sea area, Geoscience documented the presence of additional buried fault traces located near the eastern edge of the sea. This fault zone is referred to as the East Shoreline Fault (ESF) and extends from the eastern edge of the Salton Sea and northwest toward the Indio area. The ESF Zone may be projected to extend through the VSD area (Geoscience, 2022).

In 2021 Geoscience and Atlas Technical Consultants conducted a local subsurface geophysical survey to identify any nearby or onsite faults that could potentially inhibit the ability to inject water at VSD. The survey identified a series of probable faults, or a fault zone, present in the area under the eastern-northeastern portion of the VSD site (Attachment A; Geoscience, 2022). The fault zone trends to the northwest and is illustrated as an anomaly in the geology on Geoscience Cross-Section B-B' (Attachment A). The onsite fault zone also is illustrated on **Figure 4** (and other report figures) and is extrapolated to the southeast and northwest across the study area, consistent with the alignment of the San Andreas and other faults. Based on structural and lithologic correlation of existing boring logs, Geoscience concluded that there is possible uplift and offset of sedimentary layers at depths greater than approximately 150 feet. The offset may cause a local partial barrier to groundwater flow at and near VSD. This barrier might inhibit or affect injection capacity and the migration of injected RW.

The actual existence of a barrier and the magnitude of its hydraulic effects on groundwater flow at the site currently are unknown. If the fault serves as a hydrogeologic barrier, a discontinuity in groundwater levels and changes on either side of the fault may be observed. Well pumping tests with groundwater level monitoring near the fault may also indicate a hydrogeologic barrier. Additional investigation, including installation of test or monitoring wells on either side of the fault zone, monitoring of groundwater levels, and performance of pumping tests along with groundwater flow model simulations, are recommended to confirm the degree of impedance provided by the local fault zone.

2.6. Aquifer Hydraulic Properties

Aquifer hydraulic properties (hydraulic conductivity, porosity, and storage coefficients) in the vicinity of VSD have been previously characterized through analysis of numerous well pumping tests along with a basin-wide aquifer textural study (Indio GSAs, 2021). Fogg and others (2000) conducted a kriging analysis of aquifer textures and associated hydraulic properties of the shallow and deep aquifers. In the VSD study area, horizontal hydraulic conductivities of both aquifer zones range from approximately 20 to 50 feet per day (ft/day) for sand/gravel deposits. The regional clay aquitard has a lower horizontal hydraulic conductivity, approximately 1.0 ft/day. The deep aquifer has storage coefficients of 10^{-3} to 10^{-4} 1/foot, typical of confined aquifers, while effective porosity ranges from 0.15 to 0.20 for the shallow and deep aquifers and 0.01 for the clay aquitard.

The hydraulic property distributions developed by Fogg et al. and used in the Indio Subbasin regional MODFLOW model for each aquifer zone were imported to the VSD local MODFLOW model. Low conductance (permeability) for the San Andreas and local fault zones also were simulated in the local model, using assumed fault barrier conductance values. Additional discussion of the aquifer hydraulic properties used in the model is included in **Section 3**. Overall, combination of both the moderate to high hydraulic conductivities and the deep aquifer's large thickness indicate that the zone has the capacity to accept large amounts of injected RW.

2.7. Groundwater Levels and Flow

Groundwater level data are available for numerous municipal and private wells in the VSD study area. Monthly and annual level data between 2009 and 2021 were evaluated for this study. **Figures 7** through **9** show shallow and deep aquifer groundwater elevation values and deep aquifer equipotential contour lines for three recent annual periods: 2019, 2020, and 2021. Levels are posted on the maps for shallow (red well symbols), deep (blue symbols), intermediate (purple symbols), and for wells of unknown depths. Only deep aquifer groundwater elevation contours are provided on the maps because shallow aquifer level data are sparse. Groundwater levels were reported as static, but some water levels suggested recent or nearby pumping.

The groundwater elevation maps show that levels and general flow patterns for the three years are similar. Groundwater elevations for shallow aquifer wells (red symbols on **Figures 7** through **9**) are generally around 20 feet higher than levels for nearby deep aquifer wells. The shallow wells were not used to develop the deep groundwater elevation contours.

The deep aquifer contour patterns for the three years are similar, indicating a similar hydraulic gradient through the years, with slightly lower levels in the southern part of the study area during 2019. As indicated by the contours, groundwater west of the Whitewater River

Channel during all years generally flows in a north to south direction. Local cones of depression are illustrated around several active groundwater production wells with lowered pumping levels. In the eastern study area, groundwater inflow from the Indio Hills appears to cause a northeasterly-to-southwesterly component of flow from the east toward VSD. The local fault zone may form an impedance to flow, as indicated by the higher groundwater elevations east of the fault zone and as illustrated/inferred with the elevation contours.

During 2019-2021, the change in groundwater elevation across the Study area in the deep aquifer was approximately 40 feet, from around -80 ft msl to -120 ft msl. The corresponding hydraulic gradient west of the local fault zone is approximately 0.001 to the south. Based on Darcy's Law of groundwater flow and assuming a hydraulic conductivity of 50 ft/day and an effective porosity of 0.15, the estimated deep aquifer regional groundwater flow velocity across the Study area is approximately 0.4 foot/day.

Groundwater elevation trends over time from 2009 to 2021 in selected shallow and deep aquifer wells are illustrated on **Figure 10**. The wells shown were selected based on the availability of frequent (monthly) water level data. Levels from both shallow and deep aquifer wells are shown to illustrate the different groundwater elevations and trends between the two aquifer zones.

Overall groundwater level trends in both aquifers have been relatively stable since 2010. Levels in shallow wells (those with red or purple symbols on **Figure 10**) only exhibit small fluctuations of less than 10 feet across seasons and years. Deeper wells (blue) tend to have larger fluctuations of 20 or more feet between seasons and years, with higher groundwater elevations typical during winter and spring months and lower levels during summer and fall. These seasonal fluctuations reflect increased deep aquifer well pumping during summer months, when water demand is higher, and associated decline in deep aquifer levels.

Comparison of groundwater elevations in nearby shallow and deep well (nested) wells, such as IWA Well 7 (shallow) and IWA Well BB (deep) indicates shallow aquifer groundwater elevations are generally 10 to 20 feet higher than nearby deep aquifer groundwater elevations when deep levels are not drawn down from pumping. At nested well pair 05S07E27L01S (shallow) and 05S07E27B01S (deep) shallow groundwater elevations are around 20 feet higher than deep levels when not pumping. The difference in levels between the shallow and deep well pairs and the lack of seasonal fluctuations in shallow levels suggests that the regional aquitard effectively separates the deep aquifer from the overlying shallow zone.

Overall, the groundwater elevation data indicate relatively stable flow conditions in the study area. Hydraulic gradients and flow directions in the study area are consistent and can be used to predict subsurface flow paths of injected RW. Injected RW likely will migrate in the subsurface in a general southerly direction. The ambient depth to water in the deep aquifer is approximately 100 ft bgs, indicating that the aquifer has capacity for injected RW.

2.8. GROUNDWATER PRODUCTION

Monthly and annual production data are available for metered municipal and private production wells for the period 2009 to 2021. CVWD collects this information from well pumpers in the subbasin and the pumping amounts are available in the Alternative Plan Update database. Pumping data were extracted and used to characterize groundwater pumping in the vicinity of VSD WRP.

Groundwater is currently pumped from municipal and private wells in the vicinity of the VSD WRP as shown in **Figures 11** through **13**. Note the area shown on these figures is slightly smaller than the larger VSD study area on the other Section 2 figures, and only shows active pumping wells closest to the site and that are within the groundwater model area (**Section 3**). These include IWA and CWA municipal wells, and private domestic, SWS, and golf course wells. Note that IWA and CWA also pump from other wells in the Indio Subbasin but beyond the local vicinity of VSD site. **Figures 11** through **13** shows the average annual pumping rates in the local wells for three recent years 2019, 2020, and 2021. As indicated by comparison of the figures, groundwater production rates for individual wells were similar for each year. Total average annual production from IWA wells has been around 10,000 acre-feet per year (AFY), while average production from nearby CWA wells Study area has been around 7,000 AFY. Several CWA wells south of the site are large pumpers, producing over 1,000 AFY each. These include CWA Well No. 19 and unnumbered CWA Well 05S08E31E01. Pumping rates of private wells are generally lower, from less than 100 up to several hundred AFY.

Figures 14 and **15** show the monthly and average annual pumping rates of active IWA, CWA, and nearby Carver Tract SWS wells in the vicinity of VSD site between 2009 and 2021. As illustrated on the monthly pumping plots, production rates for most wells are higher in the summer months. A few municipal wells have sometimes been inactive during winter, then resume operations during summer. The annual pumping plots reveal some year-to-year pumping rate variations, with increased production from a few IWA and CWA wells during recent years (2018 through 2021). **Figure 16** shows the total production of all IWA wells and all CWA wells in the vicinity of VSD site between 2009 and 2021, and reveals increased IWA production in recent years, while CWA production site area has remained relatively steady. The nearby Carver Tract SWS well 05S08E30M01S is active, and during 2019 through 2021 pumped and average of around 100 AFY.

The production well data were used in the local groundwater flow model, as they affect groundwater flow directions and velocities.

2.9. GROUNDWATER RECHARGE SOURCES

The largest source of recharge to the study area (delineated in **Figure 1**) is subsurface inflow from areas of the Indio Subbasin, flowing from the north-northwest. The rate of subsurface inflow is governed by the cross-sectional area of groundwater flow, aquifer hydraulic properties, and the hydraulic gradient. Subsurface inflow amounts are calculated using the groundwater flow model and vary over time but are generally on the order of tens of thousands of AFY.

Groundwater recharge in the Study area from surface sources is limited. Because precipitation in the east valley is low, most local of the limited groundwater recharge occurs from municipal, sewer, and outdoor irrigation return flows. Although historical irrigation water use and associated return flow was higher, the current amount of return flow recharge is small, on the order of an inch or two per year. Seasonal groundwater level fluctuations are driven by pumping patterns, more so than precipitation or irrigation return flow.

Implementation of a RW injection project will increase local groundwater recharge, providing benefits to groundwater levels and production in Indio and Coachella.

2.10. GROUNDWATER QUALITY

Limited groundwater quality data (including total dissolved solids [TDS] and nitrate concentrations) are available for municipal (primarily deep aquifer) wells in the vicinity of VSD Study area. **Figures 17** and **18** show the most recent TDS and nitrate concentration measurement for each well monitored between 2010 and 2020. TDS concentrations are relatively low, ranging from 120 to 370 milligrams per liter (mg/L), well below the primary maximum contaminant (MCL for drinking water limit of 1,000 mg/L). Nitrate (as nitrate-NO_3) concentrations for available wells are below the primary drinking water MCL of 45 mg/L during the last sampling event at each well.

The potential injection project will include advance treatment of RW that results in TDS and nitrate concentrations below ambient groundwater quality concentrations. Accordingly, no quality degradation for these water quality parameters will occur. Conversely, injection of high-quality advanced treatment RW could provide benefits to local groundwater quality by reducing concentrations of water quality parameters in groundwater.

3. GROUNDWATER FLOW MODEL SIMULATIONS

A three-dimensional local MODFLOW groundwater flow model was constructed and applied simulate potential operations and benefits of a RW injection system. The objectives of the modeling evaluation are to:

1. Predict the lateral and vertical movement of groundwater under current conditions
2. Simulate RW injection at a hypothetical injection well located in the southern portion of the VSD property
3. Predict the amount of groundwater level rise and injection well capacity for several operational scenarios
4. Assess the potential movement of injected RW to nearby downgradient water supply wells, and estimate residence times

Model results provide a technical basis for assessing RW injection feasibility and refining a potential injection system at or near the VSD site.

The groundwater flow model was constructed based on available information on aquifer depths and thicknesses, hydraulic properties, fault barriers, groundwater levels, and groundwater production. The model was calibrated to recent groundwater levels and used to predict future groundwater level and flow responses including lateral and vertical flow paths of injected RW. Discussion of the model construction approach and methods, inputs, and model results are presented below.

3.1. REGIONAL GROUNDWATER FLOW MODEL

An existing regional MODFLOW model of the entire Indio Subbasin was reviewed to aid in development of the local VSD model. The regional model simulates flow throughout the Coachella Valley, from the San Gorgonio Pass area to the Salton Sea. The historical simulation period is 1936 to 2020, using annual stress periods. Model calibration quality (the match between measured and simulated groundwater elevations and flows) for the historical period is good and meets all calibration criteria as identified in the Alternative Plan Update (Indio GSAs, 2021). The Plan Update also included simulations of future groundwater conditions for the period 2020-2070 under several management scenarios.

The model includes four model layers representing the perched aquifer, the shallow aquifer and deep aquifers, and the inter-lying regional aquitard. Variable model layer thickness and heterogeneous hydraulic conductivities are simulated. Variable annual production well pumping rates along with non-uniform natural and return flow recharge is simulated, along with groundwater replenishment at CVWD’s Groundwater Replenishment Facilities.

Selected input parameters from the regional model were used to develop the local VSD model. The distribution of horizontal hydraulic conductivity and aquifer top and bottom layer elevations in the regional model were extracted and used as input to the local VSD model.

The regional model layering was slightly modified for the local model. The local model retained four model layers but used one layer for the shallow aquifer, one for the regional aquitard, and two layers for the deep aquifer. This change also necessitated re-assignment of hydraulic conductivity values to accommodate the representation of clay deposits in Layer 2 in the local model instead of Layer 3 in the regional model.

To account for representative local groundwater conditions, new model boundary conditions were developed for the local WRP 10 model as described below.

3.2. LOCAL VSD MODEL APPROACH AND CONSTRUCTION

The model was constructed using the United States Geological Survey (USGS) MODFLOW code, along with the particle-tracking flowpath model MODPATH. Model construction and calibration was performed using the Groundwater Modeling System (GMS) version 10.5 model pre- and post-processing software.

The local groundwater model area is slightly smaller than the VSD Study area shown on **Figure 19**. The model encompasses an 18.5 square mile area around the VSD site. The model boundaries are located approximately 2 miles north, 2 miles east, 2 miles west, and 3 miles south of the VSD site.

Model input parameters included the following:

- Aquifer Layer Geometry and Thickness
- Aquifer Horizontal and Vertical Hydraulic Conductivity and Porosity
- Boundary Conditions (Specified Heads)
- Groundwater Production Wells Depths and Pumping Rates
- Areal Recharge
- Injection Well Depth and Pumping Rate

As described in Section 3.1, local model layer geometry/thickness and aquifer hydraulic properties were assigned based on characteristics of Indio Subbasin regional MODFLOW model and modified to simulate local groundwater flow more reliably in the shallow and deep aquifers.

Subsurface flows into the model area occur primarily through the northern (upgradient) model boundary, while subsurface outflows out of the model area occur primarily through the southern model boundary. Respective rates are governed by the cross-sectional area of flow, aquifer hydraulic properties, and hydraulic gradients across these boundaries. Accordingly, specified heads defined along each of the model boundaries in each model layer were assigned based on evaluation of observed groundwater elevations during 2021. These specified-head boundaries, combined with aquifer hydraulic properties and model-predicted hydraulic gradients along the margins of the model, govern the rate of subsurface flows into and out of the model area.

Representative recent groundwater production rates for known production wells in the model area were simulated. The average production rate for producing wells over the three-year period from 2019 to 2021 was used. Percentages of the average annual pumping rate from the wells were allocated to respective model layers based on the well screen location within each model layer. Also simulated were minor combined water, sewer, and irrigation return flows.

The model simulates steady-state flow under representative current (2019-2021) conditions. The steady-state approach is appropriate for this phase of the project because flow and pumping conditions during recent years have been relatively constant, and the preliminary injection simulations are intended to assess the deep aquifer capacity to inject RW and general flowpaths of injected RW. The simulation utilizes average representative recent groundwater elevations for boundary conditions and recent average pumping rates for Study area wells. If additional transient simulations of variable well pumping or injection rates over time are warranted, the MODFLOW model can be easily converted to transient.

3.3. MODEL INPUTS

3.3.1. Model Domain Grid and Layering

As shown in **Figure 19**, the model area covers approximately 18.5 square miles, roughly centered on the VSD site. The model grid comprises 160 rows by 130 columns with a variable cell size ranging from 50 by 50 feet in the VSD site area to 250 feet at the model boundaries. Model grid columns were oriented north to south. The small cell size of 50 feet allows for accurate simulation of hydraulic effects of pumping and injection in the site area.

Four model layers were used to simulate the shallow and deep aquifers. The model layer elevations were based on the Indio Subbasin regional model. The regional model layer geometries were compared with aquifer layer elevations in local study area well logs and the hydrogeologic cross sections described in **Section 2**. There is good agreement between the regional model layer elevations and the local lithologic logs and cross-sections with respect to elevations of the tops and bottoms of the shallow aquifer, regional aquitard, and deep aquifer. Differences in layer top and bottom elevations between the regional model and local well stratigraphic elevations are generally less than 10 feet. Accordingly, no changes were made to the regional model layer elevations, and these were imported and used in the local model.

Figure 20 shows the elevations of the bottoms of the local Model Layers 1 through 4. The base of each layer generally slopes to the south. Model Layer 1 represents the unconfined shallow aquifer, with layer bottom elevations ranging from -240 ft msl at the northern model boundary to -400 ft msl at the southern boundary. The saturated thickness of Model Layer 1 is the difference between the water table and layer bottom, and ranges from around 160 to 315 feet in the model area. Model Layer 2 represents the low-permeability regional clay deposits, which was simulated as Layer 3 in the regional MODFLOW model. Model Layer 2 bottom elevations range from -380 ft msl at the northern model boundary to -620 ft msl at the southern boundary. The thickness of Model Layer 2 ranges from 140 to 250 feet and is thickest in the middle of the area. Model Layers 3 and 4 represent the upper and lower portions, respectively, of the deep aquifer. These deep aquifer layers each have the same thickness, ranging from approximately 500 to 625 feet each.

3.3.2. Aquifer Hydraulic Properties

Aquifer hydraulic properties include horizontal hydraulic conductivity (K_H), vertical hydraulic conductivity (K_V), and effective porosity or specific yield [Sy]. The values used for the shallow and deep aquifers for the local model are based on the respective values assigned in the regional flow model. These values were developed based on a detailed evaluation of pumping test-derived hydraulic conductivity values and kriging analysis of aquifer textures logged for available borehole records (Fogg, 2000). K_H values assigned to Model Layer 1 (shallow aquifer) and Layers 3 and 4 (deep aquifer) are shown on **Figure 21**. As shown on the figure, K_H values for Model Layers 1 and 3/4 are similar and range from approximately 10 to 60 feet per day (ft/day) in the Study area. In Model Layer 2, a uniform lower K_H value of 1.0 ft/day was used.

Vertical hydraulic conductivity values are defined as an anisotropy ratio of horizontal to vertical hydraulic conductivity (K_H/K_V). A uniform ratio of 10:1 was assigned to Model Layers 1 and 3/4. Model Layer 2 representing the regional aquitard was a K_H/K_V ratio of 100:1, like the regional flow model.

A uniform effective porosity/specific yield value of 0.15 was assigned to Model Layers 1, 3, and 4, while a value of 0.01 was assigned to Model Layer 2.

3.3.3. Hydraulic Flow Barriers

Based on water level mapping in other portions of the Indio Subbasin, the San Andreas Fault and local fault zone mapped beneath the northern portion of the VSD site are assumed to form partial barriers to flow between areas east and west of the faults. To account for potential partial flow barriers effects caused by the faults, the MODFLOW Horizontal Flow Barrier (HFB) Package was used to simulate the San Andreas Fault and local fault zone identified at the site. The locations of the two barriers are shown on **Figure 21**. A single HFB was used for the San Andreas fault, and one barrier was used for the local fault zone, rather than the multiple fault splays identified during the site geophysical investigation. For the local fault zone at the VSD site, the hydraulic barrier is extrapolated to the northwest and southeast of the site all the way across the local model area, parallel to the onsite fault alignment identified by Geoscience (2022). The faults are simulated as vertical HFBs in all model layers (Layers 1-4). A uniform hydraulic conductance value of 0.001/day was assigned to both HFBs and was not adjusted during model calibration. Because the hydraulic characteristics of the local fault and its extent northwest and southeast of the VSD site are unknown, the assumed characteristics should be refined as additional information becomes available. Regardless, simulation of the local fault zone hydraulic barrier is considered a conservative assumption as its effects limit the capacity of the injection well and increase groundwater velocities of injected water south of the barrier.

3.3.4. Boundary Conditions

Because the local model comprises a much smaller area than the regional MODFLOW model, different model boundary conditions were required. Specified heads were defined along each of the model boundaries in each layer. The assigned head values are based on 2021 groundwater elevation measurements across the local model area (**Figure 7**). The same boundary condition elevation values were used for deep aquifer Model Layers 3 and 4, while Model Layer 1 was assigned values approximately 15 feet higher than those for the deep aquifer. Boundary elevations for Model Layer 2 were assigned intermediate values.

3.3.5. Production Well Pumping

As described in Section 2.8, groundwater is pumped from numerous municipal and private production wells in the Study area. Within the local model area, 33 wells are known active pumpers. These include 12 IWA wells, 5 CWA wells, and 16 private wells. For the baseline model simulation, average annual production over the three-year period between 2019 and 2021 were simulated. This period represents the representative current pumping rates in the Study area.

The simulated production wells are listed in **Table 3** along with their average pumping rates, depths, and model layer assignments. As described in Section 2, the local production wells are completed (screened) at various depths within the shallow and deeper aquifer zones, with five wells simulated in the shallow aquifer (Model Layer 1) and the remained simulated as pumping from the deep aquifer (Model Layers 3 and 4). Wells completed in a single model layer were simulated as pumping exclusively from that layer. For wells completed in more than one model layer, the total pumping amounts were allocated to respective model layers. For example, the average flow rate for a deep aquifer well completed in both Model Layers 3 and 4 was allocated with 50 percent occurring from Model Layer 3 and 50 percent from Layer 4. Wells were simulated using the standard MODFLOW Well Package.

3.3.6. Hypothetical Injection Well

As a preliminary simulation of RW injection, a single deep aquifer injection well (Well IW-1) was simulated. In accordance with VSD input and accounting for the presence of the local fault that may act as a hydraulic barrier and impede groundwater flow, the hypothetical injection well was located on the central portion of the VSD site south of the mapped local fault zone. The well is assumed to be around 1,100 feet deep, screened between 500 and 1,100 ft bgs, and is simulated to inject only into Model Layer 3 (upper deep aquifer). Two initial injection simulations were performed, with the well injecting at rates of 2 MGD and 4MGD.

3.3.7. Return Flow Recharge

While it is recognized that water system, sewer, and irrigation return flows vary by location due to differences in land and water use practices, aquifer recharge from return flow is a relatively minor component of the Indio Subbasin water budget (Indio GSAs, 2021) as compared with other water budget components including subsurface inflow and potential RW injection operations. In the local model, an areal recharge rate of 1.0 inch per year was applied uniformly across the model area to simulate these combined return flow sources. This value is based on return flow estimates developed as a part of the Alternative Plan Update. Recharge is applied to Model Layer 1 using the standard MODFLOW Recharge Package. Simulation of uniform areal recharge is considered a reasonable simplifying assumption, and return flow recharge amounts do not significantly affect the flow model simulation results.

3.4. MODEL RESULTS

3.4.1. Baseline Calibration Results

The local model was calibrated to observed groundwater elevations during 2021. During model calibration, boundary condition head values were adjusted until simulated groundwater elevations matched observed patterns and trends. Model layer elevations, hydraulic conductivities, recharge rates, and production well pumping rates were not adjusted.

Simulated groundwater elevations in Model Layer 3 (deep aquifer) during 2021 are shown on **Figure 22**. The map shows the location of production wells, the simulated baseline groundwater elevation contours in the deep aquifer, and the groundwater flowpaths in the deep aquifer as simulated by the MODPATH particle tracing. The simulated deep aquifer groundwater elevations can be compared with measured groundwater elevations during this same period **(Figure 10**). As shown on the figures, the observed and simulated groundwater elevations and hydraulic gradients are well-matched across the Study area. Deep aquifer observed and simulated groundwater elevations range from approximately -80 feet msl at the northern (upgradient) model boundary to approximately -115 feet msl at the southern model boundary. West of the local fault zone, the simulated groundwater elevation contours (black contour lines on **Figure 22**) indicate regional north-south flow, with local drawdown cones simulated around pumping wells. East of the local fault zone, the simulated groundwater elevation contours have a more northeast-southwest flow direction, indicating groundwater flow from the Indio hills toward the center of the valley.

Close inspection of the simulated groundwater elevations near the local fault zone indicates that simulated groundwater elevations drop about 15 feet across the flow barrier. Because the actual groundwater elevation changes across the fault are currently unknown, the currently simulated flow barrier affect is hypothetical. Additional data collection and evaluation in the fault area is recommended to confirm actual barrier hydraulic properties and flow conditions.

Simulated shallow aquifer (Model Layer 1) groundwater elevations and flow patterns are similar to deep aquifer flow patterns. Simulated shallow aquifer groundwater elevations are around 15 feet higher than simulated deep groundwater levels, as observed in the measured groundwater level data. The local fault zone is simulated as causing about a 15-foot change in groundwater elevations in the shallow aquifer, like in the deep zone.

Overall, the model is well calibrated and the simulated shallow and deep groundwater levels closely match the observed 2021 groundwater levels.

Also depicted on **Figure 22** are MODPATH-generated deep aquifer groundwater flow paths (blue lines with arrowheads). These simulated groundwater flowpaths illustrate groundwater flow directions and velocities in the deep aquifer under current baseline conditions. For the **Figure 22** map view of the flowpaths, the pathline starting locations were assigned in the middle of Model Layer 3 (upper portion of deep aquifer) along the northern and eastern model boundaries, with additional flowpaths starting at the VSD site. The arrowheads on the blue pathlines represent 10-year travel time intervals. As illustrated, groundwater is predicted to flow from north to south in the area west of the local fault zone. Some flowpaths are captured by active production wells, including the CWA wells south and west of the VSD site. Most of the flow across the VSD site area is captured by unnumbered CWA Well 05S08E31E01. East of the local fault zone, flowpaths have a more northeast-southwest directions with most paths crossing the local fault barrier and then moving west and south of the VSD site.

Simulated baseline groundwater levels and flowpaths are also depicted in cross-section view on **Figure 23**. The cross section is aligned north-south in the middle of the model grid, crosses the VSD site (see inset map on Figure 23) and includes unnumbered CWA Well 05S08E31E01. The simulated groundwater elevations (color fill isocontours) show the higher elevations simulated for the shallow aquifer, with lower groundwater elevations in the underlying deep aquifer. Drawdown associated with the high pumping rate CWA wells south of VSD is illustrated in the simulated isocontours. For the cross-section view of the flowpaths, pathline starting locations were assigned at various depths in each of Model Layers 1, 3, and 4, and at different locations along the northern and eastern model boundaries. The arrowheads on the blue pathlines represent 10-year travel time intervals. As illustrated, groundwater in the shallow aquifer flows from north to south across the area. Some shallow aquifer flowpaths move downward, across the regional aquitard and into the deep aquifer. Deep aquifer flowpaths originating in Model Layers 3 and 4 remain in the deep zone, with some paths captured by the CWA wells south of the VSD site. As indicated by the 10-year travel time arrowheads, under baseline conditions groundwater beneath the VSD site takes on the order of 40 to 50 years to flow south and into the nearby CWA wells. Flow in the deep zone does not move upward through the regional aquitard and into the shallow aquifer or shallow Carver Track wells or presumed shallow Cabazon well (see Figure 22 for locations).

The baseline simulation results were used as starting conditions for the predictive injection simulations, to allow comparison of the differences in groundwater elevations and flow patterns resulting from RW injection.

3.4.2. 2 MGD Injection Simulation

Figure 24 shows the simulated groundwater elevations and particle-trace flowpath for the 2 MGD injection. For the initial injection simulation, a single hypothetical injection well (Well IW-1 on **Figure 24**) was modeled, injecting at a constant rate of 2 MGD (1,390 gpm). This injection rate is lower than the actual average operating rates of the nearby most productive CWA and IWA wells, that pump 1,500 gpm or more. Given that injection rates often are less than production rates, this rate is conservative, and should be achievable for a hydraulically efficient deep injection well. The hypothetical injection well was located at the VSD site, just south of the southern reservoir.

Predicted groundwater elevations in the deep aquifer and flowpaths for the 2 MGD injection scenario are shown on **Figure 24**. The groundwater elevation contours show that the area close to the injection well is characterized by a simulated mound of higher groundwater elevations around the well. These result in radial flow away from the injection point, as shown by the flowpaths, with subsequent flow to the south along the prevailing groundwater flow direction. The simulated flowpaths illustrate the subsurface pathways and the travel time of the injected RW from VSD to downgradient areas. Most of the injected RW is captured by CWA Well 05S08E31E01 south of the site. Some RW flows to the west of the CWA well towards downgradient areas to the south.

Comparison of the flowpaths shown in **Figure 22** with those of **Figure 24** indicates that deep aquifer groundwater velocities are slightly higher for the injection simulation than for the baseline simulation in the area near VSD site. This is Indicated by the greater spacing of the blue arrowheads on **Figure 24** and is due to the steeper hydraulic gradient induced by the injection. The corresponding travel time from the injection well to CWA Well 05S08E31E01 is approximately 30 to 40 years, as compared with 40 to 50 years for the baseline simulation. None of the injected RW is predicted to flow to the north or east across the HFB.

Figure 25 shows a cross-sectional view of the groundwater elevations and flowpaths from the injection well to downgradient areas and wells. The flowpaths in the cross section depict the vertical migration of injected RW and indicate that none of the RW migrates upward from the deep aquifer zone to the shallow aquifer. Most of the injected RW moves toward and into CWA Well 05S08E31E01. Only a small fraction of injected RW travels past the CWA well to downgradient areas.

Figure 26 shows the simulated change (increase) in deep aquifer groundwater elevations predicted to result from 2 MGD injection. The color-fill contours show that the deep groundwater elevations are predicted to increase by about two feet around the CWA wells and closest IWA wells to the northwest. Larger increases are simulated onsite, with a maximum increase of 22 feet predicted for the model cell representing the injection well.

Note that the MODFLOW model utilizes a grid of finite difference cells to predict the average groundwater elevation within each model cell, that are 50 by 50 feet in onsite area. The actual increase in groundwater elevation within the injection well (of smaller diameter than 50 by 50 feet) is higher than predicted for the model cell. An analytical method can be used to predict the actual amount of water level rise in the injection well (Anderson and Woessner, 1992). Assuming an 18-inch diameter injection well that is 50 percent hydraulically efficient, the additional rise in the well is approximately six feet, for a total rise in the injection well of 28 feet. Because groundwater elevations in the deep aquifer are currently around 100 ft bgs, the aquifer has the capacity to accept at least 2 MGD injection.

3.4.3. 4 MGD Injection Simulation

A second injection simulation was performed using the same hypothetical injection well injecting at a constant rate of 4 MGD (2,780 gpm). This injection rate is somewhat higher than the average pumping rate of nearby municipal production wells, and it may not be achievable with a single injection well.

Predicted groundwater elevations and flowpaths for the 4 MGD injection scenario are shown on **Figure 27**. In the onsite and near site area close to the injection well, simulated groundwater elevations increase more than for the 2 MGD scenario, with greater radial flow away from the injection point. The simulated flowpaths illustrate the subsurface pathways and the travel time of the injected RW from VSD to downgradient areas. About half of the injected RW is simulated as being captured by CWA Well 05S08E31E01 south of the site, with other RW flowpaths captured by CWA Well 19 further to the west. Some RW flows between the CWA wells and to downgradient areas to the south. The corresponding travel time from the injection well to the CWA wells south of VSD is approximately 20 to 30 years, as compared with 40 to 50 years for the baseline simulation. Like the 2 MGD injection simulation, none of the injected RW is predicted to flow to the north or east across the HFB.

Figure 28 shows the cross-sectional view of groundwater elevations and flowpaths from the 4 MGD injection well. The flowpaths again indicate that none of the RW migrates upward from the deep aquifer zone to the shallow aquifer. Most of the injected RW moves toward and into downgradient CWA Well 05S08E31E01.

Figure 29 shows the simulated change (increase) in deep aquifer groundwater elevations predicted to result from 4 MGD injection. Deep aquifer groundwater elevations are predicted to increase by about four feet around the CWA wells south of VSD and closest IWA wells to the northwest. Larger increases are simulated onsite, with a maximum increase of 42 feet predicted for the model cell representing the 4 MGD injection well. As with the 2MGD injection scenario, the analytical method can be applied to predict the actual water level rise in the 4 MGD injection well. Assuming an 18-inch diameter injection well that is 50 percent hydraulically efficient, the additional rise in the well would be approximately 12 feet, for a total rise in the injection well of 54 feet. This rise is approaching the maximum capacity of the deep aquifer to accept at least injection without the groundwater level rising to near or above the top of the well.

The modeling indicates that the deep aquifer has the capacity to accept 2 or even 4 MGD from a single deep aquifer injection well. Other injection scenarios with different well locations or multiple injection wells can easily be simulated using the project groundwater model. As the potential location(s) of the RW injection system are refined and after preliminary design development of system construction and operation, it is recommended that additional groundwater modeling simulations be conducted.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. HYDROGEOLOGIC AND MODELING EVALUATION CONCLUSIONS

Based on the site hydrogeologic evaluation, the local aquifer conditions are conducive to operation of a deep RW injection system. The deep aquifer in the site area is approximately 500 to 1,000 feet thick and has moderate to high permeability. The deep aquifer is hydraulically separated from shallow aquifer by the thick and continuous regional clay aquitard.

Groundwater elevations have been generally stable for the past 10 years and the ambient hydraulic head in the deep aquifer is around 100 ft bgs, indicating that the deep aquifer has capacity for injection and storage in the aquifer. Groundwater flow is generally to the south.

Only a few shallow domestic and SWS wells that may be affected by RW injection, with potential ramifications for regulatory constraints affecting the design and/or operation of the proposed project. Several deeper CWA wells are further south of the VSD site. Existing IWA wells are generally north of the site.

The local MODFLOW model was calibrated to measured groundwater flow conditions and accurately simulates flow in the shallow and deep aquifers. Preliminary injection simulations of a hypothetical injection well at the southern portion of the VSD site indicate that the deep aquifer has the capacity to accept 2 to 4 MGD of RW injected in a single well. Predicted groundwater flowpaths of the injected RW indicate that the water remains in the deep aquifer and does not migrate upward into the overlying shallow aquifer and nearby shallow domestic/SWS wells.

Nearby deep CWA wells are located south of the VSD site and may ultimately receive some of the injected RW. Based on the simulated travel times, these wells are several decades downgradient of possible onsite injection locations, indicating that DDW minimum retention time requirements would be satisfied for the CWA wells.

4.2. RECOMMENDATIONS

The following recommendations are provided for next steps in the GRRP planning, permitting, and system design process:

- The ownership, construction, and operational status of several nearby domestic and SWS wells including the Cabazon and Carver Track wells should be further investigated. The construction of the nearby Cabazon well should be documented to confirm that it is completed in the shallow aquifer and not within the deep aquifer zone, where it would be likely to receive RW injected in the deep aquifer at the site.
- CWA should be engaged to confirm the status of their municipal wells in the study area. Additional information should be obtained for unnumbered CWA Well 05S08E31E01, since this well is reported to have a high production rate and is

predicted to receive injected RW. Data gaps regarding construction specifications for some nearby CWA should be addressed.

- Additional hydrogeologic site investigations should be considered to confirm the hydraulic barrier effects of the fault splays identified in the 2022 Geoscience investigation. These could include additional geophysical surveys and/or the installation measurement and testing and monitoring wells. Monitoring wells installed on the eastern and western sides of the estimated fault zone could be monitored and pump tested to confirm the barrier effects of the faults.
- Deep aquifer exploratory borings completed as monitoring or test wells would also confirm aquifer characteristics at the site, providing more confidence in siting and design of a full-scale injection well.
- Several of these monitoring wells could serve as compliance monitoring points for the DDW GRRP Permit Application.
- The injection well(s) location(s) and operational scenario and flow rates should be refined, and updated model simulations performed to confirm aquifer capacity, response, and injected RW flowpaths.

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Table 1. Municipal Well Construction Information
Valley Sanitary District Hydrogeologic and Modeling Evaluation

State Well Number	Well Owner	District Well Name	Latitude	Longitude	Surface Elevation (feet amsl)	Production Data	Level Data	Quality Data	Completion Report	Well Depth (feet)	Screen 1 Top Perforation Depth (feet)	Screen 1 Bottom Perforation Depth (feet)	Screen 2 Top Perforation Depth (feet)	Screen 2 Bottom Perforation Depth (feet)	Screen 3 Top Perforation Depth (feet)	Screen 3 Bottom Perforation Depth (feet)	Screen 4 Top Perforation Depth (feet)	Screen 4 Bottom Perforation Depth (feet)	Well Depth Category
05S07E10H02S	IWA	NA	33.75141	-116.23593	27.871	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E11M03S	IWA	IWA Well 8	33.750888	-116.233583	10.671	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E12D01S	IWA	IWA WELL Y	33.755402	-116.21636	43.318	NA	NA	Y	NA	1140	NA	500	NA	NA	NA	NA	NA	NA	Shallow
05S07E12D02S	IWA	NA	33.75544	-116.21635	34.668	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E12M01S	IWA	IWA WELL X	33.7485	-116.2165	-0.333	NA	Y	Y	NA	1300	NA	610	630	660	910	950	NA	NA	Well screen depth >= 500 ft
05S07E12P01S	IWA	NA	33.74549	-116.21212	3.667	Y	Y	Y	Y	400	280	400	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E14J03S	IWA	IWA WELL BB	33.73422	-116.21685	9.667	Y	NA	Y	NA	1230	NA	860	885	930	1000	1050	NA	NA	Well screen depth >= 500 ft
05S07E14K02S	IWA	IWA WELL 7	33.73456	-116.22462	-3.33	NA	Y	NA	Y	411	147	411	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E15N01S	IWA	IWA WELL AA	33.73264	-116.25124	19.767	Y	NA	Y	Y	1250	21.4	550	650	690	760	830	880	920	Top Screen < 500 but well deeper than 500
05S07E16K02S	CVWD	CVWD Well 5737-1	33.734833	-116.255	27.677	Y	Y	Y	Y	415	200	415	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E19A01S	CVWD	CVWD Well 5708-1	33.725333	-116.2865	90.288	Y	Y	Y	Y	980	450	510	540	580	620	650	700	720	Top Screen < 500 but well deeper than 500
05S07E20A02S	CVWD	CVWD Well 5718-1	33.728667	-116.271167	53.284	Y	Y	Y	Y	1500	940	980	1040	1220	1270	1400	1440	1480	Well screen depth >= 500 ft
05S07E20C01S	CVWD	CVWD Well 5709-1	33.725667	-116.277667	77.585	Y	Y	Y	Y	850	480	700	780	840	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E20F02S	CVWD	CVWD Well 5714-1	33.723	-116.283833	82.093	Y	Y	Y	Y	1280	900	970	1010	1050	1150	1270	NA	NA	Well screen depth >= 500 ft
05S07E20G01S	CVWD	CVWD Well 5713-1	33.723833	-116.2735	74.793	Y	Y	Y	Y	1200	670	730	780	830	880	900	940	990	Well screen depth >= 500 ft
05S07E20H01S	CVWD	CVWD Well 5717-1	33.722333	-116.269167	49.622	Y	Y	Y	Y	1465	815	1040	1100	1125	1160	1190	1250	1380	Well screen depth >= 500 ft
05S07E20J01S	IWA	IWA WELL T	33.7216	-116.27247	75.824	Y	NA	Y	Y	1350	580	620	640	720	770	880	910	1030	Well screen depth >= 500 ft
05S07E20P04S	CVWD	CVWD Well 5716-1	33.7175	-116.278	61.794	Y	Y	Y	Y	1250	900	1200	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E21M03S	IWA	IWA WELL W	33.72163	-116.25953	40.39	Y	NA	Y	Y	1320	38.6	490	620	660	720	810	880	940	Top Screen < 500 but well deeper than 500
05S07E21P01S	IWA	IWA WELL 4B	33.71551	-116.26032	38.093	Y	Y	Y	NA	1300	NA	750	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E21P02S	IWA	IWA WELL 4C	33.71488	-116.26101	39.084	Y	NA	Y	Y	1300	500	560	570	620	660	710	800	1050	Top Screen < 500 but well deeper than 500
05S07E21Q01S	IWA	IWA WELL 4A	33.71491	-116.25977	40.693	Y	Y	Y	Y	1170	460	720	810	1040	1100	1150	NA	NA	Top Screen < 500 but well deeper than 500
05S07E22H01S	IWA	NA	33.725162	-116.234996	NA	Y	NA	NA	Y	312	120	312	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E22H03S	IWA	IWA WELL 2C	33.7253	-116.23434	5.675	Y	Y	Y	Y	1152	480	1152	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E22H04S	IWA	IWA WELL 2D	33.72564	-116.23531	5.675	Y	Y	Y	Y	1205	500	575	595	670	715	797	880	930	Top Screen < 500 but well deeper than 500
05S07E24L02S	IWA	NA	33.72195	-116.21191	-15.729	Y	Y	NA	Y	500	208	500	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E24M02S	IWA	IWA WELL 1B	33.72203	-116.21547	-15.728	Y	Y	Y	Y	410	190	410	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E24M04S	IWA	IWA WELL 1C	33.72105	-116.21354	NA	Y	Y	Y	Y	660	250	350	510	660	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E24XXX	IWA	IWA WELL 1E	33.721658	-116.214322	-14.748	NA	NA	Y	NA	NA	17.5	552	650	660	690	701	817	842	Top Screen < 500 but well deeper than 500
05S07E26E01S	IWA	IWA WELL 3A	33.70865	-116.23129	-2.595	Y	Y	Y	Y	1157	515	630	970	1130	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E26E02S	IWA	IWA WELL 3B	33.7095	-116.2314	-2.595	Y	Y	Y	Y	1200	500	580	700	780	980	1200	NA	NA	Top Screen < 500 but well deeper than 500
05S07E26E03S	IWA	IWA WELL 3C	33.70776	-116.23147	5.686	Y	Y	Y	Y	1110	515	630	970	1110	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E27P01S	IWA	IWA WELL Z	33.70028	-116.24402	15.684	Y	NA	Y	Y	NA	15.3	580	620	670	730	810	850	910	Shallow
05S07E28E01S	CVWD	CVWD Well 5701-1	33.709333	-116.266667	48.691	Y	Y	Y	Y	198	128	192	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E28E03S	CVWD	CVWD Well 5701-2	33.709667	-116.2665	47.098	Y	Y	Y	Y	1280	900	990	1020	1050	1180	1270	NA	NA	Well screen depth >= 500 ft
05S07E29P02S	CVWD	CVWD Well 5715-1	33.7	-116.279833	56.603	Y	Y	Y	Y	1410	840	1380	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E30A01S	CVWD	CVWD Well 5712-1	33.713167	-116.289333	77	Y	Y	Y	Y	1000	550	650	750	990	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E30J01S	CVWD	CVWD Well 5704-1	33.707	-116.28655	70.202	Y	Y	Y	Y	925	500	900	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E31A01S	CVWD	CVWD Well 5711-1	33.6998	-116.28666	58.806	Y	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E31A02S	CVWD	CVWD Well 5711-2	33.6995	-116.286333	60.306	Y	Y	Y	Y	1410	1005	1155	1210	1245	1310	1390	NA	NA	Well screen depth >= 500 ft
05S07E32B01S	CVWD	CVWD Well 5725-1	33.698667	-116.275667	56.004	Y	Y	Y	Y	1450	1010	1130	1170	1190	1260	1430	NA	NA	Well screen depth >= 500 ft
05S07E32H01S	CVWD	CVWD Well 5727-1	33.692833	-116.269167	44.406	Y	Y	Y	Y	1460	930	1185	1340	1440	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E33E01S	IWA	IWA WELL S	33.6928	-116.26442	40.305	Y	NA	Y	Y	1280	460	730	830	910	950	970	1100	1200	Top Screen < 500 but well deeper than 500
05S07E34P04S	IWA	IWA WELL V	33.68609	-116.24663	14.04	Y	NA	Y	Y	1290	460	530	550	600	640	660	720	740	Top Screen < 500 but well deeper than 500
05S07E35R02S	IWA	IWA WELL U	33.6858	-116.21728	-8.537	Y	NA	Y	Y	1210	480	520	570	890	1090	1190	NA	NA	Top Screen < 500 but well deeper than 500
05S07E36D03S	CWA	CWA Well 19	33.6982	-116.21616	-19.331	Y	NA	Y	NA	1270	650	900	950	1250	NA	NA	NA	NA	Well screen depth >= 500 ft
05S08E18G01S	IWA	IWA Terra Lago GC South	33.737	-116.188167	21.665	Y	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E28N02S	CWA	CWA Well	33.70133	-116.16077	-54.392	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E31C03S	CWA	CWA Well 11	33.700156	-116.190419	-39.33	Y	Y	Y	Y	823	513	818	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S08E31E01S	CWA	CWA Well	33.69649	-116.19866	48.673	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E33D02S	CWA	CWA Well 10	33.70017	-116.16383	-135.482	Y	NA	NA	Y	830	521	810	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E03H02S	IWA	La Hacienda	33.68033	-116.235	-0.303	Y	Y	NA	Y	620	470	615	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E04H01S	CVWD	CVWD Well 6710-1	33.680667	-116.253333	-21.895	Y	Y	Y	Y	765	450	740	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E10A02S	CVWD	CVWD Well 6734-1	33.670333	-116.2345	-13.498	Y	Y	Y	Y	1320	880	1300	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S08E05N01S	CWA	CWA Well	33.67447	-116.1807	-68.218	Y	NA	NA	Y	803	500	800	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S08E06K02S	CWA	CWA Well 12	33.676986	-116.186775	-61.163	Y	NA	Y	NA	1030	500	740	850	890	950	1010	NA	NA	Top Screen < 500 but well deeper than 500
06S08E28N06S	CWA	CWA Well 18	33.700711	-116.161147	-135.482	Y	NA	Y	NA	1210	900	1190	NA	NA	NA	NA	NA	NA	NA
06S08E31E01S	CWA	CWA Well 17	33.699553	-116.197636	-99.328	Y	NA	Y	Y	1120	600	660	710	790	NA	NA	NA	NA	Well screen depth >= 500 ft
NA	IWA	IWA WELL 13A	33.751361	-116.235889	27.491	NA	NA	NA	NA	NA	550	690	735	780	800	840	921	936	Well screen depth >= 500 ft

Notes:
NA - Information not available.
feet amsl - Ground surface elevation in feet above mean sea level (NAD88 datum).
Production Data Y - Monthly production data available.
Level Data Y - Intermittant depth to groundwater level data available.
Quality Data Y - Intermittant groundwater quality data available.
Completion Report Y - DWR well completion report available.

Table 2. Private Well Construction Information
Valley Sanitary District Hydrogeologic and Modeling Evaluation

State Well Number	Well Owner	Latitude	Longitude	Surface Elevation (feet amsl)	Production Data	Level Data	Quality Data	Completion Report	Well Depth (feet)	Screen 1 Top Perforation Depth (feet)	Screen 1 Bottom Perforation Depth (feet)	Screen 2 Top Perforation Depth (feet)	Screen 2 Bottom Perforation Depth (feet)	Screen 3 Top Perforation Depth (feet)	Screen 3 Bottom Perforation Depth (feet)	Screen 4 Top Perforation Depth (feet)	Screen 4 Bottom Perforation Depth (feet)	Well Depth Category
05S07E02E01B	HI GRADE MATERIALS CO	33.7662	-116.23393	108.11	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E02E01S	HI GRADE MATERIALS CO	33.766167	-116.233833	101.47	Y	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E03H01S	GRANITE CONSTRUCTION COMPANY	33.765833	-116.234333	115.50	Y	NA	NA	Y	NA	250	330	390	470	530	550	650	680	Top Screen < 500 but well deeper than 500
05S07E03K01S	NA	33.763167	-116.241833	44.67	NA	Y	NA	Y	743	580	740	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E09F01S	NA	33.752	-116.256833	39.68	NA	Y	NA	Y	NA	279	375	459	615	616	684	NA	NA	Top Screen < 500 but well deeper than 500
05S07E09H01S	SHADOW HILLS GOLF CLUB	33.751833	-116.2525	60.67	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E09K01S	NA	33.75	-116.2555	33.67	NA	Y	Y	Y	387	147	387	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E09L02S	NA	33.748333	-116.2645	41.68	NA	Y	Y	Y	319	147	319	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E10D02S	NA	33.754833	-116.251167	32.67	NA	Y	Y	Y	530	200	530	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E10E01S	NA	33.752833	-116.250667	28.67	NA	Y	NA	Y	360	70	360	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E11C01S	NA	33.757	-116.229667	29.67	NA	Y	NA	Y	486	323	443	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E13N03S	WALLER TRACT MUTUAL WATER	33.730167	-116.214833	NA	Y	NA	NA	Y	670	540	660	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E14J02S	NA	33.7345	-116.219833	-11.33	NA	Y	NA	Y	374	232	350	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E15Q01S	NA	33.731667	-116.2395	6.17	NA	Y	NA	Y	466	264	464	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E16C01S	NA	33.74	-116.262833	37.68	NA	Y	NA	Y	355	147	355	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E16Q01S	NA	33.730833	-116.258333	20.37	NA	NA	Y	Y	263	200	260	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E16Q03S	NA	33.730833	-116.258667	30.68	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E17F02S	BERMUDA DUNES COUNTRY CLUB	33.737167	-116.2795	79.42	Y	NA	NA	Y	NA	205	349	373	445	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E17F04S	BERMUDA DUNES COUNTRY CLUB	33.7365	-116.279167	89.59	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E17K01S	MYOMA DUNES WATER COMPANY	33.73613	-116.27476	61.05	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E17L01S	MYOMA DUNES WATER COMPANY	33.736333	-116.278167	67.68	Y	Y	Y	Y	NA	212	283	330	440	537	600	NA	NA	Top Screen < 500 but well deeper than 500
05S07E19H02S	NA	33.72423	-116.28793	104.69	NA	Y	Y	Y	660	460	660	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E19M02S	CITY OF INDIAN WELLS	33.7195	-116.3035	125.70	Y	NA	Y	Y	NA	300	800	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E20P02S	NA	33.714833	-116.281167	49.91	NA	Y	Y	Y	438	150	350	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E20R01S	INDIAN SPRINGS GOLF CLUB LP	33.715167	-116.269167	81.08	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E21B01S	HERITAGE PALMS MASTERS HOA	33.728833	-116.256	29.38	Y	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E21F02S	NA	33.7225	-116.260333	28.69	NA	Y	NA	Y	NA	82	86	88	106	130	137	144	154	Top Screen < 500 but well deeper than 500
05S07E21N01S	INDIAN SPRINGS GOLF CLUB LP	33.714833	-116.265	33.51	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E22H02S	NA	33.727	-116.236167	5.68	NA	Y	Y	Y	1100	506	1100	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E22L02S	BOE DEL HEIGHTS MUTUAL WATER	33.718667	-116.244667	26.94	Y	NA	NA	Y	447	171	447	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E22L03S	BOE DEL HEIGHTS MUTUAL WATER	33.720333	-116.245	26.94	Y	NA	NA	Y	NA	565	650	675	740	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E22Q02S	HERNANDEZ, DAVID V.	33.716167	-116.239833	10.53	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E23D02S	NA	33.72768	-116.23313	7.23	NA	Y	NA	Y	NA	483	699	702	882	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E25R01S	NA	33.701667	-116.201	-29.33	NA	Y	NA	Y	381	214	378	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E27B01S	NA	33.711167	-116.2425	17.19	NA	Y	NA	Y	511	236	500	NA	NA	NA	NA	NA	NA	Shallow
05S07E27L01S	NA	33.706667	-116.2445	22.87	NA	Y	NA	Y	615	516	600	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E28D02S	INDIAN SPRINGS GOLF CLUB LP	33.714333	-116.265	43.02	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E28H02S	TRICON/COB RIVERDALE LP	33.709833	-116.2545	13.81	Y	NA	NA	Y	651	162	636	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E28M02S	SHIELDS DATE GARDENS	33.705833	-116.266333	30.23	Y	NA	NA	Y	350	95	200	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E28P02S	OUTDOOR RESORTS INDIO HOA	33.701833	-116.263333	42.37	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E29B01S	NA	33.712167	-116.274667	49.91	NA	NA	Y	Y	628	500	620	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E29B03S	NA	33.714	-116.274833	63.04	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E29C02S	NA	33.712533	-116.279551	82.70	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E29K01S	NA	33.7053	-116.275286	59.76	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E29K02S	NA	33.703833	-116.271833	57.46	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E29P01S	NA	33.7045	-116.274833	49.91	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E30C01S	NA	33.713833	-116.295	73.70	NA	Y	Y	Y	NA	115	489	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E30C02S	NA	33.7135	-116.295333	73.70	NA	Y	NA	Y	NA	412	467	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E32D03S	TD DESERT DEV/RANCHO LA QUINTA	33.698167	-116.2825	60.71	Y	Y	Y	Y	830	400	780	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E32J01S	TD DESERT DEV/RANCHO LA QUINTA	33.690167	-116.269667	59.11	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E32R01S	NA	33.6865	-116.2695	40.71	NA	Y	NA	Y	512	180	500	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E33A01S	NA	33.7	-116.255	7.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E33A02S	NA	33.697167	-116.255	38.10	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E33C04S	MOTORCOACH COUNTRY CLUB	33.6985	-116.262333	44.01	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E33D02S	NA	33.697833	-116.265667	43.70	NA	Y	Y	Y	518	398	518	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E33F02S	NA	33.6965	-116.2615	40.70	NA	Y	NA	Y	540	400	540	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E33J01S	NA	33.692333	-116.252667	35.70	NA	Y	Y	Y	654	500	650	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E33M01S	NA	33.691333	-116.2675	40.71	NA	Y	Y	Y	517	388	517	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E33N01S	NA	33.688167	-116.268	20.40	NA	NA	Y	Y	250	202	250	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E33R02S	NA	33.686	-116.255333	28.59	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E33R05S	NA	33.687833	-116.253833	23.01	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E34Q02S	NA	33.688	-116.239	5.70	NA	Y	Y	Y	NA	188	550	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E35F02S	NA	33.690667	-116.223833	-4.32	NA	Y	Y	Y	832	510	800	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
05S07E35F04S	INDIAN PALMS CC 2012 INC	33.695667	-116.229167	0.99	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E35F05S	INDIAN PALMS CC 2012 INC	33.692833	-116.226167	-1.56	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S07E36D01S	NA	33.69968	-116.21622	-20.32	NA	Y	NA	Y	756	152	756	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S07E36G01S	NA	33.691333	-116.203833	-31.32	NA	Y	NA	Y	345	125	345	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S07E36Q01S	NA	33.68905	-116.20741	-33.32	NA	Y	Y	Y	375	147	375	NA	NA	NA	NA	NA	NA	Well depth < 500 ft

Table 2. Private Well Construction Information
Valley Sanitary District Hydrogeologic and Modeling Evaluation

State Well Number	Well Owner	Latitude	Longitude	Surface Elevation (feet amsl)	Production Data	Level Data	Quality Data	Completion Report	Well Depth (feet)	Screen 1 Top Perforation Depth (feet)	Screen 1 Bottom Perforation Depth (feet)	Screen 2 Top Perforation Depth (feet)	Screen 2 Bottom Perforation Depth (feet)	Screen 3 Top Perforation Depth (feet)	Screen 3 Bottom Perforation Depth (feet)	Screen 4 Top Perforation Depth (feet)	Screen 4 Bottom Perforation Depth (feet)	Well Depth Category
05S08E17N01S	NA	33.733	-116.180333	30.67	NA	Y	Y	Y	400	278	398	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E18H01S	NA	33.7415	-116.184833	33.48	NA	Y	Y	Y	500	300	500	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E18N02S	RANCHO CASA BLANCA HOA	33.73194	-116.19831	3.95	Y	NA	NA	Y	NA	500	600	780	840	880	920	NA	NA	Well screen depth >= 500 ft
05S08E18Q02S	TERRA LAGO COMMUNITY ASSOC	33.7305	-116.187167	4.66	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E19A01S	NA	33.728833	-116.182167	20.35	NA	NA	Y	Y	388	305	383	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E19H02S	NA	33.7252	-116.18172	17.06	NA	Y	Y	Y	696	402	690	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S08E20C02S	NA	33.72802	-116.17565	33.47	NA	Y	Y	Y	453	278	438	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E20M01S	NA	33.72	-116.1775	-9.33	NA	Y	Y	Y	452	400	450	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E21P01S	NA	33.716748	-116.157549	128.62	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E28A01S	NA	33.711833	-116.148833	54.67	NA	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E28M01S	NA	33.711	-116.161167	-17.93	NA	Y	Y	Y	465	388	460	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E28M02S	NA	33.706667	-116.161667	-39.83	NA	Y	Y	Y	270	208	268	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E29E02S	NA	33.711167	-116.179167	-29.33	NA	Y	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05S08E29G01S	NA	33.710833	-116.170833	-26.13	NA	Y	NA	Y	278	230	278	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E29R01S	NA	33.703833	-116.166	-49.33	NA	Y	Y	Y	592	400	592	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
05S08E30M01S	CARVER TRACT MUTUAL WATER CO	33.703667	-116.196333	-22.30	Y	NA	NA	NA	300	NA	NA	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E30N03S	CARVER TRACT MUTUAL WATER CO	33.702833	-116.196667	-22.30	Y	NA	NA	Y	330	270	330	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E31J01S	NA	33.6925	-116.185833	-51.33	NA	Y	NA	Y	306	240	302	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
05S08E33D01S	NA	33.7	-116.163833	-56.43	NA	Y	Y	Y	832	521	810	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E01A04S	VARGAS, ROGELIO	33.681833	-116.201667	-41.97	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01D01S	NA	33.6851	-116.21493	-22.29	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01D02S	NA	33.676167	-116.2095	-22.29	NA	NA	Y	Y	657	537	657	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E01D03S	NA	33.684	-116.209333	-22.29	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01E03S	NA	33.673667	-116.208833	-9.15	NA	NA	Y	Y	612	480	600	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E01F04S	NA	33.672833	-116.204167	-25.56	NA	NA	Y	Y	408	340	400	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E01G04S	JORDAN OUTREACH MINISTRIES INT	33.679833	-116.206333	-40.66	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01H01S	NA	33.681667	-116.201167	-44.82	NA	Y	Y	Y	595	525	595	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E01H02S	NA	33.67906	-116.20124	-45.87	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01K01S	NA	33.671667	-116.204167	-41.96	NA	NA	Y	Y	688	580	680	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E01L02S	NA	33.675667	-116.209667	-25.57	NA	NA	Y	Y	600	480	600	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E01L05S	NA	33.677167	-116.208333	-40.00	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01M05S	NA	33.676167	-116.214333	-28.13	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01N03S	GIDDYUP PROPERTIES LLC	33.671833	-116.212167	-41.82	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E01P01S	GIDDYUP PROPERTIES LLC	33.671167	-116.2115	-49.31	Y	Y	Y	NA	600	NA	600	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E01Q01S	NA	33.672667	-116.2075	-46.21	NA	Y	Y	Y	500	460	500	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E01R01S	NA	33.67141	-116.20119	-51.80	NA	NA	Y	Y	436	316	436	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E02C02S	PLANTATION GOLF CLUB	33.681333	-116.2275	-1.91	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E02D02S	NA	33.684833	-116.232	0.48	NA	Y	Y	NA	320	NA	NA	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E02G01S	NA	33.674667	-116.221667	-10.31	NA	Y	NA	Y	363	160	363	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E02G03S	NA	33.674	-116.219167	-27.46	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E02G05S	NA	33.680167	-116.224167	-11.31	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E02M02S	PLANTATION GOLF CLUB	33.677	-116.233333	-2.68	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E02N01S	NA	33.67432	-116.23372	-9.30	NA	Y	NA	Y	570	426	570	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03B03S	EMPIRE II LLC	33.68517	-116.2415	NA	Y	NA	Y	Y	NA	560	600	650	860	NA	NA	NA	NA	Well screen depth >= 500 ft
06S07E03C03B	DESERT POLO LAND CO LLC	33.684	-116.246333	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03C03S	DESERT POLO LAND CO LLC	33.684	-116.246333	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03C04B	DESERT POLO LAND CO LLC	33.682833	-116.242833	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03C04S	NA	33.682833	-116.242833	11.20	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03D01S	NA	33.683686	-116.249143	23.67	NA	Y	NA	Y	671	460	640	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03E03S	ELDORADO POLO CLUB	33.6815	-116.250833	3.98	Y	NA	NA	Y	702	350	700	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03E04S	ELDORADO POLO CLUB	33.679167	-116.248	118.70	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03H01S	EMPIRE II LLC	33.67831	-116.23591	NA	Y	NA	NA	Y	NA	220	300	480	630	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03H03S	EMPIRE II LLC	33.67833	-116.23817	4.20	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03J02S	EMPIRE II LLC	33.67619	-116.23814	3.98	Y	NA	NA	Y	710	490	690	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03L01S	EMPIRE II LLC	33.67627	-116.24304	NA	Y	NA	NA	Y	607	485	605	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03L02S	EMPIRE II LLC	33.67796	-116.24359	NA	Y	NA	NA	Y	555	395	555	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E03L03S	EMPIRE II LLC	33.67644	-116.24382	9.97	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03N02S	DESERT POLO LAND CO LLC	33.67275	-116.24758	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03Q01S	DESERT POLO LAND CO LLC	33.674166	-116.240166	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E03R02S	EMPIRE II LLC	33.671833	-116.236166	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E04D02S	NA	33.684167	-116.266833	20.40	NA	Y	Y	Y	597	472	592	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E04H02S	NA	33.6745	-116.253667	NA	NA	NA	Y	Y	500	300	500	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E04J01S	SMITH, JEAN H	33.673333	-116.2545	3.99	Y	NA	NA	Y	497	170	495	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E04J03S	NA	33.675306	-116.253306	19.71	NA	NA	Y	Y	NA	340	500	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E04R01S	GIANNINI, OLGA H.	33.67175	-116.25236	10.71	Y	Y	Y	Y	302	189	297	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E04R02S	GIANNINI, OLGA H.	33.6735	-116.251667	13.37	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E04R03S	GIANNINI, OLGA H.	33.673833	-116.251667	13.68	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E10G01S	NA	33.66524	-116.24191	-14.29	NA	Y	Y	Y	360	100	360	NA	NA	NA	NA	NA	NA	Well depth < 500 ft

Table 2. Private Well Construction Information
Valley Sanitary District Hydrogeologic and Modeling Evaluation

State Well Number	Well Owner	Latitude	Longitude	Surface Elevation (feet amsl)	Production Data	Level Data	Quality Data	Completion Report	Well Depth (feet)	Screen 1 Top Perforation Depth (feet)	Screen 1 Bottom Perforation Depth (feet)	Screen 2 Top Perforation Depth (feet)	Screen 2 Bottom Perforation Depth (feet)	Screen 3 Top Perforation Depth (feet)	Screen 3 Bottom Perforation Depth (feet)	Screen 4 Top Perforation Depth (feet)	Screen 4 Bottom Perforation Depth (feet)	Well Depth Category
06S07E11A01S	CV PUBLIC CEMETERY DISTRICT	33.66915	-116.218658	-38.68	Y	NA	NA	Y	534	149	533	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E11A02S	CV PUBLIC CEMETERY DISTRICT	33.670333	-116.22	-38.68	Y	NA	Y	Y	NA	460	520	560	680	750	820	870	1000	Top Screen < 500 but well deeper than 500
06S07E11A03S	CV PUBLIC CEMETERY DISTRICT	33.67067	-116.21983	-21.91	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E11D04S	NA	33.668833	-116.229667	-16.70	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E11P03S	BROOKS, CARLETON AND TRACI	33.659	-116.226333	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E11R01S	NA	33.658406	-116.218831	7.26	NA	Y	NA	Y	585	440	560	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E11R02S	LANE, DONA K	33.657333	-116.219667	-35.39	Y	NA	NA	Y	625	440	620	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E12E01S	53 & JACKSON	33.663833	-116.215333	-44.31	Y	Y	Y	Y	600	120	600	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E12H03S	NA	33.66556	-116.19975	-64.31	NA	Y	Y	Y	350	290	350	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E12J01S	KIRKJAN, GEORGE	33.663333	-116.203333	-51.80	Y	NA	NA	Y	546	76	546	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E12N01S	NA	33.659	-116.2145	-47.21	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E13C02S	FISH A BIT RANCH	33.653667	-116.212	-54.75	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E13D04S	OLDS, TOM	33.655	-116.214333	-50.34	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S07E14A03S	NA	33.654793	-116.218774	-35.39	NA	Y	NA	Y	267	171	267	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S07E14A07S	NA	33.654793	-116.218774	-55.07	NA	NA	Y	Y	556	496	556	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E14G01S	JCM FARMING	33.65283	-116.22483	-40.32	Y	Y	NA	Y	NA	300	500	NA	NA	NA	NA	NA	NA	Top Screen < 500 but well deeper than 500
06S07E14H03S	NA	33.652333	-116.221333	-41.00	NA	NA	Y	Y	NA	500	600	NA	NA	NA	NA	NA	NA	Well screen depth >= 500 ft
06S08E05F02S	PETER RABBIT FARMS	33.68133	-116.17333	-67.94	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S08E05G01S	PETER RABBIT FARMS	33.68167	-116.17183	-69.21	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S08E06D01S	NA	33.683569	-116.196752	-99.32	NA	Y	NA	Y	459	171	459	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S08E06G03S	NA	33.678667	-116.186167	-61.32	NA	Y	NA	Y	260	200	260	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S08E06M01S	NA	33.67808	-116.19708	-54.32	NA	Y	Y	Y	400	300	380	NA	NA	NA	NA	NA	NA	Well depth < 500 ft
06S08E06N02S	KIRKJAN, GEORGE	33.672833	-116.196833	-54.76	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06S08E07D04S	LEJA FARMS	33.66832	-116.19797	-55.41	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	CABAZON	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
NA - Information not available.
feet amsl - Ground surface elevation in feet above mean sea level (NAD88 datum).
Production Data Y - Monthly production data available.
Level Data Y - Intermittant depth to groundwater level data available.
Quality Data Y - Intermittant groundwater quality data available.
Completion Report Y - DWR well completion report available.

Table 3. Production Well Pumping Rates and Model Layer Allocations
Valley Sanitary District Hydrogeologic and Modeling Evaluation

State Well Number	Owner/District Well Name	Ave 2019-21 Production (GPM)	Ave 2019-21 Production (AFY)	Total Depth (feet)	Top Screen Depth (feet)	Model Layer
05S08E30N03S	CARVER TRACT MUTUAL WATER CO	60	97	330	270	1
05S08E28N02S	CWA Well	628	1,015	NA	NA	3
05S08E31E01S	CWA Well	1,348	2,176	NA	NA	3
05S08E31C03S	CWA Well 11	208	335	823	513	3
06S08E31E01S	CWA Well 17	0	0	1120	600	3 & 4
05S07E36D03S	CWA Well 19	1,733	2,798	1270	650	3 & 4
06S07E03C03B	DESERT POLO LAND CO LLC	4	6	NA	NA	3
06S07E03C03S	DESERT POLO LAND CO LLC	74	119	NA	NA	3
06S07E03C04B	DESERT POLO LAND CO LLC	79	128	NA	NA	3
06S07E03C04S	DESERT POLO LAND CO LLC	45	73	NA	NA	3
06S07E03B03S	EMPIRE II LLC	78	125	NA	560	3
05S07E22Q02S	HERNANDEZ, MASILIA C	0	0	NA	NA	1
05S07E35F04S	INDIAN PALMS CC 2012 INC	5	8	NA	NA	3
05S07E35F05S	INDIAN PALMS CC 2012 INC	175	283	NA	NA	3
05S07E24L02S	IWA	336	543	500	208	1
05S07E24M02S	IWA WELL 1B	648	1,045	410	190	1
05S07E14J03S	IWA WELL BB	199	321	1230	860	4
05S07E24M04S	IWA WELL 1C	255	412	660	250	1 & 3
05S07E22H03S	IWA WELL 2C	251	405	1152	480	3 & 4
05S07E22H04S	IWA WELL 2D	606	979	1205	500	3 & 4
05S07E26E01S	IWA WELL 3A	634	1,023	1157	515	3 & 4
05S07E26E02S	IWA WELL 3B	458	739	1200	500	3 & 4
05S07E26E03S	IWA WELL 3C	515	832	1110	515	3 & 4

Table 3. Production Well Pumping Rates and Model Layer Allocations
Valley Sanitary District Hydrogeologic and Modeling Evaluation

State Well Number	Owner/District Well Name	Ave 2019-21 Production (GPM)	Ave 2019-21 Production (AFY)	Total Depth (feet)	Top Screen Depth (feet)	Model Layer
05S07E35R02S	IWA WELL U	326	526	1210	480	3 & 4
05S07E34P04S	IWA WELL V	280	453	1290	460	3 & 4
05S07E27P01S	IWA WELL Z	763	1,231	NA	500	3 & 4
06S07E03H02S	IWA La Hacienda	0	0	620	470	3
06S08E05F02S	PETER RABBIT FARMS	14	23	NA	NA	3
06S08E05G01S	PETER RABBIT FARMS	60	97	NA	NA	3
06S07E02C02S	PLANTATION GOLF CLUB	165	267	NA	NA	3
05S08E18N02S	RANCHO CASA BLANCA HOA	108	174	NA	500	3 & 4
05S08E18Q02S	TERRA LAGO COMMUNITY ASSOC	68	109	NA	NA	3
06S07E01A04S	VARGAS, ROGELIO	53	85	NA	NA	3

Notes:
NA - Information not available.
GPM - Gallons per minute.
AFY - Acre feet per year.

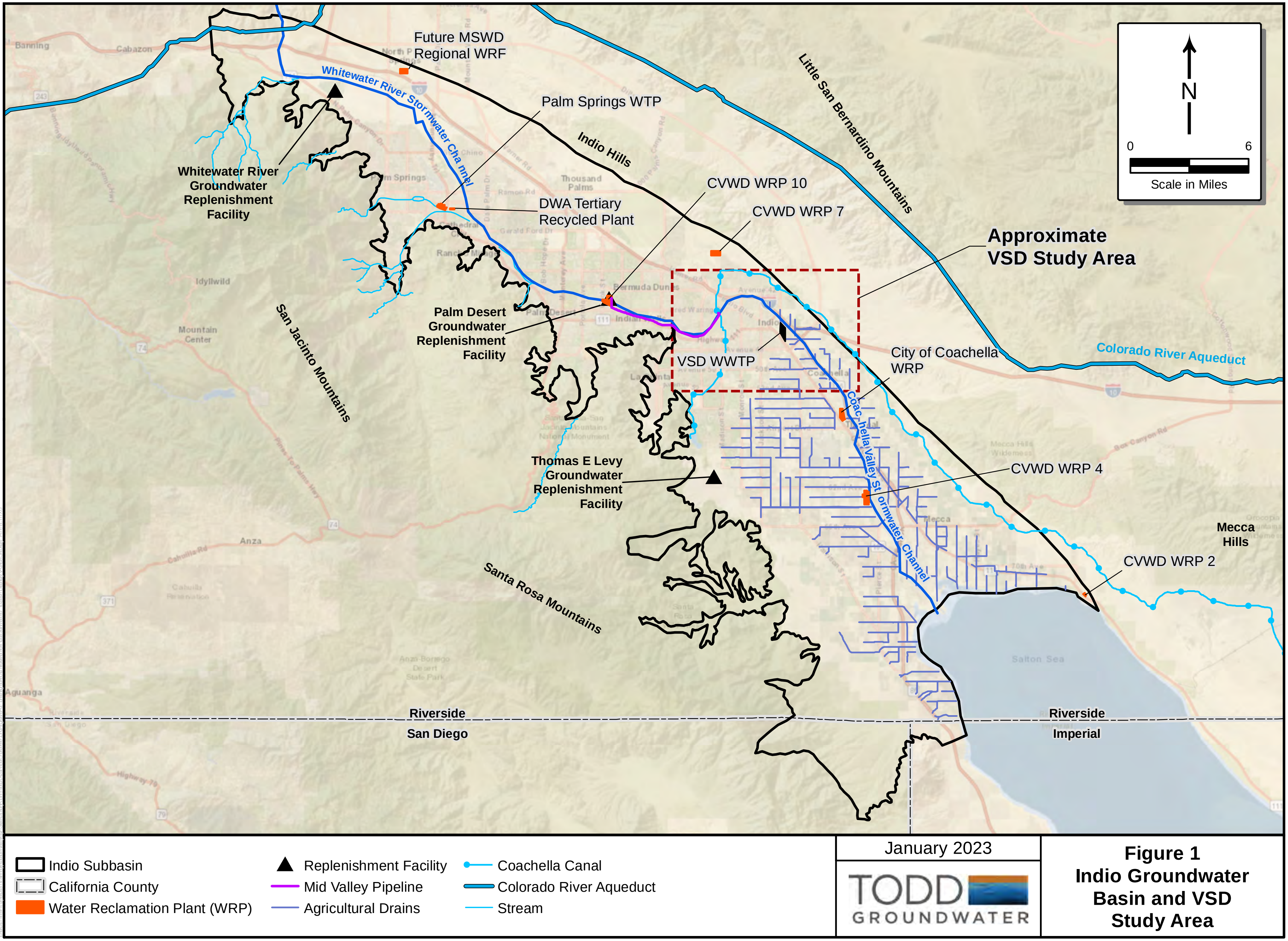
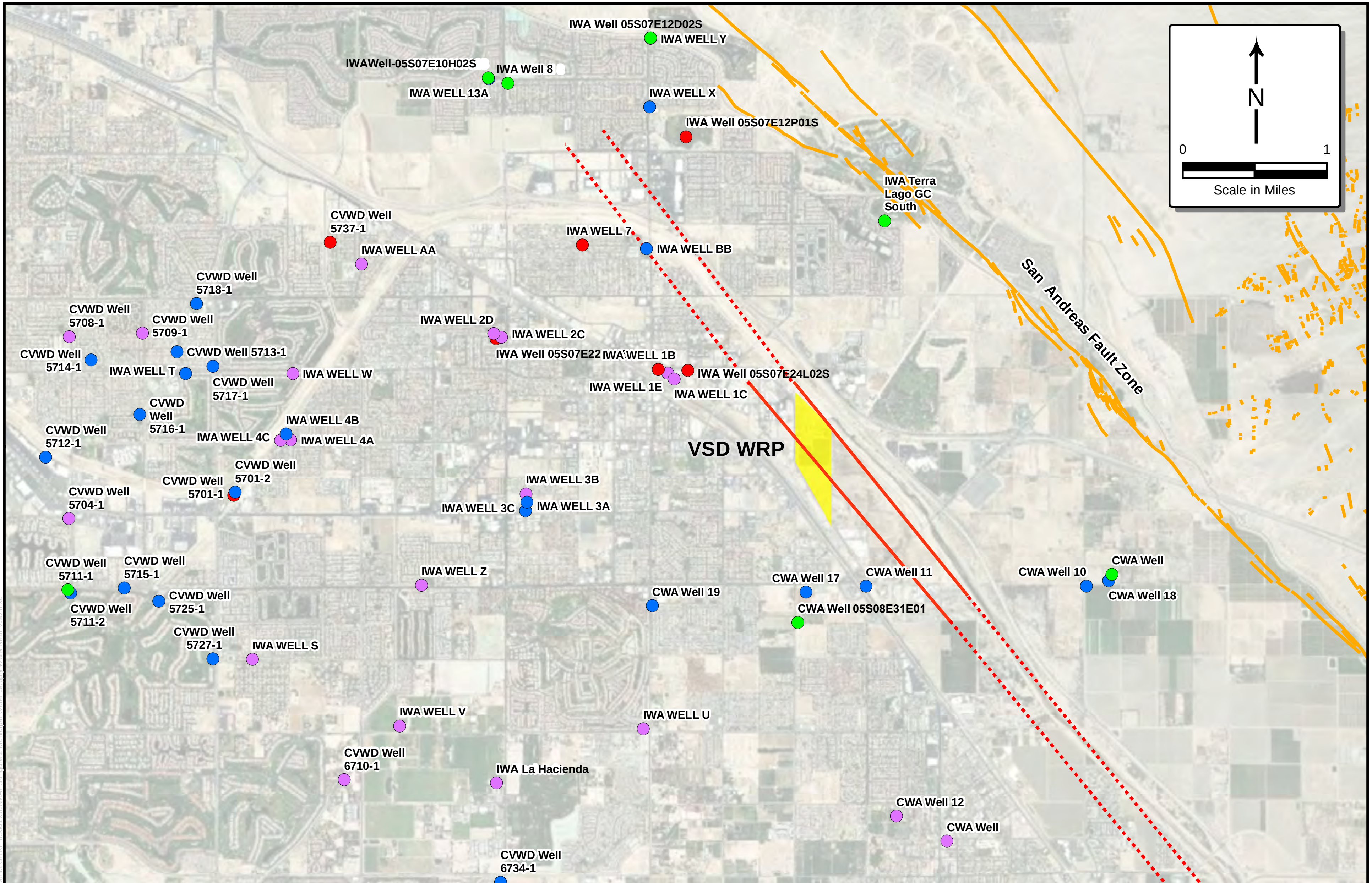


Figure 1
Indio Groundwater Basin and VSD Study Area



- Well Depth < 500 ft
- Top Screen < 500 but Well Deeper than 500
- Well Screen Depth >= 500 ft
- No Data Available

Geoscience Identified Fault Zone

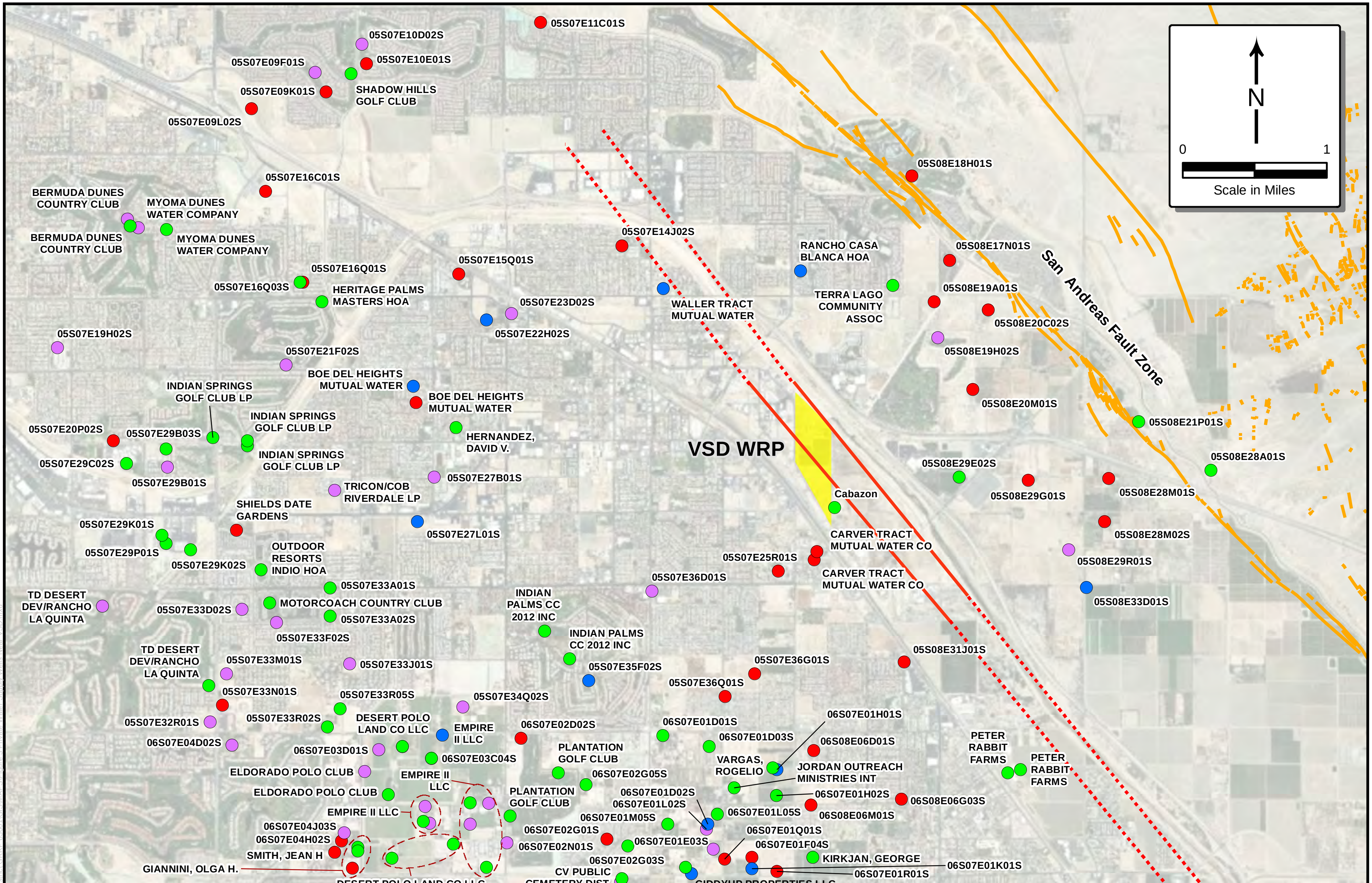
- Identified in Study
- Interpolated
- Quaternary Faults

VSD Boundary

January 2023

TODD GROUNDWATER

Figure 2
Municipal Water Supply Wells Near VSD



- Well Depth < 500 ft
- Top Screen < 500 but Well Deeper than 500
- Well Screen Depth >= 500 ft
- No Data Available

Geoscience Identified Fault Zone

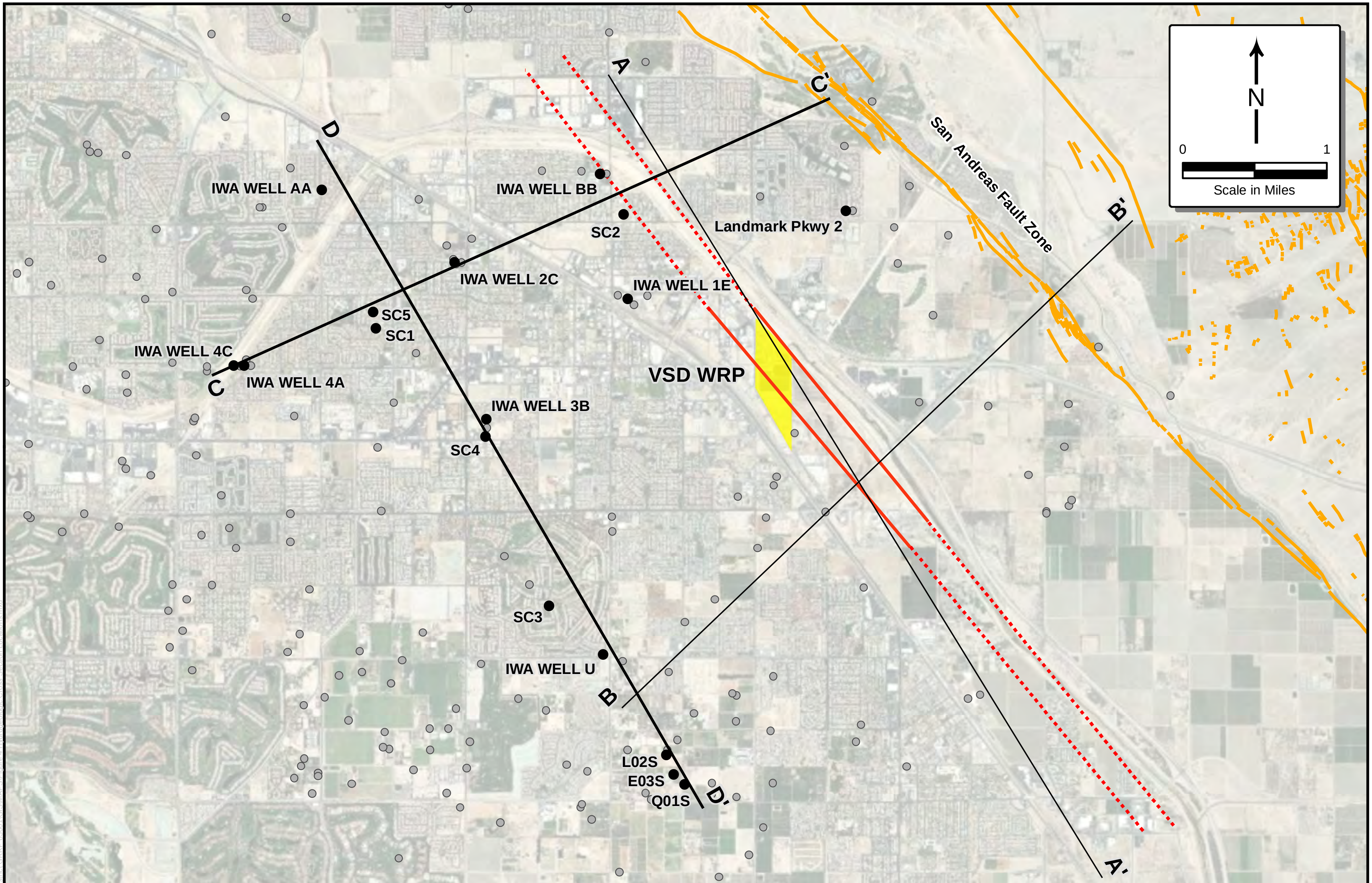
- Identified in Study
- Interpolated
- Quaternary Faults

VSD Boundary

January 2023

TODD GROUNDWATER

Figure 3
Private Water Supply Wells Near VSD



- Cross Section Well
- Well Location
- Cross Section (TODD)
- Cross Section (GEOSCIENCE)

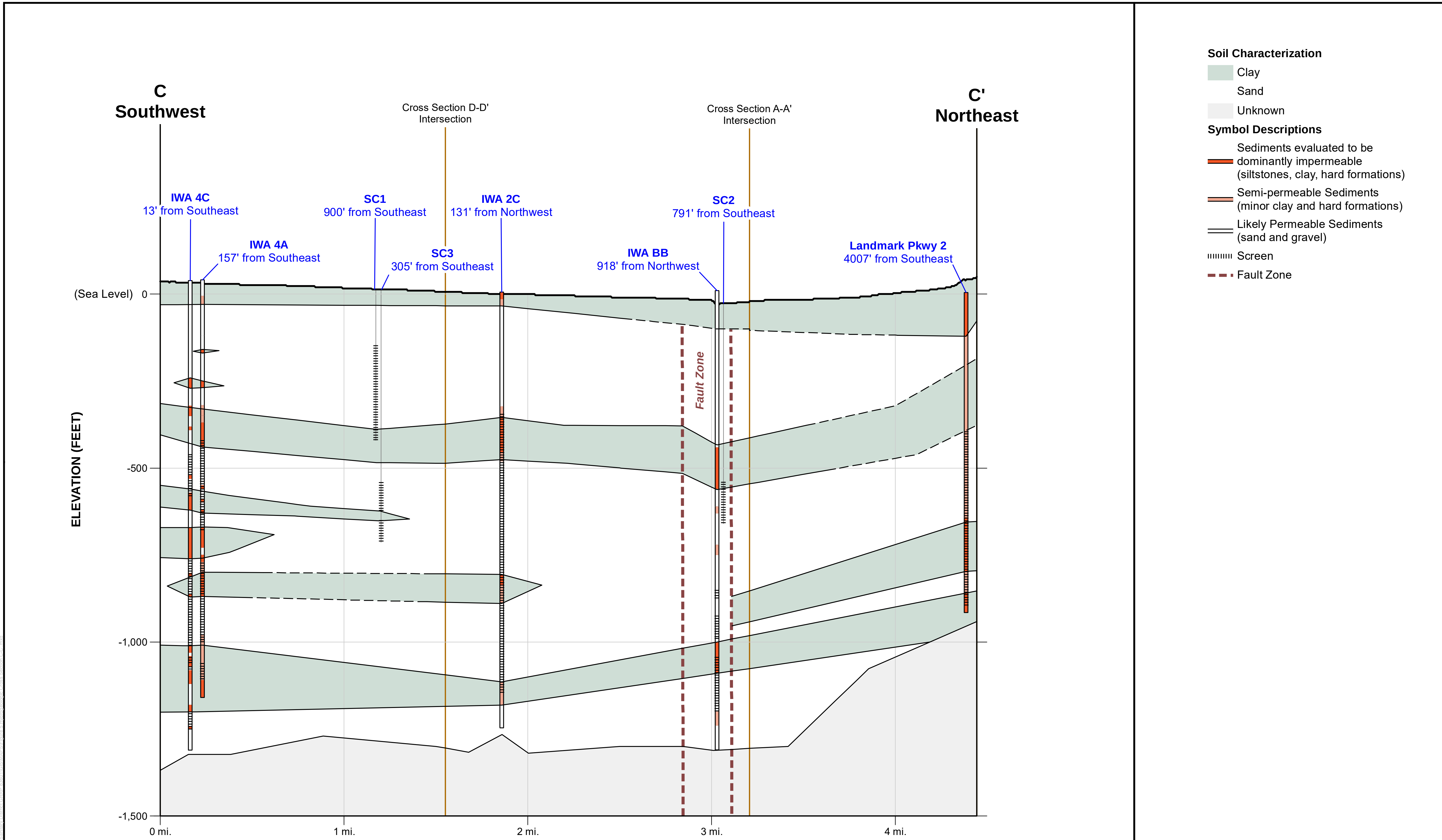
Geoscience Identified Fault Zone

- Identified in Study
- Interpolated
- Quaternary Faults
- VSD Boundary

January 2023

TODD GROUNDWATER

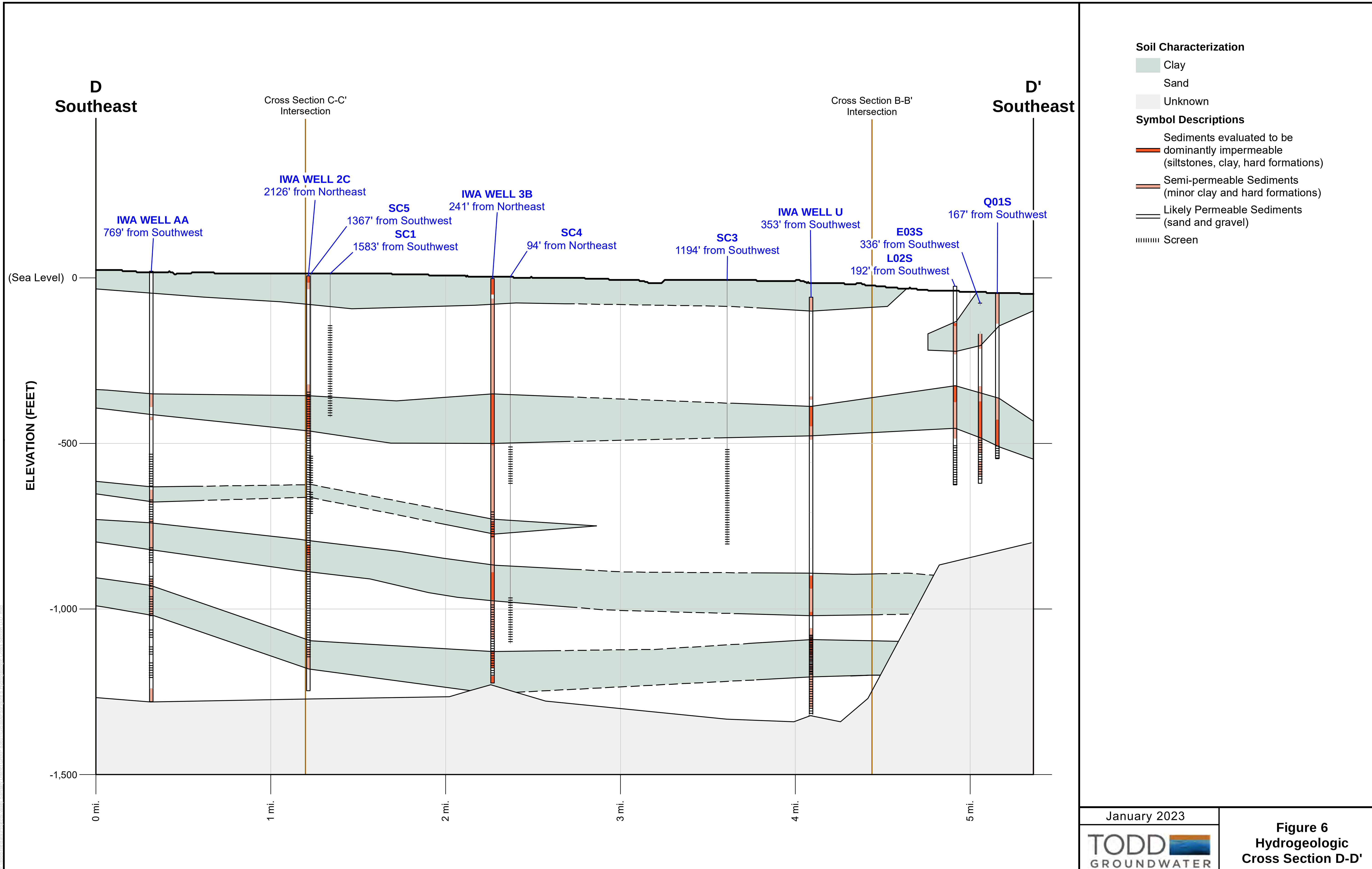
Figure 4
Hydrogeologic Cross Section Locations



January 2023

TODD GROUNDWATER

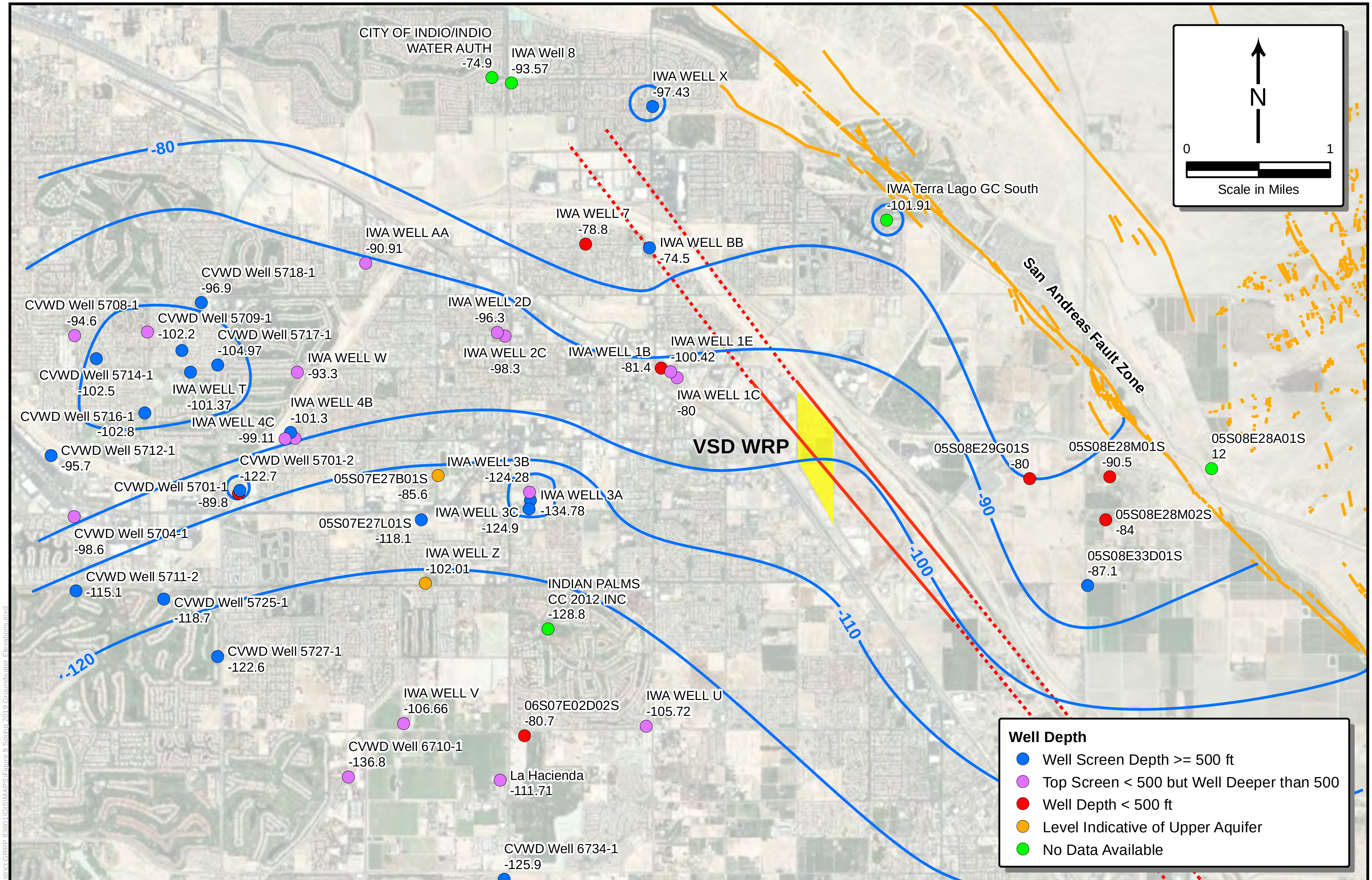
Figure 5
Hydrogeologic Cross Section C-C'



January 2023

TODD GROUNDWATER

Figure 6
Hydrogeologic Cross Section D-D'



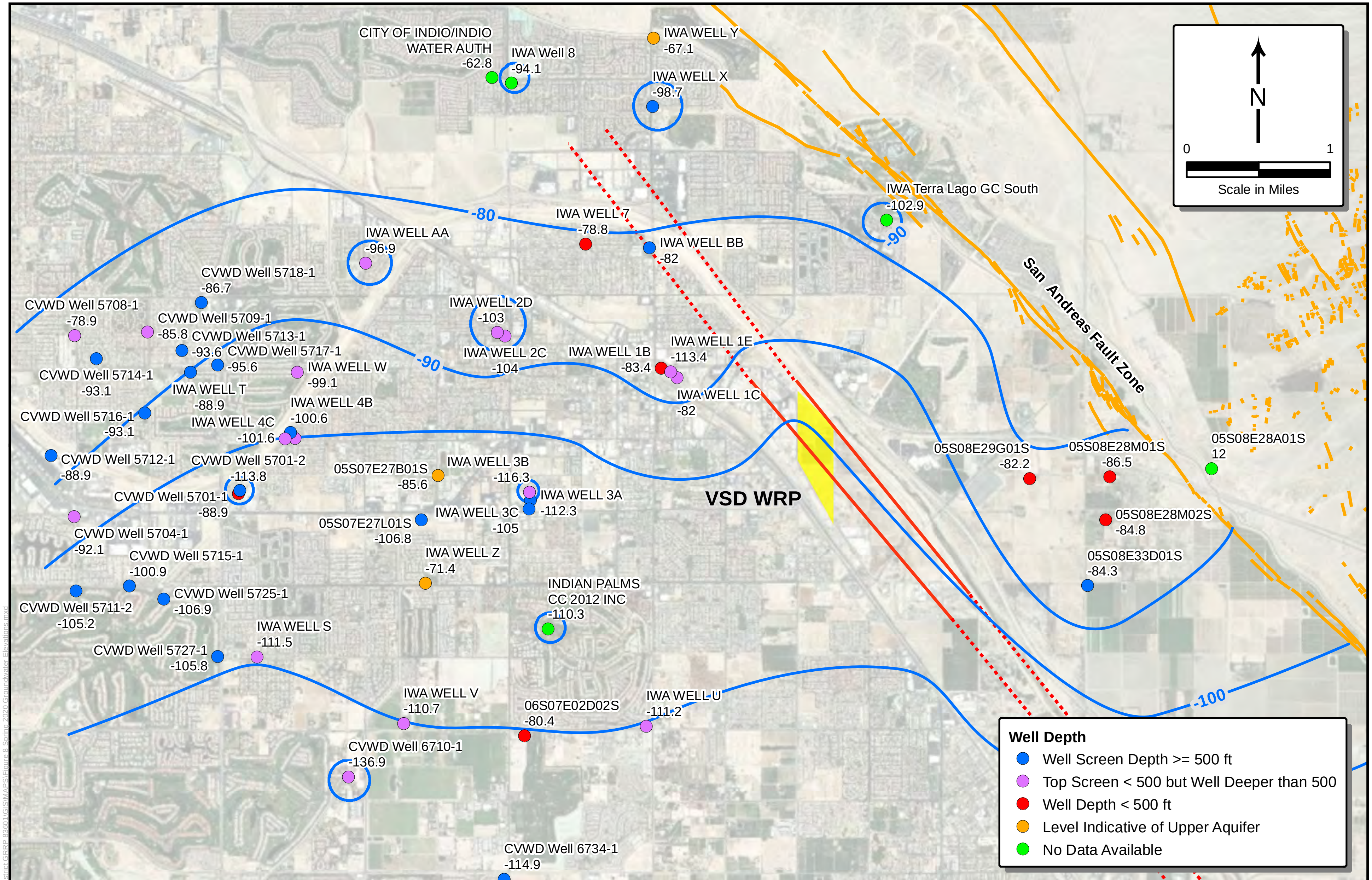
Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults

- Spring 2019 Deep Aquifer Groundwater Elevation Contours (10 ft)
- VSD Boundary

January 2023

TODD GROUNDWATER

Figure 7
Spring 2019 Groundwater Elevations



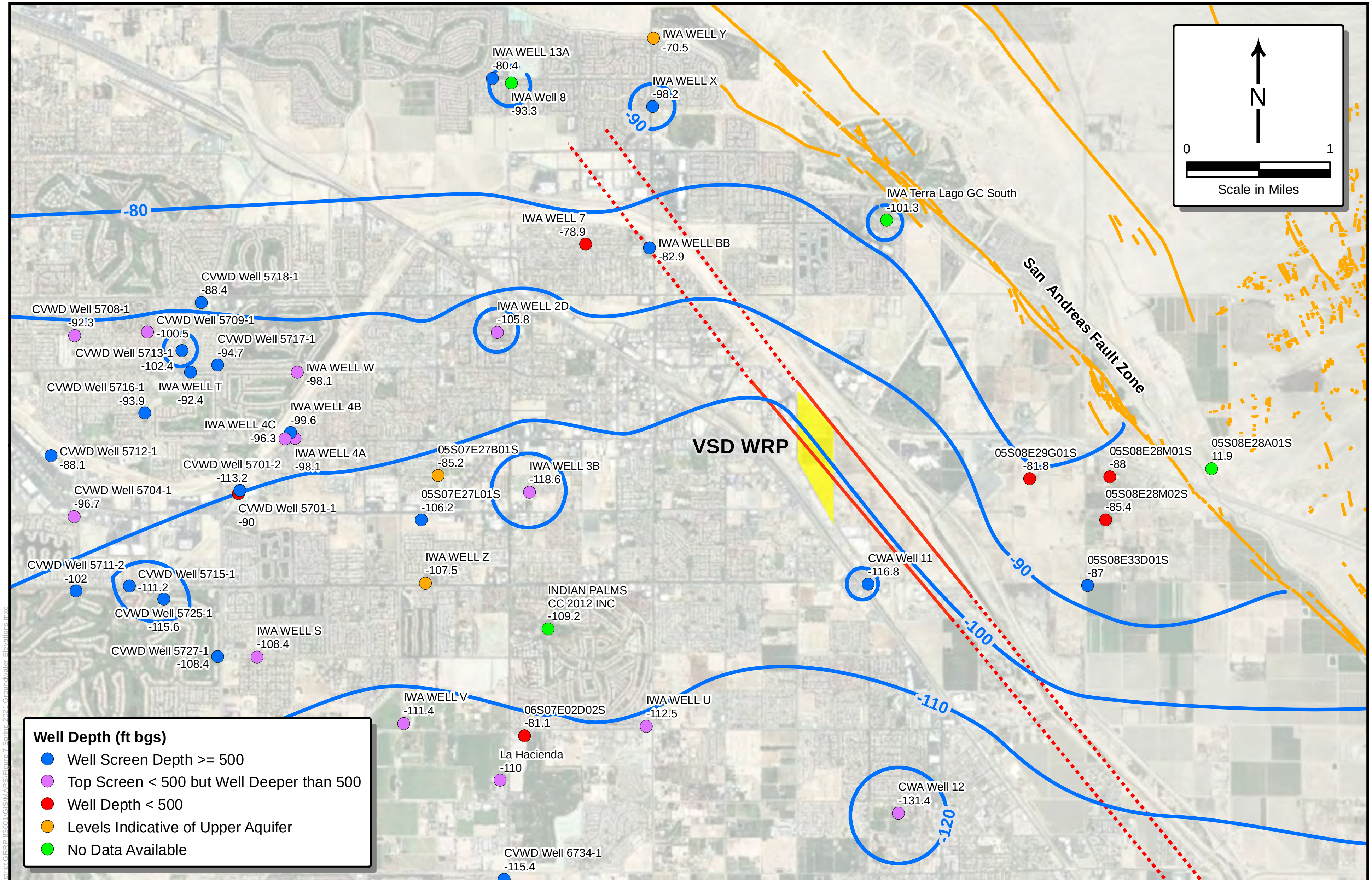
Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults

- Spring 2020 Deep Aquifer Groundwater Elevation Contours (10 ft)
- VSD Boundary

January 2023

TODD GROUNDWATER

Figure 8
Spring 2020 Groundwater Elevations



Geoscience Identified Fault Zone

- Identified in Study
- Interpolated
- Quaternary Faults

- Spring 2021 Deep Aquifer Groundwater Elevation Contours (10 ft)
- VSD Boundary

January 2023

TODD GROUNDWATER

Figure 9
Spring 2021 Groundwater Elevations

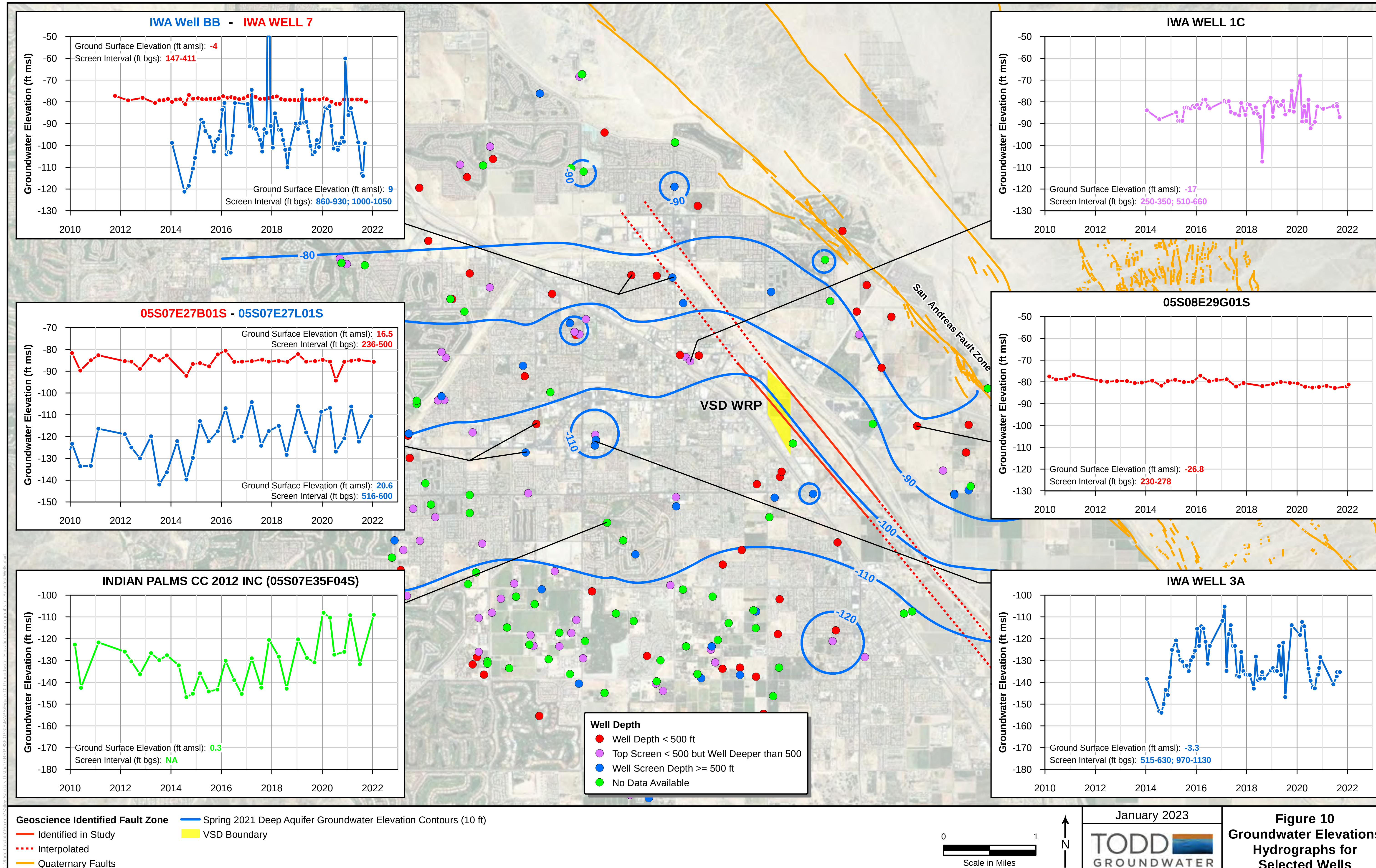
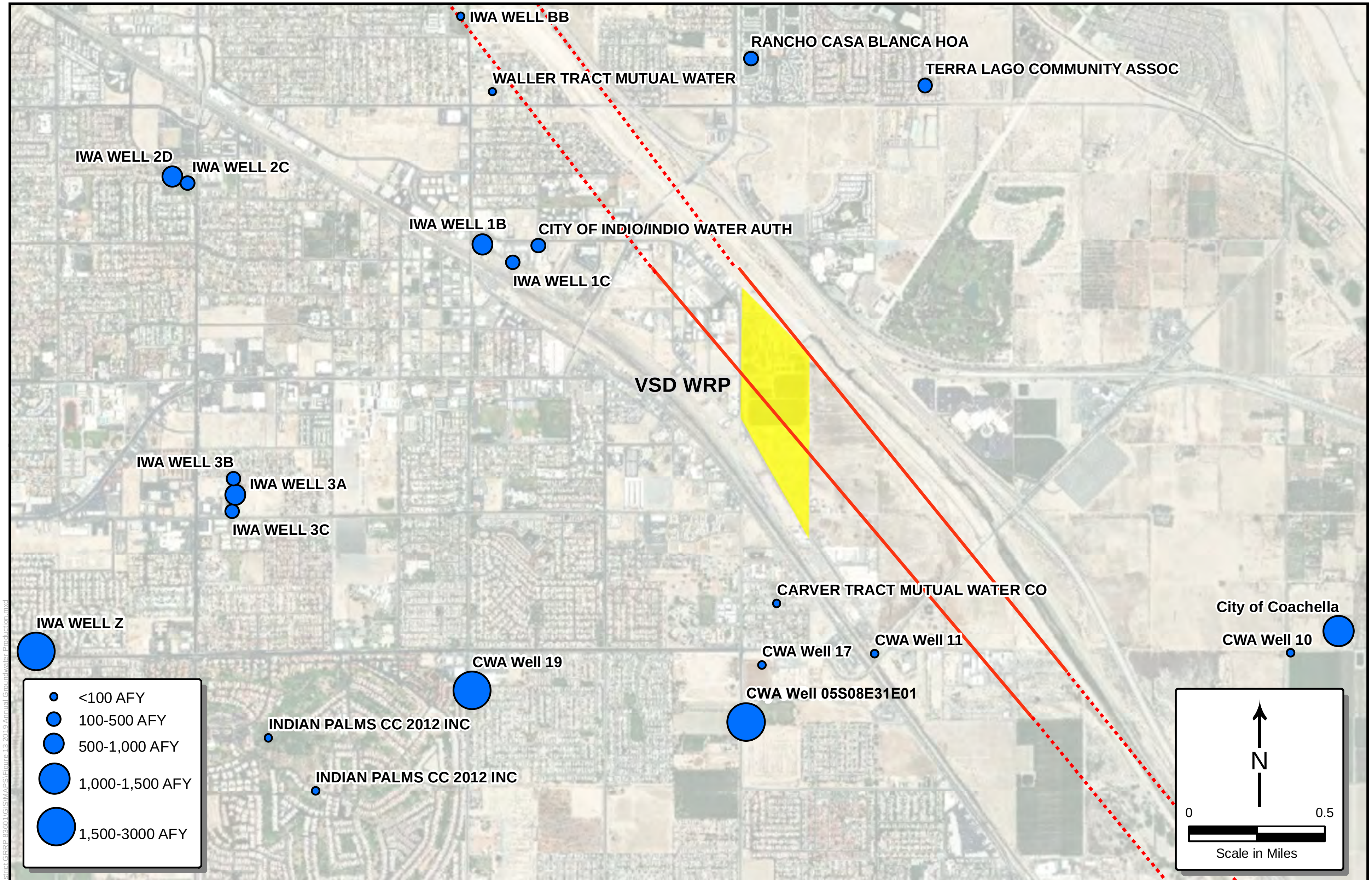


Figure 10
Groundwater Elevations Hydrographs for Selected Wells



Geoscience Identified Fault Zone

Identified in Study

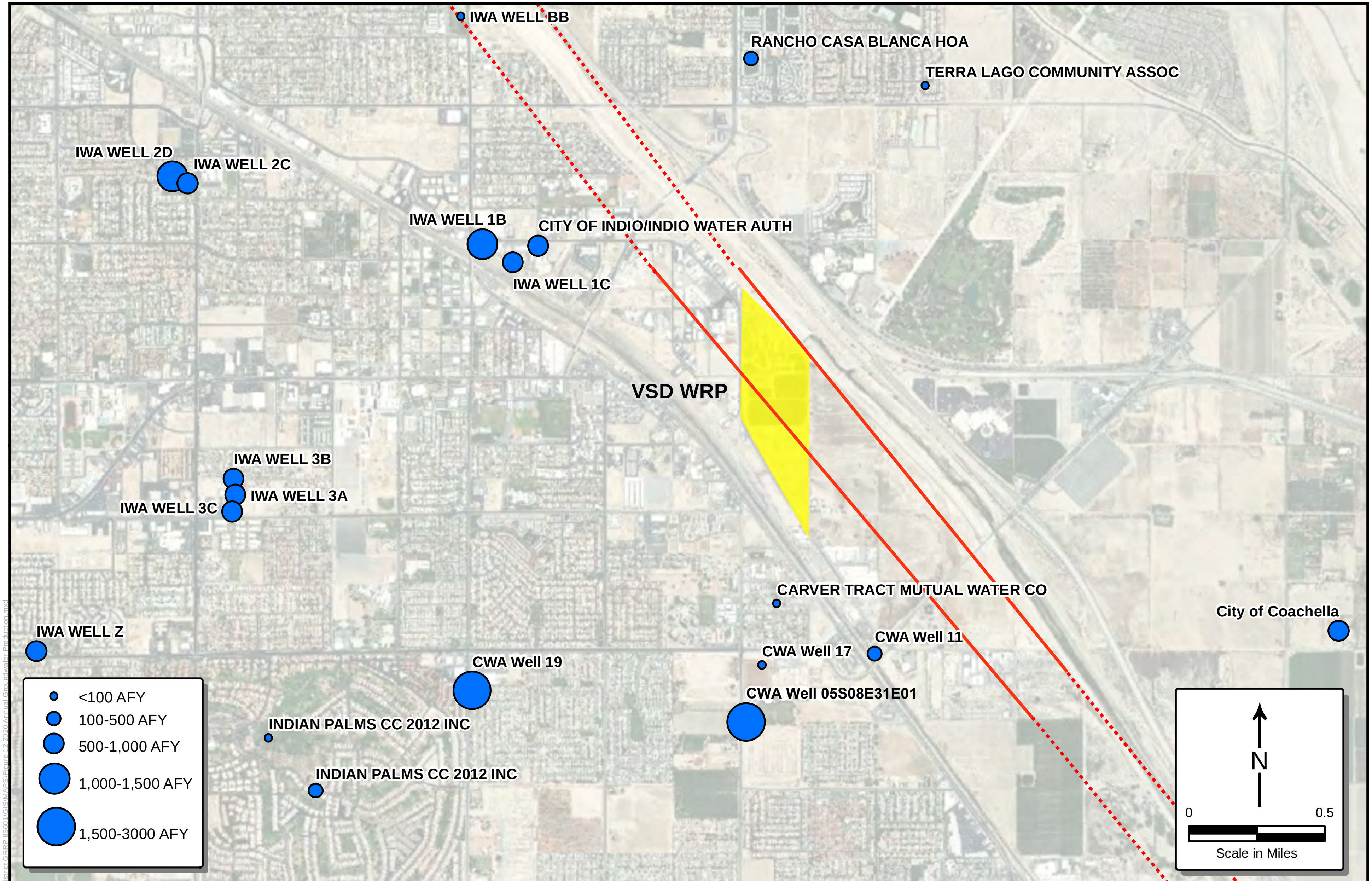
Interpolated

VSD Boundary

January 2023

TODD GROUNDWATER

Figure 11
2019 Annual Groundwater Production



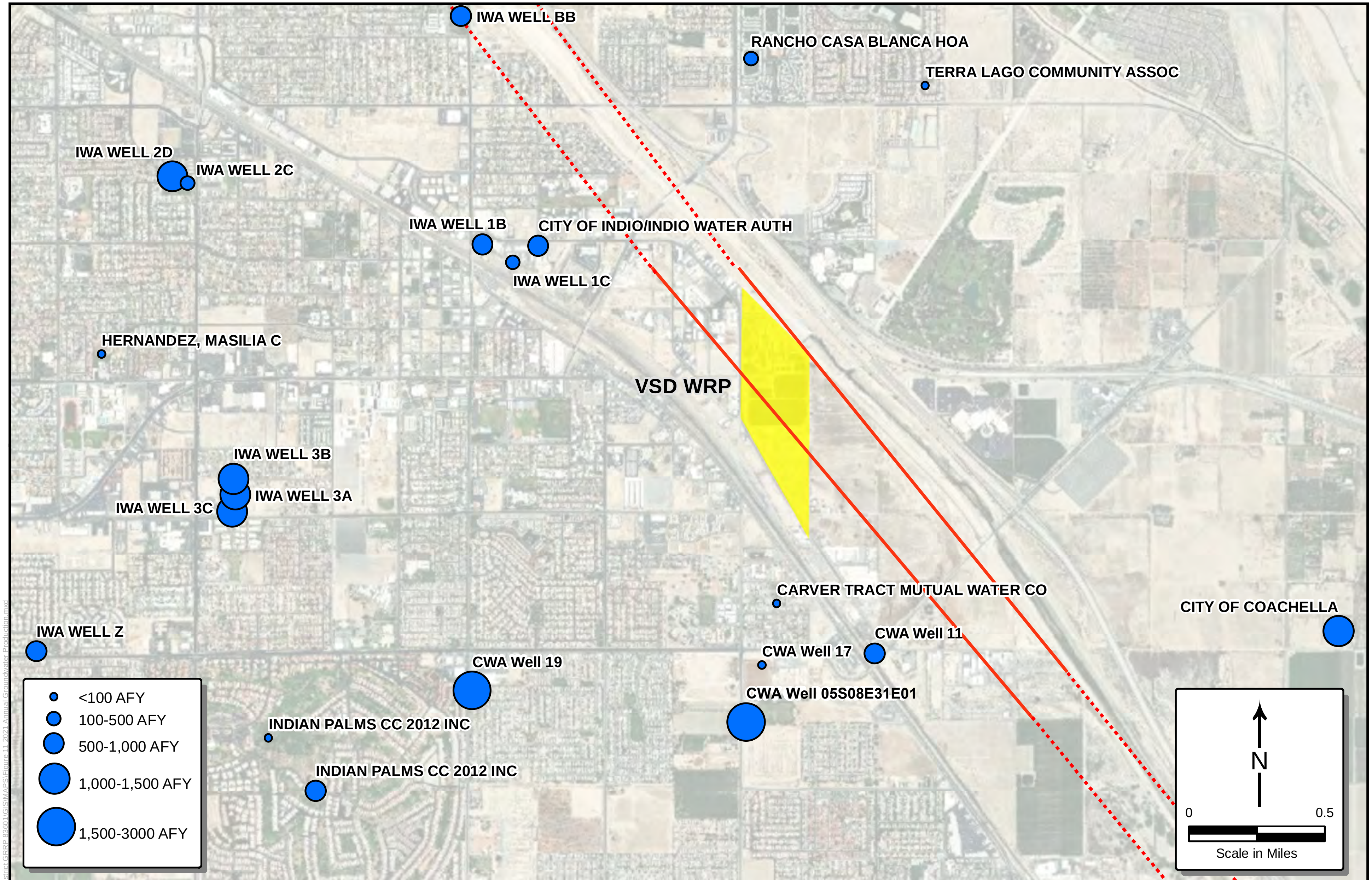
Geoscience Identified Fault Zone

- Identified in Study
- Interpolated
- VSD Boundary

January 2023

TODD GROUNDWATER

Figure 12
2020 Annual Groundwater Production



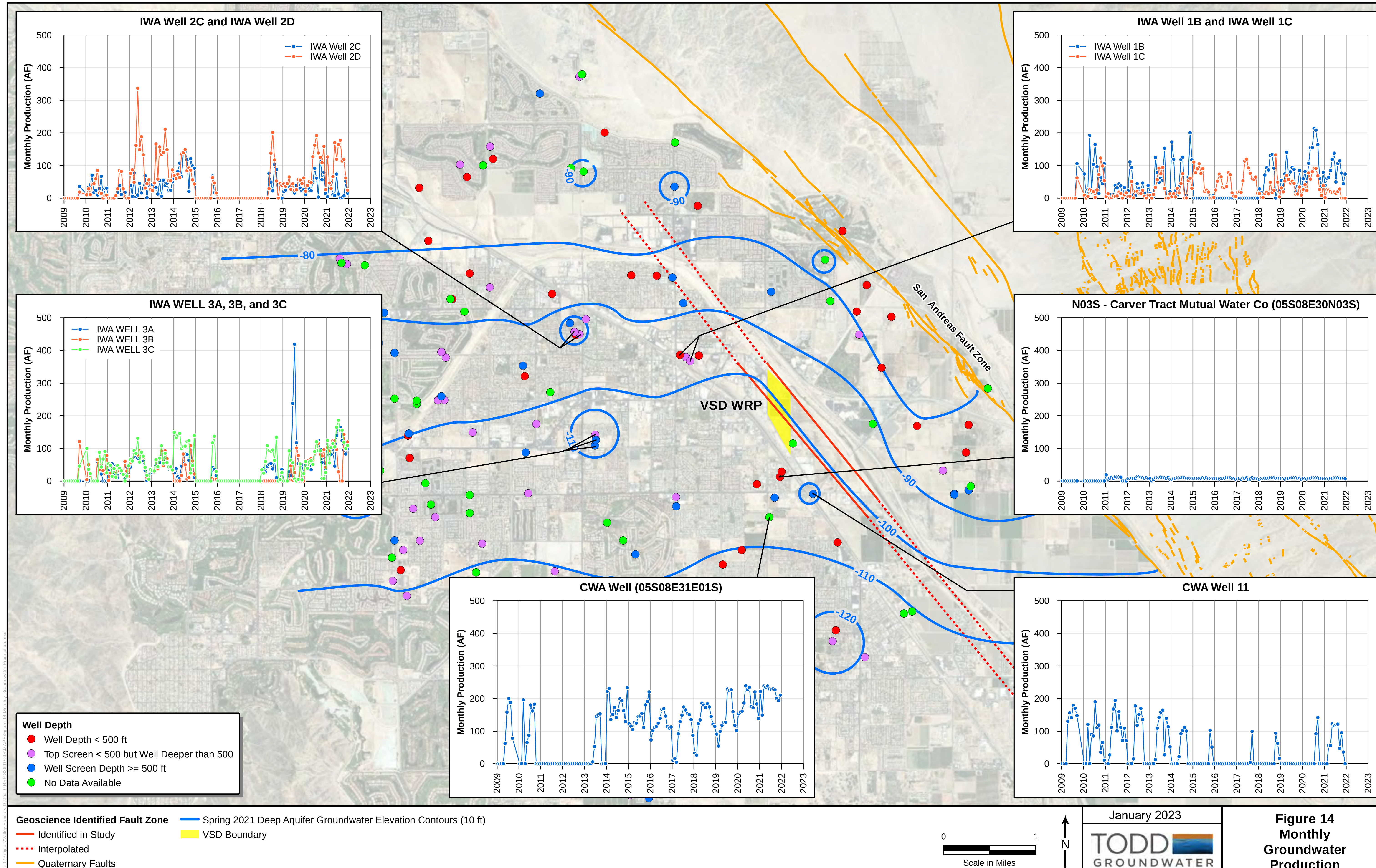
Geoscience Identified Fault Zone

- Identified in Study
- Interpolated
- VSD Boundary

January 2023

TODD GROUNDWATER

Figure 13
2021 Annual Groundwater Production



January 2023

TODD GROUNDWATER

Figure 14 Monthly Groundwater Production

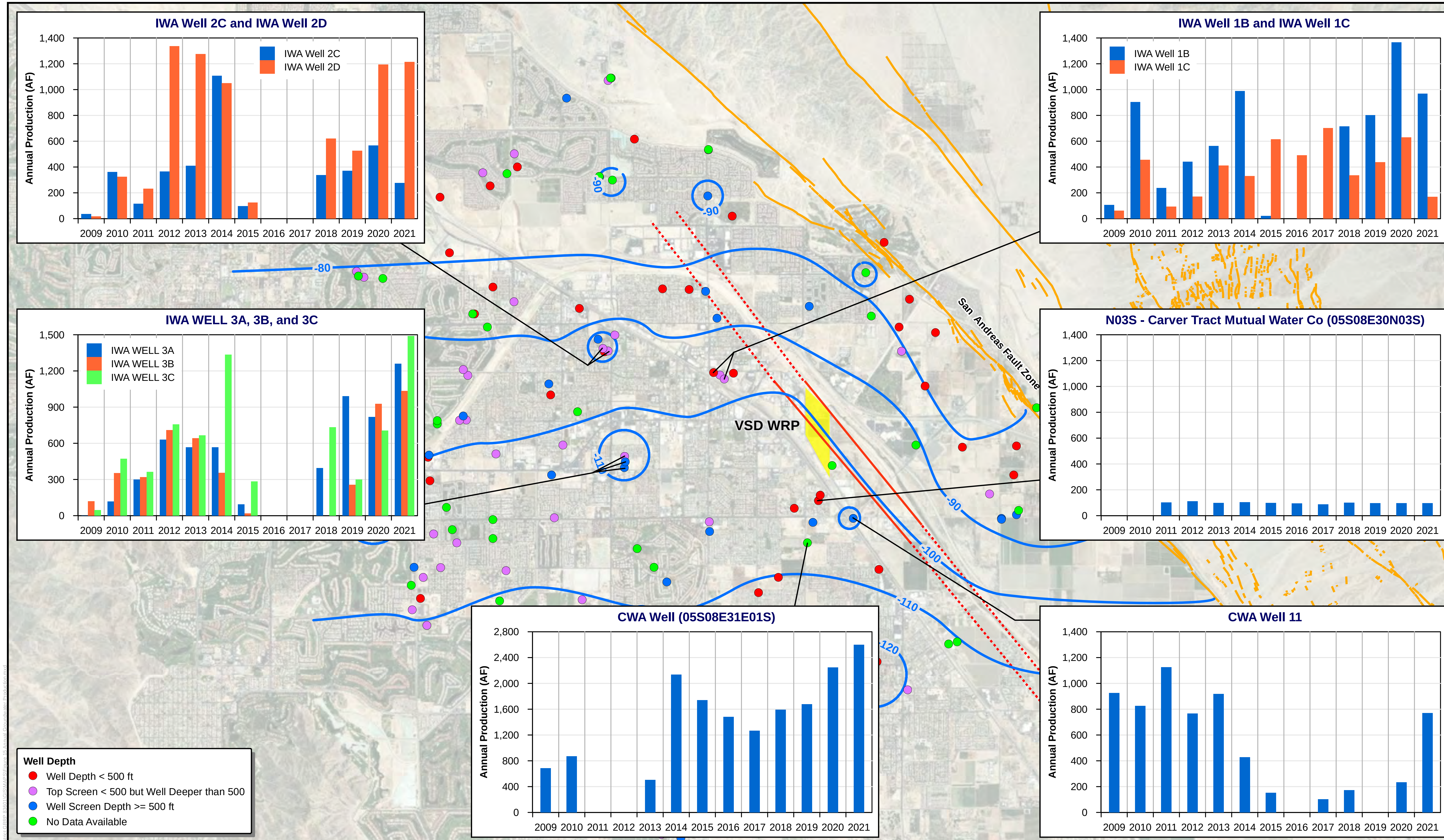
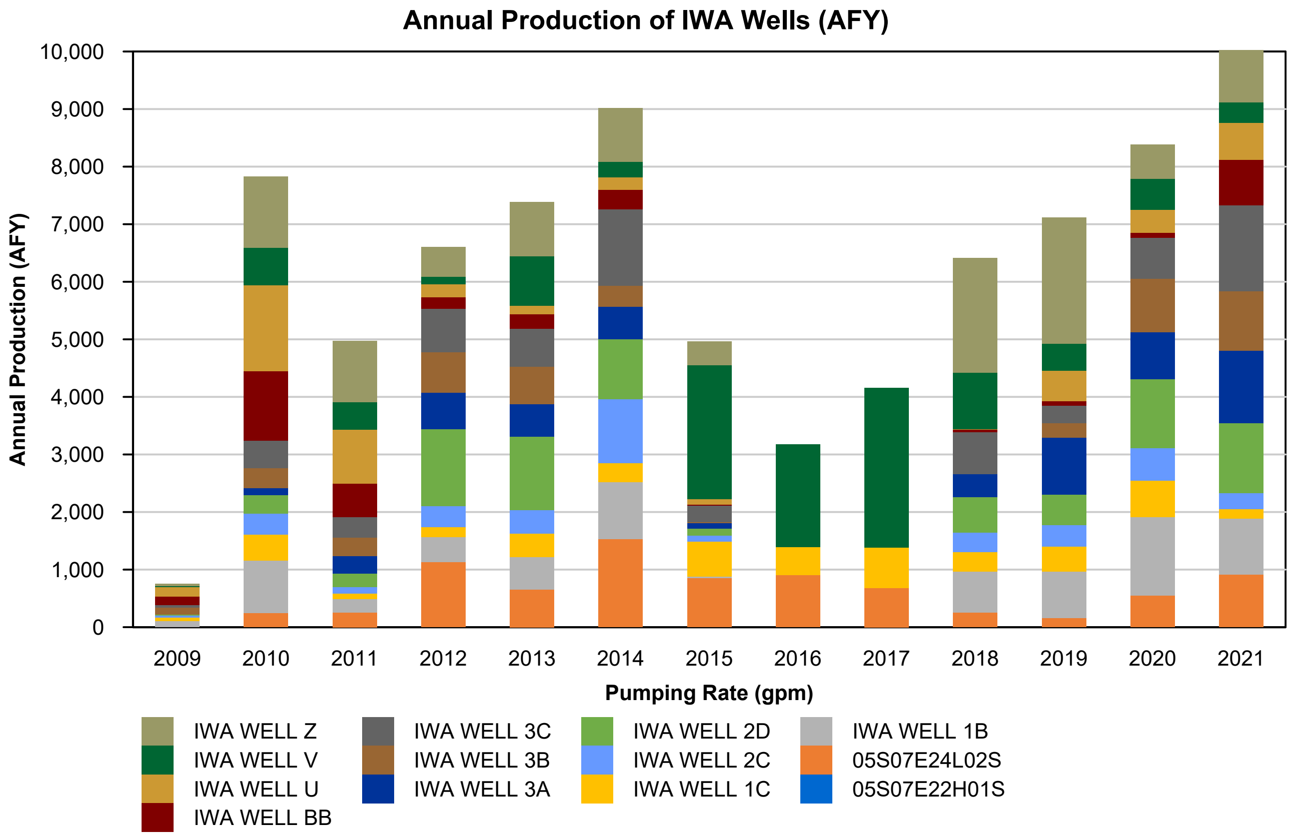
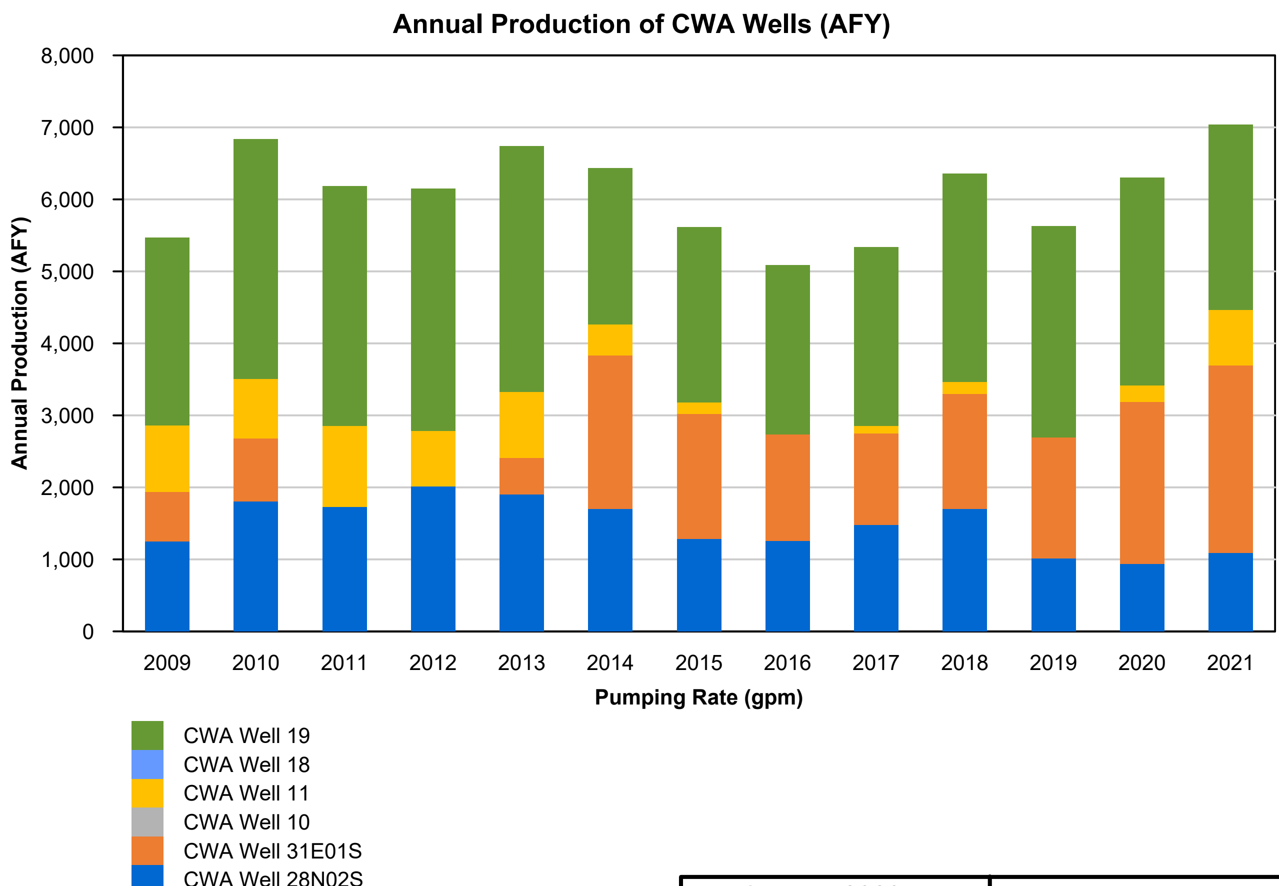


Figure 15
Annual
Groundwater
Production



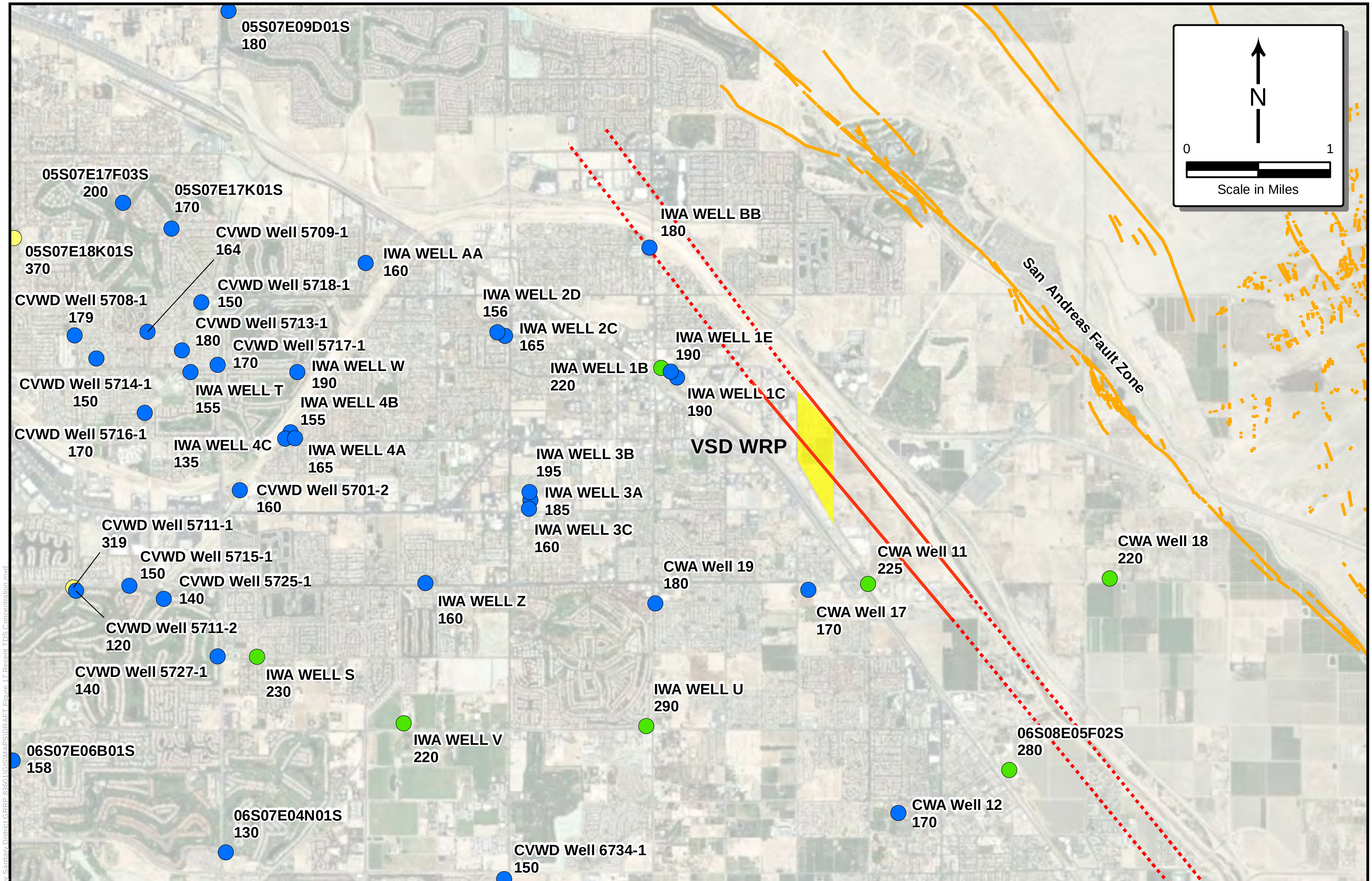


January 2023

TODD GROUNDWATER

Figure 16
2009-2021 Annual Groundwater Production from IWA and CWA Wells

Path: T:\Projects\Valley Sanitary District GRRP 83601\GRAPHICS\Figure 16 2009-2021 Annual Groundwater Production from IWA and CWA Wells.gpj



Most Recent TDS Concentration Measurement
- <200 mg/L
- 200-300 mg/L
- 300-400 mg/L

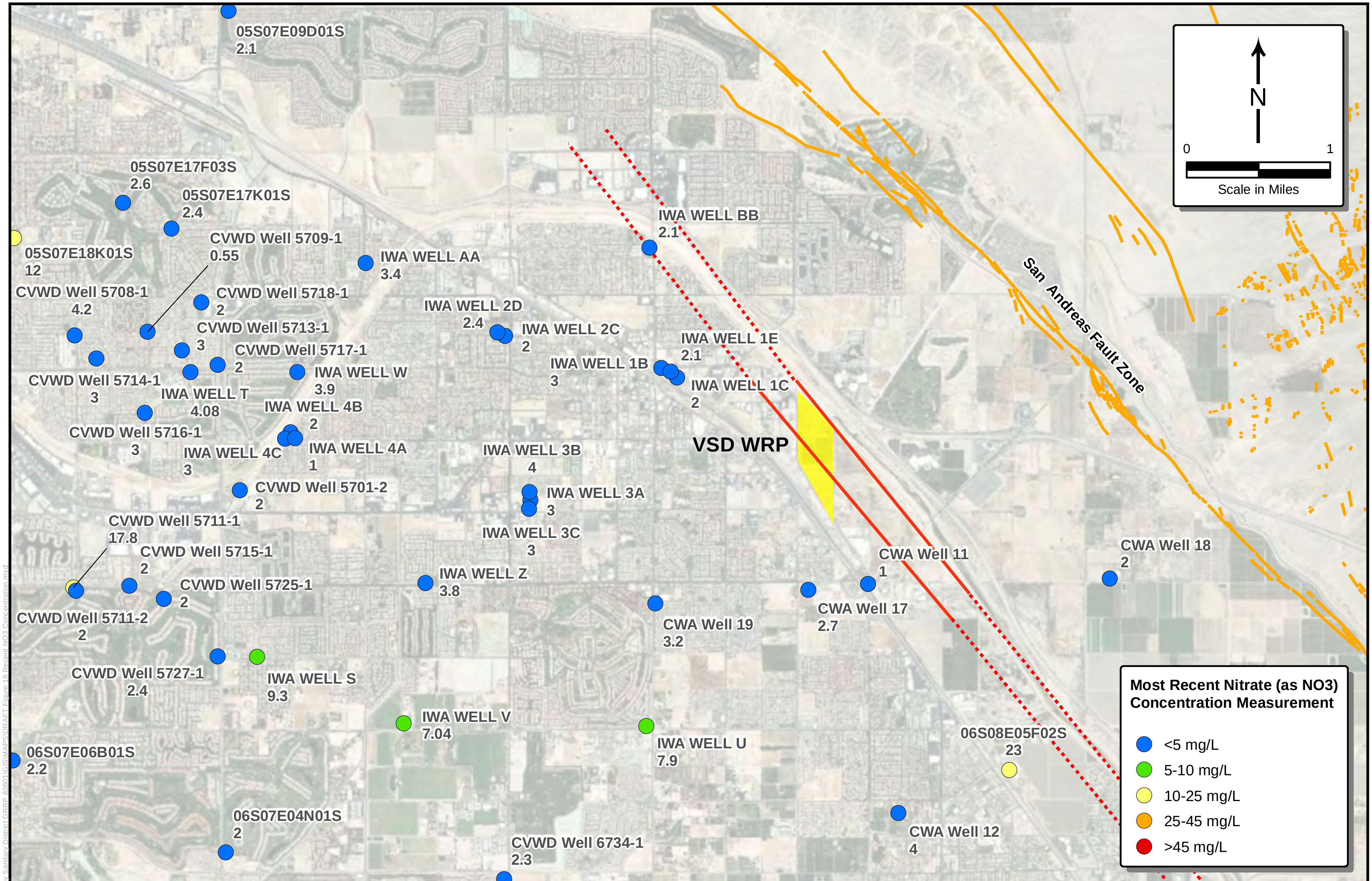
Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults

VSD Boundary

January 2023

TODD GROUNDWATER

Figure 17
Most Recent TDS Measurement 2010-2020



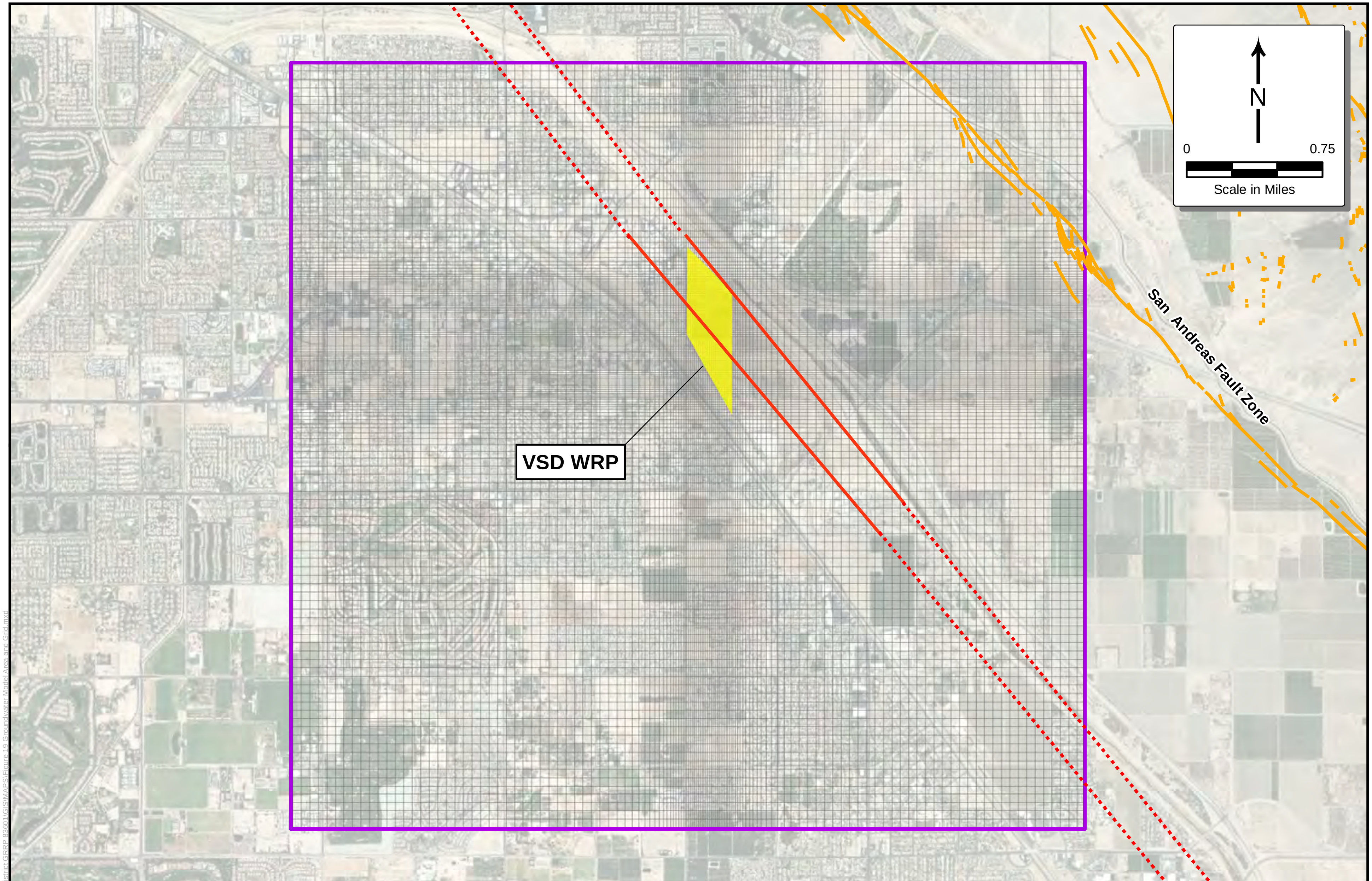
Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults

VSD Boundary

January 2023

TODD GROUNDWATER

Figure 18
Most Recent Nitrate (as NO3) Measurement 2010-2020



Geoscience Identified Fault Zone

- Identified in Study
- Interpolated
- Quaternary Faults
- VSD Boundary
- Model Grid

January 2023

TODD GROUNDWATER

Figure 19
Groundwater
Model Area and Grid

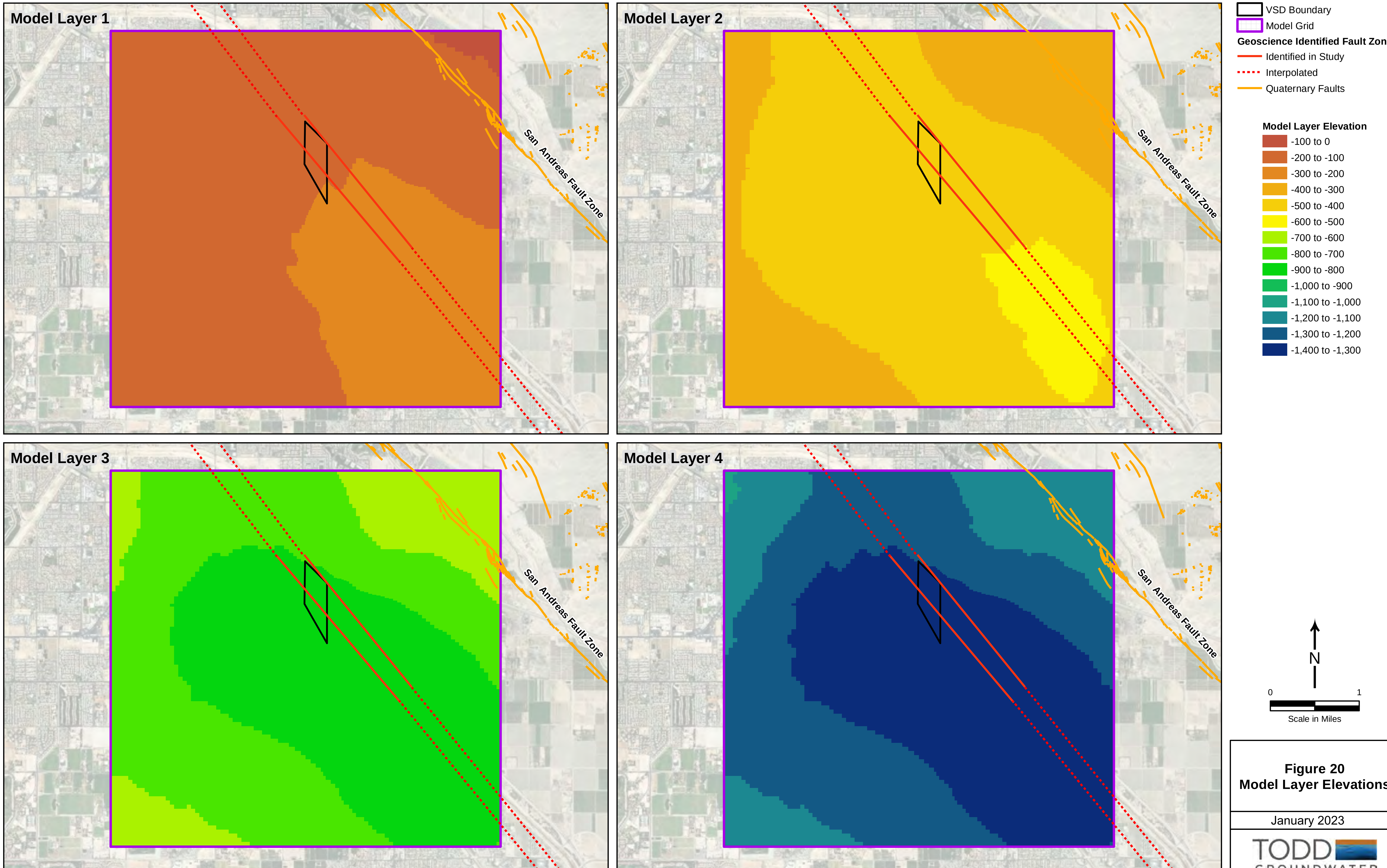
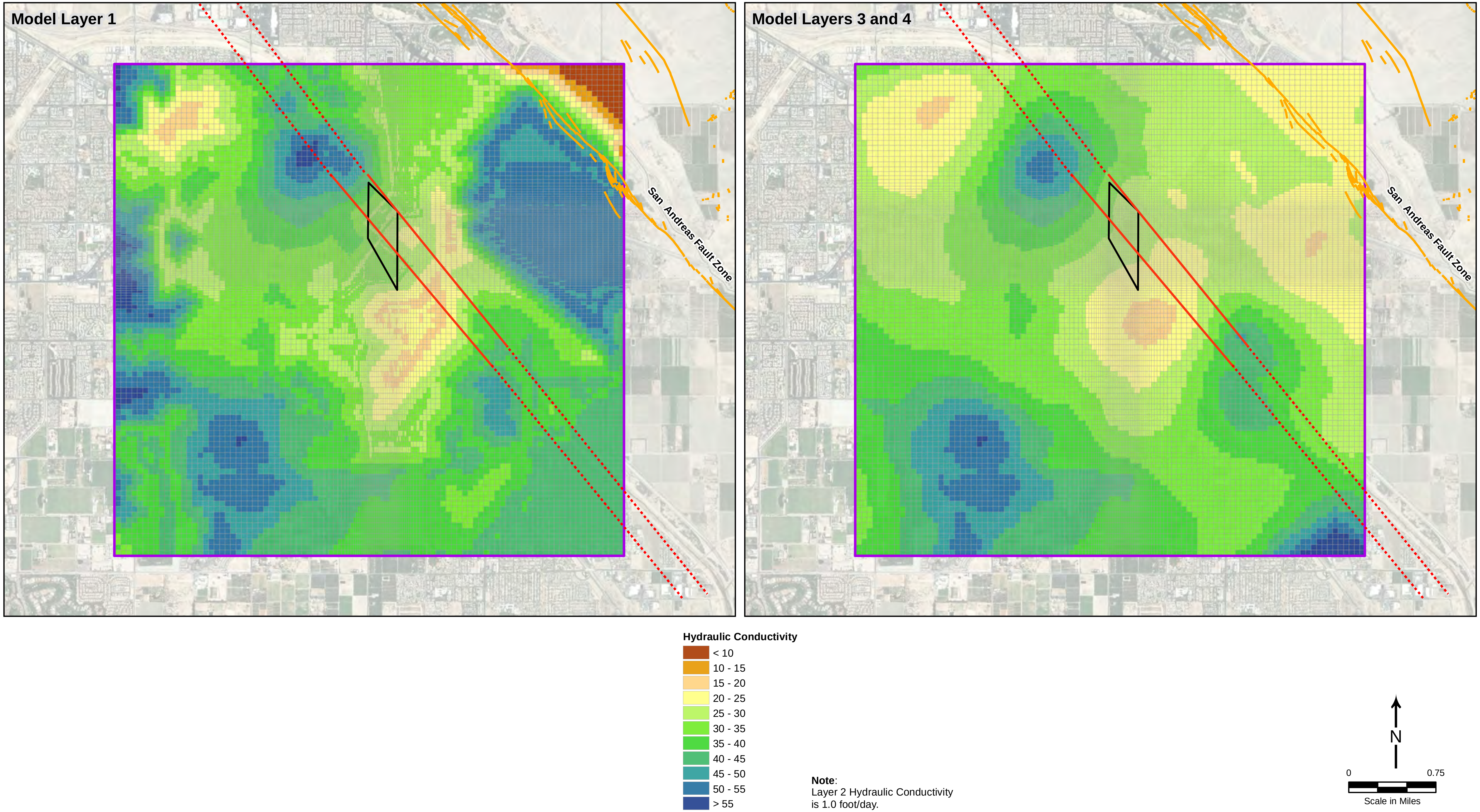


Figure 20
Model Layer Elevations

January 2023

TODD GROUNDWATER

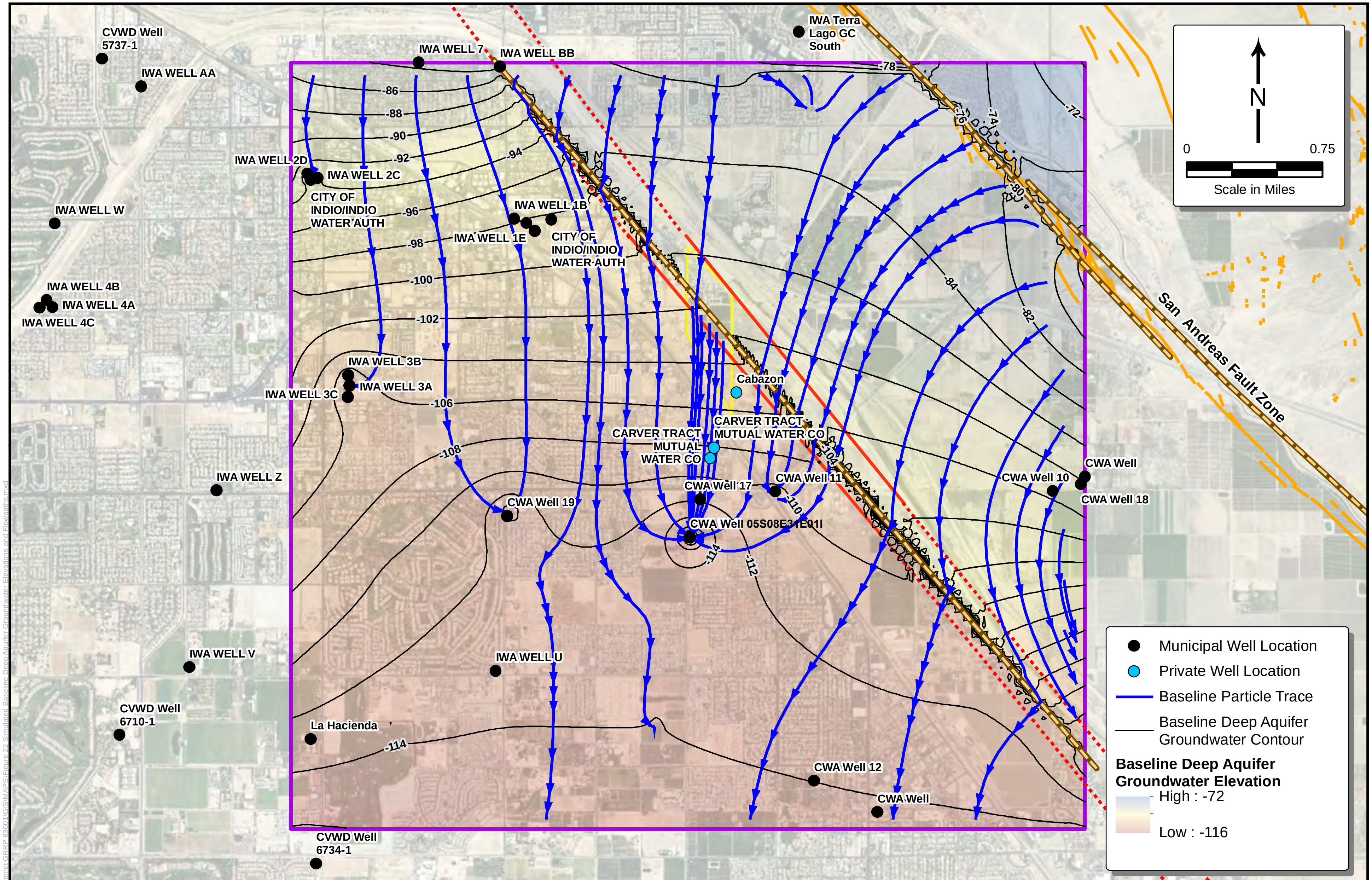


Geoscience Identified Fault Zone
Identified in Study
Interpolated
Quaternary Faults
VSD Boundary
Model Grid

January 2023

TODD GROUNDWATER

Figure 21
Model Layer Hydraulic Conductivities



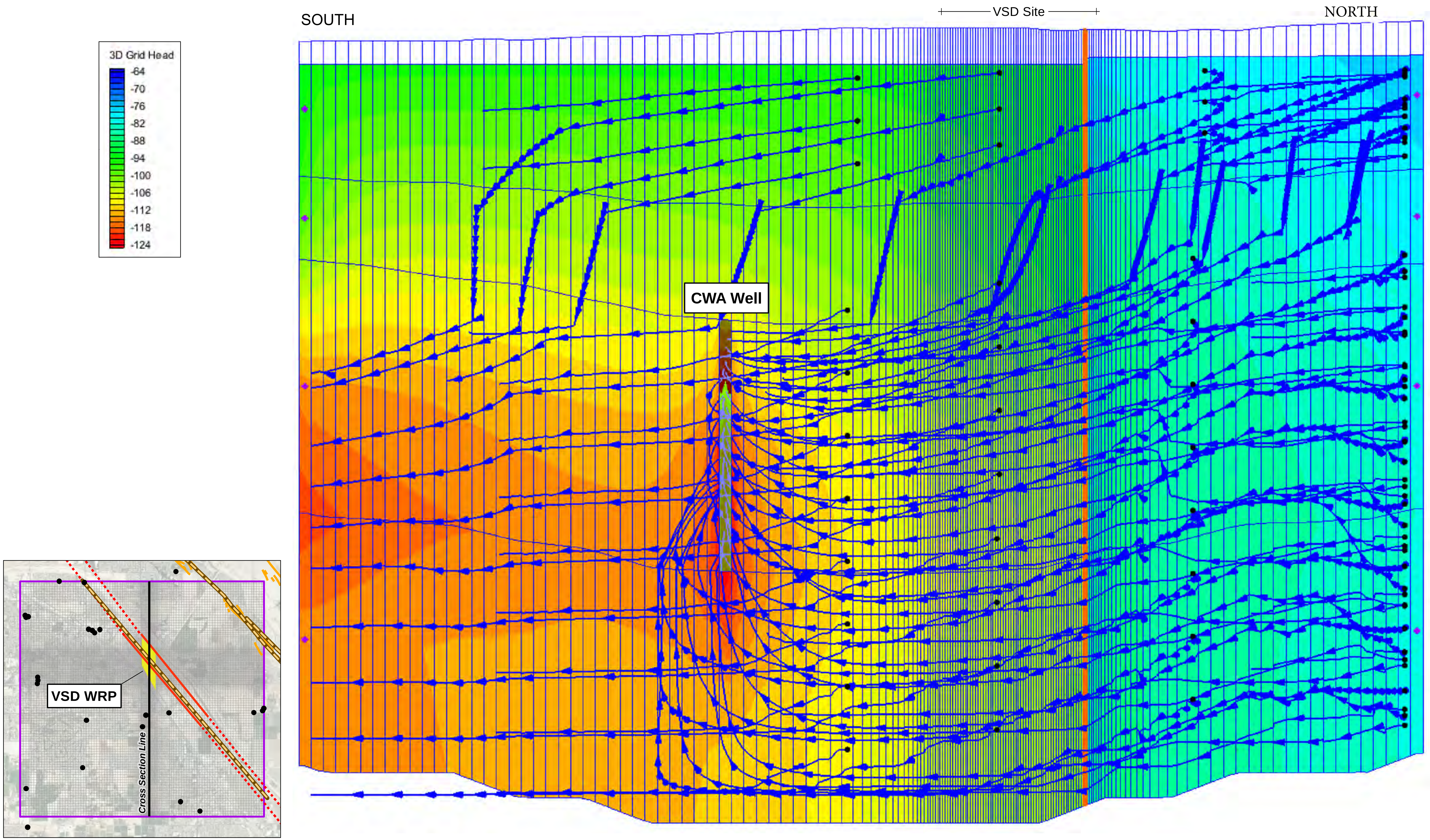
Geoscience Identified Fault Zone

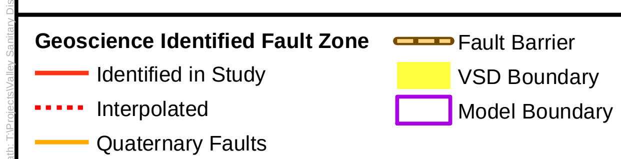
- Identified in Study
- Interpolated
- Quaternary Faults
- Fault Barrier
- VSD Boundary
- Model Boundary

January 2023

TODD GROUNDWATER

Figure 22
Simulated Baseline Deep Aquifer Groundwater Elevations and Flowpaths

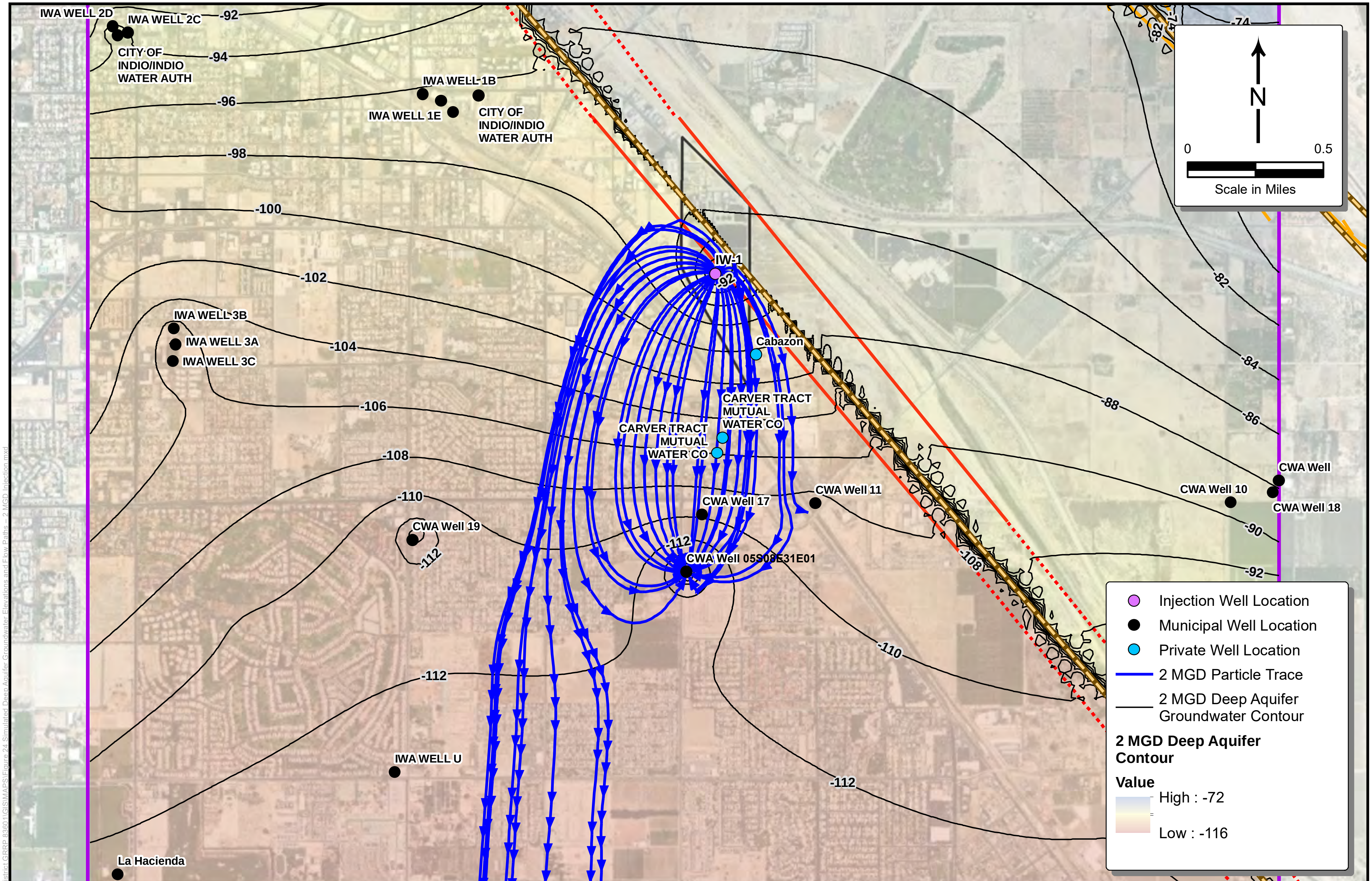




January 2023

TODD GROUNDWATER

Figure 23
Cross-Section of Simulated Baseline Groundwater Elevations and Flowpaths



Geoscience Identified Fault Zone

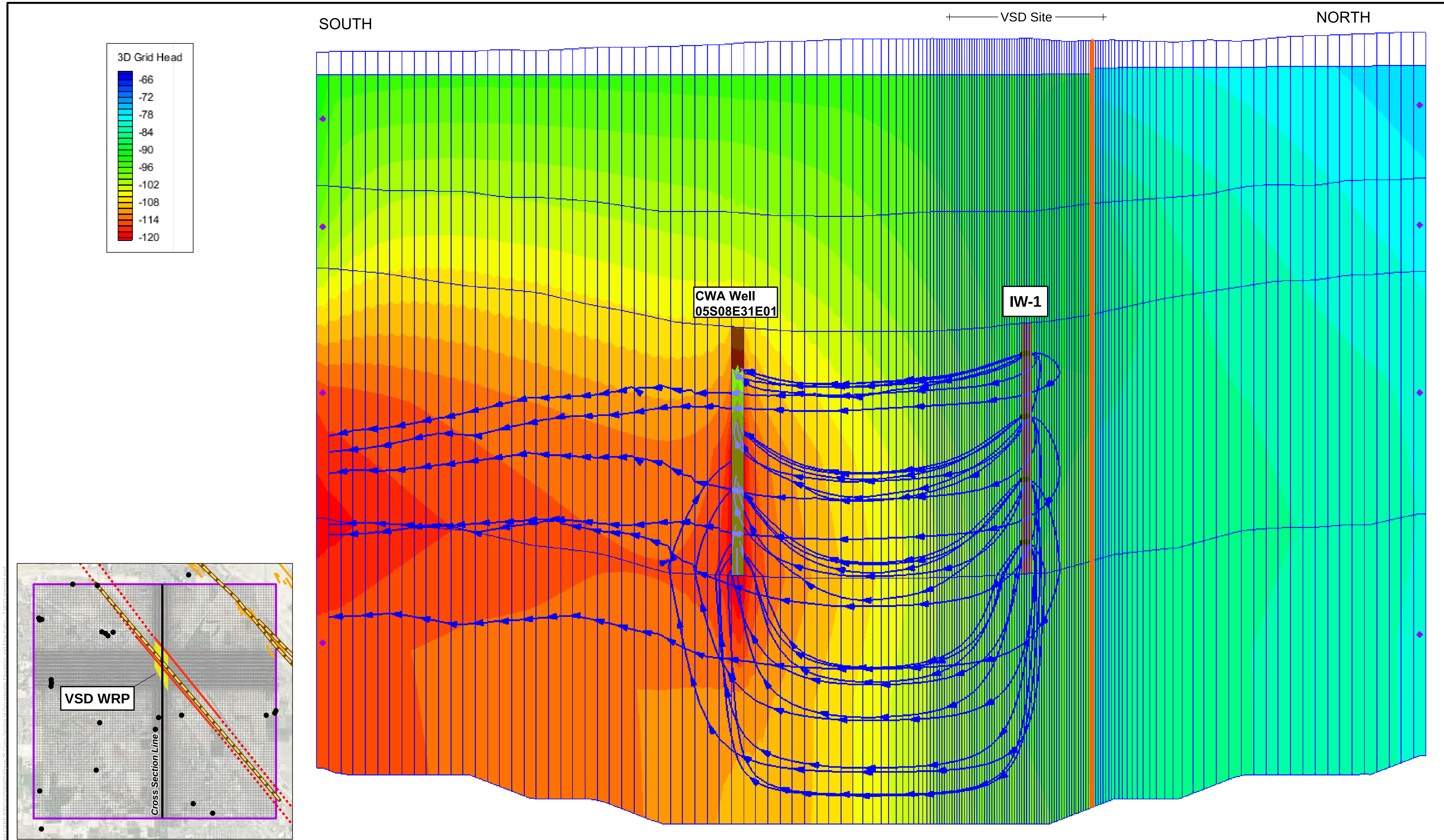
- Identified in Study
- Interpolated
- Quaternary Faults

- Fault Barrier
- VSD Boundary
- Model Boundary

January 2023

TODD GROUNDWATER

Figure 24
Groundwater Elevations and Flow Paths
2 MGD Injection

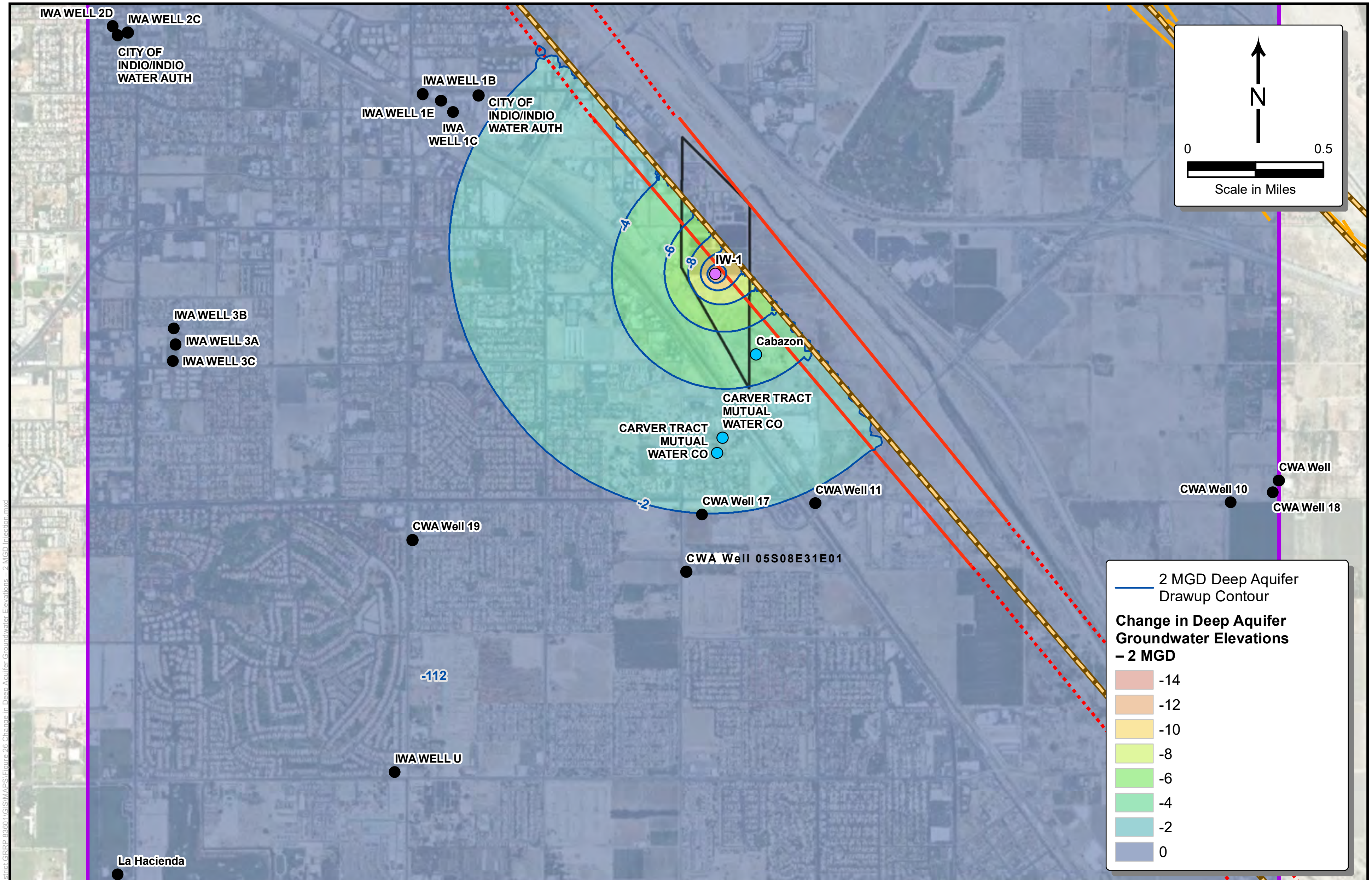


Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults
- Fault Barrier
- VSD Boundary
- Model Boundary

January 2023

TODD GROUNDWATER

Figure 25
Cross-Section of Groundwater Elevations and Flow Paths, 2 MGD Injection



Geoscience Identified Fault Zone
Identified in Study
Interpolated
Quaternary Faults

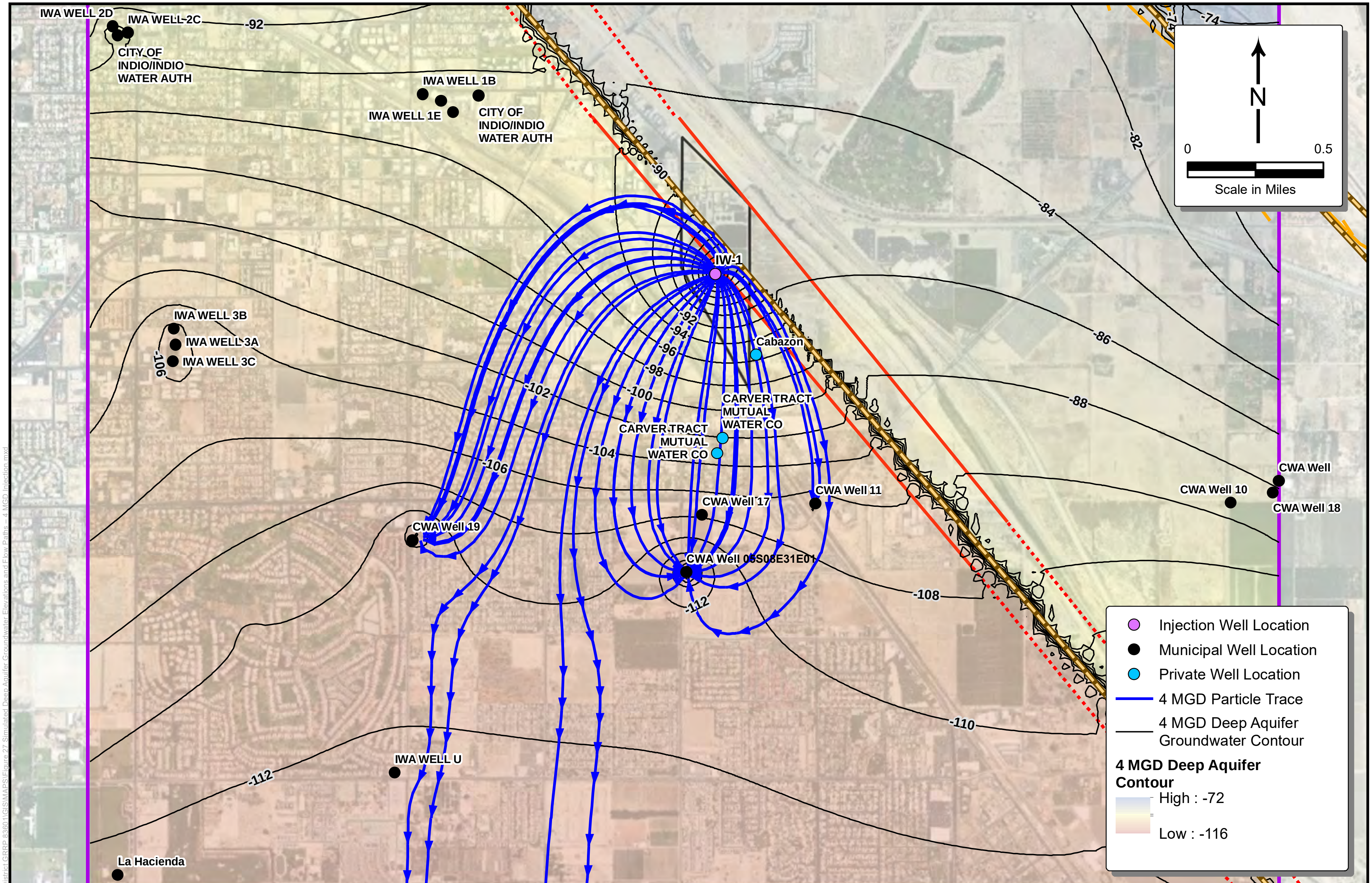
Fault Barrier
VSD Boundary
Model Boundary

Injection Well Location
Municipal Well Location
Private Well Location

January 2023

TODD GROUNDWATER

Figure 26
Change in Deep Aquifer Groundwater Elevations
2 MGD Injection



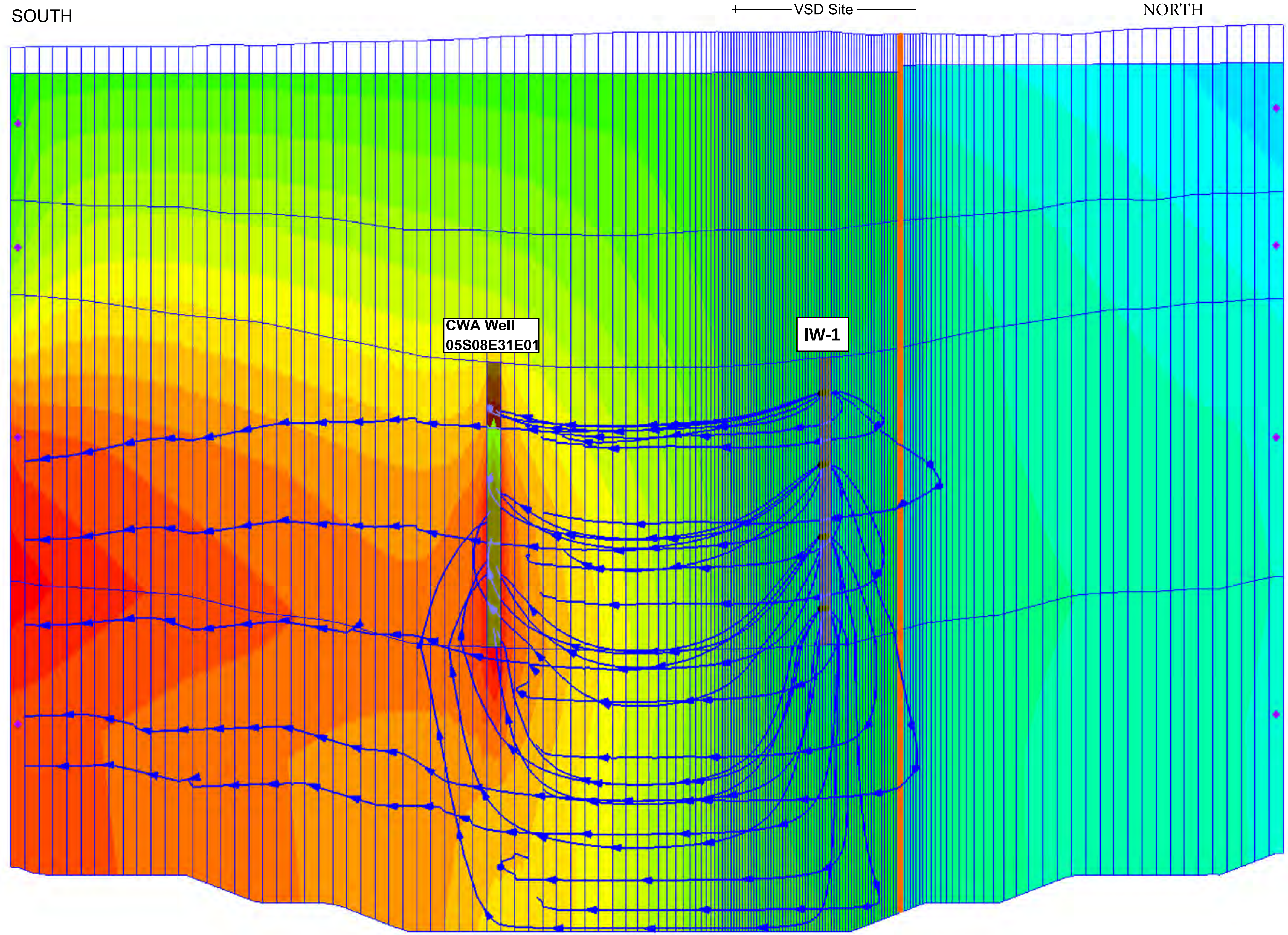
Geoscience Identified Fault Zone

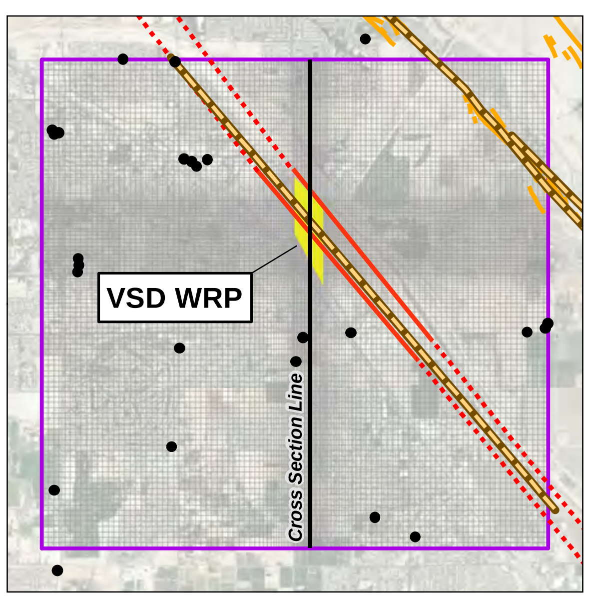
- Identified in Study
- Interpolated
- Quaternary Faults
- Fault Barrier
- VSD Boundary
- Model Boundary

January 2023

TODD GROUNDWATER

Figure 27
Groundwater Elevations and Flow Paths
4 MGD Injection



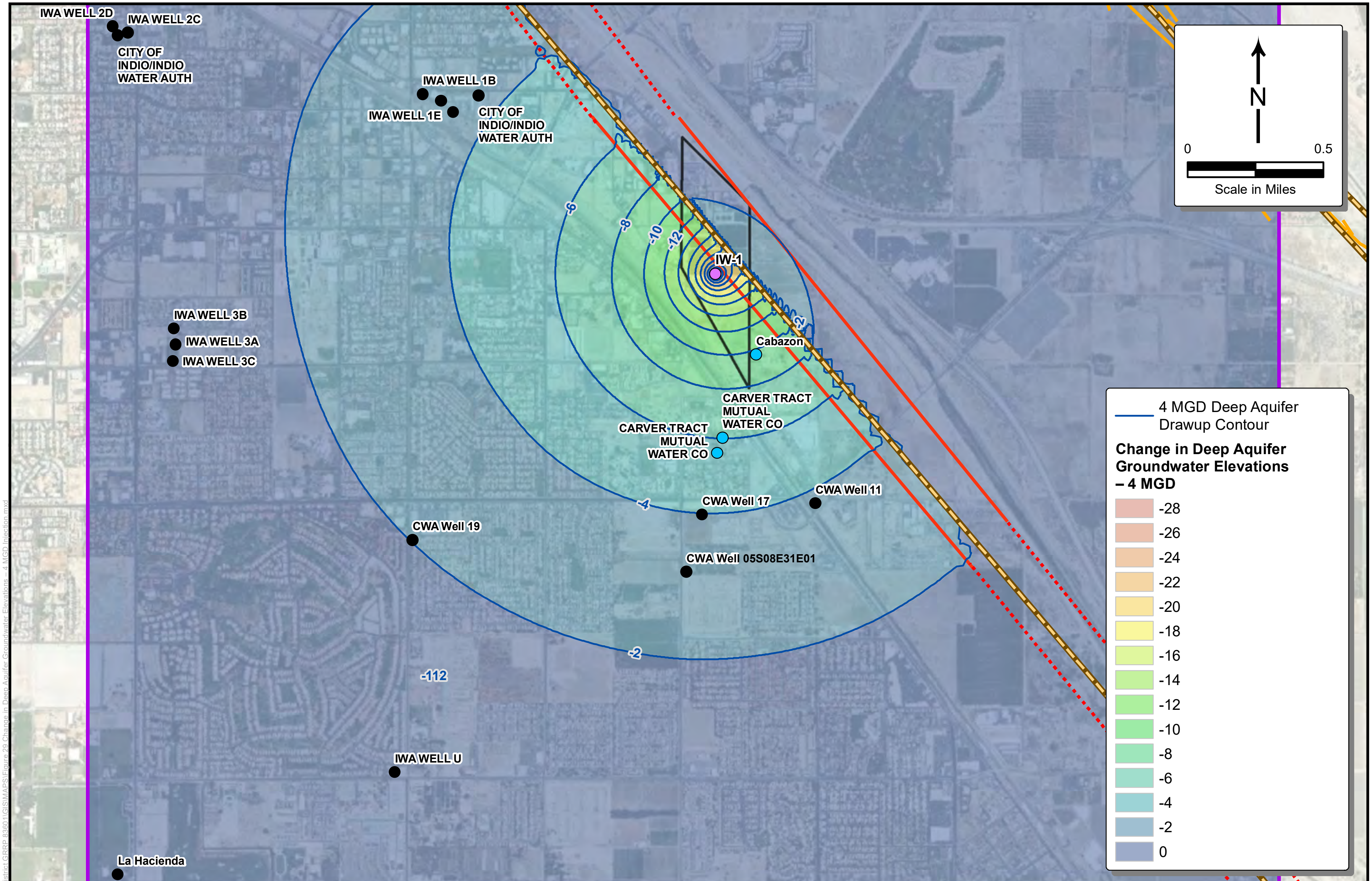


Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults
- Fault Barrier
- VSD Boundary
- Model Boundary

January 2023

TODD GROUNDWATER

Figure 28
Cross-Section of Groundwater Elevations and Flow Paths, 4 MGD Injection



Geoscience Identified Fault Zone
- Identified in Study
- Interpolated
- Quaternary Faults
- Fault Barrier
- VSD Boundary
- Model Boundary
- Injection Well Location
- Municipal Well Location
- Private Well Location

January 2023

TODD GROUNDWATER

Figure 29
Change in Deep Aquifer Groundwater Elevations 4 MGD Injection

Attachment 1 Geoscience 2022 Subsurface Geophysical Survey Investigation Report

Subsurface Geophysical Survey Investigation
Near Valley Sanitary District

Prepared For: East Valley Reclamation Authority

June, 2022

GEOSCIENCE Support Services, Inc. | P (909) 451-6650 | F (909) 451-6638
160 Via Verde, Suite 150, San Dimas, CA 91773 | Mailing: P.O. Box 220, Claremont, CA 91711
www.gssiwater.com

GEOSCIENCE

GEOSCIENCE

The First Name in Groundwater

THIS TECHNICAL MEMEORANDUM IS RENDERED EAST VALLEY RECLAMATION AUTHORITY AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

THIS DOCUMENT HAS BEEN CHECKED FOR COMPLETENESS, ACCURACY, AND CONSISTENCY BY THE FOLLOWING PROFESSIONALS:

Logan Wicks, PG
Project Geohydrologist
PG No. 9580

Brian Villalobos, PG, CHG. CEG
Principal
CHG No. 794

1.0 BACKGROUND

The Indio Water Authority (IWA) services approximately 38 square miles of the Coachella Valley in Riverside County and is located approximately 120 miles east of Los Angeles and 30 miles east of the City of Palm Springs (Figure 1). Much of this service area is also covered by Valley Sanitary District (VSD), which formed in 1925 under the California Sanitary Act of 1923. VSD is responsible for the collection and treatment of municipal sewage as required by permits issued by the California Regional Water Quality Control Board (RWQCB).

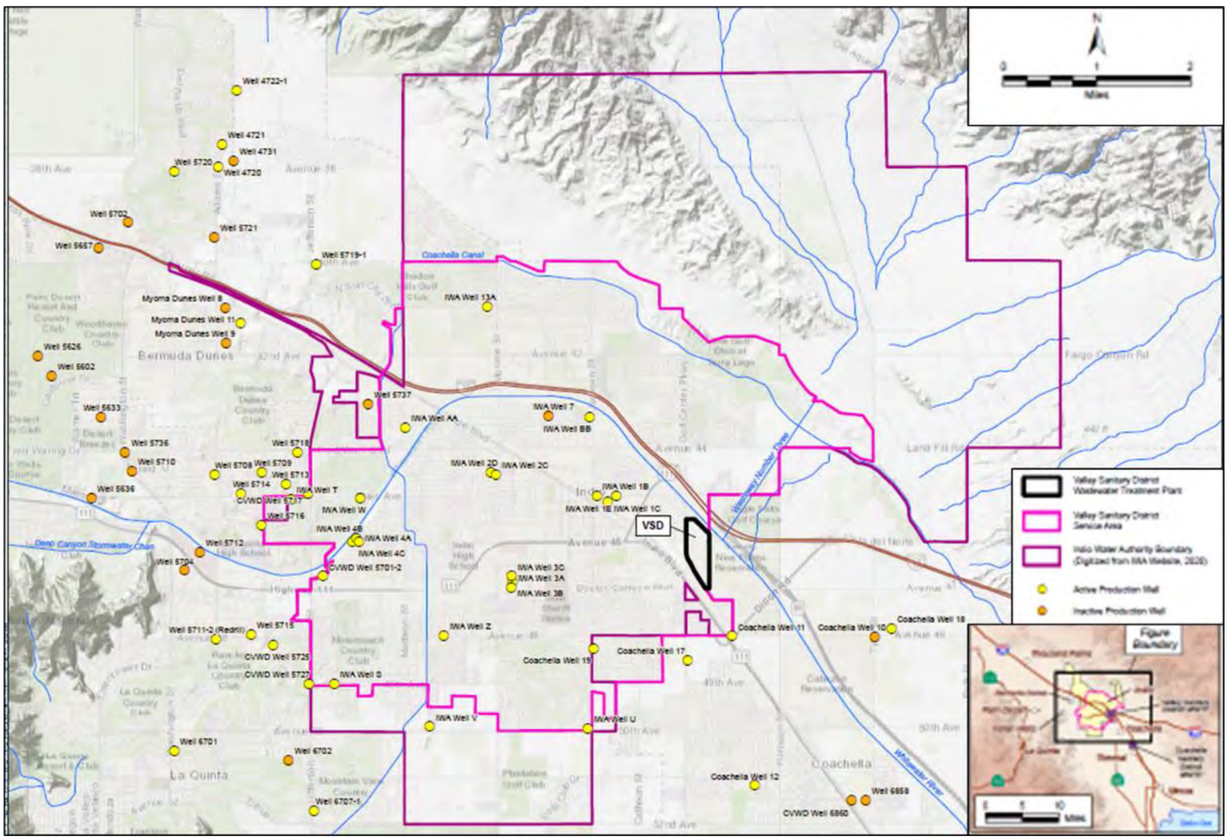


Figure 1 – Study Location

Ten cities, including Indio, make up the geographic area known as the "Coachella Valley." As the largest city in the Coachella Valley, Indio has a growing population of approximately 85,000 residents. With nearly 23,500 service connections and eight major annual festivals and events that bring thousands more visitors each year to the continually growing IWA system, both IWA's demands, and needs must also increase. Therefore, near the end of 2013, IWA and VSD formed a Joint Powers Agreement known as the East Valley Reclamation Authority (EVRA), with the main objective to augment local water resources through beneficial water reuse.

In an effort to develop beneficial use through a local water reuse program in the City of Indio, Geoscience Support Services, Inc. (Geoscience) has been tasked with investigating whether indirect potable reuse (IPR) aquifer recharge is feasible at the VSD facility. The VSD facility receives wastewater which is then treated and discharged into the Whitewater River/Coachella Valley Storm Channel (CVSC). The CVSC is considered a soft bottom channel, meaning that the bottom of the channel is comprised of native wash and windblown sand material. The discharged wastewater continuously flows at or near the channel surface for five miles to the area just upstream of the Coachella Sanitary District Wastewater Treatment Plant. The greatest surface flow occurs within approximately 2.7 miles of the VSD facility. The purpose of this study is to verify findings from previous studies, increase understanding of aquifer systems in the project area, and evaluate IPR options for recharging approximately 7.7 million gallons of treated wastewater from the VSD facility.

1.1 Previous Findings

The following conclusions were made in the November 2020 report[1] (TM-1 see Appendix A):

Work completed by Jänecke (2018) suggests that the anomaly may be along the trend of a buried fault located along the eastern Salton Sea. She and others have mapped the East Shoreline Fault from the eastern edge of the Salton Sea and a few places trending northwest from the eastern shoreline (Figure 2). The area near the VSD may fall on strike with this trend and this investigation may suggest that the ancient structure beneath the VSD may be associated with the ESF Zone.

An anomaly in the geology through Cross-Section B-B' (see Figure 3) which was based on structural and lithologic correlation of existing boring logs suggested that there is offset of the underlying sediments potentially from differential subsidence of the underlying sediments and/or potential movement on an ancient fault buried beneath the surface of the VSD or its vicinity, The offset may potentially represent a zone which might inhibit injection capacity. Geophysics could help identify the extent and configuration of the possible fault/fault zone and assist in determining the distribution of permeable deposits in which to site an exploratory boring.

1.2 Purpose and Scope

In response to the findings of the November 2020 report, the following recommendations were made:

Additional work (i.e., geophysical survey) is needed to verify site-specific, subsurface hydrogeologic conditions. The data collected from this work could be used to assist in the design and locating potential IPR injection and/ or monitoring wells.

---

[1] Geoscience, 2020, "Evaluation of Indirect Potable Reuse at The Valley Sanitary District Water Reclamation Facility for East Valley Reclamation Authority" November 2020.

Given the significant challenges a potential fault could pose to the IPR project, EVRA authorized additional investigational work. The scope of this work is summarized below.

Geophysical Investigation

Atlas Technical Consultants, LLC (Atlas) conducted the subsurface geophysical surveys for this project as well as other similar geophysical work in the area in the past. The geophysical surveys were conducted on January 27, 28, and 29 and February 1, 2, 4, 5, 8, and 9, 2021, at selected locations. The purpose of the surveys was to identify any subsurface geologic structures that might represent geologic conditions that could potentially inhibit the ability to inject water at VSD. By collecting this data, Atlas was able to better define subsurface geologic structures (i.e., fault or fault zone) and the distribution and thickness of the faults in the vicinity of the VSD. Geoscience would then use the geophysical information, if appropriate, to recommend a site for conducting an exploratory borehole for estimating potential injection capacities.

For the geophysical investigation, Atlas used seismic reflection methodology to define subsurface structure. This included conducting two body seismic wave reflection surveys, approximately 3,000 feet long, at available selected sites in the vicinity of the VSD. Reflection data were collected using five Geometrics 24-channel Geode seismographs and 120 30-Hz vertical component geophones. The geophones were spaced 10 feet apart for an array length of 1,190 feet. "Roll-Alongs" were conducted to achieve the desired profile length. The seismic source was created using a 20-pound sledgehammer and an aluminum plate (shot). The resultant seismic reflection readings provided additional information about the subsurface structure(s) in the vicinity of VSD (see Figure 3).

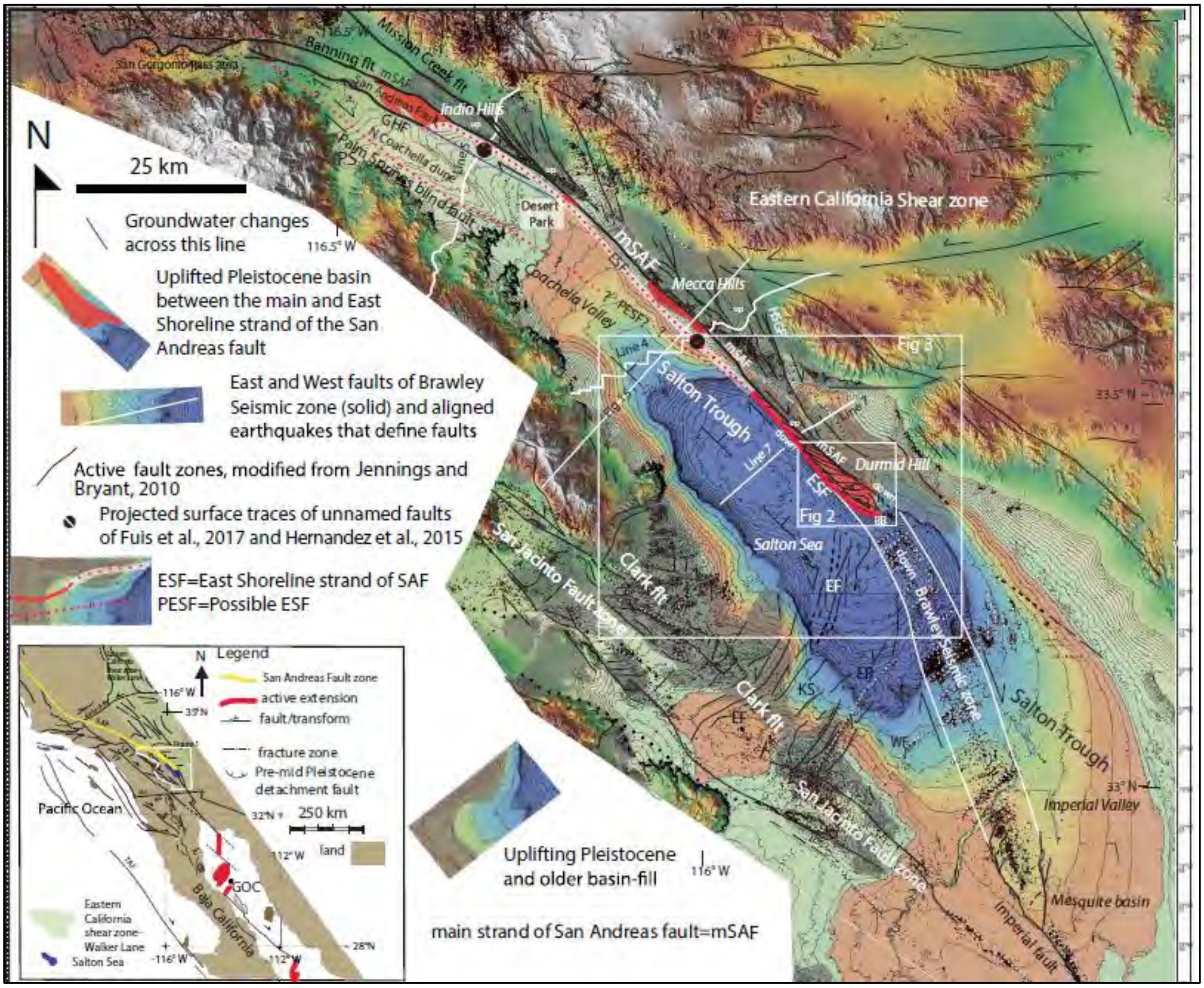


Figure 2 - Work completed by Jänecke (2018) shows the relationship of the ESF Zone in the Valley

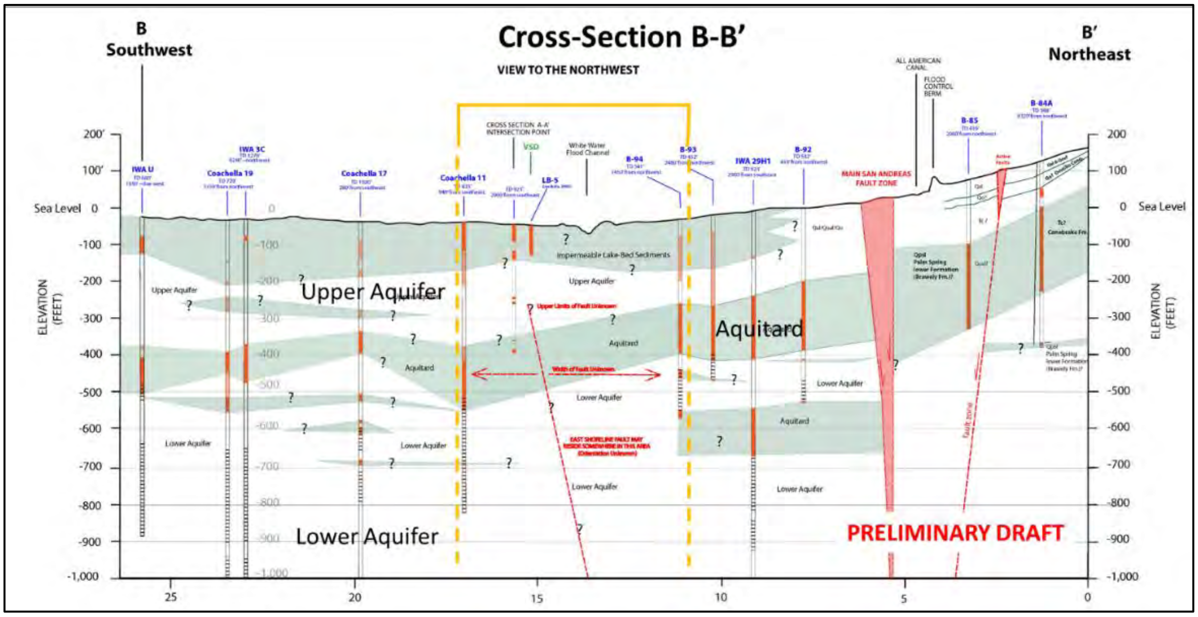


Figure 3 - Area of Interest for Further Investigation (inside yellow box)

Geophysical lines completed in February 2021 are shown on Figure 4. The area in red indicates the general location of the proposed IPR project at the VSD site.

Figure 4 - Geophysical Survey Lines from January and February 2021

Reporting

After the geophysical surveys were complete, Geoscience compiled and reviewed the survey data and prepared this letter report summarizing the geophysical survey results, including figures and tables. The geophysical report prepared by Atlas is included in Appendix B. The geophysical data were then used to update the geologic cross-sections prepared as a part of our report entitled "Evaluation of Indirect Potable Reuse at the Valley Sanitary District Reclamation Facility" November 2020 to illustrate the distribution of the subsurface hydrogeologic units below and in the vicinity of VSD.

2.0 ANALYSIS OF GEOPHYSICAL DATA

2.1 Updated Configuration of Subsurface Structure in the Vicinity of VSD

The geophysical survey data collected by Atlas in January and February 2021 along Dillon Road and the eastern property line of the VSD are shown in the following profiles (Figures 5 and 6 for SL-1 and SL-2, respectively). Both SL-1 and SL-2 show evidence of probable faulting in the past, as identified by Atlas and indicated by the solid blue lines. These ancient fault splays are no longer active since they do not extend up past the major marker bed (yellow dashed line) or top of the upper aquifer. The blue dashed lines are possible faults identified by Atlas.

Figures 5 and 6 below represent filtered data for SL-1 and SL-2. The SL-1 survey data were collected in both the daytime (left half) and nighttime (right half). The data collected during the day were subject to much more road traffic along Dillion Road which created more "noise" in the data and less resolution than the right half of the survey. However, the continuous marker bed (yellow dashed line) shows this area of "noise" displayed little to no faulting over the length of the survey line.

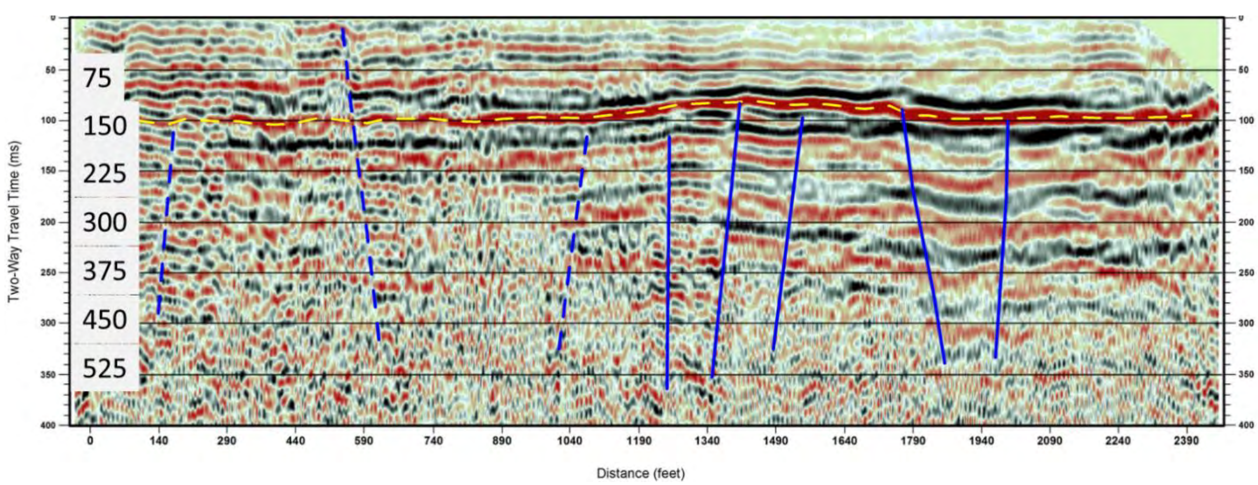


Figure 5 - Geophysical Survey Profile SL-1: Dillion Road

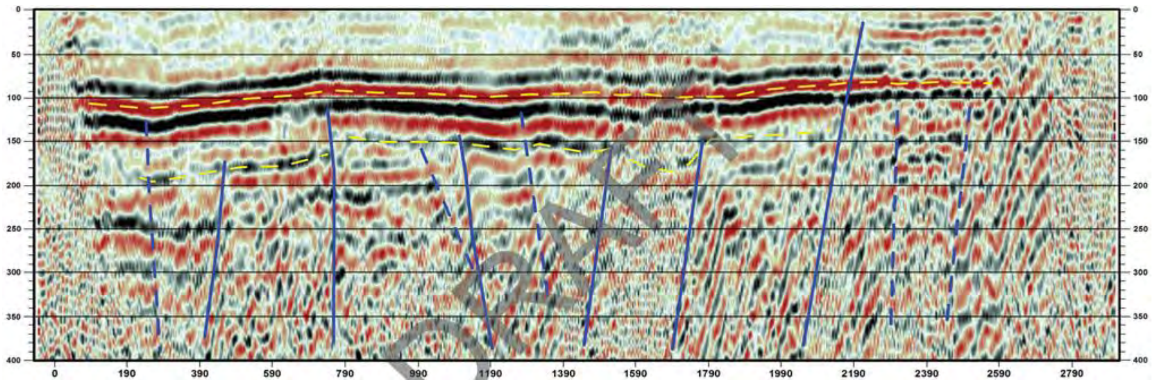


Figure 6 - Geophysical Survey Profile SL-2: Eastern Property Boundary of VSD

Geophysical survey profile SL-2 shows similar probable faults along the profile and the same marker bed (yellow dashed line) as SL-1. Geophysical survey profile SL-1 was scaled to Cross Section B-B' (Figure 7) to illustrate the location of the paleo faulting interpreted in the seismic survey data. Overlaying the seismic data on Cross-Section B-B' shows the marker bed in the survey profiles represents the transition from the Semi-Perched Aquifer which is made up of coarse lithologic units within the ancient Cahuilla Lakebed Deposits (DWR, 1964) to the Upper Aquifer which is composed of Pleistocene[2] Older Alluvium. This transition is the approximate boundary of the faulting since all of the interpreted faults do not extend through this transition. Therefore, the probable faults (solid blue lines) do not appear to have been active in recent time (i.e., less than 11,700 years ago) and are not considered active faults. The data suggest an area of possible uplift at a depth of approximately 150 ft due to a restraining bend of a low slip rate, right lateral, strike-slip, ancient fault zone (personal communication, Dr. Miles Kenny, 2021).

[2] The Pleistocene is the geological epoch that lasted from about 2,580,000 to 11,700 years ago, spanning the earth's most recent period of repeated glaciations. Prior to 2009, the epoch was considered to have begun 1.806 million years Before Present (BP). The end of the Pleistocene corresponds with the end of the last glacial period.

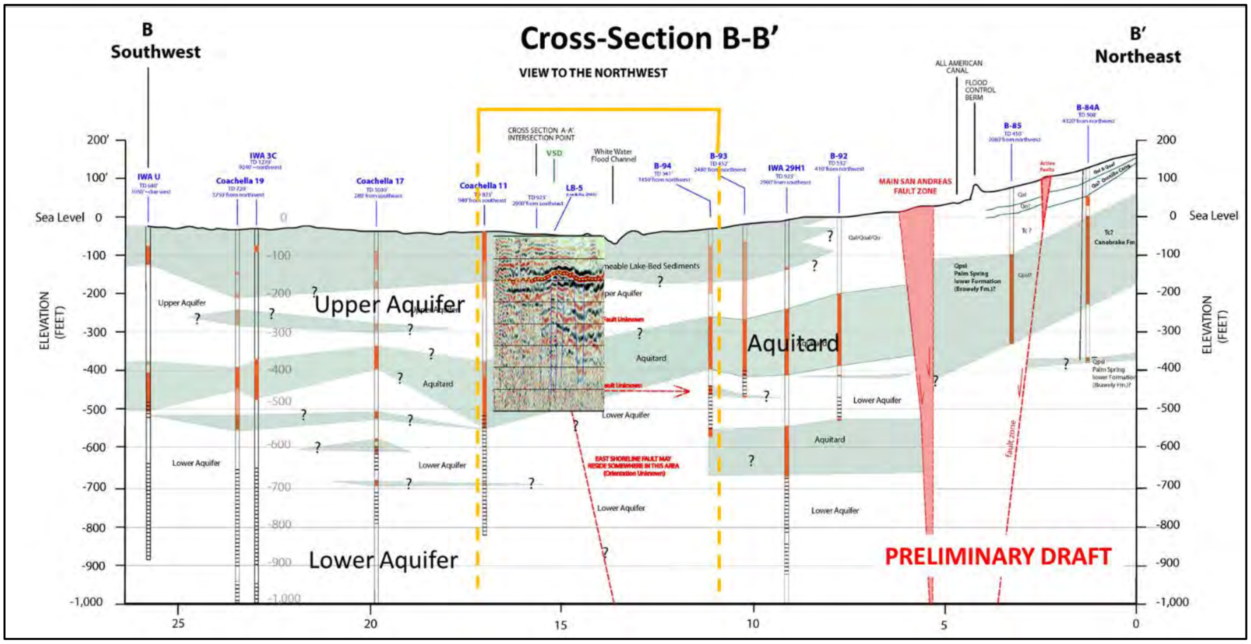


Figure 7 - Dillon Road Geophysical Survey and Cross-Section B-B' from November 2020 Report

The two seismic geophysical survey profiles were used to construct a semi-3D map, or fence diagram, illustrating the likely ancient zone of faulting in the VSD area (Figure 8). When placed on a map and scaled correctly, the probable fault splays identified by Atlas in their report (provided in Appendix B) show a zone of ancient (non-active) faulting which trends to the northwest through the northern section of the VSD facility (denoted by blue shaded areas in Figure 8). Based on the location of the probable fault zone, a potential area favorable for the IPR project was identified at the VSD facility. This area is shown as the yellow polygon on Figures 8 and 9, while the red dots represent potential injection well locations.

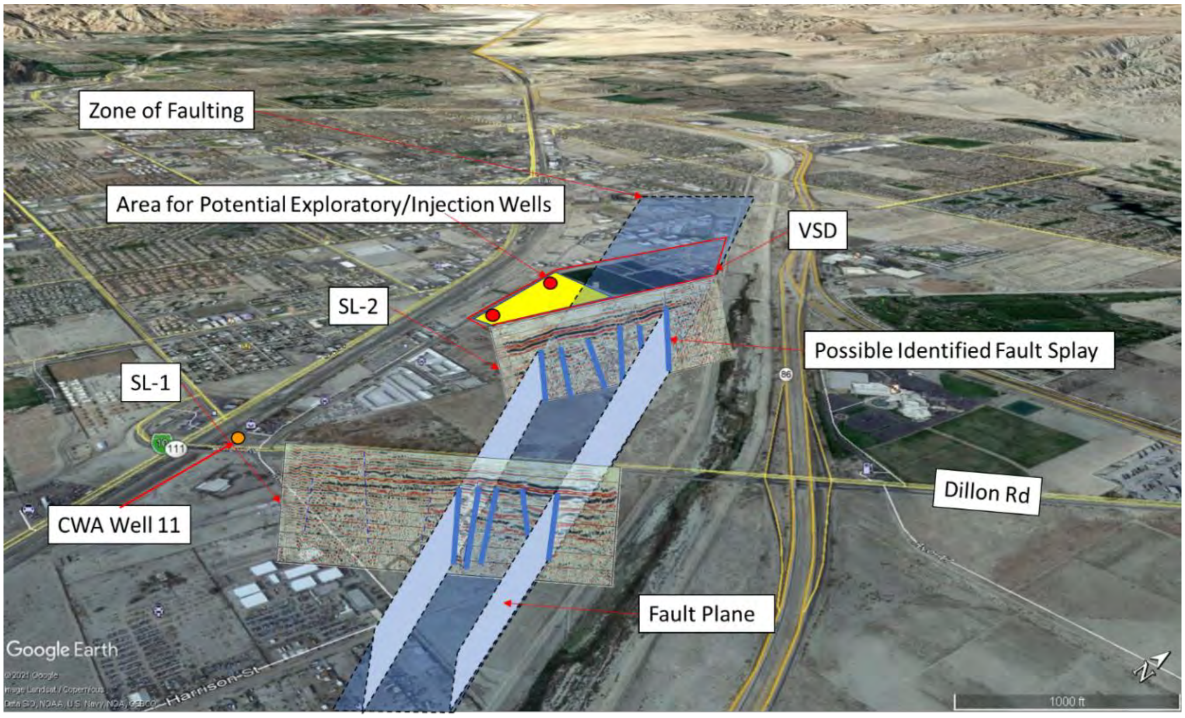


Figure 8 - Probable Zone of Faulting Identified by the Geophysical Surveys

Figure 9 - Potential Area for IPR Project

The data from the geophysical evaluation suggest that injection wells for the IPR project would be best located in the southwestern portion of the VSD property (red dots on Figure 9 above). Although the probable faults (located within the blue shaded area on Figure 9) identified from the geophysical survey lines (orange lines) may only vary from a few inches to a few feet in thickness, it would be best to site the future wells outside of the zone of faulting. Two potential locations for injections wells with approximate distances from the nearest extraction well in the lower aquifer (CWA Well 11) are shown on Figure 9 above.

3.0 SUMMARY

Evaluation of the results from additional seismic reflection survey lines has enabled the interpretation of the configuration of subsurface geologic structure including buried ancient faults in the area of the VSD to be refined from the that of the previous work (Geoscience, 2020). The importance of this finding is locating injection wells to avoid the areas that may be impacted by the buried faults. The following conclusions are made with regard to the additional geophysical evaluation completed in late January, early February 2021 and represent an update to the conclusions provided in the November 20, 2020, Technical Memorandum. Specifically,

- A series of probable faults, or a fault zone, is present in the area under the VSD facility. This zone trends to the northwest and is located along the eastern-northeastern portion of the VSD facility.
- The data suggest an area of possible uplift at a depth of approximately 150 ft due to a restraining bend of a low slip rate, right lateral, strike-slip, ancient fault zone.
- The survey data and review of nearby fault data suggest that the faults in this area are relatively thin and can range from a few inches up to a few feet thick.
- Although the faults in the eastern portion of the VSD facility are not active and may not be thick, they still may impact groundwater flow from an injection well(s).
- Future subsurface exploratory work for siting potential injection wells should be placed west and outside of the fault zone as depicted on the figures presented herein.

4.0 REFRENCES

CALIFORNIA DEPRATMENT OF WATER RESOURCES, “Coachella Valley Investigation”; Bulletin 108, dated July 1964.

GEOSCIENCE, 2020, “Evaluation of Indirect Potable Reuse at the Valley Sanitary District Water Reclamation Facility for East Valley Reclamation Authority” November 2020

JÄNECKE, U.S., et. al., 2018, “Durmid ladder structure and its implications for the nucleation sites of the next M >7.5 earthquake on the San Andreas fault or Brawley seismic zone in Southern California”; LITHOSPHERE; v. 10; no. 5; p. 602–631

KENNEY, M.D., 2021, Personal Communication

APPENDIX A

Evaluation of Indirect Potable Reuse at the Valley Sanitary District Water Reclamation Facility

GEOSCIENCE

Evaluation of Indirect Potable Reuse at the Valley Sanitary District Water Reclamation Facility

Prepared For: East Valley Reclamation Authority

November 2020

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GEOSCIENCE

THIS TECHNICAL MEMEORANDUM IS RENDERED EAST VALLEY RECLAMATION AUTHORITY AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

THIS DOCUMENT HAS BEEN CHECKED FOR COMPLETENESS, ACCURACY, AND CONSISTENCY BY THE FOLLOWING PROFESSIONALS:

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EVALUATION OF INDIRECT POTABLE REUSE AT THE VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY FOR EAST VALLEY RECLAMATION AUTHORITY

CONTENTS

FIGURES and APPENDIX

FIGURES

FIGURES (continued)

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No.	Description	Page
(Inset in Text)		

APPENDIX

Ltr.	Description
(Attached)	
A	Permits Required for EVRA's Groundwater Recharge Project

EVALUATION OF INDIRECT POTABLE REUSE AT THE VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY FOR EAST VALLEY RECLAMATION AUTHORITY

1.0 EXECUTIVE SUMMARY

The Indio Water Authority (IWA) has completed several investigations to determine the feasibility of using discharge from the Valley Sanitary District (VSD) Water Reclamation Facility to recharge groundwater supplies. Since the 1950s, the VSD has discharged treated wastewater under permit, into the Whitewater River/Coachella Valley Storm Channel (CVSD) shown on Figure 1. The existing discharge point is located at the northeast portion of the VSD site (see Figure 2). With an increasing service area and number of connections, the amount of discharge into channel has increased. Current estimates indicate that a groundwater replenishment project could possibly recharge up to 7.7 million gallons per day (MGD).

The East Valley Reclamation Authority (EVRA), comprised of IWA and VSD, retained Geoscience to evaluate local data, review previous studies, and explore groundwater recharge options that will utilize treated effluent from VSD's Water Reclamation Facility as the recharge source. The ultimate purpose of this investigation was to develop a better understanding of available groundwater recharge options, including indirect potable reuse (IPR) through surface spreading or injection.

Previous studies have illustrated the complexity of the geology surrounding and underlying the project site. The presence of fine-grained lakebed deposits near the surface of the VSD site would impede or preclude water from the surface from recharging the targeted Upper and Lower Aquifer systems. Therefore, the use of spreading ponds for IPR is not suitable for this area. Instead, injection wells may provide a viable alternative for recharging treated wastewater into targeted aquifers. Additional work is needed to verify site-specific, subsurface hydrogeologic conditions.

2.0 INTRODUCTION

2.1 Background

The Indio Water Authority (IWA) services approximately 38 square miles of the Coachella Valley in Riverside County, and is located approximately 120 miles east of Los Angeles and 30 miles east of the City of Palm Springs (Figure 1). Much of this service area is also covered by Valley Sanitary District (VSD), which formed in 1925 under the California Sanitary Act of 1923. VSD is responsible for the collection and treatment of municipal sewage as required by permits issued by the California Regional Water Quality Control Board (RWQCB).

Ten cities, including Indio, make up the geographic area known as the “Coachella Valley.” As the largest city in the Coachella Valley, Indio has a growing population of approximately 85,000 residents. With nearly 23,500 service connections and eight major annual festivals and events that bring thousands more visitors each year to the continually growing IWA system, both IWA’s demands and needs must also increase. Therefore, near the end of 2013, IWA and VSD formed a Joint Powers Agreement for East Valley Reclamation Authority (EVRA), with the main objective to augment local water resources through beneficial water reuse.

In an effort to develop beneficial use through a local water reuse program in the City of Indio, Geoscience Support Services, Inc. (Geoscience) has been tasked with investigating whether indirect potable reuse (IPR) aquifer recharge is feasible at the VSD facility. The VSD facility receives wastewater which is then treated and discharged into the Whitewater River/Coachella Valley Storm Channel (CVSC). The CVSC is considered a soft bottom channel, meaning that the bottom of the channel is comprised of native wash and windblown sand material. The discharged wastewater continuously flows at or near the channel surface for five miles to the area just upstream of the Coachella Sanitary District Wastewater Treatment Plant. The greatest surface flow occurs within approximately 2.7 miles of the VSD facility. The purpose of this study is to verify findings from previous studies, increase understanding of aquifer systems in the project area, and evaluate IPR options for recharging approximately 7.7 million gallons of treated wastewater from the VSD facility.

2.2 Previous Work

Over the past two decades, IWA has completed numerous planning level reports that focused on creating supplemental water supplies by recharging the Indio Subbasin with either treated imported water or with highly treated recycled water from the VSD facility. Most reports lacked additional information necessary to consider recharge by injection wells. Report findings and recommendations from 2005 to present include:

- The 2005 report by Lee & Ro, Inc. (Lee & Ro) provided recommendations regarding the proposed VSD plant expansion. Five borings were drilled in late March 2005 to explore subsurface conditions, which confirmed low permeability materials representing the semi-perched aquifer.

- The 2008 report by Petra Geosciences, Inc. (Petra) completed a desktop study and described areas within the City of Indio that might be suitable for aquifer recharge through surface infiltration to both the upper and lower aquifers, without the use of injection wells. Petra identified five potential areas that may allow surface infiltration to recharge the upper aquifer, two of which would also provide recharge to the lower aquifer. However, field data collection was recommended to determine subsurface conditions

- The 2009 reports by Petra presented results for the Phase 1 hydrogeologic investigation to assess Poses Park as a potential site for artificial recharge facilities. Data from this investigation concluded that artificial recharge to the lower aquifer by surface spreading is not feasible due to the thickness of low permeability sediments; the vertical percolation of water spread at the surface would be stopped from reaching the lower aquifer. Based on geologic mapping, well data, and geophysical surveys, the 2009 Petra report suggested that groundwater storage is likely feasible in parts of Fargo subbasin. However, water quality in Fargo subbasin is poor.

- In 2018, Petra completed a study for an area immediately north of Posse Park, in the City of Indio, as a potential site for artificial recharge facilities. Borings encountered a thick layer clay at approximately 240 feet below ground surface (ft bgs). Geological mapping and geophysical logs confirmed faulting as a broad zone, hundreds of feet wide, potentially acting as barriers to groundwater flow to the south. Surface spreading of water would not recharge into the lower aquifer beneath the valley area from this location.

- The 2018 report by Hazen and Sawyer found that groundwater recharge via spreading or injection is a favorable recycled water alternative and recommended 1) conducting percolation testing and soil borings near the evaporation ponds at the VSD facility to confirm hydrogeologic findings and adequacy for percolation, and 2) consideration of groundwater recharge via injection if surface spreading is not feasible.

2.3 Purpose and Scope

The current scope is to review previous studies and explore groundwater recharge options that will utilize treated effluent from VSD’s Water Reclamation Facility as the recharge source. While an estimated 0.5 MGD of wastewater will still be required to flow into the CVSC to maintain habitat, groundwater credit may also be obtained for surface water used for habitat. The ultimate purpose of this investigation is to develop a better understanding of available groundwater recharge options, including IPR through spreading or injection. Based on an initial review of the geohydrology, Geoscience has concluded that surface water spreading would not allow sufficient groundwater recharge due to the presence of fine-grained materials in the subsurface. The supporting information for this conclusion is presented below. Geoscience, as a part of the approved scope of work, proposed an approach to evaluate injection capabilities in the lower aquifer with a goal of increasing local groundwater supplies.

The scope of work for this study includes:

- Researching and reviewing geohydrologic literature for the project area and compiling information. Data include well construction details, well locations, water levels, well production, and water quality data, which will be used to assess groundwater recharge capability and monitoring methodology. Figures 1 and 2 show wells used for this technical memorandum (TM).

- Preparing this TM evaluating recharge options at the VSD facility and outlining a proposed regulatory strategy for groundwater recharge by injection.

- Validating the conceptual hydrogeologic model to a depth of about 1,000 feet below the VSD facility and presenting existing data that support the use of injection for IPR at the VSD site, rather than surface water spreading. Once the conceptual model is confirmed, Geoscience will prepare exploratory drilling technical specifications for a deep boring at the VSD site to collect data for the assessment of subsurface conditions.

- Preparing a monitoring network to collect water level and water quality data to identify the influence and extent of treated wastewater being introduced into the CVSC. This will provide a better understanding of the fate of treated wastewater that has historically been and is currently being discharged into the CVSC.

2.4 Sources of Data

The data collection effort began with obtaining available data from IWA and VSD. This included:

- Groundwater production reports provided by IWA,
- Well static water levels and pumping levels provided by IWA,
- Groundwater quality data provided by IWA,
- Video survey reports provided by IWA,
- Well logs from DWR and the Geoscience well log database,
- Effluent discharge data from VSD,
- Treatment plant effluent water quality provided by VSD,

- Past reports from Hazen & Sawyer, Lee & Ro, and Petra.

A complete list of references is provided in Section 7.0 of this TM.

3.0 GEOHYDROLOGY

To assess the recharge feasibility of an area, the geohydrology must first be determined to understand if an area is adequate for groundwater recharge and what type of recharge is most appropriate. The geologic history around the VSD site is very complex. This area has been deformed by the San Andreas Fault, which caused uplift of the Indio Hills and extensive subsidence of the valley floor. These processes have defined the recent (Pleistocene to present) sedimentation of this area. Regional and site-specific geohydrology is discussed in the following sections.

3.1 Regional Geohydrologic Setting

The study area is located within the southeastern Coachella Valley, which is in the northern portion of the Salton Trough and in the Colorado Desert Geomorphic Province (CDGP) (Figure 1). The CDGP encompasses a northwest trending area stretching from Palm Springs to Imperial Valley, also referred to as the Salton Trough (Norris and Webb, 1990). Deposited sediments are estimated to be 2 to 5 miles thick (Biehler, et. al., 1964; Fuis and Kohler, 1984; Kohler and Fuis, 1986). Weathered material from the surrounding Transverse Ranges and Peninsular Ranges, and deposits from the Colorado River have filled the basin with sediments since at least the late Miocene (Petra, 2018). The Salton Trough formed by crustal extension, starting as a half-graben basin followed by bounding of the San Andreas fault zone to the northeast and the San Jacinto fault zone to the southwest (Powell, 1993; Proctor, 1968; Stock and Hodges, 1989).

3.2 Groundwater and Aquifer Systems in the Project Area

Much of the current geohydrologic understanding for the area surrounding the City of Indio comes from the Department of Water Resources' (DWR's) 1964 study, Bulletin 108, which includes descriptions of geologic and hydrostratigraphic units. Figure 1 from Bulletin 108 (DWR, 1964), shown below, illustrates a generalized hydrostratigraphic section in the vicinity of the VSD site. As shown, water-bearing materials in the area can be divided into:

- A semi-perched aquifer,
- The Upper Aquifer,
- An aquitard, and
- The Lower Aquifer.

This Figure also shows the generalized thicknesses of the units, including near surface sediments from approximately 0 – 100 ft of fine-grained lake-bed deposits which are known to impede the vertical movement of groundwater. According to Petra (2018), the Lower Aquifer in the study area is likely present within the Palm Springs Upper Formation rather than the Ocotillo Conglomerate as stated in the DWR hydrostratigraphic sequence below.

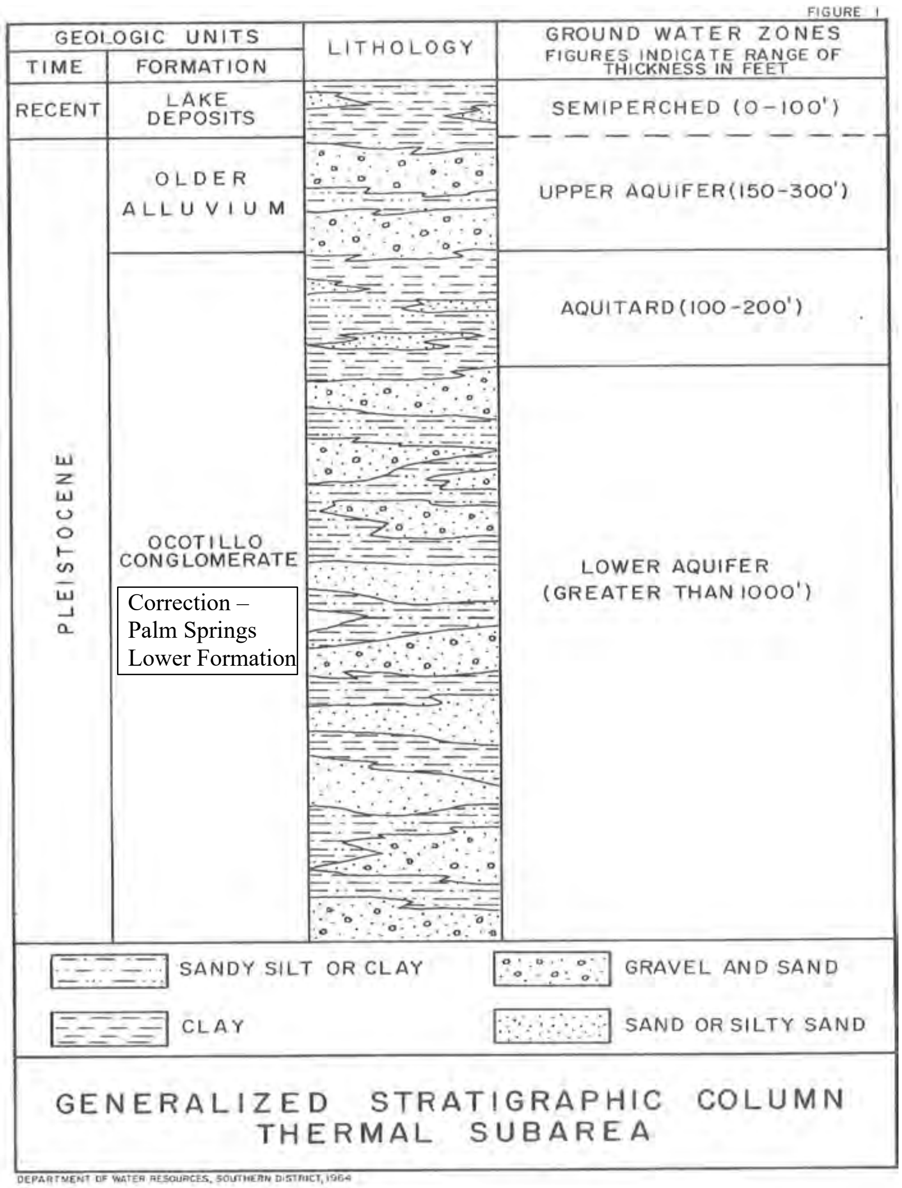

Figure 3-1. Generalized Stratigraphic Column in the Vicinity of the Project Site

(Source: Figure 1 from DWR, 1964)

3.2.1 Semi-Perched Aquifer

The Semi-Perched Aquifer is made up of late Pleistocene to Holocene Lake Cahuilla deposits, which consist of interbedded sands, silts, and clays. The last high stands related to the ancient Lake Cahuilla reached an elevation over 50 ft above mean sea level (amsl) (Suitt, 1996). Water levels in this aquifer are typically between 6 and 20 ft bgs under natural conditions and the aquifer is reported to be between 0 and 100 ft thick (DWR, 1964). These thinly interbedded lake deposits restrict the vertical movement of water. Therefore, surface water does not percolate quickly or deeply. The area west of the Coachella Canal is outside of the Semi-Perched Aquifer. According to Petra (2018), shallow monitoring wells show the Semi-Perched Aquifer at deeper levels – contrary to DWR's depiction. More work is necessary to understand the extent of the Semi-Perched Aquifer. Water quality in the Semi-Perched Aquifer is generally considered to be poor.

3.2.2 Upper Aquifer

In the project area, the Upper Aquifer is located below the Semi-Perched Aquifer, with alternating sequences of alluvial and lake deposits from approximately 150 to 300 ft bgs (Petra, 2018). In this area, this aquifer was initially developed for agriculture use. Historically, wells completed in this aquifer typically had good production yields. However, due to over pumping and degraded water quality, few wells are solely screened in this aquifer today. The last IWA well to be installed in the Upper Aquifer was abandoned in 2007, in part due to poor water quality.

3.2.3 Aquitard

An aquitard is defined as a fine-grained unit that separates two groundwater aquifers. Aquitards impede vertical groundwater migration from an upper aquifer to a lower one. When assessing groundwater recharge potential, it is important to understand the extent and thickness of any aquitards present in the project area. In the area of the VSD facility, an aquitard unit has been identified. Reported thickness of the aquitard is between 100 to 200 ft. The lateral extent, however, is not well defined. With regards to potential recharge to the Lower Aquifer, this aquitard likely acts as a capping unit for the Lower Aquifer – preventing injected recharge from migrating upward and containing the recharge in the preferred Lower Aquifer. Similarly, any recharge to the Upper Aquifer in this area would be restricted from traveling downward to the Lower Aquifer.

3.2.4 Lower Aquifer

The Lower Aquifer is made up of interbedded fine- and coarse-grained materials. The Lower Aquifer reaches depths greater than 1,000 ft, according to DWR (1964). This aquifer is the primary source of groundwater for the Valley. This lower unit is primarily recharged from the infiltration of surface water in the western region, where the aquitard is missing. Artificial recharge projects have targeted the lower aquifer to mitigate falling groundwater levels in the lower aquifer. This western area of the valley is underlain by material that represents undifferentiated Upper and Lower Aquifer.

3.3 Historical Groundwater Elevations

Historical groundwater elevations in the vicinity of the VSD site are relatively well documented for the Lower Aquifer. However, the Upper and Semi-Perched Aquifers have very little data. This is likely due to poor historical record keeping and the fact that water quality from both the Semi-Perched and Upper Aquifers is poor. Selected hydrographs from IWA wells around the VSD site are shown on Figure 3. These data demonstrate that, while groundwater levels do fluctuate somewhat over time, they appear to be fairly stable (i.e., no long-term regional decline). Short-term periods of decline are typically followed by periods of recovery. These fluctuations can likely be attributed to, among other factors, annual precipitation events and the corresponding availability of natural recharge for aquifers. In most of the selected wells, water levels appear to be increasing slightly over the past ten years. This increase in water levels may be due to several variables, including decreased pumping activity in the area, increased precipitation, and basin management practices. Table 3-1 below summarizes average water levels in active IWA wells over the past five years. The large differences seen between water levels in Wells 1B and 1C and other wells in the area indicate that these two Upper Aquifer wells are (at least in part) hydraulically disconnected from the Lower Aquifer.

Table 3-1. Five-Year Historical Water Level Data

Station ID	Date Range (5-year avg.)	Well Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Depth to Water (ft bgs)
Well 1B*	**1/15 to 4/20**	**-23**	**89.40**	**66.40**
Well 1C**	**3/20 to 5/20**	**-27**	**93.30**	**66.30**
Well 1E	1/15 to 5/20	-27	138.40	111.40
Well 2D	3/15 to 5/20	-3	123.20	120.20
Well 3A	1/15 to 5/20	-7	130.80	123.80
Well 13A	3/15 to 4/20	8	104.00	112.00
Well BB	3/15 to 5/20	-23	145.00	122.00
Well U	1/15 to 5/20	-22	138.10	116.10
Well Z	1/15 to 5/20	6	127.50	133.50

*Well screened in Upper Aquifer
**Well screened in Upper and Lower Aquifer

3.4 Groundwater Occurrence and Movement

Groundwater in the vicinity of the VSD site has been recorded at two distinct levels due to the stratified aquifer system (i.e., Semi-Perched, Upper, and Lower Aquifers). Unfortunately, too few water level data exist to fully map groundwater elevations and flow directions for the Semi-Perched and Upper Aquifers. However, three IWA wells were constructed in the Upper Aquifer north of the VSD site and are some of the closest wells with current water level data. According to the 2018 Petra report, water levels in Well

1A, which was abandoned in 2007, ranged from 31 to 47 ft bgs from 1992 to 2002. Recently compiled IWA water level data for Wells 1B and 1C show April 2020 water levels in the Upper Aquifer of 67 an 65 ft bgs, respectively. Groundwater flow direction in the Upper Aquifer is difficult to determine with the few water level data that exist. However, there seems to be a relatively consistent gradient between Wells 1B and 1C from the northwest to the southeast, similar to that observed in the Lower Aquifer.

Most wells in the area are screened in the Lower Aquifer (below approximately 550 ft bgs). IWA Well 1E (near Wells 1B and 1C) recorded a groundwater level for the month of April 2020 of 104 ft bgs. Other wells in the area that are only screened in the Lower Aquifer have water levels generally consistent with Well 1E ranging from approximately 110 ft to 130 ft bgs, that indicate groundwater generally flows to the south-southeast.

3.5 Groundwater Quality

Groundwater in the Lower Aquifer around the VSD site is reported to be of relatively good quality. Recent groundwater quality for local IWA production wells is summarized in Table 3-2 below and on Figure 3.

Table 3-2. Recent Groundwater Quality

Well ID	Nitrate as NO3 (mg/L)	Nitrate as N (mg/L)	Hexavalent Chromium (ug/L)
Well 1B	4	1	**11**
Well 1C	3	1	**10**
Well 1E	2	0	**17**
Well 2C	2	1	**17**
Well 2D	2	1	**19**
Well 3A	4	1	**14**
Well 3B	4.7	1	**14**
Well 3C	2.7	0.62	**17**
Well 4A	8.4	2.3	**10**
Well 4B	6.6	1.5	9.2
Well 4C	2.8	12	2
Well 13A	2	0.44	**14**
Well 13B	1.5	0.34	NA
Well AA	3.2	0.73	**15**
Well BB	2.5	0.56	**17**
Well S	26	5.9	7.9
Well T	9.2	2.1	**10**
Well U	5.3	1.2	**14**
Well V	12	2.7	**10**

Well ID	Nitrate as NO3 (mg/L)	Nitrate as N (mg/L)	Hexavalent Chromium (ug/L)
Well W	2.6	0.6	**14**
Well Z	2.9	0.76	**12**

BOLD values indicate water quality equal to or above current or preexisting maximum contaminant level (MCL) or notification level. State Water Resources Control Board Division of Drinking Water (DDW) primary MCL for Nitrate as N 10 mg/L; Nitrate as NO3 45mg/L; No MCL for Hexavalent Chromium in California yet, however the old MCL was 10 ug/L.

In many of the wells, Hexavalent Chromium (chromium VI, a naturally-occurring metal present in basin sediments) concentrations exceed the outdated primary maximum contaminant level (MCL) of 10 micrograms per liter (ug/L). While chromium VI does not currently have an MCL, total chromium concentrations for all of the wells are well below the MCL of 50 ug/L. Concentrations of nitrate reported as N range from 0 to 6 milligrams per liter (mg/L), below the MCL of 10 mg/L. Nitrate reported as NO3 for the same wells ranges from 1.5 to 26 mg/L – well below the MCL of 45 mg/L.

3.6 Aquifer Yield

An evaluation of potential aquifer recharge requires considering the production capacity of the targeted aquifer to estimate the storage capacity and potential injection rates. Potential injection rates for injection wells can be estimated by assuming half of a given well's production rate or potential yield. This is discussed further in Section 4.3, below. Specific capacity is a typical metric for analyzing a production wells' efficiency and potential yield. Specific capacity is defined as the amount of drawdown measured within a well pumping at a known rate and is expressed as the pumping rate divided by the drawdown. Generally, the specific capacity of a well is a measure of its ability to yield water and can be used to estimate the potential yield of an aquifer when aquifer pumping test data are not available (Ferris, 1963). However, it should be noted that specific capacity is somewhat variable and is affected by the pumping rate, static water level decline, and well inefficiencies (e.g., improper well development and/or clogging of well perforations and aquifer materials from corrosion and/or bacterial infestation).

Pumping parameters for selected water supply wells in the IWA and VSD service areas are presented in Table 3-3 below. The data in the table are those reported on DWR water well driller's reports following construction. As such, these data are most representative of aquifer production potential (not accounting for any potential regional water changes) since they were measured at the time the well was newly constructed.

Table 3-3. Aquifer Yield by Well

Well ID	Active/ Inactive	Screened Aquifer	Static Water Level[1] (ft bgs)	Production[1] (gpm)	Drawdown[1] (ft)	Specific Capacity[1] (gpm/ft)
Well 1B	Active	Upper	33	1,400	15	93.33
Well 1C	Active	Upper/Lower	17	2,700	86	31.40
Well 1E	Inactive	Lower	138	2,871	59	48.66
Well 2C	Active	Lower	-	-	-	-
Well 2D	Active	Lower	47*	2,400	80	30.00
Well 3A	Active	Lower	43*	3,730	43	86.74
Well 3B	Active	Lower	44*	2,900	57	50.88
Well 3C	Active	Lower	48*	3,000	-	-
Well 4A	Active	Lower	50*	2,000	85	23.53
Well 4B	Inactive	Lower	115	2,500	-	-
Well 4C	Active	Lower	123	3,500	23	152.17
Well 13A	Active	Lower	135	2,996	46	65.13
Well 13B	Unknown	Lower	135	2,974	106	28.06
Well AA	Active	Lower	129	3,000	54	55.56
Well BB	Active	Lower	107	3,000	75	40.00
Well S	Active	Lower	131	3,500	34	102.94
Well T	Active	Lower	149	3,000	120	25.00
Well U	Active	Lower	112	3,000	33	90.91
Well V	Active	Lower	147	3,000	27	111.11
Well W	Inactive	Lower	154	3,000	35	85.71
Well X	Pending	Lower	128	-	-	-
Well Y	Pending	Lower	127	3,000	51	58.82
Well Z	Active	Lower	127	3,000	51	58.82

Notes:

See Figure 1 for well locations.

[1] Obtained at time of well construction, reported on DWR log

- Well test data NOT reported on DWR log

* Static water levels at time of test likely not accurate based on a comparison with current water levels

Of the active wells provided by IWA, data from the time of original construction indicate that specific capacity ranged from approximately 31 to 93 gallons per minute per foot (gpm/ft) of drawdown, with instantaneous discharge rates ranging from approximately 1,400 to 2,700 gpm for the Upper Aquifer. The Lower Aquifer, in which more wells are completed, has specific capacity values ranging from approximately 23 to 120 gpm/ft with instantaneous discharge rates ranging from approximately 2,000 to 3,730 gpm. These data suggest that highly permeable aquifer materials are present within 2 miles of the vicinity of the VSD site and that the potential exists for high instantaneous production rates.

4.0 EVALUATING POTENTIAL INDIRECT POTABLE REUSE METHODS

IPR involves using treated wastewater to recharge groundwater and increase groundwater storage in the local groundwater system. IPR projects may be used for long-term storage (banking) or shorter-term recharge and extraction. Both strategies help improve local groundwater storage and supply by increasing water levels and potentially improving groundwater quality in a given aquifer. The purpose of the current investigation is to further understand the geohydrologic conditions under the VSD site with the intent of recommending the most feasible approach (spreading or injection) for IPR. Although there are hydrogeologic data gaps in this initial phase of investigation of the VSD site when addressing the potential feasibility of an IPR project, current data suggest the site is technically feasible. However, additional site and local investigations should include deep borings and geophysical survey lines to verify the distribution of lithologic materials.

4.1 Recharge through Spreading

IPR with recharge through spreading basins involves conveying treated water to engineered surface basins or “ponds” where the treated water percolates into underlying groundwater aquifers. From there it can be extracted or recovered by downgradient pumping wells. While spreading is the simplest, and therefore cheapest, IPR method, it also has its limitations. Spreading basins work best in an area underlain by thick, permeable sediments – typically present in unconfined aquifer conditions. Sufficient storage under the spreading site is also necessary so that recharge will not cause excessive mounding, rejected recharge, or potential surface issues like liquefaction, water logging of shallow soils, or artesian conditions in undesirable areas caused by shallow groundwater levels. Groundwater quality of the receiving water is another important factor to consider. Therefore, the characteristics of near-surface sediments need to be understood and considered along with these other important variables to evaluate IPR recharge through spreading.

The area that has been identified by EVRA to be utilized for spreading treated wastewater is located at the southern end of the VSD site. It is an area of approximately 20 acres where the old biological treatment ponds were located. If this area were to be used for spreading, it would require excavation and disposal of any accumulated solids. In addition, while Hazen and Sawyer (2018) estimated infiltration rates of 1.5 ft per day using approximately 12 acres to infiltrate 5.9 MGD, the cross-section below illustrates that a continuous perched aquifer exists under the VSD site. The two underlying aquitard units are composed of fairly thick interbedded silts and clays up to 70 ft below the VSD site (Lee and Ro, 2005). Studies conducted by Petra (2008, 2009, and 2018) also confirm the presence of lake-bed sediments underlying the area, which are typically fine-grained and generally of very low permeability. These sediments would impede downward percolation from any surface water spreading.

Therefore, while the selected IPR area is large enough to accommodate surface spreading, it is not suitable for surface water recharge to either the Upper Aquifer or, more importantly, the Lower Aquifer due to the fine-grained nature of the underlying sediments of the semi-perched aquifer and interbedded silt and clay layers. Our recommendation to no longer investigate surface spreading at the VSD site is detailed in the next section.

4.2 Hydrogeologic Recommendations for Spreading

Historically, production wells extracted water from the Upper Aquifer, above the aquitard. As groundwater levels dropped from increased pumping, water quality degraded. Subsequent production wells were therefore drilled into the Lower Aquifer, below the aquitard (approximately 550 ft bgs). Currently, almost all of the water produced in this area is pumped from the Lower Aquifer. Consequently, the Lower Aquifer represents the target aquifer for IPR operations.

A brief review of the five borings conducted for the 2005 geotechnical investigation by Lee & at the VSD site indicates that most of the soil material in the upper 70 feet is low permeability clay, organic clay, silt, or organic silt. The inset below is a geologic cross-section constructed from the 2005 boring data. The clay/silt layers appear to be continuous at two separate depths, one from approximately 10 to 20 ft bgs (representing a 10-ft continuous low permeability layer) and the second from approximately 30 to 60 feet bgs (representing a 30-ft continuous low permeability layer). Groundwater encountered in the borings likely represent groundwater levels from the Semi-Perched Aquifer. The lithologic cross-sections on Figures 4 and 5, are regional, but also illustrate the subsurface conditions at the VSD site to 1,000 feet. The shallow fine-grained sediments are likely the Pleistocene to Holocene lakebed deposits of Lake Cahuilla, which were identified by DWR (1964) within 100 ft bgs of much of the Coachella Valley.

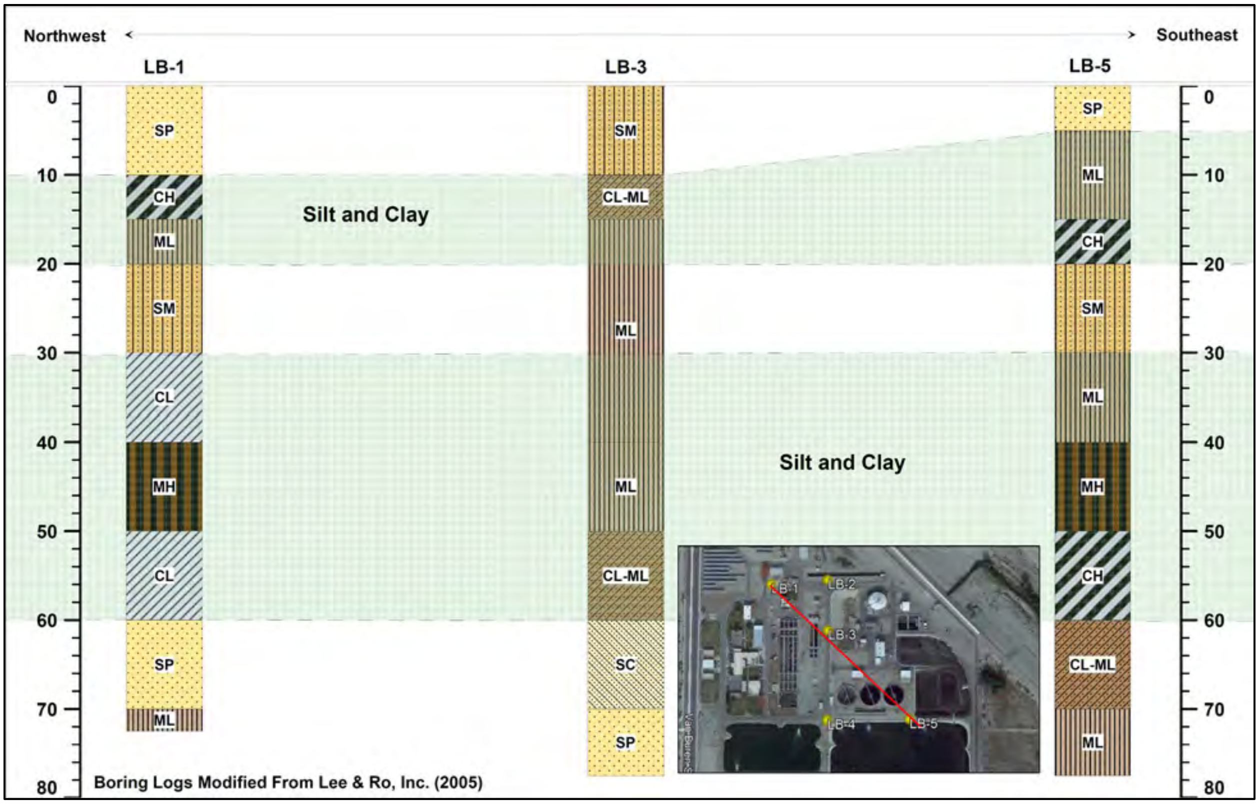

Figure 4-1. Generalized Cross-Section Underlying the VSD Site (LB-1 to LB-5)

These and other previous investigations provide sufficient information regarding the unsuitability of the VSD site for potential IPR through surface spreading. Through review, it was confirmed that due to the fine-grained lakebed deposits near the surface of the VSD site, spreading would not be a viable method of recharge to the Upper or Lower Aquifer systems and should no longer be investigated.

4.3 Recharge through Injection

Injection wells are often utilized where space is an issue or in areas with complex aquifer systems containing two or more hydraulically disconnected aquifers. In particular, injection wells are an appropriate means of recharging water to a desired aquifer below confining (i.e., aquitard) unit(s) – much like the conditions present below the VSD site. Cross-sections A-A’ and B-B’ on Figures 4 and 5, respectively, show the main hydrogeologic units and approximate depth of the Upper and Lower Aquifer systems near the VSD site. In this area, wells have historically been constructed in both the Upper and Lower Aquifers. In Cross-sections A-A’ and B-B’ on Figures 4 and 5 a slight anomaly presented itself when reviewing the well logs and drawing the cross-sections. Well logs B-94 and Coachella 11 appear to show an offset in the aquitard dividing the Upper and Lower Aquifers. This offset (up on the northeast and down on the southwest) may be due to natural subsidence in the valley due to rotational extension from the

San Andreas and San Jacinto Fault Zones. This offset may also be an ancient splay of the San Andreas Fault which has been eroded and recovered with sediments from the Pleistocene and Holocene and appears to be no longer active. Either way, this anomaly will need to be further investigated to either rule out or locate the potential fault. Work completed by Jänecke (2018) suggests that the anomaly may be along the trend of a buried fault located along the eastern Salton Sea. The presence of a fault as a potential barrier to groundwater movement in the lower aquifer could act to constrain the flow of injected water from some downgradient wells. Alternatively, if fault is present and represented by a thick gouge zone, then the injection wells will have to be constructed outside of this zone. Further field investigation is required to evaluate this condition.

Injection wells are often constructed much like production wells. They typically consist of a louvered screen, annular seal, conductor pipe, sounding or gravel tubes, and SCADA system connected to automated injection and backwashing schedules. Due to the nature of injection, well screens tend to foul (clog) fairly quickly compared to pumping wells. Therefore, injection wells are typically constructed with dedicated air valves to bleed undesired entrained air and submersible pumps for routine backwashing to help break up any fouling on the screen. This intermittent backwashing assists well efficiency and lengthens the time interval between well rehabilitations.

It is common practice when estimating the potential rate of injection to halve the rate of extraction for wells screened in the same aquifer. For example, if a production well screened in a given aquifer is able to extract approximately 2,000 gpm, the potential injection rate is approximately 1,000 gpm (2,000 gpm/2 = 1,000 gpm). Recent wells constructed in the Upper and Lower Aquifers had average instantaneous extraction rates of 2,050 and 2,970 gpm. Therefore, it extremely probable that utilizing injection wells in the vicinity of the VSD to recharge the lower aquifer is feasible. However, to further validate this assumption, deep exploratory seismic surveys and boreholes located at or very near the VSD site should be conducted to confirm aquifer depths and the distribution of lithologic materials. This will allow for a better understanding of site-specific hydrogeology directly beneath the VSD site and provide important data to use as a basis for design for IPR injection wells.

5.0 PERMITTING CONSIDERATIONS

As part of this project, Woodard & Curran prepared a memo outlining permitting considerations for recharge projects for EVRA (Appendix A). Multiple permits are needed for the proposed IPR project. The primary permitting agencies for this project will be the State Water Resources Control Board (SWRCB) – Division of Water Rights, the SWRCB – Division of Drinking Water (DDW) and the Colorado River Regional Water Quality Control Board (RWQCB). The Division of Water Rights will need to approve a Wastewater Change Petition to change VSD's existing discharge point prior to the Colorado River RWQCB adopting a permit for the groundwater replenishment project. After the project concept is finalized, it is recommended that EVRA begin engaging with DDW and the RWQCB early to determine if these agencies have any concerns about the project that will need to be addressed in the permitting submittals. The permitting submittals can be developed in tandem with the design of the project. The other major permitting requirement is the completion of the environmental documentation for the California Environmental Quality Act (CEQA). This must be completed to construct the project and to receive Wastewater Change Petition approval and the RWQCB permit for the project.

A detailed permitting schedule showing how these permits fit together is included in Woodard & Curran's report, included here as Appendix A. The inset figure below shows a detailed permitting flowchart describing the steps and time need for an IPR Project (this flowchart can also be found on Attachment A of Appendix A of this report).

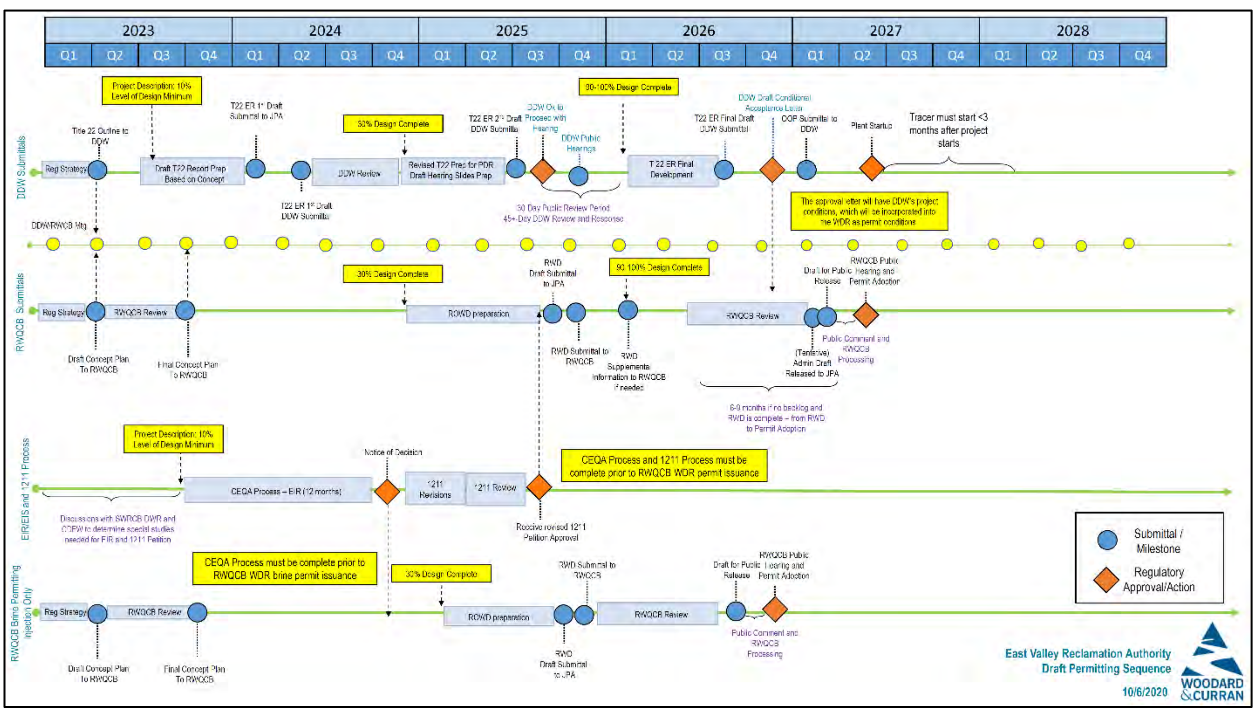

Figure 5-1. Permitting Flowchart

6.0 FINDINGS AND RECOMENDATIONS

The area identified by EVRA to be utilized for IPR activities, at the southern end of the VSD site, is located within a geologically complex area of the Salton Trough which has been subject to compressional and extensional forces from the San Andreas and San Jacinto fault systems. Hydrostratigraphic units below the VSD site include a Semi-Perched Aquifer, Upper Aquifer, Aquitard, and Lower Aquifer.

Previous studies have confirmed the presence of lake-bed sediments underlying the VSD site, which are typically fine-grained and generally of low permeability. These sediments would impede downward percolation from any surface water spreading. Therefore, the use of spreading ponds for IPR is not suitable for this area. Instead, injection wells may provide a viable alternative for recharging treated wastewater into targeted aquifers (i.e., Upper and/or Lower Aquifers).

An anomaly in the geology through Cross-Section B-B' suggests that there may be either subsidence or an ancient fault buried beneath the surface. Additional work (i.e., geophysical survey, and deep boring) is needed to verify site-specific, subsurface hydrogeologic conditions. The data collected from this work could be used to assist in the design and locating potential IPR injection and/ or monitoring wells.

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FIGURES

GEOSCIENCE

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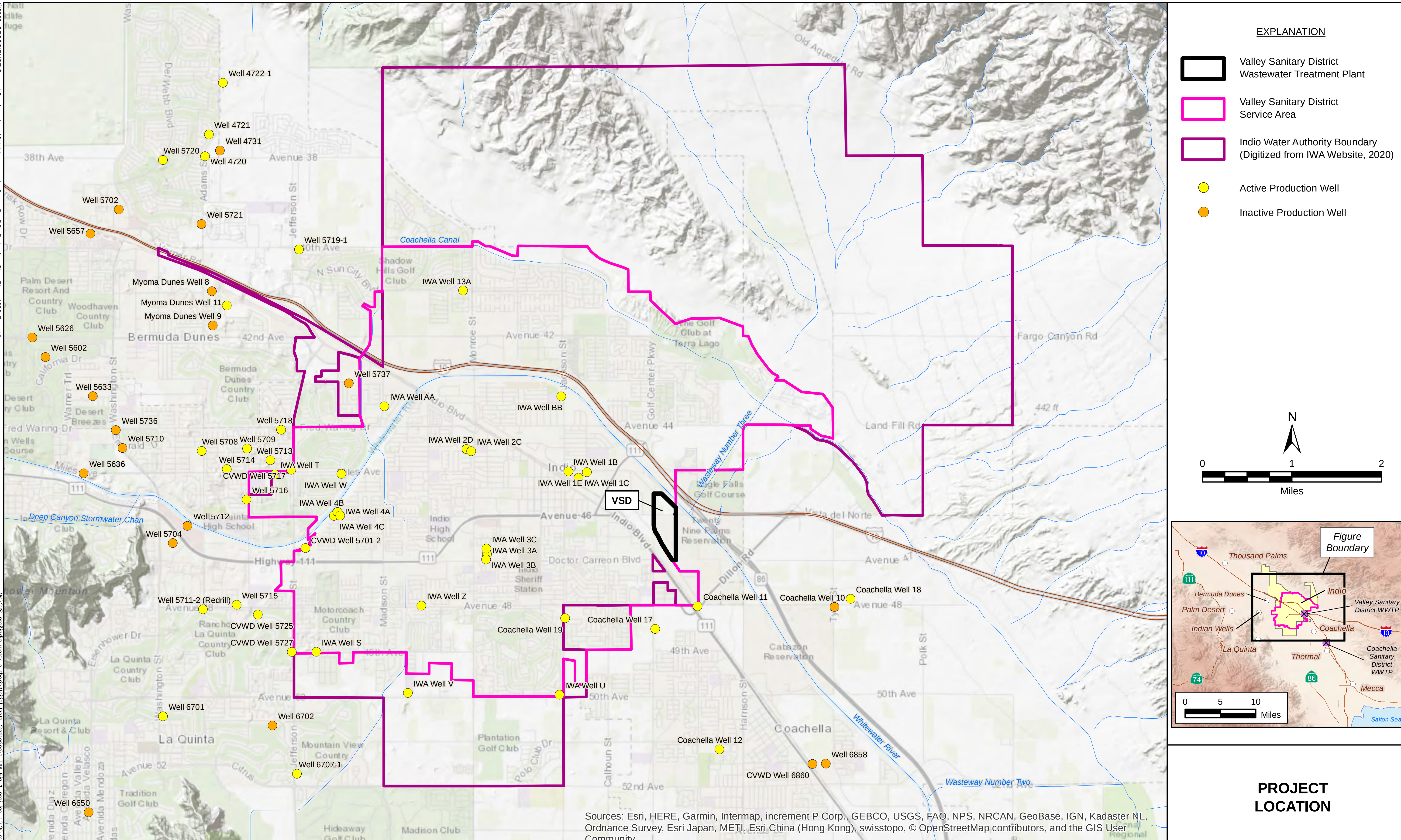

Nov-20

EAST VALLEY RECLAMATION AUTHORITY

FIGURE 1

EVALUATION OF INDIRECT POTABLE REUSE AT THE VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY FOR EAST VALLEY RECLAMATION AUTHORITY

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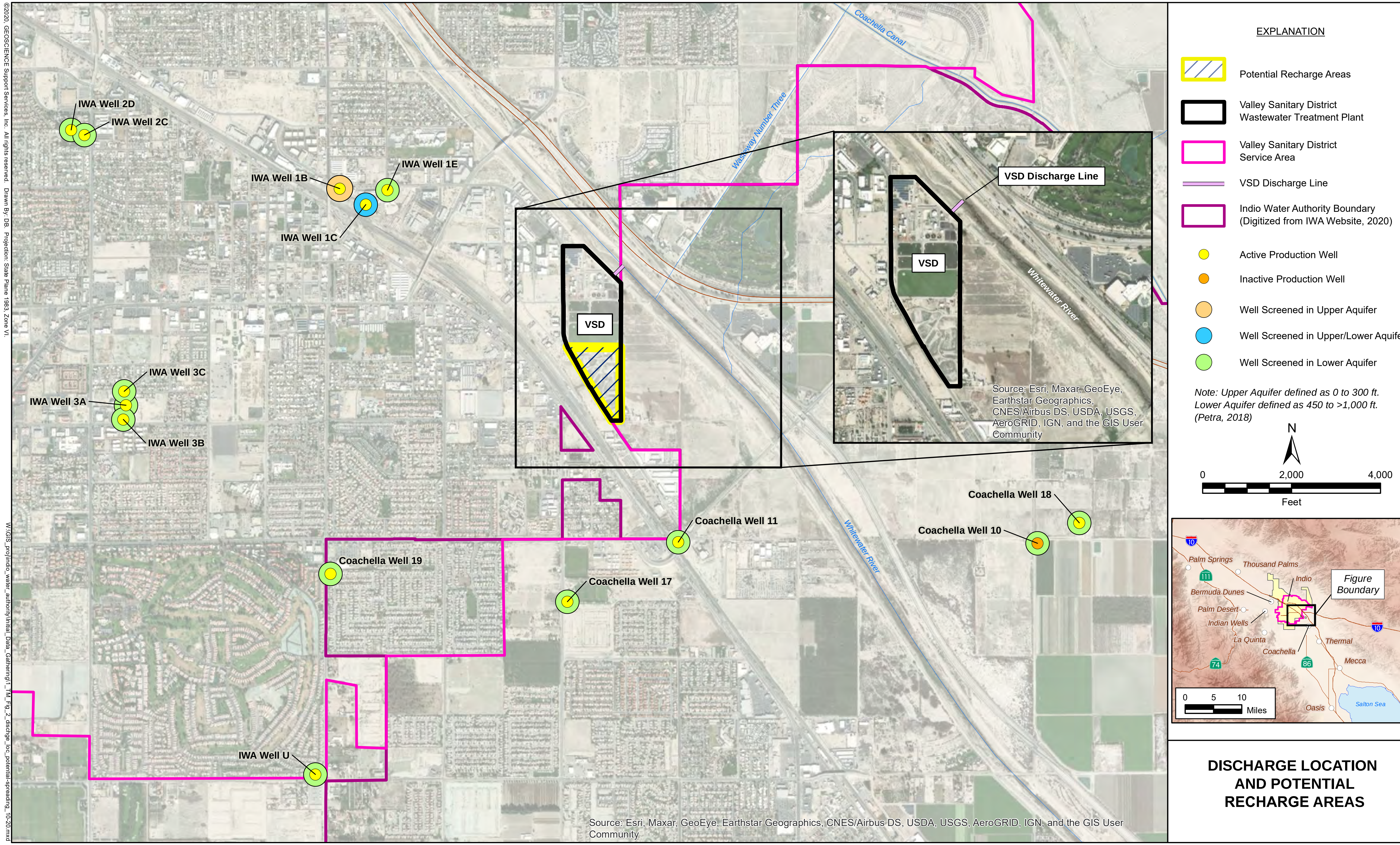

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DISCHARGE LOCATION AND POTENTIAL RECHARGE AREAS

Nov-20

EAST VALLEY RECLAMATION AUTHORITY

FIGURE 2

EVALUATION OF INDIRECT POTABLE REUSE AT THE VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY FOR EAST VALLEY RECLAMATION AUTHORITY

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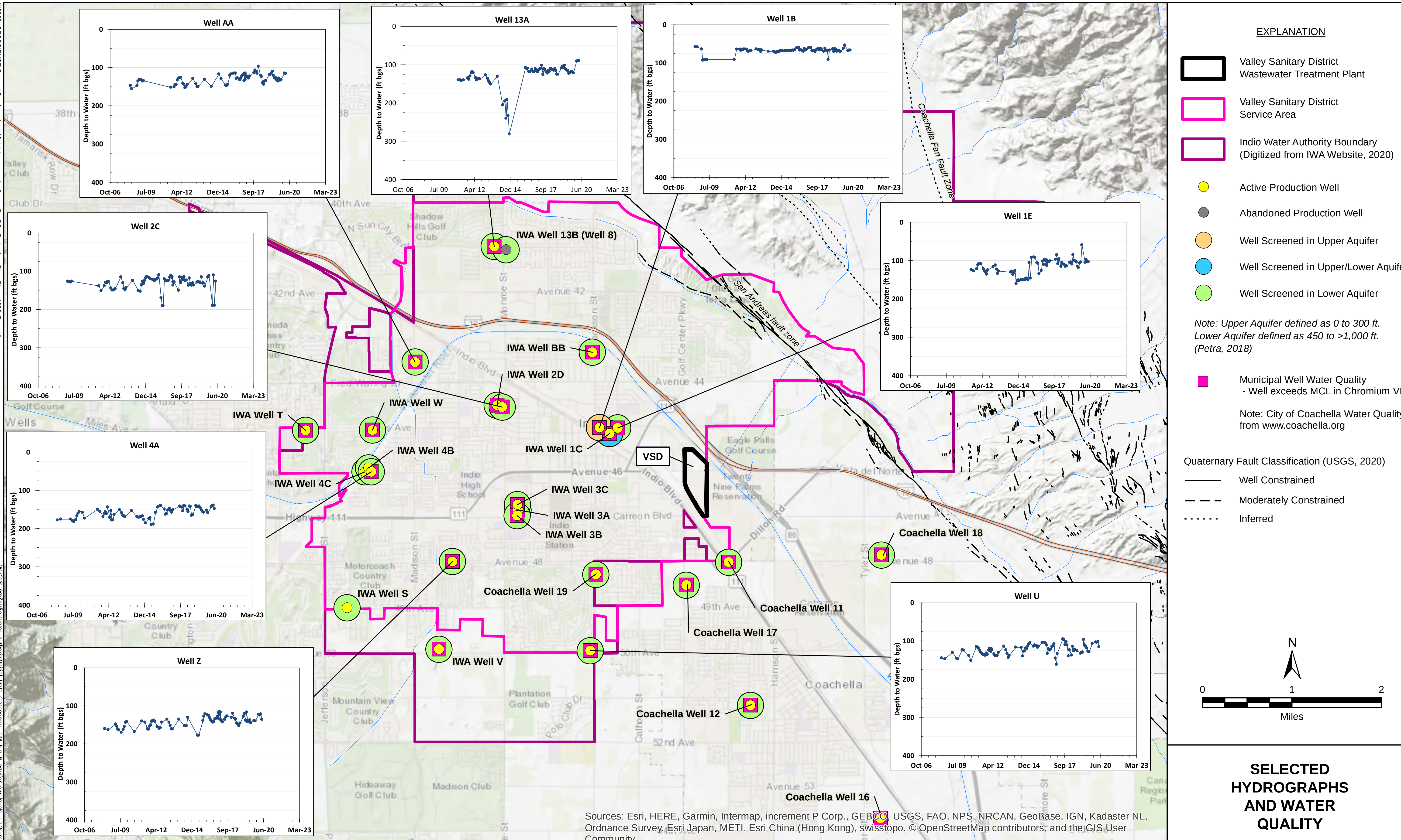

SELECTED HYDROGRAPHS AND WATER QUALITY

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EAST VALLEY RECLAMATION AUTHORITY

FIGURE 3

EVALUATION OF INDIRECT POTABLE REUSE AT THE VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY FOR EAST VALLEY RECLAMATION AUTHORITY

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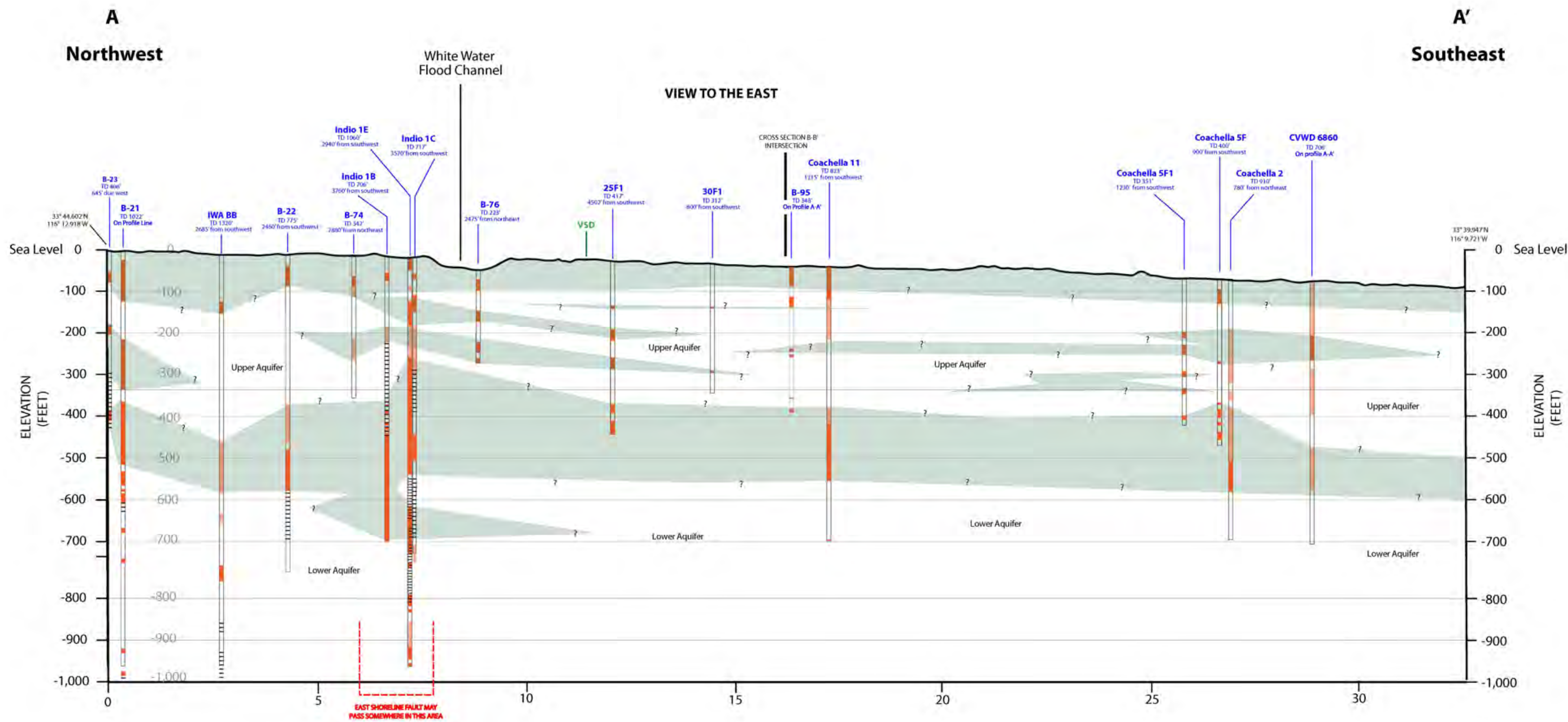


EXPLANATION

Valley Sanitary District Wastewater Treatment Plant

Valley Sanitary District Service Area

Indio Water Authority Boundary (Digitized from IWA Website, 2020)

Active Production Well

Inactive Production Well

SYMBOL DESCRIPTIONS

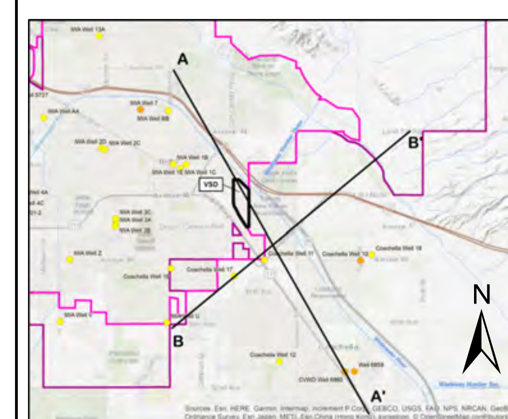
Likely permeable sediments (sands and gravels)

Semipermeable sediments (minor clay or hard formations)

Sediments evaluated to be dominantly impermeable (siltstones, clay, hard formations)

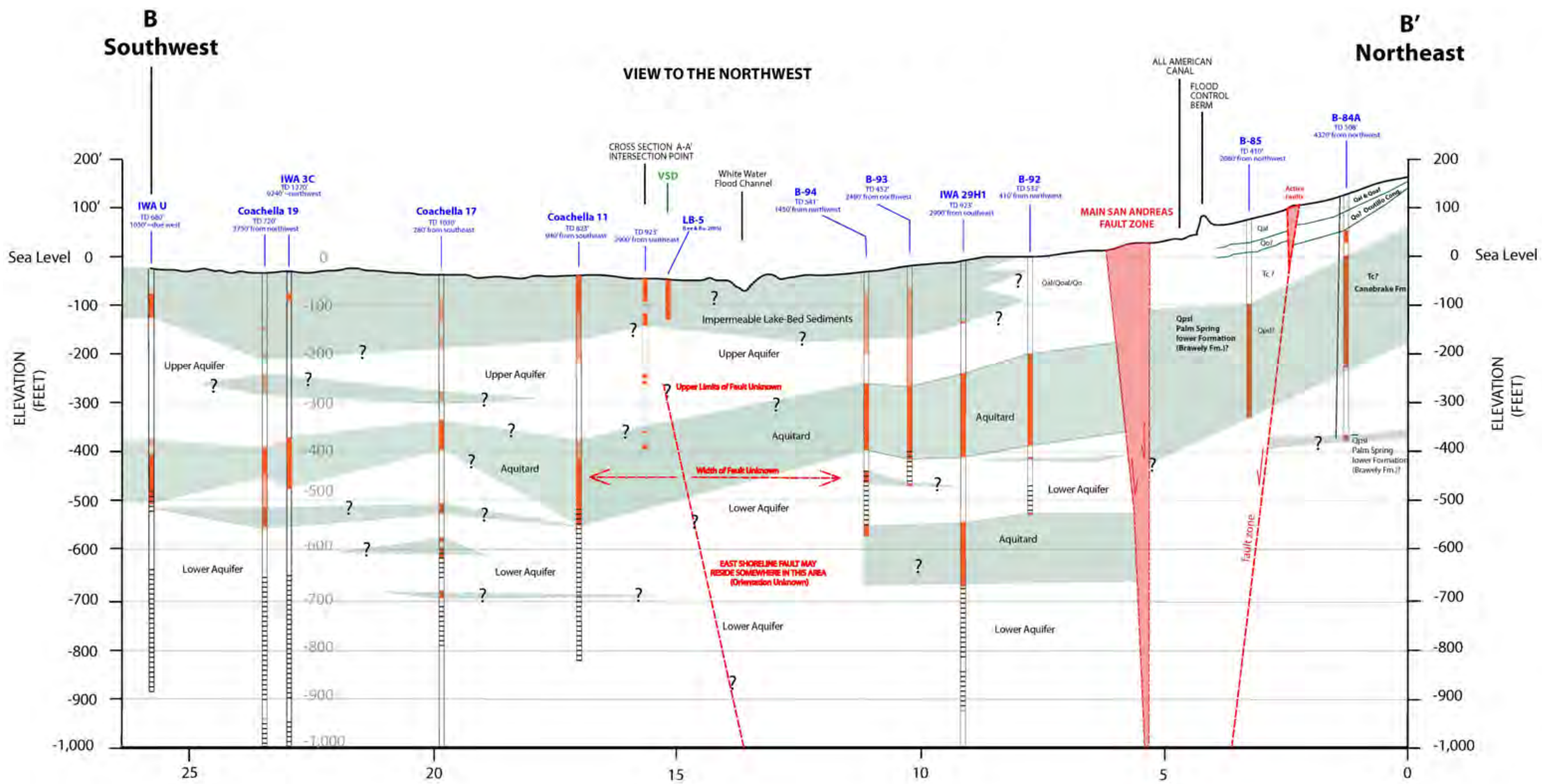
Select well screen intervals

Scale
Horizontal: 1"=1000'
Vertical: 1"=100'



KENNEY GEOSCINECE
JN 754-20
CLIENT: GEOSCIENCE
CONTACT: LOGAN WICKS
DATE: 2020.09.25
DATE MODIFIED: 2020.10.08

CROSS-SECTION A-A'



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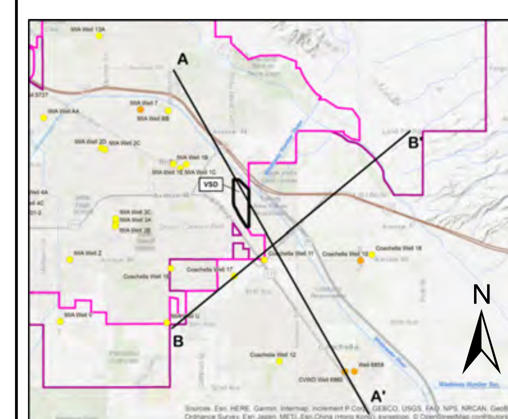

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JN 754-20
CLIENT: GEOSCIENCE
CONTACT: LOGAN WICKS
DATE: 2020.09.25
DATE MODIFIED: 2020.10.08

CROSS-SECTION B-B'

Nov-20

EAST VALLEY RECLAMATION AUTHORITY

FIGURE 5

EVALUATION OF INDIRECT POTABLE REUSE AT THE VALLEY SANITARY DISTRICT WATER RECLAMATION FACILITY FOR EAST VALLEY RECLAMATION AUTHORITY

GEOSCIENCE

APPENDIX A

Permits Required for EVRA's Groundwater Recharge Project

GEOSCIENCE

TECHNICAL MEMORANDUM

TO: Reymundo Trejo, Indio Water Authority & Ron Buchwald, Valley Sanitary District

CC: Logan Wicks, PG, Geoscience Support Services, Inc.
Brian Villalobos, PG, Geoscience Support Services, Inc.

PREPARED BY: Erica Wolski, PE

DATE: November 19, 2020

RE: Permits Required for EVRA's Groundwater Recharge Project

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EXECUTIVE SUMMARY

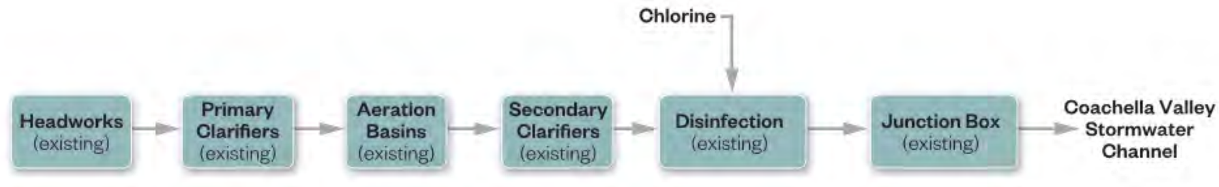
Valley Sanitary District (VSD) and Indio Water Authority (IWA) have formed a Joint Powers Authority (JPA), East Valley Reclamation Authority (EVRA), to explore a potential groundwater replenishment project using treated recycled water. VSD provides wastewater collection and treatment for the City of Indio and portions of the City of Coachella and unincorporated Riverside County. To accomplish this project, multiple permits are needed. The primary permitting agencies for this project will be the State Water Resources Control Board (SWRCB) – Division of Water Rights, the SWRCB – Division of Drinking Water (DDW) and the Colorado River Regional Water Quality Control Board (RWQCB). The Division of Water Rights will need to approve a Wastewater Change Petition to change VSD's existing discharge point prior to the Colorado River RWQCB adopting a permit for the groundwater replenishment project. After the project concept is finalized, it is recommended that EVRA begin engaging with DDW and the RWQCB early to determine if these agencies have any concerns about the project that will need to be addressed in the permitting submittals. The permitting submittals can be developed in tandem with the design of the project. The other major permitting requirement is the completion of the environmental documentation for the California Environmental Quality Act (CEQA). This must be completed to construct the project and to receive Wastewater Change Petition approval and the RWQCB permit for the project. A detailed permitting schedule showing how these permits fit together is included as **Attachment A**. The remaining permits will be required depending on the proposed project and the full list of permits is included in **Table 1**.

1. INTRODUCTION

Valley Sanitary District (VSD) and Indio Water Authority (IWA) have formed a Joint Powers Authority (JPA), East Valley Reclamation Authority (EVRA), to explore a potential groundwater replenishment project using treated recycled water. VSD provides wastewater collection and treatment for the City of Indio and portions of the City of Coachella and unincorporated Riverside County. VSD has an existing wastewater treatment plant with a permitted capacity of 13.5 million gallons per day (MGD) located in Indio, CA. IWA provides domestic water supply to the City of Indio and relies solely on groundwater wells for water supply.

2. EXISTING PERMITS

Since the 1950s, VSD has discharged treated wastewater to the Whitewater River/Coachella Valley Storm Channel (CVSC). VSD's existing wastewater treatment consists of the treatment train shown in **Figure 1** and discharges disinfected secondary effluent to the CVSC. The existing VSD discharge point is at the northeast of VSD's wastewater treatment plant site. The CVSD is not lined and discharges to the CVSC infiltrate into the shallow aquifer. VSD's discharge maintains a wetted area up to five miles downstream. The Coachella Sanitary District's Wastewater Treatment Plant is the next discharger downstream of VSD's plant. VSD technically discharges to a river even though the discharge primarily infiltrates to the groundwater basin. This discharge is regulated under a National Pollutant Discharge Elimination System (NPDES) permit and is therefore required to meet both federal Clean Water Act requirements and any additional state discharge requirements. VSD's NPDES permit was just renewed in 2020 and its discharge is currently regulated under R7-2020-0007.



Source: Figure 6-1 (Hazen, 2018).

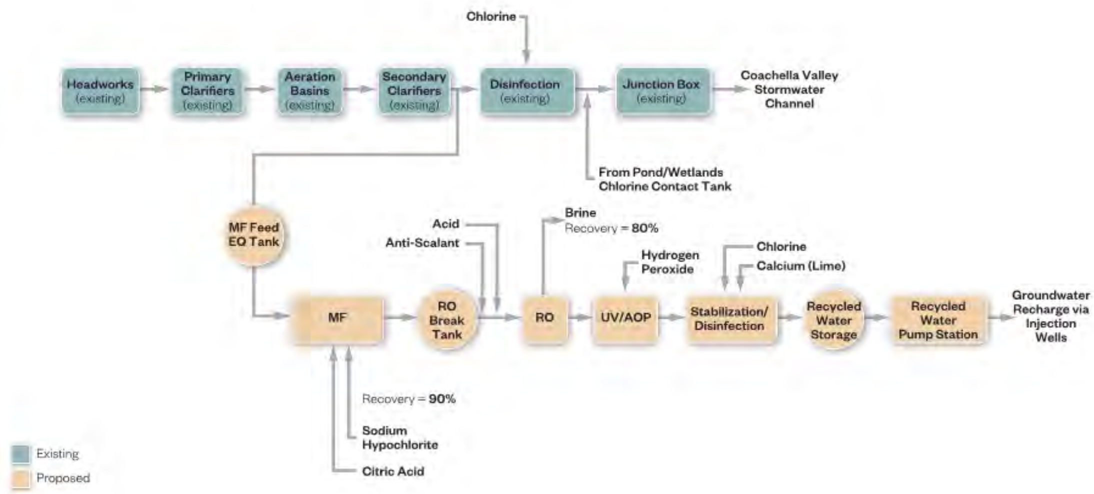
Figure 1. Existing VSD WWTP Treatment Processes

IWA has an existing domestic water treatment and distribution system and is regulated under a Drinking Water Supply Permit and amendments issued by the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW). IWA currently has twenty active groundwater wells in service that are primarily located in the City of Indio, upgradient of the VSD discharge to the groundwater basin.

3. PROPOSED PROJECT

The 2018 *Recycled Water Program Development Feasibility Study* authored by Hazen and Sawyer (Hazen, 2018) for EVRA ranked two groundwater recharge opportunities as the top two preferred projects: 1) spreading tertiary effluent at VSD's existing plant site and 2) injecting tertiary effluent at VSD's existing plant site. Groundwater recharge at other locations and non-potable reuse were considered but ranked lower than these two options.

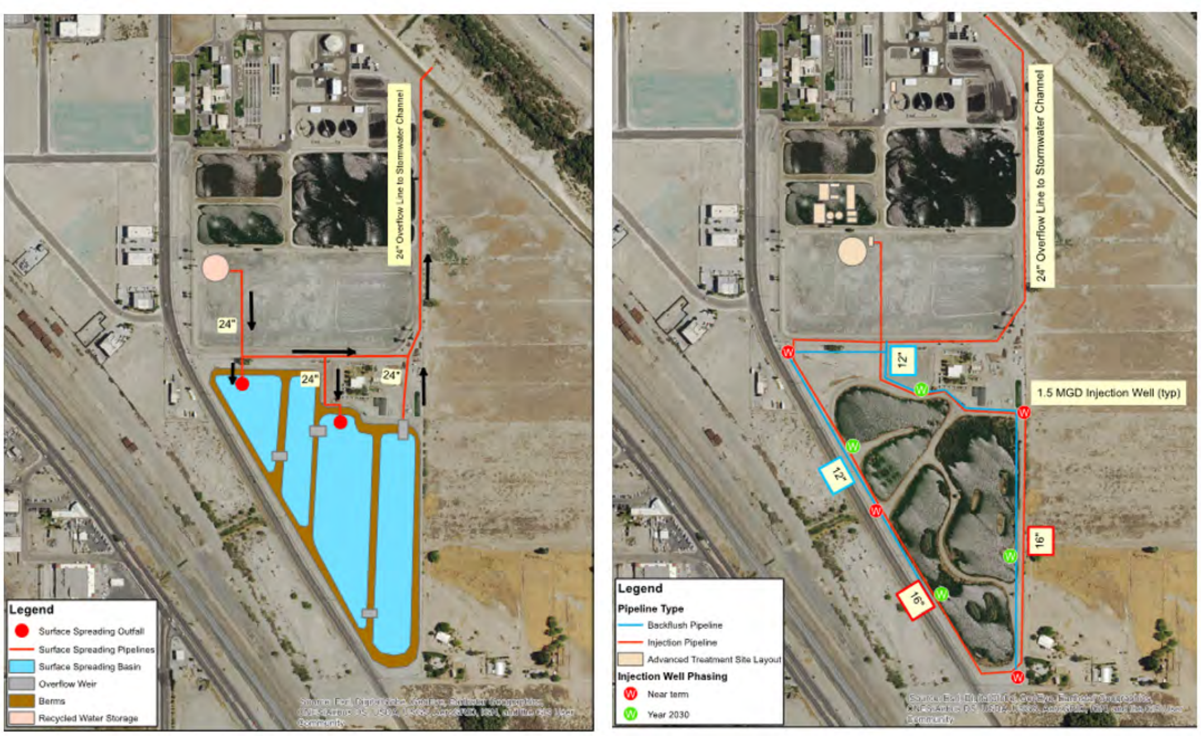
For the spreading option, tertiary treatment consisting of filtration and disinfection to meet the requirements of disinfected tertiary effluent per the water recycling requirements in Title 22 of the California Code of Regulations (CCR) would be constructed at VSD's existing plant site. For the injection option, an advanced treatment plant consisting of membrane filtration (microfiltration or ultrafiltration) followed by reverse osmosis (RO) and an ultraviolet (UV) disinfection / advanced oxidation process (AOP) that meets the requirements of Article 5.2 (Title 22 CCR) for subsurface injection, would be constructed at VSD's existing plant site. An example advanced treatment process is shown in **Figure 2**.



Source: Figure 6-9 (Hazen, 2018).

Figure 2. Proposed Advanced Treatment for Injection at VSD

As shown in **Figure 3**, tertiary effluent would be spread or advanced treated effluent would be injected at the southern end of VSD's existing plant site.



Source: Figures 7-1 and 7-3 (Hazen, 2018).

Figure 3. Proposed Spreading and Injection Siting at VSD

4. PROJECT PARTICIPANTS AND REGULATORY REQUIREMENTS

Project participants include Federal, State, and local agencies. To ensure protection of water quality and public health, the use of recycled water is regulated under several State laws, regulations, and policies. Different State regulatory responsibilities are assigned to the SWRCB DDW and the Colorado River Regional Water Quality Control Board (RWQCB).

4.1 Project Participants

The project will require collaborative efforts between EVRA and several local, State, and Federal agencies. General responsibilities of major agencies are summarized as follows:

East Valley Reclamation Authority (EVRA)

EVRA will be the Project Sponsor with roles as identified in state regulation. Responsibilities include the following:

- Administration, ownership, construction, operation, and maintenance.
- Environmental compliance, permitting, monitoring, and reporting.

California State Water Resources Control Board, Division of Water Rights

- Reviews and approves Orders Approving Change in Place of Use and Quantity of Discharge (Wastewater Change Petitions) per California Water Code Sections 1210 through 1212.

Colorado River Regional Water Quality Control Board (RWQCB)

- Oversees surface water and groundwater quality and establishes water recycling and waste discharge requirements in the Colorado River Region.
- Incorporates recommendations from the SWRCB DDW into permits for water recycling and groundwater recharge projects.
- Issues and enforces water recycling and waste discharge permits and requirements.

California State Water Resources Control Board, Division of Drinking Water (SWRCB DDW)

- Administers California's Drinking Water Program.
- Establishes criteria to protect the public health regarding recycled water production and use.
- Adopts Water Recycling Criteria in the California Code of Regulations, Title 22, including regulations with specific criteria for groundwater recharge projects.
- Holds public hearings on potable reuse projects and makes recommendations to the RWQCB for inclusion into the water recycling requirements, or project permit.

Indio Subbasin Groundwater Sustainability Agencies (GSA)

IWA along with Coachella Valley Water District, Coachella Water Authority, and Desert Water Agency, are each exclusive GSAs that oversee and manage the portions of the Indio Subbasin that overlay each of their respective service areas. As the project will affect portions of the basin outside of IWA's jurisdiction, IWA will need to coordinate with the affected agencies.

4.2 Regulatory Requirements

Implementation of the project will be achieved through approvals and permitting from the Federal, State, and local agencies listed in **Table 1**. **Section 5** contains the state permitting requirements, which make up the bulk of the regulatory hurdles for groundwater recharge projects. **Section 7** discusses federal and local permitting and requirements.

Table 1. Permits and Approvals

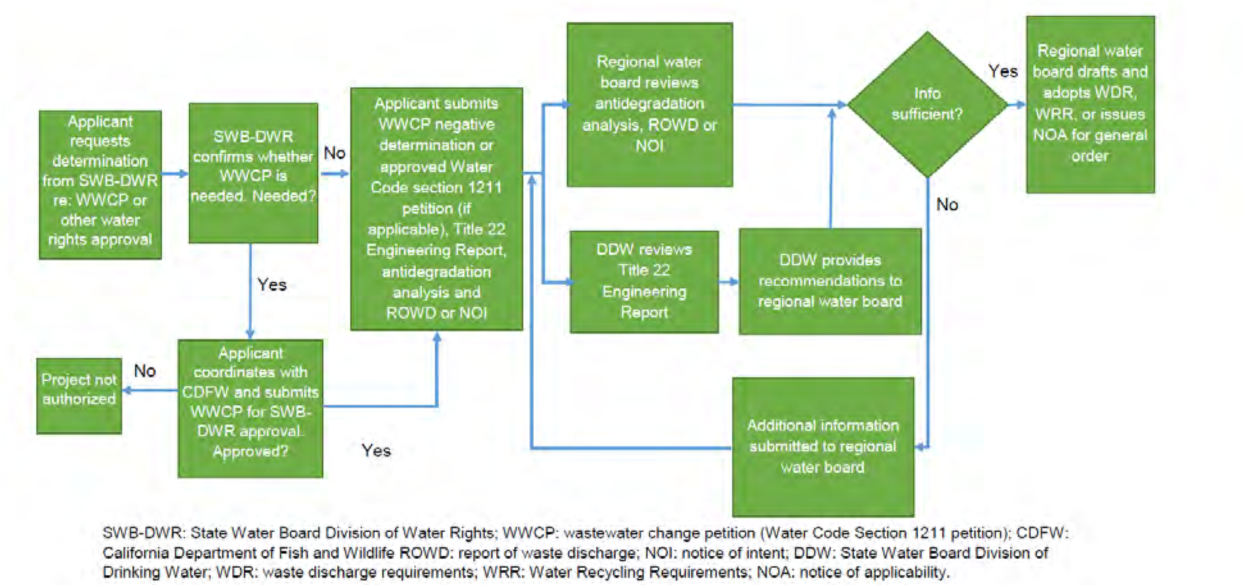
Permit/Approval	Agency
Water Code Section 1211 Wastewater Petition for Change	SWRCB – Division of Water Rights
Review and approval of Engineering Report; Recommendations to RWQCB for Water Recycling Requirements	SWRCB – DDW
Clean Water Act Section 401 General Water Quality Certification and Order	SWRCB – Water Quality Certification and Wetlands Program
Issuance of Waste Discharge Requirements (for recycled water project)	Colorado River RWQCB (Region 7)[1]
Issuance of Waste Discharge Requirements (for brine discharge – for injection only)	
NPDES General Construction Permit/Stormwater Pollution Prevention Plan (SWPPP)	
CA Fish & Game Code Section 1602 Streambed Alteration Agreement	California Department of Fish and Wildlife (CDFW)
CA Endangered Species Act consultation	
Excavation and Dirt Moving Permit	California Division of Occupational Safety & Health (OSHA)
Safety Permit	California Division of Industrial Safety
Conditional Use Permit	City of Indio
Traffic Control Permit/Construction Staging and Traffic Management Plan	
Approval of Construction SWPPP	
Encroachment Permits	
Haul Route Permit	
Well/Boring Installation Permit	Riverside County Department of Environmental Health (DEH)
Oversees hazardous material/CUPA (Certified Unified Program Agency) plans	
Underground Injection Control – Injection Well Registration (Injection only)	United States Environmental Protection Agency (USEPA), Region 9

5. STATE WATER RESOURCES CONTROL BOARD PERMITS

Figure 4 shows a flowchart from the SWRCB's Recycled Water Policy Staff Report (SWRCB 2018b), which details how the SWRCB - Division of Water Rights, SWRCB - DDW, and RWQCB requirements fit together before the RWQCB can issue a water recycling permit. The first step is working with the Division of Water Rights to receive an approved

[1] As the injection wells will be located at the VSD plant site, it is assumed that the injection well backflush can be routed to the head of the advanced treatment plant onsite and that this backflush does not need to be covered under the NPDES for Drinking Water System Discharges (General Order WQ 2014-0194-DWQ).

Water Code Section 1211 petition to change the existing discharge from the Whitewater River/CVSC to the proposed recycled water project. Concurrently, EVRA can submit a Title 22 Engineering Report to DDW and the Report of Waste Discharge and antidegradation analysis to the Colorado River RWQCB for review and approval. After receipt of DDW's comments, the RWQCB will draft the Waste Discharge Requirements (WDR) order for EVRA's recycled water project. Additional information about each of these permitting steps is detailed in the following sections. A more detailed permitting flowchart specific to the EVRA project is included as **Attachment A**.



Source: 2018 SWRCB Staff Report for Recycled Water Policy

Figure 4. SWRCB Recycled Water Project Permitting Process

5.1 Wastewater Change Petition – Section 1211

The California Water Code (CWC) states that the owner of a wastewater treatment plant shall hold the exclusive right to the treated wastewater. Before making a change in the point of discharge, place of use, or purpose of use of treated wastewater, the CWC requires the owner to obtain approval from the SWRCB Division of Water Rights. This is accomplished by filing a Section 1211 Petition for Change for Owners of Wastewater Treatment Plants (Wastewater Change Petition). Before approving the Wastewater Change Petition, the SWRCB must determine that the proposed change will not injure other legal users of water, will not unreasonably harm in-stream uses, and is not contrary to the public interest.

The project would change the place of use from the Whitewater River/CVSC to groundwater recharge and therefore would require a Section 1211 Petition. After filing the petition, the Division of Water Rights will issue a public notice to interested parties and downstream water rights holders. If protests are received, Division of Water Rights will review them to determine if the petition would cause injury to any other lawful use of water downstream of the current discharge. Ideally if protests are received, EVRA and the protestor(s) will collaborate to resolve the protest as it is easier to receive the Wastewater Change Petition if all protest(s) are withdrawn. The Division of Water Rights is also obligated to consider the effect of the proposed change in discharge on public trust resources and to protect those resources where feasible. At a minimum, this requires consultation with the California Department of Fish and Wildlife (CDFW) and may also require a consultation with the United States Fish and Wildlife Service (USFWS).

The Order will not be issued until the California Environmental Quality Act (CEQA) documentation is adopted by EVRA (see **Section 6**). However, it is recommended to consult with the Division of Water Rights earlier in the CEQA process in case special studies are recommended.

<u>Use of New Development Flow to Avoid 1211 Petitions</u>

Wastewater flows generated from new development that have not been previously discharged to a watercourse do not require a Section 1211 wastewater change petition. The Division of Water Rights further clarifies this requirement in its Frequently Asked Questions document by stating *“the quantity of water treated at a facility is not static but may increase over time. If a treatment plant discharges to a stream, but only plans to use increased flow that has never been discharged to the stream for a re-use project, a petition is not required. This only applies to the flow that has not been discharged to the stream.*

EVRA may be able to use wastewater flow from newly developed areas in VSD’s collection area that has not been discharged to the Whitewater River/CVSC to support a small scale project for piloting the advanced treatment plant, spreading basin and/or injection wells until the Division of Water Rights issues its Wastewater Change Petition for the full project.

5.2 Division of Drinking Water – Title 22 Engineering Report

Prior to June 18, 2014, the Water Recycling Criteria in the CCR, Title 22, Division 4, Chapter 3 (CCR, 2014) included narrative requirements for planned groundwater recharge projects. The regulations required that recycled water must be at all times of a quality that fully protects public health and that DDW recommendations would be made on an individual case basis taking into consideration all relevant aspects of each project, including the following factors: treatment provided; effluent quality and quantity; spreading area operations; soil characteristics; hydrogeology; residence time; and distance to withdrawal.

Since 1976, DDW issued numerous draft versions of more detailed groundwater recharge regulations that served as guidance for the six permitted projects in California prior to 2014:

- Water Replenishment District / Los Angeles County Sanitation District - Montebello Forebay Groundwater Recharge Project – surface spreading of tertiary recycled water, stormwater, untreated Colorado River water and State Project water (imported water)
- Inland Empire Utilities Agency - Chino Basin Groundwater Recharge Project – surface spreading of tertiary recycled water and stormwater;
- Alamitos Gap Seawater Intrusion Barrier – injection of full advanced treatment (FAT) recycled water and treated imported water; now using 100% FAT recycled water;
- West Coast Basin Seawater Intrusion Barrier – injection of 100% FAT recycled water in 2013;
- Dominguez Gap Seawater Intrusion Barrier – injection of FAT recycled water and treated imported water; now using 100% FAT recycled water; and
- Orange County Water District - Groundwater Replenishment System (GWRS) – injection and surface spreading of 100% FAT recycled water, expanded to 100 MGD in 2015.

Final groundwater recharge regulations were adopted and went into effect June 18, 2014. The groundwater recharge regulations are organized by type of project: (1) surface application (surface spreading) and (2) subsurface application (injection or vadose zone wells). Since 2014, only injection projects have been successfully permitted and the two existing spreading projects have not yet come into full compliance with the 2014 regulations. With the requirement for a large supply of diluent water (up to 80% for projects upon initiation) and the new notification levels for per- and polyfluoroalkyl substances (PFAS), such as PFOA and PFOA, tertiary spreading of recycled water has become less feasible unless a system is already spreading imported water supply and provides additional treatment beyond tertiary filtration and disinfection.

Project proponents that would like to recharge groundwater are required to complete a Title 22 Engineering Report for the project that addresses how the Title 22 CCR regulations are met. A detailed list of the types of information required to be included in the Title 22 Engineering Report is included in **Table 2.** DDW will review the report and after DDW provides initial approval of the report's completeness, the project proponent is required to hold a Title 22 public hearing. The hearing is required to be noticed and include a minimum 30-day public comment period. The project proponent is required to prepare a draft response to the comments for DDW review and revise the report as necessary to address these comments. However, the majority of project proponents that have held public hearings have found limited public attendance and have received few or no comments that require a change to the report. After the hearing and submittal of the revised report, DDW will generate a Conditional Approval Letter for the project, which will be included in the RWQCB's WDR permit for the discharge. Additional DDW requirements include review and approval of the tracer study protocol and report for determining underground retention time and review and approval of the Operations Optimization Plan, which is recommended to be submitted six months prior to when the project intends to begin operation.

Table 2: Groundwater Recharge Requirements to Address in the Title 22 Engineering Report

Requirement	Surface Spreading	Subsurface Injection
Enhanced Source Control	• Water recycling agency must develop a pretreatment program similar to those required for the federal Clean Water Act but with additional emphasis on constituents that may pass through treatment and could be harmful to human health.	• Same as Spreading.
Minimum Treatment Required	• Disinfected tertiary treatment required (filtration and disinfection that meets the minimum requirements for non-potable recycled water per Title 22) • Due to emerging contaminant issues, such as PFAS, many projects are finding additional treatment such as granular activated carbon (GAC) is needed. • Soil aquifer treatment	• Full advanced treatment (FAT) consisting of reverse osmosis (RO) and ultraviolet (UV) disinfection / advanced oxidation process (AOP). The UV/AOP is designed to meet a minimum of 0.5-log 1,4-dioxane removal or sufficient NDMA removal to meet the notification level, whichever is greater. • Alternative treatment, such as non-RO processes, may be considered and has been permitted in other states but has not been approved yet in California.

Requirement	Surface Spreading	Subsurface Injection
Pathogen Control and Multiple Barrier Requirements	• At least three barriers are required that achieve at least 1-log each with a maximum of 6-log per barrier. • Pathogen removal required: 12/10/10 (V/G/C)[2]	• Same as Spreading.
Total Organic Carbon (TOC) Limits	• TOC_{max} = 0.5 mg/L ÷ RWC • A project with a 20% RWC maximum will have a TOC effluent limit of 2.5 mg/L.	• The plant must produce purified recycled water with a TOC no greater than 0.5 milligrams per liter (mg/L). • Diluent water cannot be used to meet this requirement.
Recycled Municipal Wastewater Contribution (RWC) Limits	• Initial RWC limited to 20%. (Requires 80% diluent water via spreading non-recycled water or use of groundwater underflow) • RWC is limited by effluent TOC (see above). • Diluent water must meet primary drinking water standards, which is problematic if groundwater underflow is proposed as diluent and there are naturally occurring or manmade contaminants present in the groundwater basin.	• May be up to 100% • No diluent required
Chemical Standards	• <10 mg/L total nitrogen • Drinking water primary standards • Action levels for lead and copper • Notification Levels and Recycled Water Policy Chemicals of Emerging Concern (CECs) can be met after soil aquifer treatment.	• Same as Spreading except: o Notification Levels and Recycled Water Policy CECs must be met in the FAT effluent prior to recharge.
Underground retention time	• Can be credited with 1-log per month for virus reduction, no limit on virus credits due to underground retention. • Projects that use tertiary effluent for spreading and retain the effluent underground for at least six months are assumed to achieve a full 10-log reduction of *Giardia* and *Cryptosporidium.* • Spreading projects with less than six months retention time have not yet been successfully permitted due to the lack of *Giardia* and *Cryptosporidium* credits included in typical tertiary filtration and disinfection.	• Can be credited with 1-log per month for virus reduction for a maximum of 6-log. • No credit provided underground for *Giardia* and *Cryptosporidium.*

[2] *12-log enteric virus reduction, 10-log Giardia cyst reduction, 10-log Cryptosporidium oocyst reduction is required from raw sewage to extracted groundwater.*

Requirement	Surface Spreading	Subsurface Injection
Response Retention Time	• Minimum response retention time is two months • However most spreading projects provide at least six months retention in order to obtain *Giardia* and *Cryptosporidium* credits. No spreading projects have been permitted to date with less than six months retention.	• Minimum response retention time is two months. • Typically, an additional process beyond standard FAT such as free chlorine is needed to meet the required 12-log virus reduction.

5.3 RWQCB – Waste Discharge Requirements Permit

EVRA's service area is located within the jurisdiction of the Colorado River RWQCB. The Colorado River RWQCB is one of nine regional boards under the SWRCB and is responsible for regulating recycled water discharges to groundwater and surface water that are subject to state water quality regulations and statutes. The RWQCB's mission is "to preserve, enhance, and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations." Locally, the RWQCB implements policies and regulations, develops long-range plans, issues water recycling and waste discharge permits, and takes enforcement actions against violators of State and Federal environmental regulations.

In order to adopt a WDR permit for a groundwater recharge project, EVRA must submit a Report of Waste Discharge with a technical report describing the project, the required application fee, and completed CEQA documents to the RWQCB. Prior to issuing the WDR permit, DDW must provide a Conditional Approval Letter and the project must have an approved Wastewater Change Petition. The RWQCB will draft the WDR permit and will then typically provide a copy to the applicant for review and comment prior to releasing the draft WDR for public comment. After the public comment period closes, the RWQCB will address comments received and revise the permit (if applicable) prior to bringing the permit to a Board hearing for adoption.

5.3.1 Basin Plan

WDR issued by the Colorado River RWQCB are required to implement applicable State water quality control policies and plans, including water quality objectives and implementation policies established in the Basin Plan (CR-RWQCB, 2019). The Basin Plan designates beneficial uses of surface water and groundwater resources in the watershed and sets water quality objectives that must be attained to protect these beneficial uses and conform to the State's antidegradation policy. Discharges to surface water and/or groundwater must be of sufficient quality to not impact beneficial uses. **Table 3**Table 1 shows the beneficial uses of surface waters downstream of VSD's existing discharge (CVSC and Salton Sea) and the underlying groundwater basin (Coachella Valley Subunit).

Table 3: Beneficial Uses in the Project Area

Beneficial Use	Coachella Valley Storm Water Channel[1]	Salton Sea	Whitewater Hydrologic Unit – Coachella Valley Subunit
Municipal (MUN)			X
Agricultural Supply (AGR)			X
Aquaculture (AQUA)		X	
Freshwater Replenishment (FRSH)	X		
Industrial Service Supply (IND)		P	X
Groundwater Recharge (GWR)			

Beneficial Use	Coachella Valley Storm Water Channel[1]	Salton Sea	Whitewater Hydrologic Unit – Coachella Valley Subunit
Water Contract Recreation (REC1)	X[2]	X	
Non-contact Water Recreation (REC2)	X[2]	X	
Warm Freshwater Habitat (WARM)	X	X	
Cold Freshwater Habitat (COLD)			
Wildlife Habitat (WILD)	X	X	
Hydropower Generation (POW)			
Rare, Threatened or Endangered Species (RARE)	X[3]	X	

Source: Tables 2-3 and 2-5 of CR-RWQCB 2019.

Notes: X = existing use, P = potential use.

1. *Section of perennial flow from approximately Indio to the Salton Sea.*
2. *Unauthorized use.*
3. *Rare, endangered or threatened wildlife exists in or utilizes some of these waterway(s). If the RARE beneficial use may be affected by a water quality control decision, responsibility for substantiation of the existence of rare, endangered, or threatened species on a case-by-case basis is upon the California Department of Fish and Wildlife on its own initiative and/or at the request of the RWQCB; and such substantiation must be provided within a reasonable time frame as approved by the RWQCB.*

The RWQCB has not set numeric Water Quality Objectives for the groundwater basin and instead states:

> *Ideally the Regional Water Board's goal is to maintain the existing water quality of all nondegraded ground water basins. However, in most cases ground water that is pumped generally returns to the basin after use with an increase in mineral concentrations such as total dissolved solids (TDS), nitrate etc., that are picked up by water during its use. Under these circumstances, the Regional Water Board's objective is to minimize the quantities of contaminants reaching any ground water basin. This could be achieved by establishing management practices for major discharges to land. Until the Regional Water Board can complete investigations for the establishment of management practices, the objective will be to maintain the existing water quality where feasible.*

As numeric criteria have not been set, the RWQCB may require that EVRA determine the ambient groundwater quality in the project area and downgradient of the project area and to complete a detailed antidegradation analysis if any of the contaminants present in the treated effluent are anticipated to degrade the existing groundwater quality. If advanced treatment and injection is the chosen alternative, monitoring may need to be completed to determine that the lower salinity water produced by advanced treatment does not mobilize metals, such as arsenic and chromium, in the aquifer.

5.3.2 SWRCB Policies

There are two policies of particular importance with respect to groundwater recharge projects for protection of water quality and human health: (1) antidegradation policies, and (2) the Recycled Water Policy.

Antidegradation Policies

California's antidegradation policies are found in Resolution 68-16, Policy with Respect to Maintaining Higher Quality Waters in California, and Resolution 88-63, Sources of Drinking Water Policy. These resolutions are binding on all State agencies. They apply to both surface waters and groundwaters, protect both existing and potential uses, and are incorporated into RWQCB Basin Plans.

- **Resolution 68-16 (Antidegradation Policy):** The Antidegradation Policy requires that existing high water quality be maintained to the maximum extent possible, but allows lowering of water quality if the change is "consistent with maximum benefit to the people of the state, will not unreasonably effect present and anticipated use of such water (including drinking), and will not result in water quality less than prescribed in policies." The Antidegradation Policy also stipulates that any discharge to existing high quality waters will be required to "meet waste discharge requirements which will result in the best practicable treatment or control of the discharge to ensure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."
- **Resolution 88-63 (Sources of Drinking Water Policy)**: The Sources of Drinking Water Policy designates the municipal and domestic supply (MUN) beneficial use for all surface waters and groundwater except for those: (1) with TDS exceeding 3,000 milligrams per liter (mg/L), (2) with contamination that cannot reasonably be treated for domestic use, (3) where there is insufficient water supply, (4) in systems designed for wastewater collection or conveying or holding agricultural drainage, or (5) regulated as a geothermal energy producing source. Resolution 88-63 addresses only designation of water as drinking water source; it does not establish objectives for constituents that threaten source waters designated as MUN.

Recycled Water Policy

The Recycled Water Policy was adopted by the SWRCB on February 3, 2009 and became effective on May 14, 2009. It was subsequently amended on January 22, 2013 with regard to Contaminants of Emerging Concern (CEC) monitoring with an effective date of April 25, 2013. The Policy was a critical step in creating uniformity in how RWQCBs were individually interpreting and implementing Resolution 68-16 for water recycling projects, including landscape irrigation projects and groundwater recharge projects. In December 2016, the SWRCB adopted Resolution No. 2016-006, updating the Science Advisory Panel's recommendations for CEC monitoring in recycled water and updating the Recycled Water Policy to consider changes since 2013. On December 11, 2018, the SWRCB adopted Resolution No. 2018-0057, amending the Recycled Water Policy. The critical provisions in the Policy are summarized below:

- **Salt Nutrient Management Plans:** The 2009 Recycled Water Policy requires Salt Nutrient Management Plans (SNMPs) to be developed for every groundwater basin/sub-basin by May 2014 (May 2016 with a RWQCB-approved extension). The Coachella Valley SNMP was prepared in 2015. However, the RWQCB has not yet adopted the SNMP and recently provided comments on the SNMP that CVWD, DWA and IWA are working to address.
- **RWQCB Groundwater Requirements:** The Recycled Water Policy does not limit the authority of a RWQCB to include more stringent requirements for groundwater recharge projects to protect designated beneficial uses of groundwater, *provided* that any proposed limitations for the protection of public health may only be imposed following consultation with DDW. The Recycled Water Policy also does not limit the authority of a RWQCB to impose additional requirements for a proposed groundwater recharge of recycled water project that has a substantial adverse effect on the fate and transport of a contaminant plume (for example those caused by industrial contamination or gas stations), or changes the geochemistry of an aquifer thereby causing the dissolution of naturally occurring constituents, such as arsenic, from the geologic formation into groundwater. This provision requires additional assessment of impacts of a groundwater recharge of recycled water project on areas of contamination in a basin and/or if the quality of the water used for recharge (for example low salinity) causes constituents, such as naturally occurring arsenic, to become mobile and impact groundwater.
- **Antidegradation and Assimilative Capacity:** Assimilative capacity is typically defined as the difference between the ambient groundwater concentration and the concomitant groundwater quality objective. By the time EVRA's project is permitted, the Coachella Valley subunit should have an accepted SNMP, and

therefore, 2018 Recycled Water Policy Section 8.2.3 applies: "the antidegradation analysis may be based, in part, on the technical findings of the accepted salt and nutrient management plan as described in 6.2.2."

- **CECs:** As part of the Recycled Water Policy, a Science Advisory Panel was formed to identify a list of CECs for monitoring in recycled water used for groundwater recharge and landscape irrigation. The Panel completed its report in June 2010 and recommended monitoring selected health-based and treatment performance indicator CECs and surrogates for groundwater recharge of recycled water projects. The groundwater recharge monitoring recommendations were directed at surface spreading using tertiary recycled water (specifically monitoring recycled water and groundwater) and injection projects using RO and advanced oxidation processes (AOP) (specifically monitoring recycled water). The Recycled Water Policy was amended by the SWRCB on January 22, 2013 to include the CEC monitoring program and the Office of Administrative Law approved the Amendment on April 25, 2013. The Amendment provides the final list of specific CECs and monitoring frequencies for groundwater recharge projects and procedures for evaluating the data and responding to the results. The requirements for groundwater recharge projects will be incorporated into the permits for existing groundwater recharge projects and will be included as requirements for all future projects. The Panel was reconvened and modifications to the CEC monitoring requirements are included in the 2018 Recycled Water Policy. In addition to revisions to the list of CECs to be monitored, potable reuse projects must also complete bioanalytical screening. As part of the final Groundwater Recharge Regulations, DDW has its own CEC requirements and monitoring locations that must be met in addition to the Recycled Water Policy requirements.

5.4 RWQCB – Waste Discharge Requirements Permit for Brine Discharge

If injection is chosen and therefore an advanced treatment plant that includes reverse osmosis (RO) is required, an evaluation will need to be completed to determine how to handle the brine. If brine is hauled to another location, such as the Inland Empire Brine Line, a permit would not be needed from the RWQCB, however, EVRA would need to purchase capacity and receive a permit from the appropriate local agency. Currently, the Inland Empire Brine Line ends in Yucaipa, CA, which is approximately 60 miles to the west of Indio.

If local brine discharge options were considered, such as brine evaporation ponds or a discharge to the Salton Sea, a permit would be needed from the Colorado RWQCB. Due to the high salinity of the Salton Sea, the RWQCB may allow for brine discharge to the Salton Sea, if the toxic metals, such as selenium are removed prior to discharge. Some Northern California systems are currently studying wetlands for metals reduction in brine discharge prior to discharge to the San Francisco Bay. Depending on the results of those studies, this may be a viable option for EVRA as well.

In order for the RWQCB to adopt a WDR permit for a brine pond or brine discharge, EVRA must submit a Report of Waste Discharge with a technical report describing the project, the required application fee, and completed CEQA documents to the RWQCB. The RWQCB will draft the WDR permit and will then typically provide a copy to the applicant for review and comment prior to releasing the draft WDR for public comment. After the public comment period closes, the RWQCB will address comments received and revise the permit (if applicable) prior to bringing the permit to a Board hearing for adoption. The brine WDR permit can be issued as part of or separately from the groundwater recharge WDR permit.

6. ENVIRONMENTAL COMPLIANCE

6.1 California Environmental Quality Act (CEQA)

EVRA must complete the CEQA requirements prior to issuance of the Wastewater Change Petition and the RWQCB's WDRs for the groundwater recharge project. The CEQA process can be conducted concurrently with the preparation of facility planning/design. Due to the complexity of the project, it is anticipated that an Environmental Impact Report (EIR) would be required for this project.

California Endangered Species Act and Federal Endangered Species Act

Consultation with CDFW may be necessary if State-listed species are potentially impacted by project construction or operation. Consultation with USFWS may be necessary if federally listed species are potentially impacted by project construction or operation. Biological resources will need to be evaluated as part of the environmental compliance process.

The Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan (CVMSHCP) is a regional conservation plan that aims to protect acreage and 27 species in the Coachella Valley. IWA is a local permittee to the CDFW Natural Community Conservation Plan (NCCP) permit for the CVMSHCP and the Coachella Valley Conservation Commission (CVCC) is responsible for implementation of the CVMSHCP. During the CEQA process and Wastewater Change Petition process it is anticipated that EVRA will need to engage with CVCC in addition to CDFW. It is anticipated that some flow may need to be discharged into the Whitewater River/CVSC to maintain riparian habitat that has been created by VSD's existing discharge.

Lake & Streambed Alteration Agreement

A Lake & Streambed Alteration Agreement (LSAA) will be required from CDFW to ensure protection of existing fish and wildlife resources if alternations are made to the Whitewater River/CVSC for the project. The LSAA may include measures or modifications to reduce harmful impacts to fish and wildlife resources from project actions.

6.2 National Environmental Policy Act (NEPA)

If the proposed project seeks federal funding, then EVRA must also satisfy the requirements of the National Environmental Policy Act (NEPA), which although similar to CEQA, has its own unique requirements and typically require longer approval times. A few of the substantive differences between NEPA and CEQA are as follows:

- NEPA generally requires that any cost/benefit analysis prepared for the project be incorporated into or attached to the EIR. Incorporation of cost/benefit information is optional under CEQA unless it constitutes the basis for rejecting an environmentally superior alternative.
- NEPA requires that the project and each of the alternatives be analyzed equally and compared. Under CEQA, the analysis of significant effects of alternatives can be evaluated in less detail than the effects of the proposed project; however, each environmental issue should still be addressed for each alternative to allow for comparison of impacts with the proposed project.
- CEQA requires agencies to implement feasible mitigation measures. CEQA also requires the preparation of a Mitigation Monitoring or Reporting Program.
- The standards of significance under NEPA generally are less sensitive than those under CEQA.
- It is generally the case that the time commitment for a NEPA process involving an EIR will be longer than the CEQA process.

7. MISCELLANEOUS REQUIREMENTS

7.1 Federal Requirements

Groundwater recharge projects are exempt from the Federal Clean Water Act, except when a project involves a surface spreading site that is a Water of the United States (U.S.). For example, if the existing Whitewater River discharge were considered a groundwater recharge project instead of a waste disposal project, the Clean Water Act would still apply as the Whitewater River is a Water of the U.S.

If injection is chosen as the recharge alternative, the injection wells must be registered with the USEPA through its Underground Injection Control (UIC) Program. Other Federal agency approvals could include flood control and potential funding programs.

7.1.1 Underground Injection Control Program

The USEPA classifies groundwater injection wells as "Class V Wells." Before constructing a Class V well, the USEPA requires information to be submitted to the UIC Program, which is administered by USEPA Region 9 in California. The following basic information is required; more may be required by Region 9:

- Name and location of the facility;
- Name and address of a legal contact;
- Owner of the property;
- Nature and type of injection wells, and;
- Operating status of injection wells.

In most cases, Class V wells are "authorized by rule," which means that they may be operated without an UIC Program permit if underground sources of drinking water are not endangered. Since State and local regulations ensure the protection of drinking water sources, a UIC Program permit would not be required. However, the injection wells are required to be registered and that registration can be completed by filling out a form online:

https://www.epa.gov/uic/forms/underground-injection-well-registration-pacific-southwest-region-9

7.2 Other State Requirements

The spreading basin should be constructed in a manner which will avoid triggering the requirements for California Department of Water Resources - Division of Safety of Dams (DSOD) review. Dam heights of less than six feet do not fall under DSOD review. Additional information is provided on DSOD's website:

https://water.ca.gov/Programs/All-Programs/Division-of-Safety-of-Dams/Jurisdictional-Sized-Dams

7.3 County of Riverside Division of Environmental Health – Well Permits

The Riverside County Division of Environmental Health (DEH) will be responsible for issuing permits for drilling the injection wells and monitoring wells. These permits will be obtained on behalf of EVRA by the well drilling contractor.

7.4 City of Indio

The City will be responsible for issuing local permits including a Conditional Use Permit, Building & Safety Plan Check, Traffic Management Plans and Permits, Stormwater Pollution Prevention Plans for Construction, Encroachment Permits, and others. As the majority of the construction will take place within the VSD existing boundary, Encroachment Permits and Traffic Management Plans and Permits may not be needed unless work also occurs outside the plant boundary.

7.5 Coachella Water Authority

DDW requires that the owners of any domestic wells within a 10-year time of travel be notified of the proposed groundwater recharge project. As CWA owns the wells that are directly downgradient of the project and are estimated to be approximately seven to eight years downgradient (Hazen, 2018), EVRA should work with CWA to address any of their concerns during the CEQA and permitting processes. If CWA has significant opposition, it will be difficult for EVRA to receive its Wastewater Change Petition, DDW's conditional approval of the Title 22 Engineering Report and/or the WDR permit from the RWQCB.

7.6 Tribal Coordination

The VSD plant site is adjacent to tribal-owned land. In order to complete a groundwater recharge project, a well control zone, where domestic water wells cannot be drilled or used, must be established. Groundwater monitoring wells must also be installed downstream of the spreading or injection site. The current location of the proposed spreading or injection site on the southern portion of the VSD plant site would result in portions of the well control zone and possible monitoring well sites to be established on tribal land. Therefore, in order to complete the project, EVRA would need to coordinate with the owner(s) of these downstream tribal lands and ensure the tribes are willing to enter an agreement to meet the regulatory requirements for the project.

7.7 Indio Subbasin GSA – Recharge Credits

One of the goals of the current project is to investigate how to obtain recharge credit for both the historical wastewater disposal and future groundwater recharge project. While most of the effluent discharged from VSD to the Whitewater River/CVSC infiltrates, the purpose of the discharge has historically been wastewater disposal and not groundwater recharge. The wastewater infiltrates into the shallow semi-perched aquifer, as shown in **Figure 5**, and is primarily prevented from reaching the lower aquifers, from which most agencies draw groundwater for domestic use.

Source: GEOSCIENCE Support Services, Inc.

Figure 5. Location of VSD Discharge Compared to Semi-Perched Aquifer

In order to receive recharge credits for the historical discharge, it is anticipated that the other GSAs would request EVRA to demonstrate that the water discharged to the semi-perched aquifer has been beneficially used by downstream farmers or others or provided a beneficial effect on the lower aquifers and was not discharged to the Salton Sea without a direct beneficial use.

8. REFERENCES

Colorado River Regional Water Quality Control Board (CR-RWQCB), 2019. *Water Quality Control Plan for the Colorado River Basin Region*. January 2019. Accessed online at: https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/docs/2020/rb7bp_e2019.pdf

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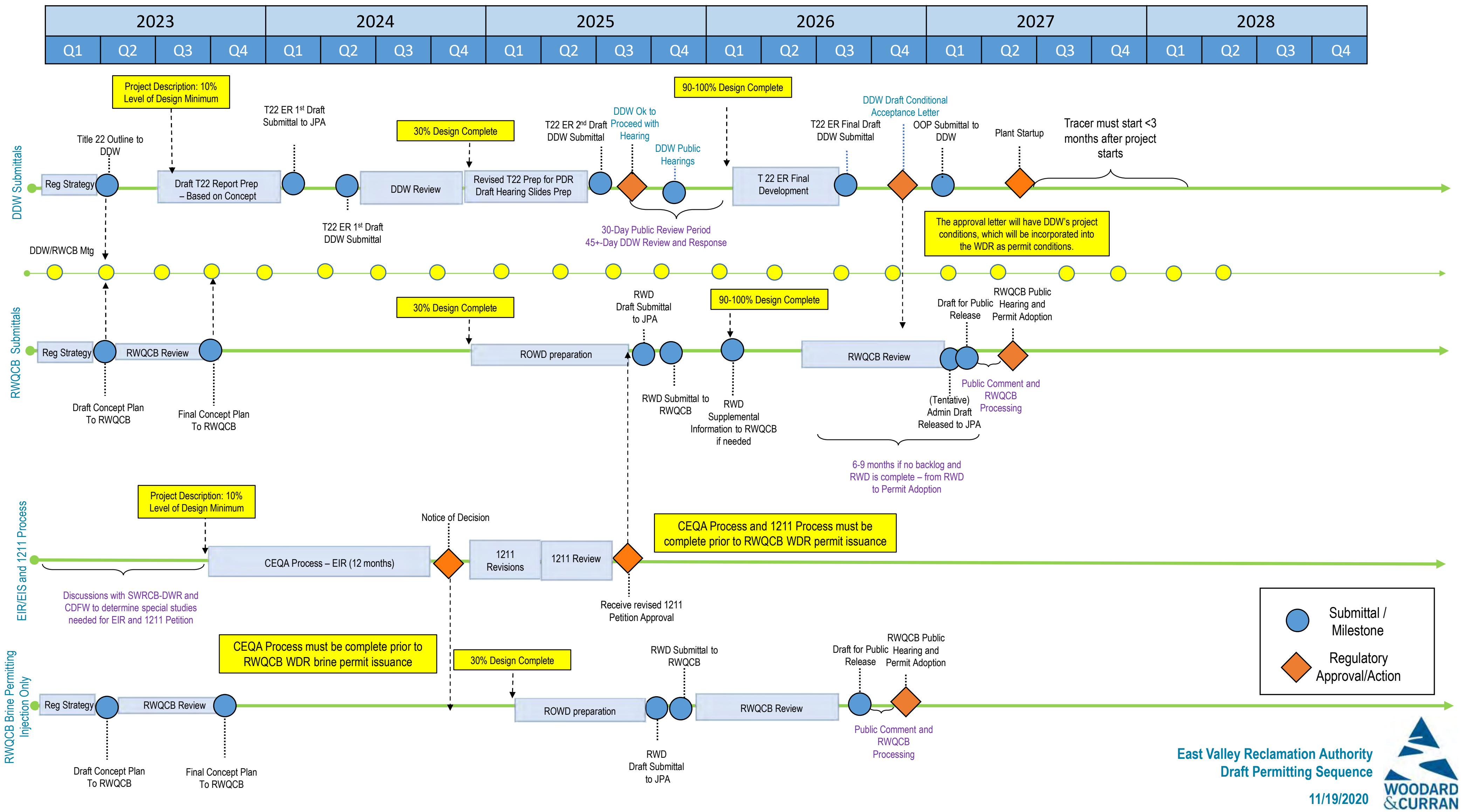
SWRCB, 2018b. "Final Staff Report with Substitute Environmental Documentation - Amendment to the Water Quality Control Policy for Recycled Water". 2018, Accessed online at: https://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/docs/2018/121118_7_final_staff_report.pdf

ATTACHMENT A – DETAILED PERMITTING FLOWCHART


2023
2024
2025
2026
2027
2028
Q1
Q2
Q3
Q4
DDW Submittals
Project Description: 10% Level of Design Minimum
Title 22 Outline to DDW
Reg Strategy
Draft T22 Report Prep – Based on Concept
T22 ER 1st Draft Submittal to JPA
T22 ER 1st Draft DDW Submittal
30% Design Complete
DDW Review
Revised T22 Prep for PDR Draft Hearing Slides Prep
T22 ER 2nd Draft DDW Submittal
DDW Ok to Proceed with Hearing
DDW Public Hearings
30-Day Public Review Period
45+-Day DDW Review and Response
90-100% Design Complete
T 22 ER Final Development
T22 ER Final Draft DDW Submittal
DDW Draft Conditional Acceptance Letter
OOP Submittal to DDW
Plant Startup
Tracer must start <3 months after project starts
The approval letter will have DDW's project conditions, which will be incorporated into the WDR as permit conditions.
DDW/RWCB Mtg
RWQCB Submittals
Reg Strategy
RWQCB Review
Draft Concept Plan To RWQCB
Final Concept Plan To RWQCB
30% Design Complete
ROWD preparation
RWD Draft Submittal to JPA
RWD Submittal to RWQCB
90-100% Design Complete
RWD Supplemental Information to RWQCB if needed
RWQCB Review
Draft for Public Release
RWQCB Public Hearing and Permit Adoption
Public Comment and RWQCB Processing
(Tentative) Admin Draft Released to JPA
6-9 months if no backlog and RWD is complete – from RWD to Permit Adoption
EIR/EIS and 1211 Process
Project Description: 10% Level of Design Minimum
CEQA Process – EIR (12 months)
Notice of Decision
1211 Revisions
1211 Review
Receive revised 1211 Petition Approval
CEQA Process and 1211 Process must be complete prior to RWQCB WDR permit issuance
Discussions with SWRCB-DWR and CDFW to determine special studies needed for EIR and 1211 Petition
RWQCB Brine Permitting Injection Only
CEQA Process must be complete prior to RWQCB WDR brine permit issuance
Reg Strategy
RWQCB Review
Draft Concept Plan To RWQCB
Final Concept Plan To RWQCB
30% Design Complete
ROWD preparation
RWD Submittal to RWQCB
RWD Draft Submittal to JPA
RWQCB Review
Draft for Public Release
RWQCB Public Hearing and Permit Adoption
Public Comment and RWQCB Processing
Submittal / Milestone
Regulatory Approval/Action
East Valley Reclamation Authority
Draft Permitting Sequence
11/19/2020
WOODARD &CURRAN

GEOSCIENCE Support Services, Inc. | P (909) 451-6650 | F (909) 451-6638

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APPENDIX B

Atlas: Geophysical Study Valley Sanitary District Water Reclamation Facility

GEOSCIENCE

GEOPHYSICAL STUDY

VALLEY SANITARY DISTRICT
WATER RECLAMATION FACILITY

Indio, California

PREPARED FOR:

GeoScience Support Services, Inc.
620 Arrow Highway, Suite 2000
La Verne, CA 91750

PREPARED BY:

Atlas Technical Consultants, LLC
6280 Riverdale Street
San Diego, CA 92120

February 26, 2021

ATLAS

6280 Riverdale Street
San Diego, CA 92120
(877) 215-4321 | oneatlas.com

February 26, 2021

Atlas No. 121033SWG
Report No. 1

Mr. Logan Wicks
GeoScience Support Services, Inc.
620 Arrow Highway, Suite 2000
La Verne, CA 91750

Subject: **Geophysical Study**
Valley Sanitary District Water Reclamation Facility
Indio, California

Dear Mr. Wicks:

In accordance with your authorization, Atlas Technical Consultants (Atlas) performed a geophysical study pertaining to the Valley Sanitary District (VSD) Water Reclamation Facility project located in Indio, California. Specifically, our study included evaluating the presence of faulting at the project site through the collection of seismic reflection data. The field work was conducted on January 27 to 29, and February 1, 2, 4, 5, 8 and 9, 2021. This data report presents our survey methodology, equipment used, analysis, and results.

If you have any questions, please call us at (619) 280-4321.

Respectfully submitted,
Atlas Technical Consultants, LLC

Eric Carlson
Project Geologist/Geophysicist

Hans van de Vrugt, C.E.G., P.Gp.
Principal Geologist/Geophysicist

HV:ERC:hv:ds

Distribution: loganwicks@geoscience-water.com

CONTENTS

FIGURES

1. INTRODUCTION

In accordance with your authorization, Atlas Technical Consultants (Atlas) performed a geophysical study pertaining to the Valley Sanitary District (VSD) Water Reclamation Facility project located in Indio, California (Figure 1). Specifically, our study included evaluating the presence of faulting at the project site through the collection of seismic reflection data. The field work was conducted on January 27 to 29, and February 1, 2, 4, 5, 8 and 9, 2021. This data report presents our survey methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Review of background project information including maps provided by your office.
- Conducting two seismic reflection lines (SL-1 and SL-2) across preselected portions of the study area.
- Compiling and analyzing the data collected.
- Preparing this illustrated data report presenting our findings and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project study area is located between Highway 111 and 86 and between the VSD Water Reclamation Facility and Dillon Road in Indio, California (Figure 1). The line locations, which were selected by your office (see Figures 2a and 2b), are located along a portion of Dillon Road and along the eastern property boundary of the VSD Water Reclamation Facility. The areas along the lines are generally flat although some slight terrain changes occur along SL-2. Figures 2a, 2b, 3a and 3b depict the general site conditions in the study areas.

Based on our discussions with you, it is our understanding that the East Shoreline Fault may cross beneath or near the VSD Water Reclamation Facility. It is our understanding that your office is conducting a hydrogeologic evaluation of the area including the siting of an exploratory boring. The results of our study may be used in the siting of the boring.

4. GEOPHYSICAL INSTRUMENTATION AND APPLICATIONS

Our evaluation included the assessing the presence of faulting at the project site through the collection of seismic reflection data. The seismic reflection method uses body waves which are generated, typically at the surface, and then recorded using an array of vertical component geophones (receivers). When the propagating wave encounters a change in acoustic impedance (impedance is equal to the product of a materials density and velocity) some of the wave energy is reflected back to the surface and detected by the geophones and recorded with a data logging instrument (seismograph). During the acquisition of seismic reflection data, the seismic waves recorded from each geophone are gathered into groups that have a common source point (source record). The individual traces within the source records are subsequently regrouped into gathers that have the midpoint between their source and receiver locations in common (termed common-midpoint [CMP] or common-depth-point [CDP] gathers). The differences in times of arrivals at variable source points to geophone distances along reflection paths are termed “moveout” and are hyperbolic (if reflecting geologic strata dips and source-receiver offsets distances are not too large). Moveout depends upon velocity, dip (to a lesser extent), and offset distance and decreases with increased reflection time.

Once the seismic traces have been grouped (sorted) into CDP gathers, analyses of the moveout of reflections within the dataset provides velocities that are used to flatten the hyperbolic moveout on adjacent traces to a common two-way travel time (time it takes seismic energy to travel from a point on the surface to a reflector and back to the same point on the surface). These correction velocities consider the approximate root-mean-square (rms) velocities of all the overlying layers, and the moveout correction is termed normal moveout or NMO. Corrected traces can be summed horizontally, or CDP stacked, to attenuate random effects and non-primary reflection NMO from other wave types (e.g., multiple reflections, surface waves, refractions, diffractions, etc.), and to increase the signal-to-noise (S/N) ratio. The amount of horizontal summing, or CDP fold, is dependent upon the number of seismograph channels (i.e., number of geophones), and the location and number of source points. Each CDP gather then becomes one stacked trace with reflected energy at two-way travel time. A seismic reflection section consists of stacked CDP gathers along the length of the line.

Signals can be enhanced through vertical stacking, which involves repeated source impacts at the same point into the same set of geophones. For each source point the stacked data are recorded into the same seismic data file and theoretically the seismic signal arrives at the same time from each impact, and thus is enhanced, while noise is random and tends to be reduced or canceled.

The quality of seismic data can be adversely affected by spurious vibrations from nearby vehicular or aircraft traffic, machinery, or wind. If the seismic noise sources are sporadic, acquisition can be timed to when the noise is at a minimum. Under conditions of constant noise, the number of stacks can be increased, or at last resort filtering can be applied.

The seismic reflection data for our study were acquired along two linear geophone spreads (SL-1 and SL-2) using five Geometrics Geode signal enhancing seismographs and 120, 30-Hz vertical component geophones. The seismic source (shot) consisted of impacting an aluminum plate with a 20-pound sledgehammer. Shots were conducted between each geophone pair along the array and off the beginning and terminating ends (off-end shots) of the geophone spreads. The geophones were spaced 10 feet apart for an array length of 1,190 feet. However, a roll along method was conducted whereby shots were conducted along the first 72 geophones and then the first 24 geophones were moved to the far end of the line. Shots were then conducted for the next 24 geophones (initial numbers 73 through 96) and again the first 24 geophones were moved to the far end of the line. This occurred six times for SL-1 and seven times for SL-2, resulting in linear arrays of 2,630 feet and 2,870 feet long, respectively.

The shot data were independently acquired five times at each source point. Only data of relatively good quality were vertically stacked (i.e., the records at each source point were stacked together) during processing although for most source points that included each record. Each geophone location and elevation along the line were recorded. Substantial noise from nearby roadway and highway traffic effected the data quality. In addition, the loose nature of the surface soils resulted in significant attenuation of the signal. Despite these limitations, data of fair to good quality was obtained.

The collected reflection seismic data were processed by Columbia Geophysical, Centennial, Colorado. Columbia Geophysical's UNIX workstation-based ProMAX reflection seismic software package was used to process the data and offered the opportunity to perform extensive testing in a short period of time.

The seismic data processing sequence applied is as follows (** = testing steps):

1. Format conversion from SEG2 to SEG-Y
2. Geometry definition and application
3. Trace editing
4. ***Spectral analysis and filter analysis to determine frequency range*
5. ***First break picking and refraction statics calculation*
6. Refraction statics calculation: datum = 0 feet, V_W = 1,800 ft/s
7. Gain recovery and spherical divergence correction
8. ***Deconvolution (testing)*
9. Surface consistent spiking deconvolution
10. Zero phase spectral whitening: 10-15-60-80 Hz range
11. Long gate trace balance
12. Common-Depth-Point (CDP) sort
13. Interactive velocity analysis
14. ***First break mute analysis*
15. Preliminary brute stack with datum statics and mutes
16. Surface consistent residual autostatics
17. Interactive velocity analysis with autostatics applied
18. Q.C. of shot records and CDP gathers
19. Normal moveout (NMO) corrections
20. ***Final first break mute analysis*
21. Final mute application
22. CDP stack
23. ***Spectral analysis and filter testing on unfiltered final stack*
24. Bandpass filter application (10-15-55-65 Hz), 0 to 2000 milliseconds (ms)
25. FX noise attenuation
26. Time variant scaling
27. SEG-Y digital output.

Spectral analyses and filter tests are conducted on individual records in order to determine the quality of the data, the amount of information present, and to design a preliminary data processing flow. Elevation statics were used to determine surface consistent residual statics that were applied after interactive velocity analysis. Statics are corrections applied to seismic data to compensate for the effects of variations in elevation, weathering thickness, weathering velocity and reference to a datum. The objective is to determine the reflection arrival times which would have been observed if all measurements had been made on a (usually) flat plane with no weathering or low velocity material present. Surface consistent means that the statics take into account time delays from both source and geophone locations.

Normal moveout (NMO) as described above is the variation of reflection arrival time because of different source point to geophone distances. To determine the NMO correction, velocity analyses of the CDP gathers were conducted by stacking several velocities and choosing those velocities where the coherency of the NMO for selected reflectors is maximized. These velocities are further refined via narrow and/or full-line CDP gather panel analyses to arrive at the final stacking velocities along the lines. The first-break mute excludes traces that are dominated by refraction arrivals or contain frequencies after NMO correction that are appreciably lower than the other surrounding traces.

In filter testing, narrow bandpass filters were applied to the data to determine the optimum frequency filtering interval(s) that can be used on the data to enhance any possible reflections and reduce noise. For the processing flow used in this project (and typically for most seismic data processing), the data are bandpass filtered after CDP stacking.

5. RESULTS AND CONCLUSIONS

As previously discussed, the purpose of our geophysical study was to assess the presence of faulting within the study area through the collection of seismic reflection data along two preselected line locations. The reflection results are presented in Figures 4a and 4b as a stratigraphy model comprised of numerous continuous and discontinuous reflectors. Selected well-defined reflectors or “Marker Beds” and zones evident in the profiles were highlighted and are shown in Figures 5a and 5b. The identified Marker Beds are subjectively considered more consistent and generally stronger, but other reflectors are also present because of the high-resolution nature of the data. It should be noted that the data near the beginning and the end of the sections are generally incoherent because the CDP fold is low near the ends of the line. Consequently, interpretations of the sections near the ends of lines are questionable or not possible. Please note that the reflection profile vertical scales are two-way travel time (TWTT) in milliseconds and that absent specific subsurface velocity information, an accurate depth scale is not provided. For rough estimating purposes only, the two-way travel time multiplied by 1.5 approximates the near surface depth in feet. This multiplier increases with depth and increased velocity.

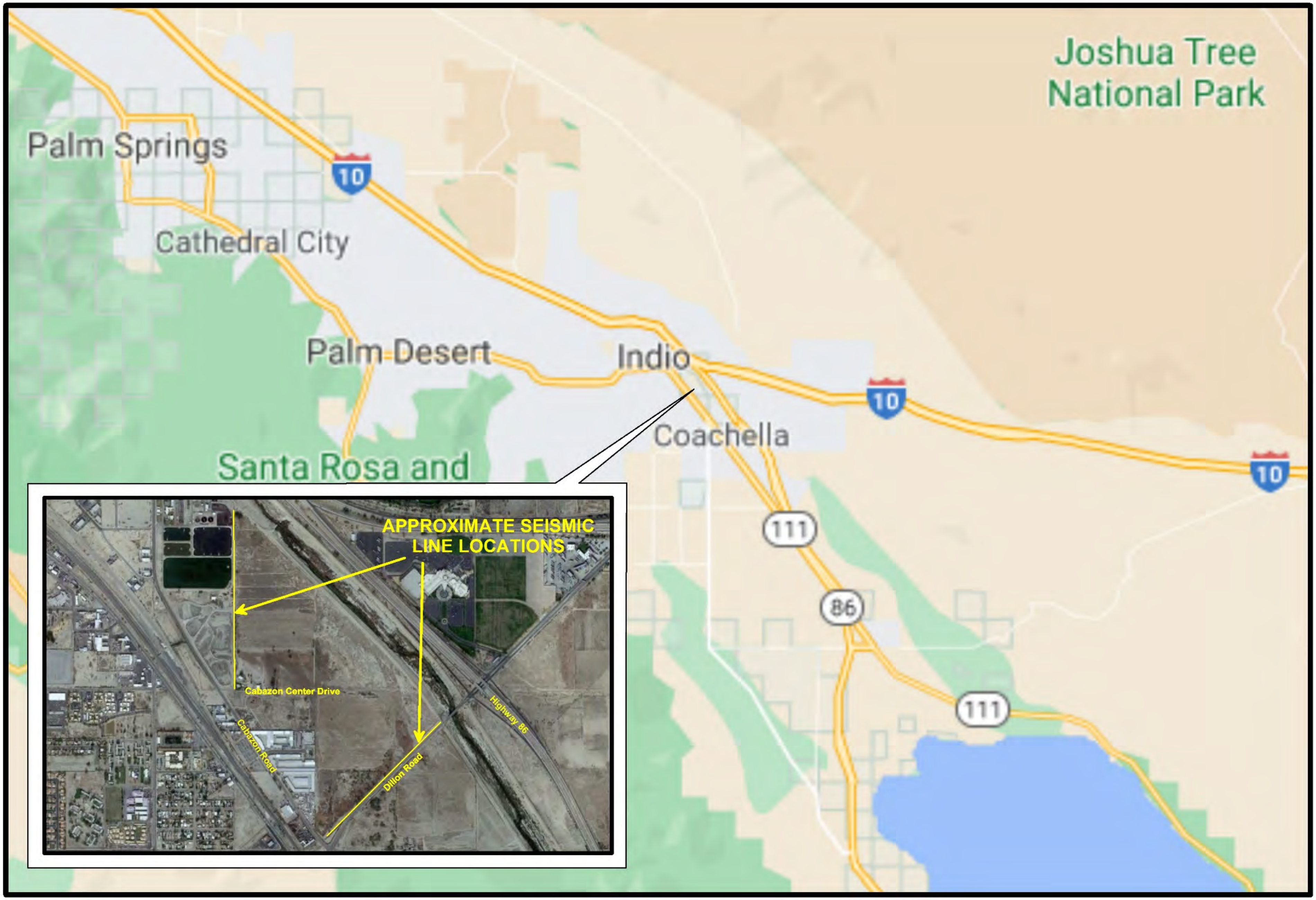
It is evident from the results that portions of the study area are experiencing compression and extension likely related to faulting. Several obvious and subtle offsets and distortions of the highlighted Marker Beds and other well-defined reflectors are revealed in the reflection profiles. Based on our interpretation of the seismic results blue lines representing probable or possible faults have been plotted on Figures 5a and 5b. Dashed lines were used where slight, apparent and often inconsistent offsets or distortions were observed in the sections. These features are considered Possible Faults, which may or may not actually represent faulting. Solid blue lines were used where more significant and continuous offsets and distortions (common in strike slip faulting) in reflectors were observed through the vertical section. These features are considered Probable Faults. As illustrated in Figures 5a and 5b, most of the faulting interpreted in the sections terminates below a robust reflector (delineated as a Marker Bed in the Figures 5a, and 5b) at roughly 100ms or 150 feet below the ground surface. The cause of this reflector is unknown. Only two faults appear to closely approach the ground surface.

It should be noted that identifying faults in a reflection record can be challenging especially where faulting is predominantly strike slip. Offsets in marker beds may not always appear continuous, or contain intermediate zones where no offsets or distortions are evident along a marked fault trace. In addition, identifying faults in reflection profiles which have an oblique orientation to the faulting in the area can substantially reduce the detectability of fault related features. Moreover, side swipe, where reflections from features off to the side of the lines are included in the vertical section, can also result in misinterpretation. It should also be noted that the picking, or tracing, of reflectors and faulting in high resolution data may be considered a combination of art and science and it is possible that other geophysicists or geologists might trace features differently along portions of the profiles. Nevertheless, it is unlikely the general nature of the subsurface interpretation would be substantially different.

6. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Atlas should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.



SITE LOCATION MAP

N

VSD Water Reclamation Facility
Indio, California

Project No.: 121033SWG | Date: 02/21

ATLAS

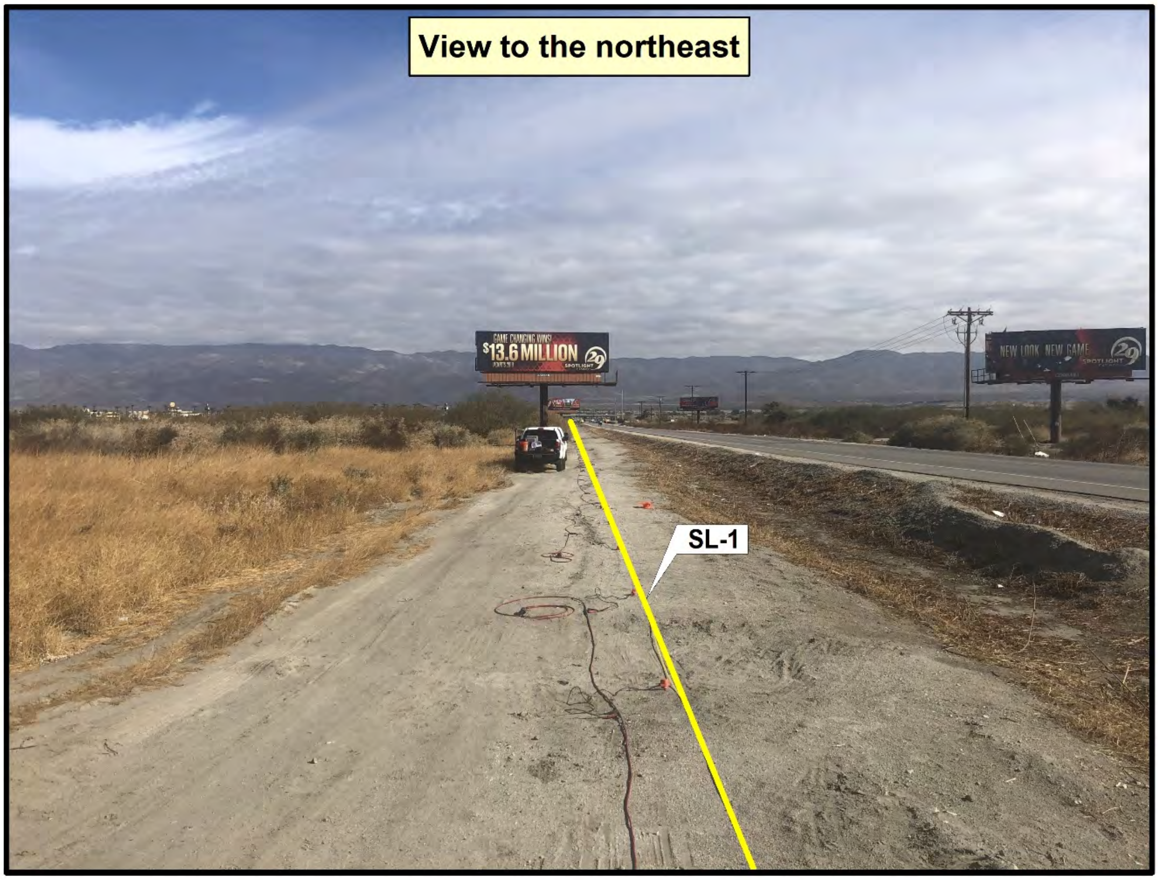
Figure 1

LINE LOCATION MAP (SL-1)	N	VSD Water Reclamation Facility Indio, California	ATLAS
		Project No.: 121033SWG / Date: 02/21	Figure 2a

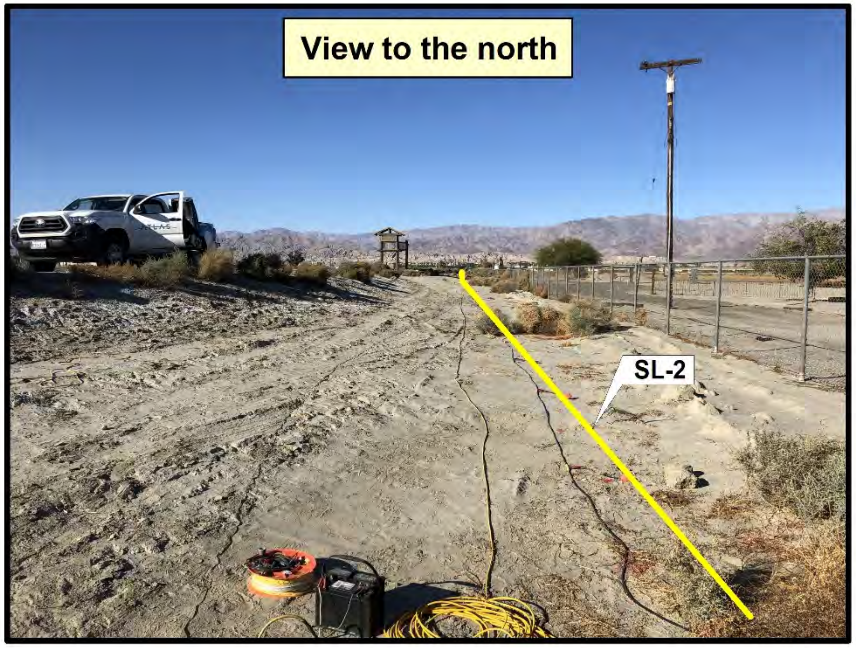
0 300 600

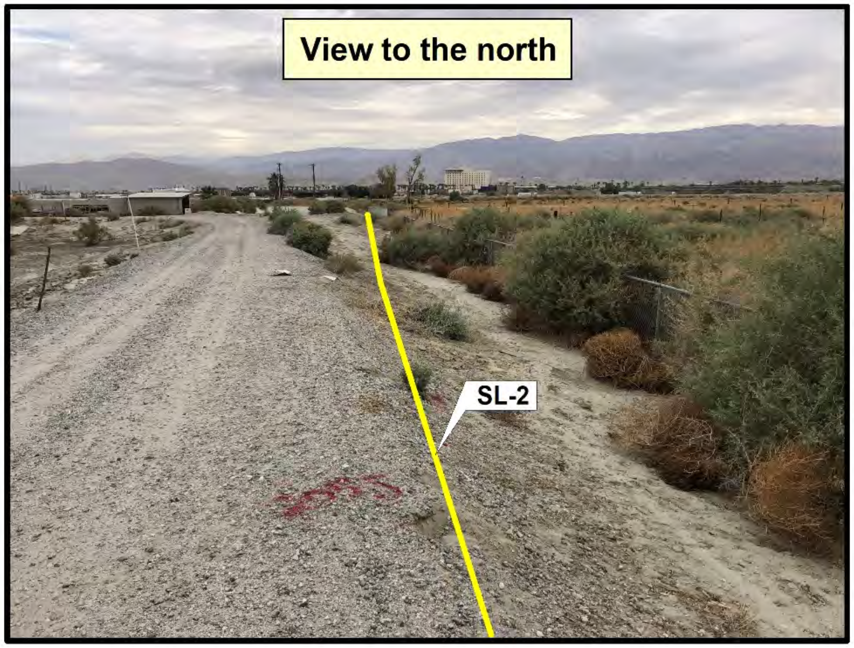
approximate scale in feet

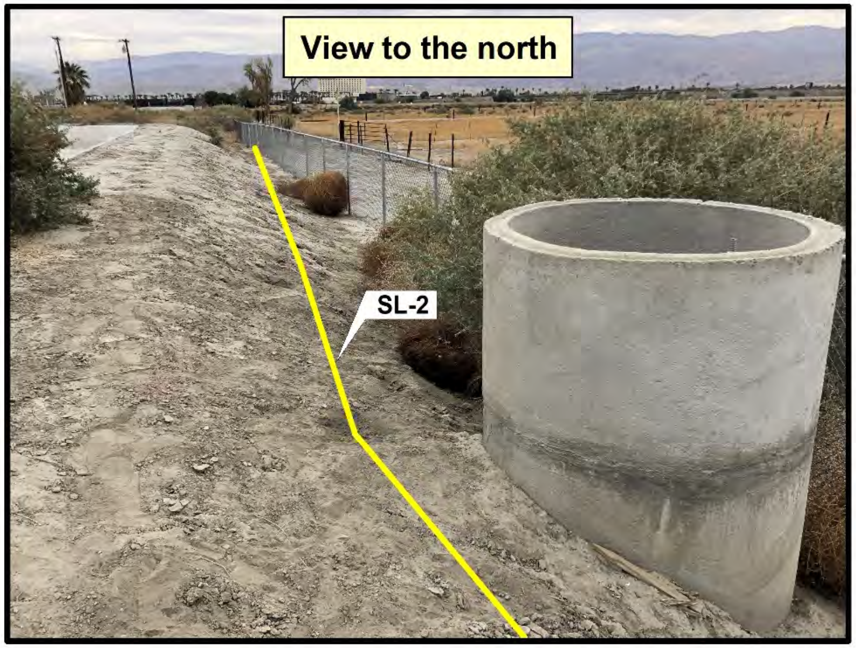
LINE LOCATION MAP (SL-2)	N	VSD Water Reclamation Facility Indio, California Project No.: 121033SWG · Date: 02/21	ATLAS Figure 2b	0 · 200 · 400 **approximate scale in feet**

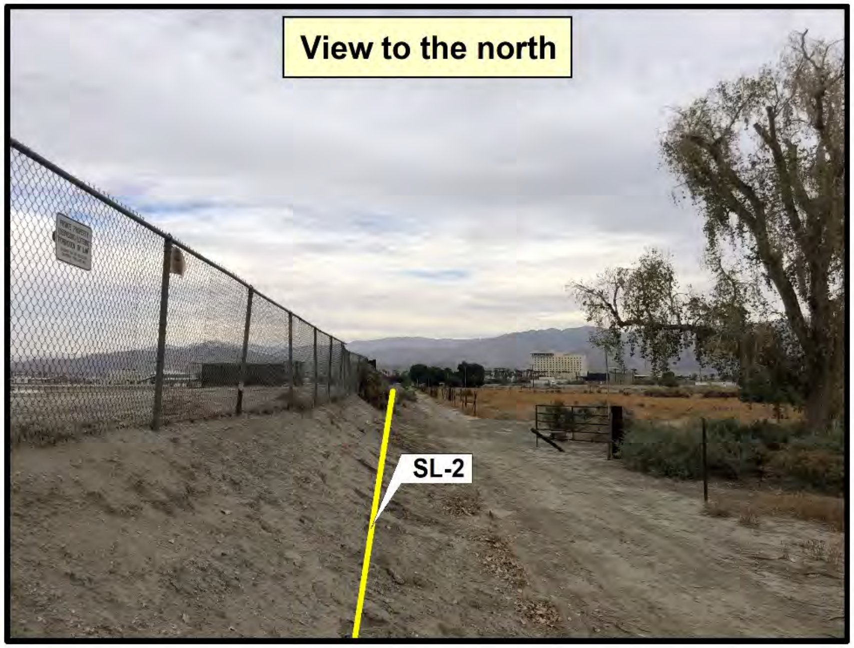


SITE PHOTOGRAPHS (SL-1)	VSD Water Reclamation Facility Indio, California Project No.: 121033SWG — Date: 02/21	ATLAS Figure 3a

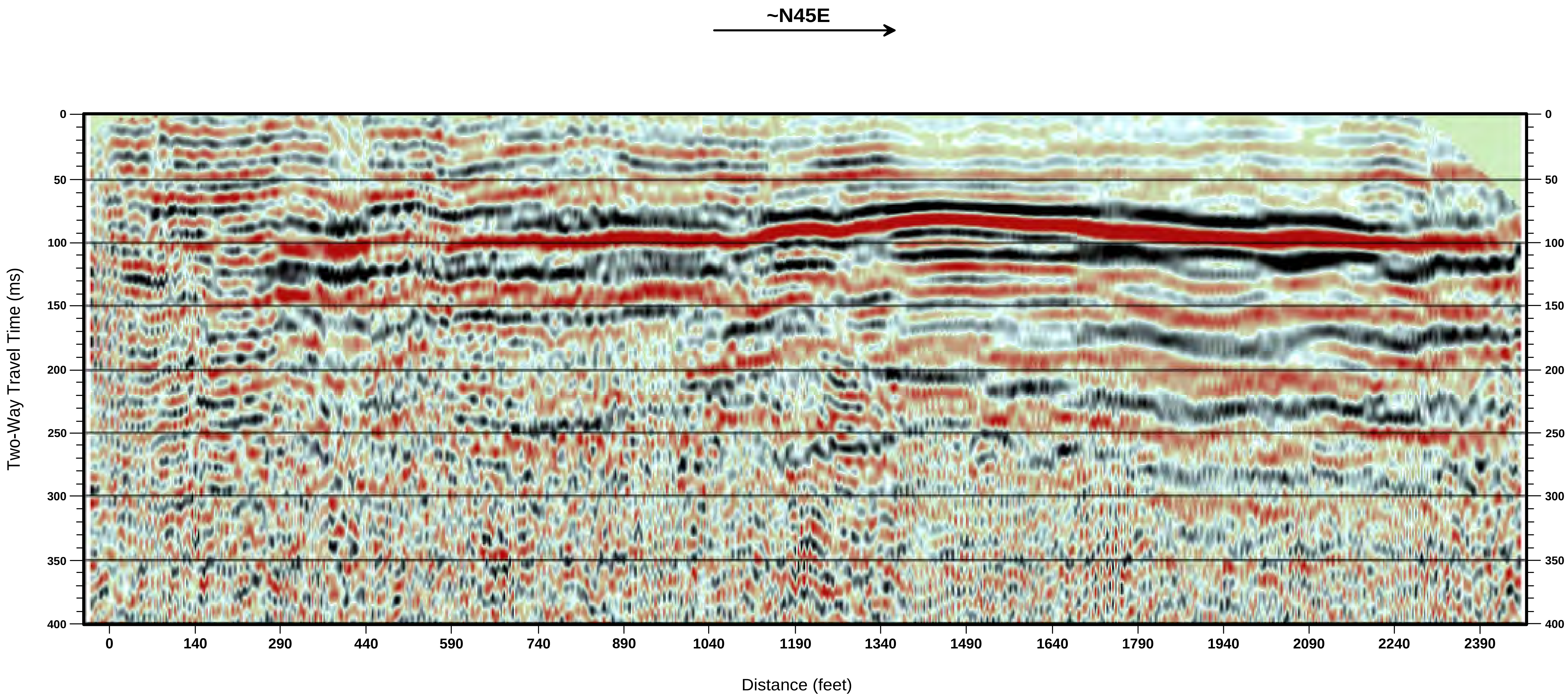








SITE PHOTOGRAPHS (SL-2)	VSD Water Reclamation Facility Indio, California Project No.: 121033SWG / Date: 02/21	ATLAS Figure 3b



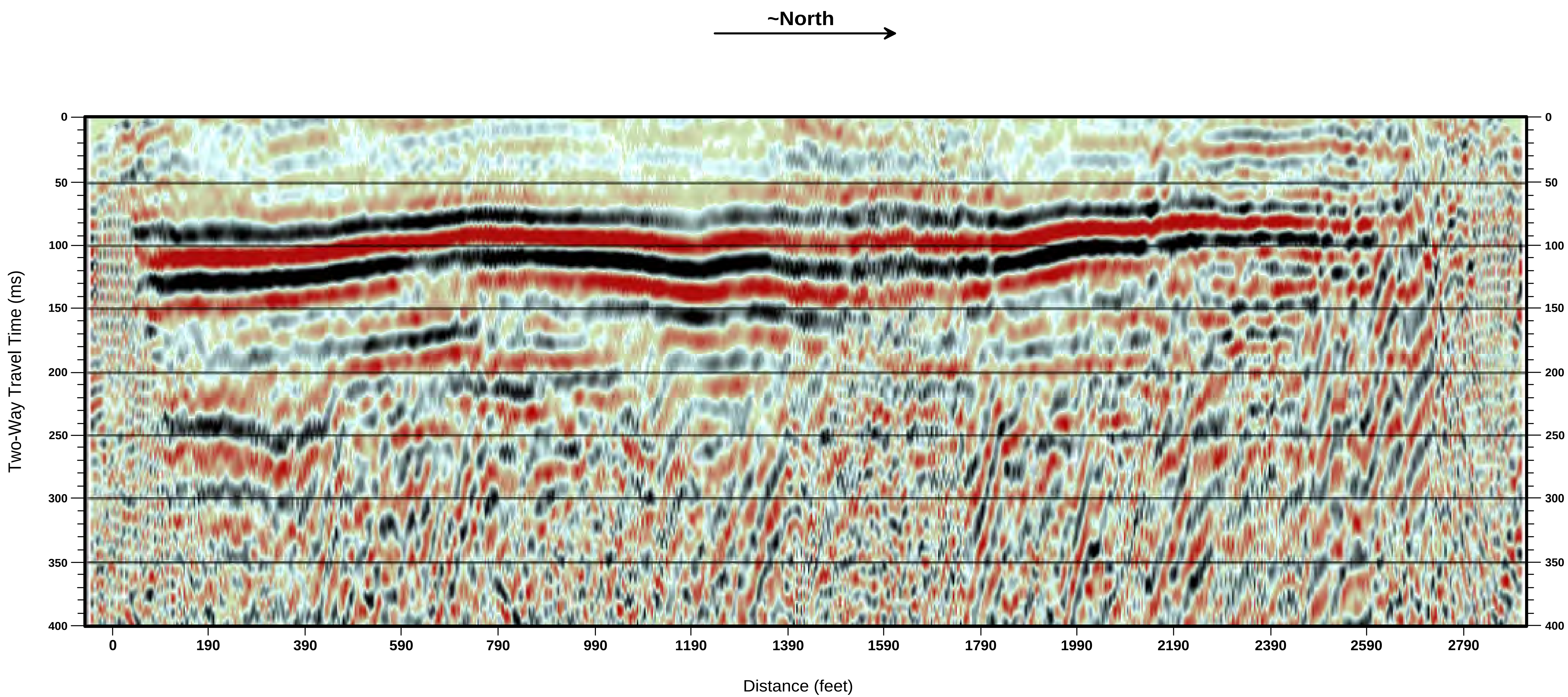
SEISMIC REFLECTION PROFILE SL-1

VSD Water Reclamation Facility
Indio, California

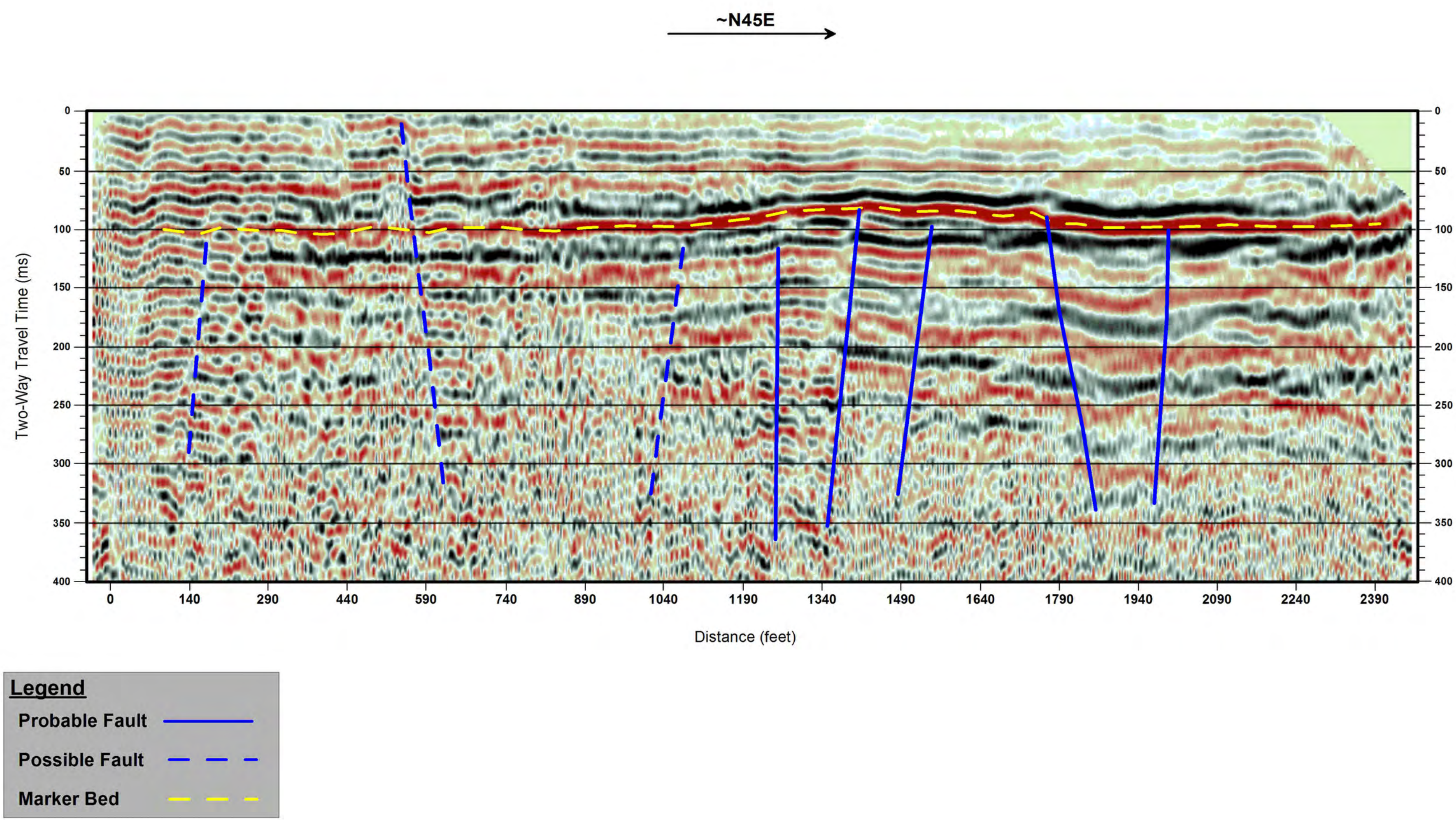
Project No.: 121033SWG | Date: 02/21

ATLAS

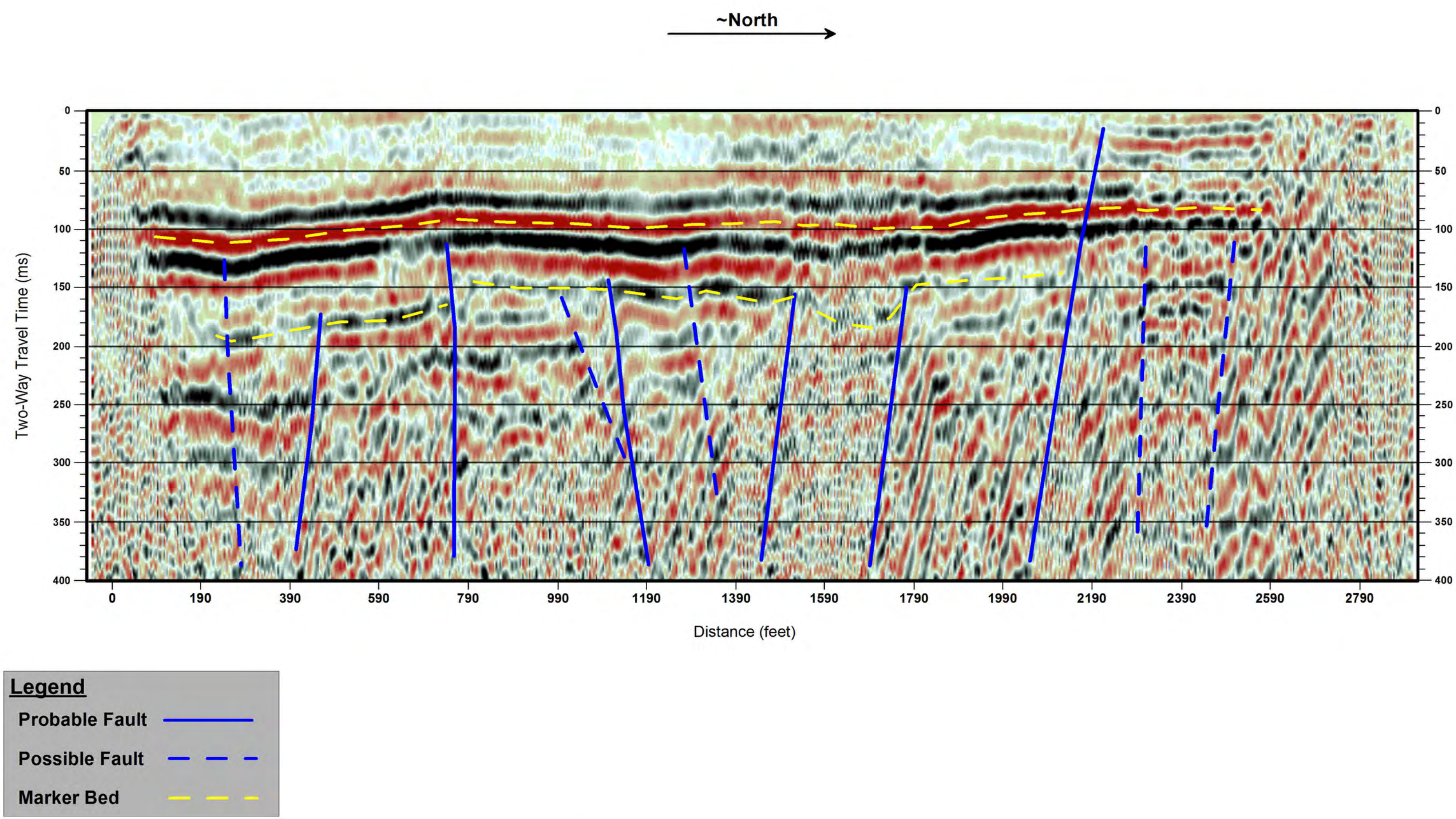
Figure 4a



SEISMIC REFLECTION PROFILE SL-2	VSD Water Reclamation Facility Indio, California	ATLAS
	Project No.: 121033SWG / Date: 02/21	Figure 4b



INTERPRETED PROFILE SL-1	VSD Water Reclamation Facility Indio, California Project No.: 121033SWG Date: 02/21	ATLAS Figure 5a



INTERPRETED PROFILE SL-2	VSD Water Reclamation Facility Indio, California Project No.: 121033SWG — Date: 02/21	ATLAS Figure 5b

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ITEM 6.7
DISCUSSION

Valley Sanitary District

DATE:	**February 21, 2023**
TO:	**East Valley Reclamation Authority**
FROM:	**Dr. Beverli A. Marshall, VSD General Manager**
SUBJECT:	**Receive and Discuss Draft Recycled Water Feasibility Study Presentation prepared by Carollo Engineers, Inc.**

Suggested Action
Discuss

Strategic Plan Compliance

Fiscal Impact
The total cost of the study was authorized not to exceed $368,583 and will be paid from existing EVRA funds and a grant from the State Revolving Fund program.

Environmental Review
This phase of the Recycled Water Project does not qualify as a project for the purposes of CEQA. Should the project move forward, the CEQA process will be initiated as appropriate.

Background
At the September 6, 2022, EVRA meeting, the Board of Directors authorized Valley Sanitary District's General Manager to execute a contract with Carollo Engineers, Inc. to complete an updated Comprehensive Recycled Water Master Plan. The first step of the process was to conduct a feasibility study utilizing existing data, updated information, and a hydrogeologic groundwater model for injection wells.

After several months of data gathering, analysis, and discussions with staff from both Valley Sanitary District and Indio Water Authority, the consultants have prepared the attached presentation. Based on the analysis, the consultants concluded that there are several feasible options for non-potable water (NPW), indirect potable water (IPW), and direct potable water (DPW) reuse.

Valley Sanitary District staff will continue working with Carollo to refine these options as well as continue to seek funding for the NPW and IPW project options.

Recommendation
Staff recommends that the Board receive and discuss the Draft Recycled Water Feasibility Study presentation prepared by Carollo Engineers, Inc. and provide direction to staff.

Attachments
VSD RWMP Meeting January 2023 (Revised).pdf

VSD RWMP
Progress Meeting

AUTHORS

Inge Wiersema, Tony Herda, Renjie Nate Li,

Binita Thapa, Andy Salveson

carollo

January 25, 2022

Presentation Outline

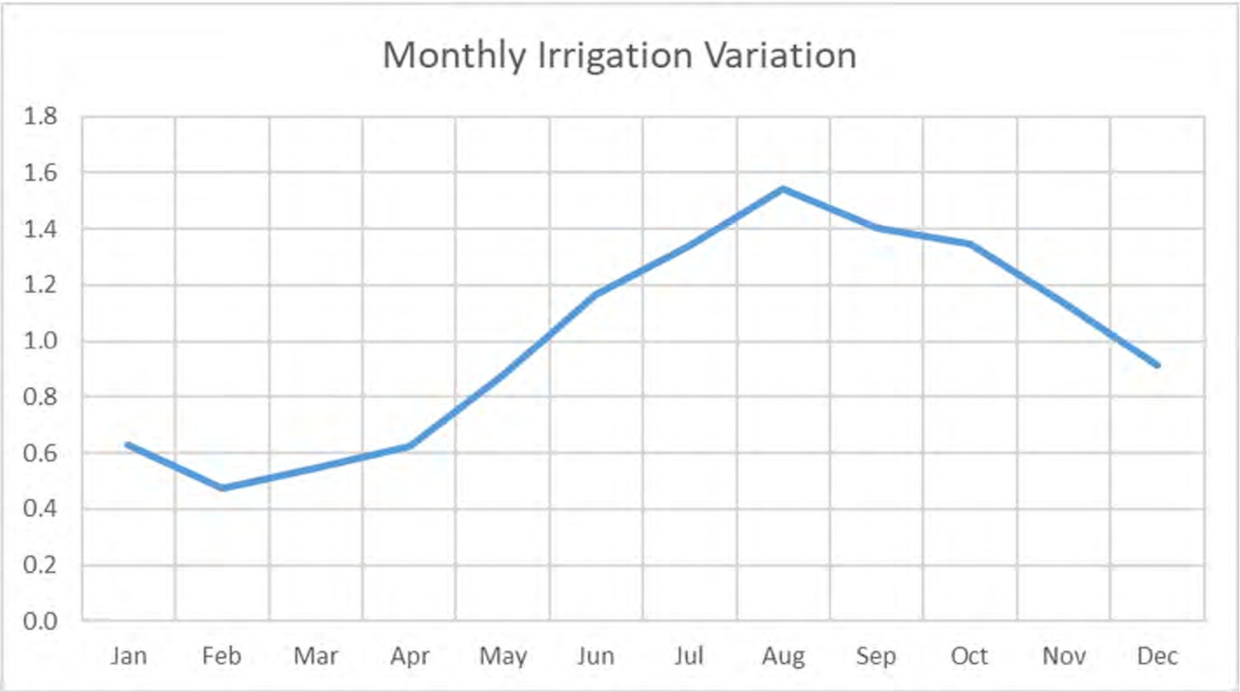
Topics

- Flows
- NPR
- IPR
- DPR
- Summary and Next Steps

Flow

Concept Flows

- Total Flow in 2045: 6.9 MGD
- Low Flow Concept: 1.4 MGD
- High Flow Concept: 6.4 MGD
- IPR and DPR assume conventional recovery of 80%
- NPR uses an MDD peaking factor of 1.85 to calculate supply requirement
- Below is the 2021-2022 monthly demand variation for dedicated IWA irrigation customers (parks, school athletic fields, landscaping)



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NPR

NPR Observations and Constraints

The existing 14-inch dedicated RW pipeline underlying the flood control channel and I-10 may create a bottleneck for peak flows south of the Water Reclamation Facility.

Irrigation demand is high in the summer and lower in the winter. The system will be sized for peak demands, so there will be surplus supply in the winter. NPR may benefit from partnering with adjacent agencies or adding other non-potable supply during peak summer months.

Four Concepts:

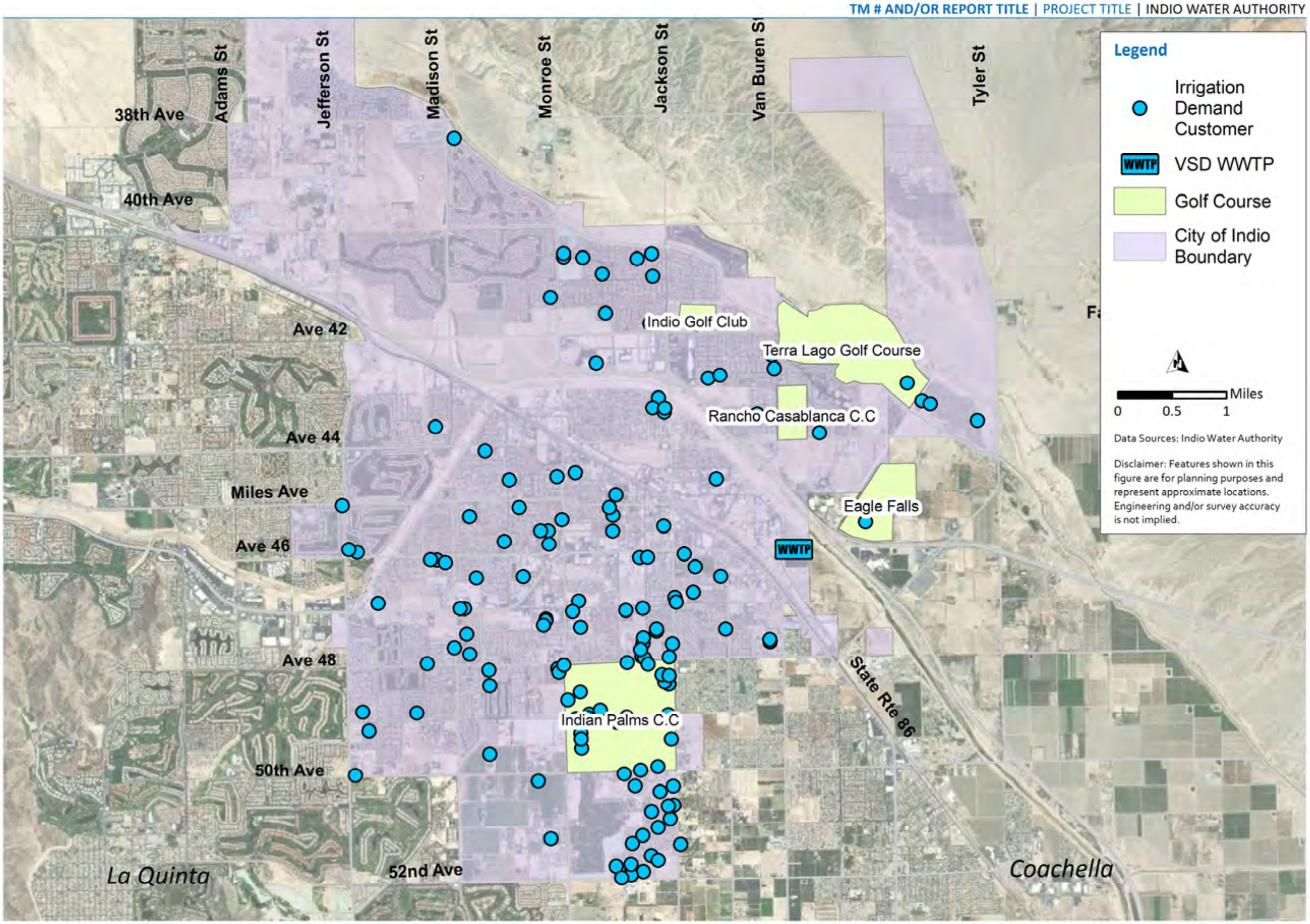
- High Flow Rate at 6.4 MGD
- Eagle Falls Golf Course
- Eagle Falls Golf Course plus Irrigation at the Casino
- 4 Northern Golf Courses

Irrigation Demand

Conversion of Existing Potable Water Irrigation Customers to RW

Conversion of Existing Golf Courses to RW

TM # AND/OR REPORT TITLE | PROJECT TITLE | INDIO WATER AUTHORITY



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Criteria

Peaking Factors

- MDD = 1.85*ADD (maximum month variation plus 20%)
- PHD = 2.0*MDD, assumptions:
  - 16-hour golf course pond refilling window during the day
  - 8-hour irrigation window for landscaping, parks and schools during the night

Pipelines

- Maximum pipe velocity under PHD conditions: 5 fps
- Maximum system pressure: 150 psi
- Minimum system pressure: 40 psi

Storage

- Equalization storage: 20% of one day of MDD (assumes some equalization in the treatment process)
- Operational Storage: 25% of one day of MDD

Pumping

- MDD

Unit Costs

Transmission and Distribution Cost Assumptions

Unit Cost : ENR index (greater LA) 13665

Pipeline (range 8-inch @ $215/foot to 36-inch @ $668/foot)

Storage (range from 1$/gallon to $1.75/gallon based on size)

Pumps (estimate based on total HP)

Markup on Materials and Labor: 60%

Amortization Rate: 4%

Amortization Period

- 20 years for pump stations
- 30 years for pipes and tanks

Infrastructure O&M: 1% of amortized capital costs

Facility O&M: 3% of amortized costs

NPR High Flow Rate (6.4 MGD)

TM # AND/OR REPORT TITLE | PROJECT TITLE | INDIO WATER AUTHORITY

carollo

Figure 1 Concept 1

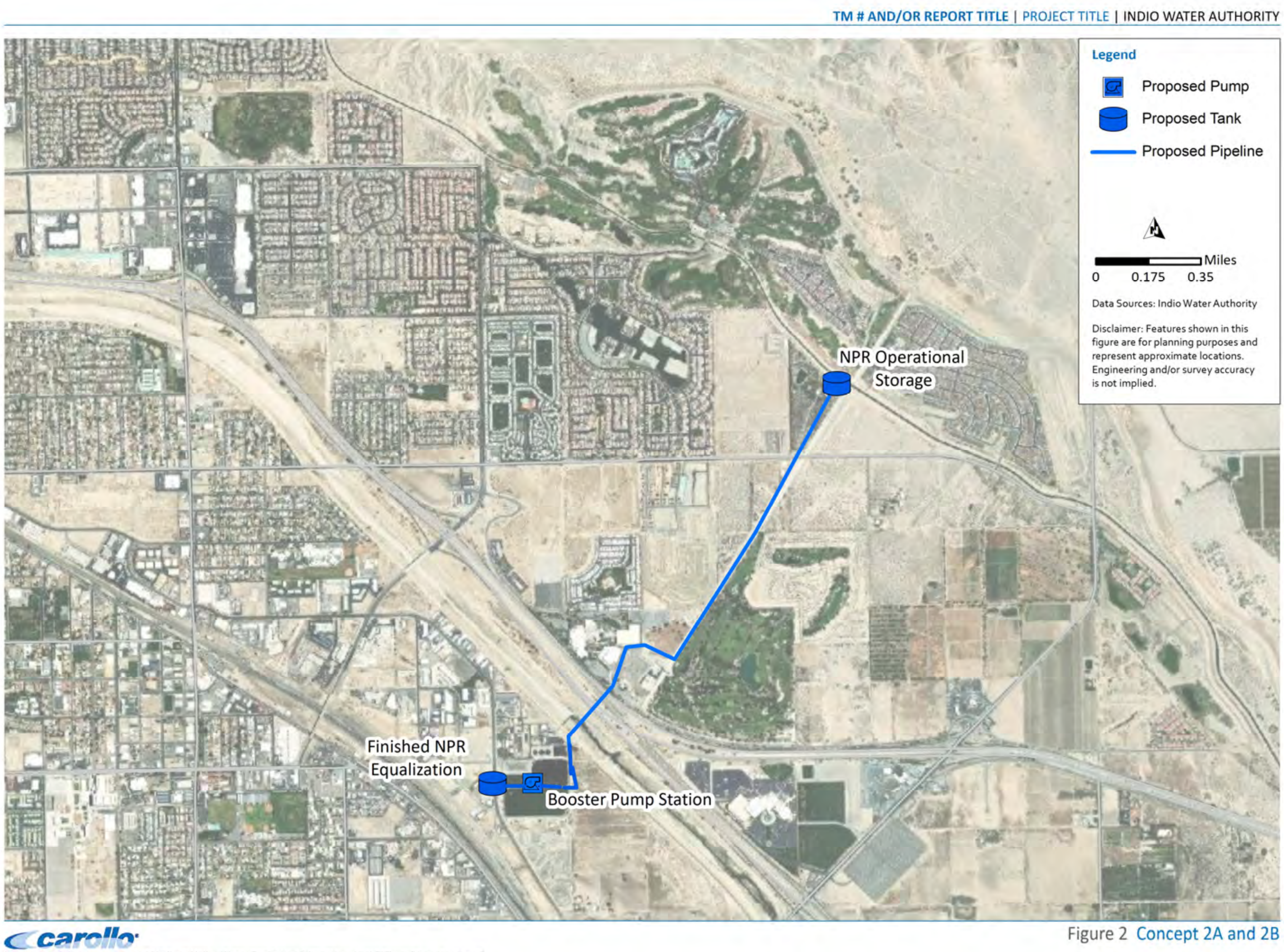
Last Revised: January 24, 2023 M:\Client\Valley Water Sanitation District\201641\GIS\mxd\IPR.mxd

NPR High Flow Rate (6.4 MGD)

Item	Capital Cost	Amortized Cost	O&M
Pipelines	20,100,000	1,180,000	11,800
Pumping	6,340,000	470,000	14,100
Storage	9,220,000	540,000	5,400
Totals	**35,660,000**	**2,190,000**	**31,300**
AFY			3,910
Unit Cost ($/AF)			**570**

- Average Demand: 3,910 AFY
- Surplus RW Supply: 3,260 AFY
- Existing 14-inch dedicated pipeline under the channel and freeway may create a bottleneck for demands south of the Water Reclamation Facility

NPR Low Flow (Eagle Falls and Casino Irrigation Only)

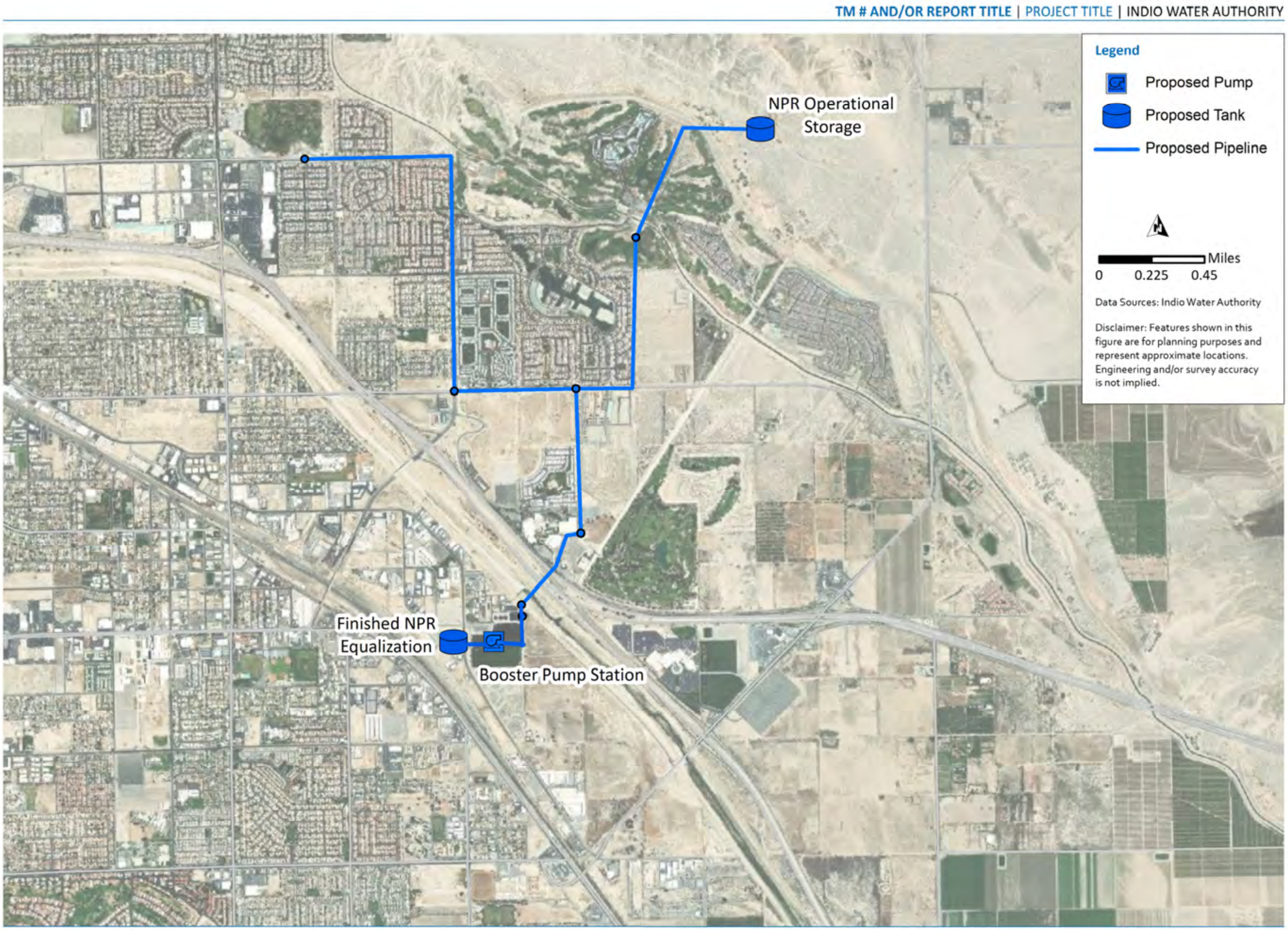


NPR Low Flow (Eagle Falls and Casino Irrigation Only)

Item	Capital Cost	Amortized Cost	O&M
Pipelines	3,830,000	228,000	2,280
Pumping	1,590,000	120,000	3,600
Storage	1,600,000	100,000	1,000
Totals	**7,020,000**	**448,000**	**6,880**
AFY			970
Unit Cost ($/AF)			**470**

- Average Demand: 970 AFY
- Surplus RW Supply: 6,200 AFY

NPR: 4 Northern Golf Courses

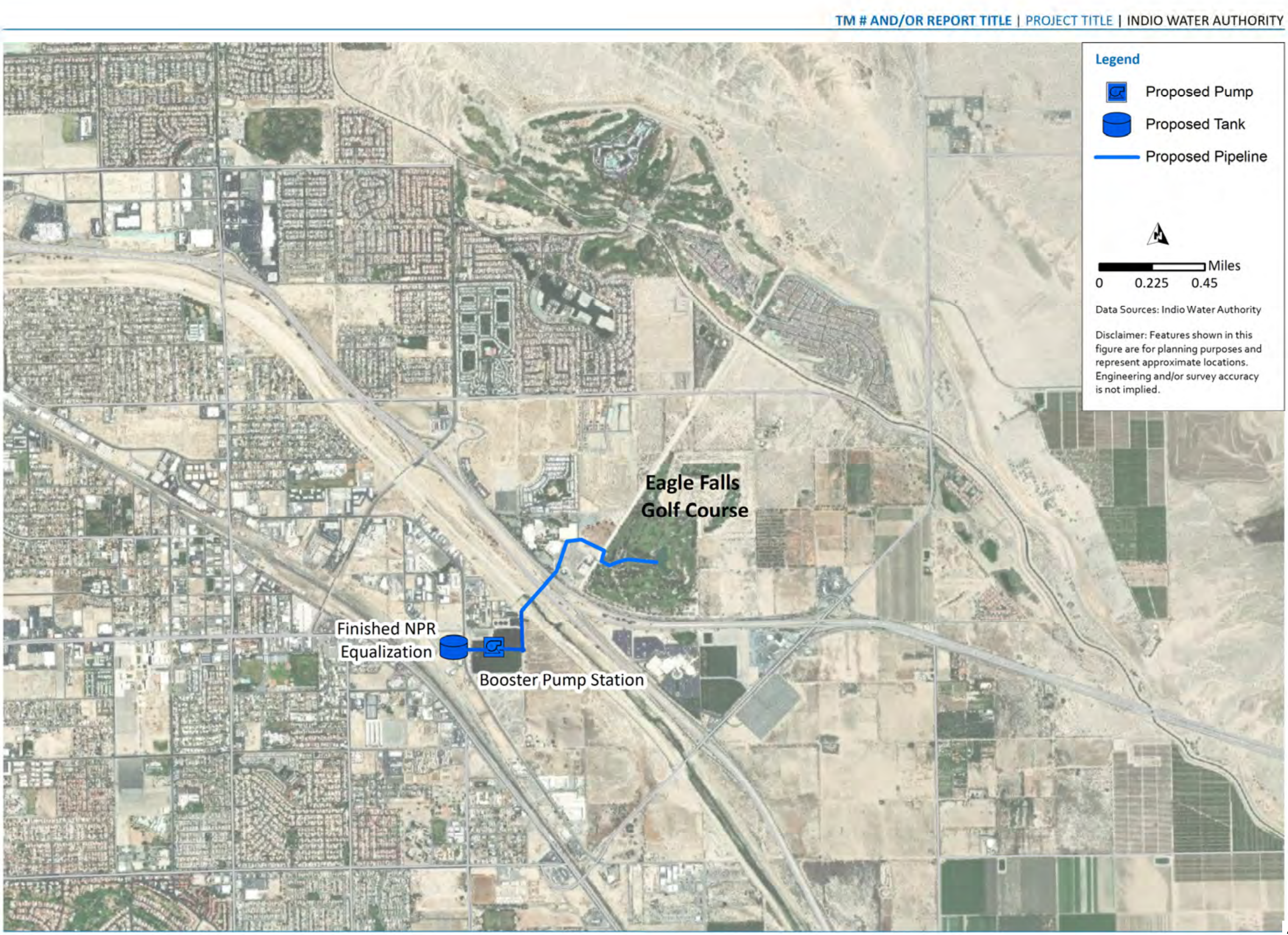


NPR: 4 Northern Golf Courses

Item	Capital Cost	Amortized Cost	O&M
Pipelines	14,680,000	860,000	8,300
Pumping	4,760,000	360,000	10,800
Storage	5,300,000	310,000	3,100
Totals	**24,740,000**	**1,530,000**	**22,200**
AFY			2,750
Unit Cost ($/AF)			**560**

- Average Demand: 2,750 AFY
- Surplus RW Supply: 4,420 AFY

NPR: Eagle Falls Golf Course Only



NPR: Eagle Falls Golf Course Only

Item	Capital Cost	Amortized Cost	O&M
Pipelines	1,430,000	83,000	8,300
Pumping	500,000	40,000	1,200
Storage	320,000	20,000	200
Totals	**2,250,000**	**143,000**	**9,700**
AFY			877
Unit Cost ($/AF)			**170**

- Average Demand: 880 AFY
- Surplus RW Supply: 6,290 AFY
- Uses the on-site lake for operational storage

Brine Disposal

Brine Disposal Concept: Evaporation Ponds

Brine Production: 20%

Local annual evaporation rate: 105 inches per year

Area Requirement: Area = Brine Flow/Evaporation Rate

Evaporation Pond Construction: excavation, double HDPE liner, monitoring wells. $325,000/acre

Land Acquisition beyond existing 25 acres owned by VSD may be required. $136,000/acre

Landfill: Per Riverside County, VSD will be responsible to determine if solid salt waste is hazardous. Solid salt is likely non-hazardous and may be hauled to the local landfill. Rate: $65/ton

Hauling: The Oasis Landfill is 23 miles away from the Water Reclamation Facility. Rate: $100/hour (assume 14 tons and 2 hours per load)

IPR

Observations and Constraints

A fault underlies the Water Reclamation Facility potentially restricting locations for injections wells

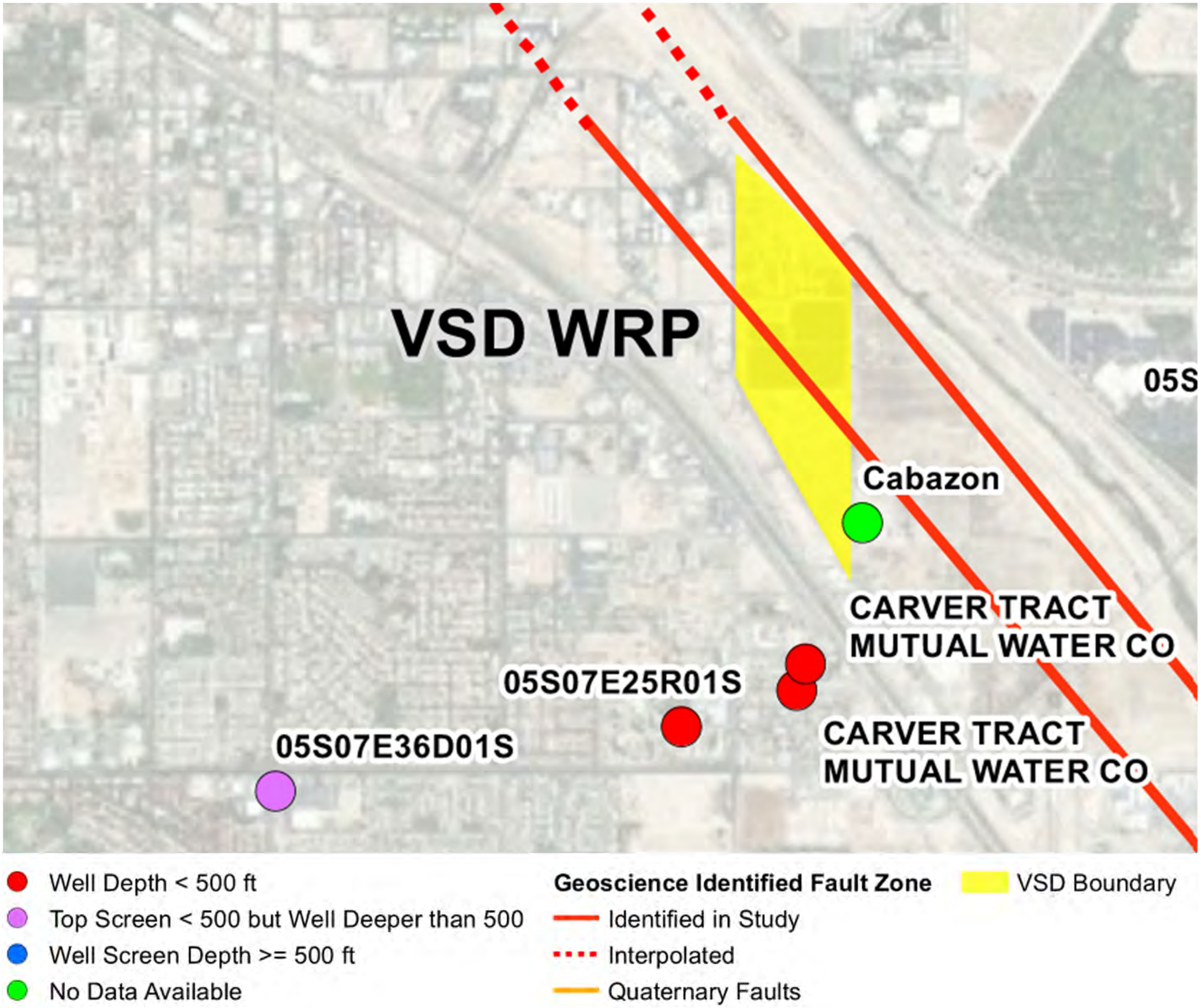
There may be interference between an on-site injection well on the south side of VSD property and the Cabazon well

The recovery rate has yet to be calculated. In general, groundwater flow is to the south, away from existing IWA production wells; however, stabilization of the surface level of the aquifer tends to benefit all pumpers within the influence of the injection wells.

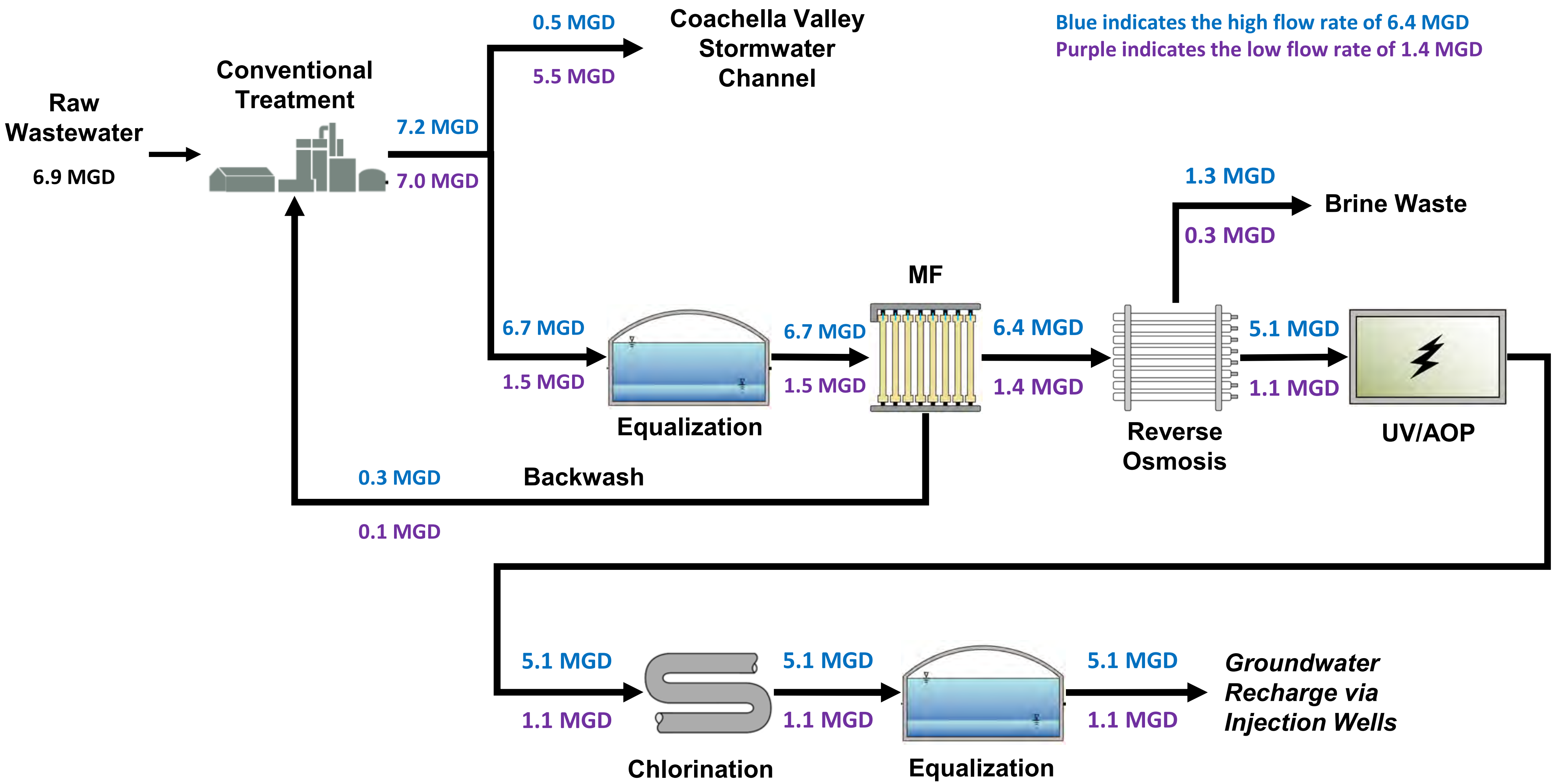
Evaporation for reverse osmosis concentrate requires a large surface area, which may create environmental constraints requiring mitigation for waterfowl, dust control, flooding, and other impacts.

Brine or salt waste may be recycled or reused for acid and caustic production, ion exchange resin regeneration, irrigation and agriculture, deicing, dust control, various industrial manufacturing

Observations and Constraints



IPR Process Flow Diagram



Locations for Injection Wells

IPR Low Flow (1.4 MGD)

Item	Capital Cost	Amortized Cost	O&M
Treatment	44,900,000	3,300,000	2,027,000
Evaporation Ponds	10,970,000	630,000	107,800
Land Acquisition	4,440,000	260,000	0
Pipelines	1,000,000	60,000	600
Wells	5,280,000	390,000	3,900
Totals	**66,590,000**	**4,640,000**	**2,139,300**
AFY			1,260
Unit Cost ($/AF)			**5,380**

IPR High Flow (6.4 MGD)

Item	Capital Cost	Amortized Cost	O&M
Treatment	93,400,000	6,870,000	5,547,000
Evaporation Ponds	51,890,000	3,000,000	474,800
Land Acquisition	22,110,000	1,280,000	0
Pipelines	7,200,000	420,000	4,200
Pumping	1,240,000	90,000	2,800
Wells	15,800,000	1,160,000	11,700
Totals	**191,640,000**	**12,820,000**	**6,040,500**
AFY			5,740
Unit Cost ($/AF)			**3,290**

Economies of Scale result in a lower unit cost

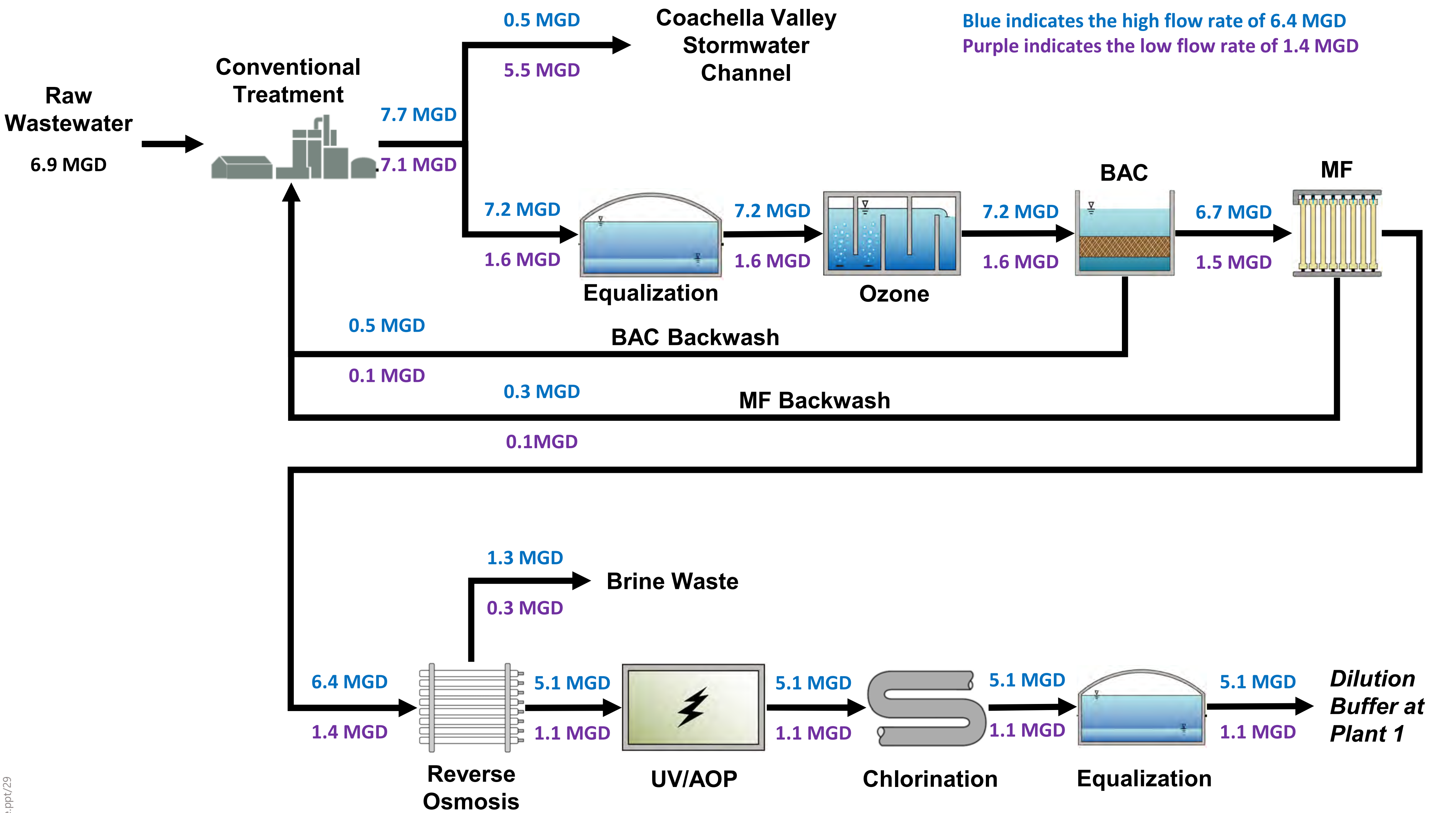
DPR

Observations and Constraints

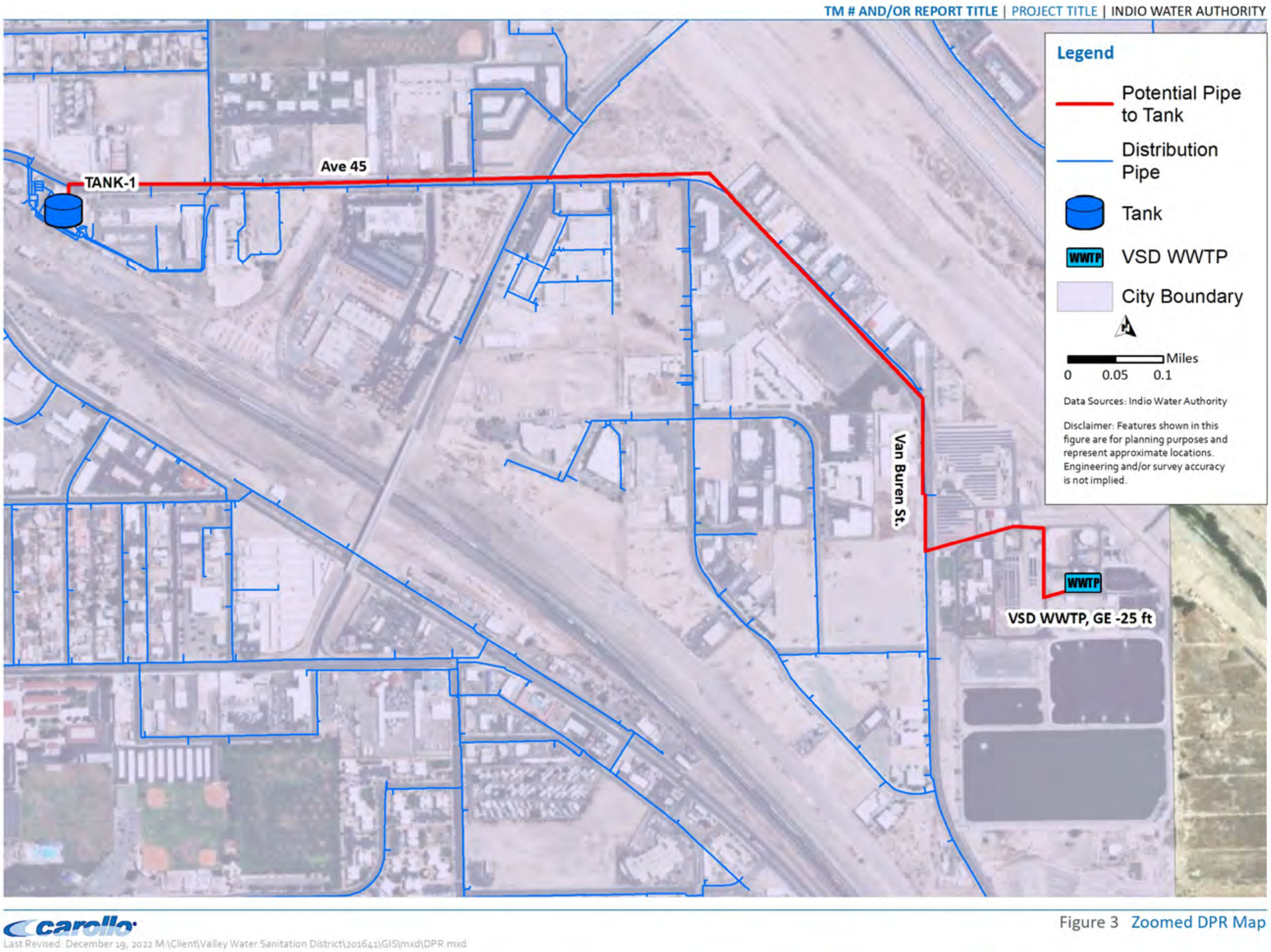
Evaporation for reverse osmosis concentrate requires a large surface area, which may create environmental constraints requiring mitigation for waterfowl, dust control, flooding, and other impacts.

DPR regulations will include a dilution requirement as a buffer. The preferred method to satisfy the dilution requirement is to blend DPR water with other potable water at a storage facility. The nearest potable water storage facility is located at IWA Plant 1. Per IWA, there is sufficient volume and operational turnover at Plant 1 to satisfy DPR dilution requirements.

DPR Process Flow Diagram



Transmission Infrastructure



DPR Low Flow (1.4 MGD)

Item	Capital Cost	Amortized Cost	O&M
Treatment	67,400,000	4,960,000	3,907,000
Evaporation Ponds	10,970,000	630,000	107,800
Land Acquisition	4,440,000	260,000	0
Pipelines	2,600,000	150,000	1,600
Pumping	740,000	50,000	1,800
Totals	**86,150,000**	**6,050,000**	**4,018,200**
AFY			1,260
Unit Cost ($/AF)			**7,990**

DPR High Flow (6.4 MGD)

Item	Capital Cost	Amortized Cost	O&M
Treatment	108,000,000	7,950,000	8,572,000
Evaporation Ponds	51,890,000	3,000,000	474,800
Land Acquisition	22,110,000	1,280,000	0
Pipelines	5,500,000	320,000	3,200
Pumping	1,590,000	120,000	3,600
Totals	**189,090,000**	**12,670,000**	**9,053,600**
AFY			5,740
Unit Cost ($/AF)			**3,780**

Economies of Scale result in a lower unit cost

Summary and Next Steps

Comparison of NPR, IPR and DPR Unit Costs

Concept	Volume (AFY)	Unit Cost
NPR High Flow Rate (6.4 MGD)	3,910	570
NPR 4 Northern Golf Courses	2,750	560
NPR Eagle Falls and Casino	970	470
NPR Eagle Falls Lake	877	170
IPR Low Flow Rate (1.4 MGD)	1,260	5,380
IPR High Flow Rate (6.4 MGD)	5,740	3,290
DPR Low Flow Rate (1.4 MGD)	1,260	7,990
DPR High Flow Rate (6.4 MGD)	5,740	3,780

Next Steps

1. Flow Analysis Chapter
2. NPR Analysis Chapter
3. IPR Analysis Chapter
4. DPR Analysis Chapter