

Application for a Development Agreement

For

St. James's Village

Prepared For:
St. James's Village, Inc.

Prepared By:
KRATER CONSULTING Group, PC
A Nevada professional corporation
1165 Mount Rose Street
Reno, Nevada 89509
(775) 815-9561

June 9, 2025

Table of Contents

- I. Supporting Letter**
 - A. Draft Development Agreement**
 - B. Draft TMWA Discovery**
 - C. CWR Serpa Well Pumping Test Final Report**
 - D. Pleasant Valley Interceptor 30% Design Report**
 - E. Pleasant Valley Interceptor 30% Plan Sheets 1-4**
- II. St. James's Village Site Plan – At Project Completion**
- III. Washoe County Development Application**
 - 1. Checklist/Submittal Requirements
 - 2. Property Owner Affidavit
 - 3. Corporate Resolution
- IV. Assessor Parcel Maps**
- V. Proof of Property Tax Payments**

Supporting Letter

KRATER CONSULTING GROUP, PC

A Nevada professional corporation

Krater Consulting Group, PC
1165 Mount Rose Street
Reno, Nevada 89509

Phone (775) 815-9561
E-mail: Ken@KCGNV.Com

June 6, 2025

Trevor LLOYD, Planning Manager
Community Services
Washoe County
1001 E. Ninth Street, Bldg A
Reno, NV 89512

Dear Trevor:

Subject: Development Agreement for St. James's Village to Provide for an Extension of Time

We respectfully request that Washoe County take action to approve the enclosed Development Agreement to grant an extension of time on the approved Tentative Map for St. James's Village, Tentative Map Case Number TM05-2-92. St. James's Village located south of Galena Forest originally consisted of approximately 1,626 acres and was approved for 530 residential lots. With construction of the 1-580- freeway, 450 lots are now contemplated on the remaining 1,161 acres.

BACKGROUND

On October 9, 2012, Washoe County and St. James's Village, Inc., (the "Landowner") entered into an agreement concerning the development of the land authorized by NRS 278.0201 and Article 814 of the Washoe County development code to provide an extension of time for the landowner to record the next in a series of final maps. Section 2.4 of the Development Agreement entitled "Further Extension," further extended the deadline to record the next in a series of final maps until October 16, 2020, in the event that the Pleasant Valley Sewer Interceptor and the 1-580 Freeway Project "have not progressed to be consistent with the development of the property." On May 26, 2016, Washoe County notified the Landowner in writing that the extension to October 16, 2020 was granted. Subdivision Tract Map #5331 for St. James's Village was subsequently recorded on June 21, 2019, in the office of the Washoe County Recorder.

On October 7, 2021, the Washoe County Planning Commission granted an Extension of Time Request for Tentative Subdivision Map Case Number TMS-2-92 (St James Village) by approving an extension of time for expiration of the approval of the subdivision, for two years, from October 16, 2021, until October 16, 2023, in accordance with NRS 278.360.

On January 24, 2024 Washoe County and the Landowner entered into that certain agreement which took effect on February 8, 2024, concerning the development of the land authorized by NRS 278.0201 and Article 814 of the Washoe County Development Code to provide an extension of time until October 16, 2025, for the landowner to record the next in a series of final maps (Ordinance No. 1710). This Development Agreement was recorded in the Office of the Washoe County Recorder as Document #5434601.

REASON FOR THE REQUEST

Additional time is necessary to work through final engineering and construction issues related to the

provision of public water and public sewer for the remaining phases of this development before filing and recording the next Final Map. The Landowner and the Truckee Meadows Water Authority ("TMWA") are actively pursuing completion of a comprehensive Water Discovery prepared by TMWA that will allow for phased development of the remaining undeveloped portion of St. James's Village.

The next phase of development will include "looping" and new or improved water wells to provide redundancy and improved water pressure within the St. James's Village development that was originally approved with a "tree" system. With buildout of St. James's Village, the entire development will meet current Nevada Administrative Code requirements and TMWA requirements that will yield a robust water system that does not now exist due to the antiquated tree system. If the project does not move forward, these improvements may never be completed, and existing residents will have a water system with lower pressure and no redundancy that does not meet current NAC and TMWA requirements.

Regarding sanitary sewer, the Landowner has completed a 30% design of the Reach IV Pleasant Valley Interceptor and plans to commence construction of the interceptor line by Fall of 2026. When originally approved, the project was able to use interim septic systems until public sewer became available to the project. All existing lots have a dry sewer line to the homes that will allow all St. James's Village homeowners to hook up to public sewer once said public sewer extends west of the I-580 freeway into St. James's Village.

Northern Nevada Public Health policies and standards no longer allow septic systems on lots less than 5-acres, so the public sewer line is now required in order to record the next in a series of final maps. Based on the foregoing, the parties agree that it is in the public interest and welfare of the County and existing St. James's Village residents to enter into this Agreement. If the project does not move forward, public sewer may never be made available and existing residents will have to maintain their septic systems that will continue to discharge nitrogen and phosphorous into groundwater.

In summary, final design and subsequent construction of public water and sewer systems are the remaining item to be resolved and the current expiration date is such that said issue will remain outstanding on October 16, 2025. However, we are confident that the granting of our request and approval and recordation of the enclosed Development Agreement will ensure the best possible solution for the Developer, Washoe County, and existing St. James's Village residents and allow development of St. James's Village to provide robust public water and public sewer infrastructure systems that meet state, TMWA, and Washoe County requirements.

Thank you for your help on this matter and please do not hesitate to contact me with any questions. We look forward to moving this project forward for the betterment of the county.

Sincerely,

Kenneth Krater, President

cc: Fred Woodside, St. James's Village Inc.

Attachments: Draft TMWA Discovery
CWR Serpa Well Pumping Test Final Report
Pleasant Valley Interceptor 30% Design Report
Pleasant Valley Interceptor 30% Plan Sheets 1-4

Draft Development Agreement

DEVELOPMENT AGREEMENT
(ST. JAMES VILLAGE)

THIS DEVELOPMENT AGREEMENT (“Agreement”) is made by and between **ST. JAMES’S VILLAGE, INC.**, a Nevada corporation (the “Landowner”), and the **COUNTY OF WASHOE**, a political subdivision of the State of Nevada, (“County”).

1. GENERAL.

1.1 Property. The Landowner owns approximately 1,161 acres of real property in Pleasant Valley, Washoe County, Nevada (the “Property”), as described in Exhibit A, attached hereto. The Property is entitled by a Tentative Map that encompasses 1,626 acres in total. Since the approval of the Tentative Map, Interstate 580 was extended through the site of the Tentative Map, impacting the constructability of the site due to: (1) acquisition of 79 acres for right-of-way by the Nevada department of Transportation, and (2) construction of the freeway, which isolated 224.1 acres east of the new freeway. Concurrently with this development agreement, the Tentative Map will be amended to exclude the 79-acre right-of-way and the 224.1 acres separated by the freeway, resulting in the currently defined 1,161-acre Property.

1.2. Tentative Map. The Property has an approved tentative map for 530 residential lots known as Tentative Subdivision Map Case File No. TM 5-2-92 (St. James's Village) (the “Tentative Map”). Said approval was granted by the Board of County Commissioners on August 18, 1992. The development of the Property must be conducted pursuant to the provisions of the Tentative Map and the Washoe County Development Code (the “Code”). Construction of the freeway impacted the feasibility of a significant number of planned residential lots; the current total number of residential lots at build out is now contemplated to be ±450 lots.

1.3 Previous Final Maps. The Landowner has been filing final maps in a series as authorized by NRS 278.360(1)(a). 14 final maps have been recorded in the office of the Washoe County recorder resulting in 256 legal residential lots being created for portions of the project consisting of the following Tract Maps: TM 3059, TM 3155, TM 3261, TM 3314, TM 3404, TM 3602, TM 3883, TM 4123, TM 4396, TM 4551, TM 4567, TM 4705, TM 4889, and TM 5331. Tract maps 4567, 4705, and 4889 were reverted in 2011 with a corresponding reduction of 29 recorded lots. Thus, there are currently 227 recorded residential lots within St. James’s Village.

1.4 Prior Development Agreements. On September 25, 2012, Washoe County and the Landowner entered into that certain agreement which took effect on October 9, 2012, concerning the development of the land authorized by NRS 278.0201 and Article 814 of the Washoe County Development Code to provide an extension of time until October 16, 2016, for the landowner to record the next in a series of final maps (Ordinance No. 1498). This development agreement was recorded in the Office of the Washoe County Recorder as Document #4160879. Section 2.4 of the Development Agreement entitled Further Extension, extended the deadline to record the next in a series of final maps until October 16, 2020, in the event that the Pleasant Valley Sewer Interceptor and the I-580 Freeway Project “have not progressed to be consistent with the development of the property” or for other good cause as determined by the Director of the Community Services Department. On May 26, 2016, Washoe County notified the Landowner in writing that the extension to October 16, 2020, was granted. Subdivision Tract Map #5331 for St. James’s Village was subsequently recorded on June 21, 2019, in the office of the Washoe

County Recorder. The Community Development Certificate in the jurat sheet of Tract Map #5331 indicated that the next final map must be approved by the Director of the Community Services Department for recording on or before October 16, 2021.

On October 7, 2021, the Washoe County Planning Commission granted an Extension of Time Request for Tentative Subdivision Map Case Number TM5-2-92 (St James Village) by approving an extension of time for expiration of the approval of the subdivision, for two years, from October 16, 2021, until October 16, 2023, in accordance with NRS 278.360.

On January 24, 2024 Washoe County and the Landowner entered into that certain agreement which took effect on February 8, 2024, concerning the development of the land authorized by NRS 278.0201 and Article 814 of the Washoe County Development Code to provide an extension of time until October 16, 2025, for the landowner to record the next in a series of final maps (Ordinance No. 1710). This Development Agreement was recorded in the Office of the Washoe County Recorder as Document #5434601.

1.5 Next Final Map Requirement. Pursuant to NRS 278.360(1), unless the parties enter into this Agreement concerning the development of land authorized by NRS 278.0201, the Landowner must cause the next final map (a “Final Map”) to be presented (i.e., approved by the Director of Planning & Building or the Director of the Community Services Department for recording) prior to the expiration of the current Extension of Time Request by October 16, 2025.

1.6 Circumstances Warranting an Extension of Time for the Tentative Map. Additional time is necessary to work through final engineering and construction issues related to the provision of public water and public sewer for the remaining phases of this development before filing and recording the next Final Map. The Landowner and the Truckee Meadows Water Authority (“TMWA”) are actively pursuing completion of a comprehensive Water Discovery prepared by TMWA that will allow for phased development of the remaining undeveloped portion of St. James’s Village. The next phase of development will include “looping” and new or improved water wells to provide redundancy and improved water pressure within the St. James’s Village development that was originally approved with a “tree” system. With buildout of St. James’s Village, the entire development will meet current Nevada Administrative Code requirements and TMWA requirements that will yield a robust water system that does not now exist due to the antiquated tree system. Regarding sanitary sewer, the Landowner has completed a 30% design of the Reach IV Pleasant Valley Interceptor and plans to commence construction of the interceptor line by Fall of 2026. When originally approved, the project was able to use interim septic systems until public sewer became available to the project. All existing lots have a dry sewer line to the homes that will allow all St. James’s Village homeowners to hook up to public sewer once said public sewer extends west of the I-580 freeway into St. James’s Village. Northern Nevada Public Health policies and standards no longer allow septic systems on lots less than 5-acres, so the public sewer line is now required in order to record the next in a series of final maps. Based on the foregoing, the parties agree that it is in the public interest and welfare of the County and existing St. James’s Village residents to enter into this Agreement.

2. AGREEMENT CONCERNING DEVELOPMENT OF LAND.

2.1 Compliance with NRS 278.0201 and Washoe County Development Code. This Agreement is an agreement concerning the development of land under NRS 278.0201 and Article 814 of the "Code". The Landowner is the owner of fee title to the Property, and therefore has a legal interest in the Property. In compliance with NRS 278.0201(1), the following covenants, terms and conditions are set forth:

2.1.1. The land which is subject to this Agreement is approximately 1,161 acres in Pleasant Valley, more particularly described in Exhibit A: Legal Description.

2.1.2. This Agreement extends the time for recording the next Final Map in the series until October 16, 2027. Unless terminated earlier in accordance with section 2.1.4 or applicable law, the duration of this Agreement shall be until October 16, 2027, provided that all the terms of this Agreement shall remain binding and enforceable regarding construction or development commenced, and any related permits, on any portion of the Property subject to a tentative map, a recorded final map or any use permit in existence at the time of expiration of this Agreement. This Agreement also incorporates the Amended Conditions of Approval in Amendment of Conditions Case Number _____ for Tentative Subdivision Map Case Number TM-5-2-92 (St. James's Village), attached hereto as Exhibit B. The parties agree that these Amended Conditions of Approval (_____) are the operable conditions of approval and survive termination of this Agreement.

2.1.3. Further Extension. In the event construction of the Reach IV Sanitary Sewer Interceptor Line has commenced construction with bonds in place as required by Washoe County but has not progressed to allow the next Final Map to be recorded in Accordance with NRS 278.360 (1) (a) as may be determined by the Director of the Community Services Department, then the duration of this agreement as stated in Subsection 2.1.2, and the extension of the deadline to file the next in a series of final maps, as stated in Subsection 2.1.2 shall be further extended to October 16, 2029.

2.1.3. This agreement shall terminate and all conditions of approval for TM05-2-92 shall be in full force and effect upon recordation of the next Final Map. Changes in federal, state or county law concerning public health, safety or welfare will apply to any final map or other permit. Future Final Maps must then be filed in accordance with NRS 278.360.

2.1.4. The permitted uses on the Property and the density or intensity of its use, are as provided in the Tentative Map and the Code. The permitted use of the Property pursuant to the Tentative Map is for a 530-lot single-family dwelling residential development on 1,626 acres, which complies with the Property's land use designation.

2.1.5. The maximum height and size of the proposed buildings will comply with the Tentative Map.

2.1.6. The provisions for the dedication of any portion of the Property for public use are as provided in the Tentative Map and the Code.

2.1.7. Terms and conditions relating to construction and financing of necessary public improvements and facilities are in accordance with and as provided for in the Tentative Map and the Code, and will also be in accordance with any subdivision improvement agreements for future Final Maps.

2.1.8. Phasing and deadline dates for project grading and development with information on required bonding or other acceptable guarantees of performance and completion required by the Code for each development phase or stage will be addressed with the submittal of each Final Map.

2.1.9 The next Final Map shall be a minimum of five residential lots, and shall be recorded on or before the date of expiration of this Agreement. All successive Final Maps, if the Landowner chooses to record in a series, must include a minimum of five residential lots. Unless otherwise provided herein, the deadlines for any future Final Maps shall be governed by NRS 278.360.

2.1.10 Development standards for the Project are set forth in the amended conditions of approval and the conditions of the Tentative Map as referenced in section 2.1.2 of this development agreement, attached hereto as Exhibits B and C, and future Final Maps.

2.2 Code and Changes to the Law. The parties agree that changes in federal, state or county law concerning public health, safety or welfare will apply to any Final Map or other permit.

2.3 Public Notice. Any and all public notices required to be given in connection with this Agreement shall be given in accordance with Section 110.814.25 of the Code.

2.4 Assumption of Risk. The Landowner acknowledges and agrees that the Landowner is proceeding voluntarily and at its own risk in entering into this Agreement and without advice, promises or guarantees of any kind from the County, other than as expressly set forth herein. The Landowner waives any claims for damages against the county that might arise out of, or relate to, a subsequent court determination that this Agreement or any provision in it is invalid and/or unenforceable, including any claim based on NRS 278.0233(1) regarding the requirements, limitations, or conditions imposed pursuant to this Agreement.

2.5 Default and Termination of Agreement. This Agreement shall become null and void, in the event of noncompliance with any term or deadline set forth in this Agreement if the breaching party fails to fully cure such noncompliance after reasonable written notice and opportunity to cure, and all proceedings concerning the Tentative Map shall be terminated , provided that all the terms of this Agreement shall remain binding and enforceable regarding construction or development commenced, and any related permits, on any portion of the Property subject to a tentative map, a recorded final map or any use permit in existence at the time of termination of this Agreement.

3. MISCELLANEOUS PROVISIONS.

3.1 Time is of the Essence. Time is of the essence of this Agreement.

3.2 Waivers. No waiver of any breach of any covenant or provision herein contained shall be deemed a waiver of any preceding or succeeding breach thereof, or of any other covenant or provision herein contained. No extension of time for performance of any obligation or act shall be deemed an extension of time for performance of any other obligation or act except those of the waiving party, which shall be extended by a period of time equal to the period of the delay.

3.3 Assignability of the Agreement. This Agreement shall be binding upon and inure to the benefit of all future successors in interest of the Property as described in Exhibit A (Legal Description), and the successor shall assume the duties and obligations under this Agreement.

3.4 Entire Agreement. This Agreement is the final expression of, and contains the entire agreement between, the parties with respect to the subject matter hereof and supersedes all prior understandings with respect thereto.

3.5 Governing Law. The parties hereto acknowledge that this Agreement has been negotiated and entered into in the State of Nevada. The parties hereto expressly agree that this Agreement shall be governed by, interpreted under, and construed and enforced in accordance with the laws of the State of Nevada and venue for any action shall be solely in state district court for Washoe County, Nevada.

3.6 Days of Week. If any date for performance herein falls on a Saturday, Sunday or holiday, pursuant to the laws of the State, the time for such performance shall be extended to 5:00 p.m. on the next business day.

3.7 Written Amendments. Amendments to this Agreement, if any, shall be approved as provided in NRS 278.0205.

3.8 Future Cooperation. Each party shall, at the request of the other, at any time, execute and deliver to the requesting party all such further instruments as may be reasonably necessary or appropriate in order to effectuate the purpose and intent of this Agreement.

3.9 Third Party Beneficiary Rights. This Agreement is not intended to create any third-party beneficiary rights in any person not a party hereto.

3.10 Interpretation. The parties hereto acknowledge and agree that each has been given the opportunity to review this Agreement with legal counsel independently. The parties have equal bargaining power and intend the plain meaning of the provisions herein. In the event of an ambiguity in or dispute regarding the interpretation of the Agreement, the interpretation of this Agreement shall not be resolved by any rule of interpretation providing for interpretation against the party who causes the uncertainty to exist, or against the draftsmen.

3.11. Counterparts. This instrument may be executed in two or more counterparts, which, when taken together, shall constitute one and the same instrument. Any signature page of this instrument may be detached from any counterpart without impairing the legal effect of any signatures thereon, and may be attached to another counterpart identical in form thereto, but having attached to it one or more additional signature pages.

[Signatures appear on following page]

[Signature page to Development Agreement]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date above last written below.

LANDOWNER:

ST. JAMES'S VILLAGE, INC., a Nevada CORPORATION

By: _____

Date: _____

Name: _____

Title: _____

COUNTY:

COUNTY OF WASHOE, a political subdivision of the State of Nevada, by its BOARD OF WASHOE COUNTY COMMISSIONERS

By: _____
_____, Chair

Date: _____

ATTEST:

_____, County Clerk

STATE OF NEVADA)
)ss.
COUNTY OF WASHOE)

 This instrument was acknowledged before me on _____, 202____, by
_____ as a _____ of St. James's Village, Inc., a Nevada corporation.

My Commission Expires: _____

STATE OF NEVADA)
)ss.
COUNTY OF WASHOE)

 This instrument was acknowledged before me on _____, 202____, by
_____, as Chair of the Washoe County Commission, County of Washoe.

Notary Public
My Commission Expires: _____

Exhibit “A

LEGAL DESCRIPTION OF PROJECT PROPERTY

DESCRIPTION
FOR
ST. JAMES'S VILLAGE DEVELOPMENT AGREEMENT

All those portions of Sections 13 and 14 lying west of the westerly right of way line of Interstate 580, T.17N., R.19E., M.D.M.;
Excepting therefrom all those areas within the following the recorded maps:
Tract Maps 3155, 3261, 3404, Parcel Maps 3243 and 3244, Tract Maps 3602, 3883, 4123, 4396, 4551, and 5331.

Exhibit “B”

Amended Conditions of Approval
(Amended Conditions of St. James’s Village Tentative Subdivision Map Case Number
TM5-2-92 approved on appeal by the Washoe County Commission on July 10, 2007)

Exhibit “C”

Amended Conditions of Approval
(Amendment of Conditions Case Number WAC23-0013 for Tentative Subdivision Map
Case Number TM-5-2-92 (St. James’s Village)

Draft TMWA Discovery

1355 Capital Blvd. • P.O. Box 30013 • Reno, NV 89520-3013
P 775.834.8080 • F 775.834.8003

Dear Ken,

Thank you for your Annexation and Discovery application, which included a cover letter giving context for the Project's details and goals.

TMWA's Discovery report attached includes a plan for water service to the Projects that complies with TMWA standards and Nevada Administrative Code (NAC) requirements. The Discovery report is extensive and I wanted to address a few of your questions and comments from your cover letter herein as to not confuse the technical aspects of the Discovery report and figures.

Your plan to extend a reclaimed water line to the Project is admirable to reduce overall water consumption in parks and common area landscaping. However, your cover letter inaccurately claims that the Sunrise Estates water system serves Pleasant Valley Elementary School. To the contrary, the school has its own domestic well for water service. As such, your stated plan to offset capacity for use by Sierra Reflections will not complete the stated goals. To that end, as we've indicated before, the Sunrise Estates system does not meet NAC or TMWA standards and has no capacity for additional lots without the system improvements detailed in the Discovery report. TMWA has considered the phased buildout of the Project and determined what can be phased for the infrastructure, as well as for water service to the phases.

As your team reviews the attached Discovery, we are available to answer questions and review the findings as they are incorporated into the Annexation agreements for the projects.

Sincerely,



Danny



TO: Tasha Ehlers

DATE: March 27, 2025

THRU: David Kershaw & Danny Rotter

FROM: Brooke Long

RE: **DISCOVERY: Sierra Reflections Discovery**
TMWA WO# 24-0113

PURPOSE:

The purpose of this Discovery (Project) is to present a water service plan, including the off-site water facility requirements and the associated cost opinions for both the Sierra Reflections and Saint James Village developments.

DISCUSSION:

The Discovery includes a phased water service plan for the Sierra Reflections development and a buildout water service plan for the Saint James Village development. Both developments will require annexation prior to water service. The proposed Sierra Reflections Project includes a 940-unit single family residential subdivision within a total area of 760 acres.

The proposed Saint James Village development includes a 228-unit single family residential subdivision on approximately 380 acres. Both developments are located within Washoe County.

The water service plan identified in this Discovery includes an extension of the existing Saint James Village system to both developments including off-site and major on-site water facilities and supply improvements to provide a long-term reliable water service. The developments can be supplied from on site wells with the expansion of TMWA's regional conjunctive use water system, which would include TMWA's Charge Area 15.



Two previous Discoveries (2015 and 2021) have been prepared for the Saint James Village (TMWA Project Numbers 21-8275 and 15-4264) and are attached. The previous water service plan remains essentially the same for this plan. The same parcel map was used. Of note is that TMWA's water demand factors have changed, slightly reduced, since the previous Discovery. Saint James Village includes units in an area to be developed and developed lots yet to be constructed that would be included within the existing development.

Saint James Village General Requirements

Saint James Village on-site improvements, in the area to be developed, include distribution mains and pressure regulating stations. Other planned facilities, within the existing Saint James Village development, include two new production wells capable of adequate Aquifer Storage and Recovery (ASR) and looping mains. Looping improvements within existing Saint James Village are required to bring into compliance existing system deficiencies and resolve reliability issues including radial mains and fire flow limitations. The proposed facilities (particularly any phased facilities) within Saint James Village that will convey supply to either development should bring into compliance existing deficiencies and not worsen existing system deficiencies. Pursuant to Nevada Administrative Code 445A.66655.2.b, a supplier of water "Shall not provide any customer with a service connection to the public water system unless the public water system is in compliance with the applicable provisions of NAC 445A.65505 to 445A.6731, inclusive, both before and after the service connection is provided."

Sierra Reflections General Requirements

Sierra Reflections can be supplied by extending the Saint James Village infrastructure under Interstate 580 to the Sierra Reflections Development. Sierra Reflections on-site improvements include dual storage tanks, distribution mains, pressure regulating stations, two production wells capable of adequate aquifer storage and recovery (ASR wells) and associated monitoring wells. The location of the two production wells capable of adequate ASR, will need to be investigated and the feasibility for the purpose must be justified by the Project proponent pursuant to the requirements specified within this Discovery.

Location

The Sierra Reflections and Saint James Village developments are adjacent although separated by I-580. Saint James Village is situated above I-580 and Sierra Reflections below I-580. The locations of the two developments are shown on Figure 1. Project parcels are listed in Tables 1 and 2. Developments are shown in Figure 1.

Sierra Reflections consists of 760-acres located between I-580 and Old US 395 (near the Galena Creek Bridge). Supply to Sierra Reflections will be provided by a continuation of the Saint James Village water system from above. The lowest pressure zone in Sierra Reflections will connect to the Sunrise Estates water system. The Project is outside

TMWA's retail service boundary and annexation of the Project will be required prior to service, which will include expanding TMWA's current Area 15 to cover the Project. The Project terrain is challenging because the proposed service elevations range from nearly 500-ft and from 4800-ft to 5270-ft. In addition, the Steamboat Creek and Browns Creek cut through the Project, presenting topographic challenges. The maximum allowable slope of installed pipe is 10%, and the creek crossings themselves will require special construction.

The proposed Saint James Village portion of the Project includes 370 acres on vacant land. The lot layout from the previous TMWA Discovery (15-4264) was used in this Discovery.

Table 1. Sierra Reflections Parcels

COUNT	APN	ACRES
1	046-100-10	5.43
2	046-090-01	0.80
3	046-060-55	54.98
4	046-090-13	2.96
5	046-090-14	0.99
6	046-090-04	5.00
7	046-090-17	5.00
8	046-090-26	154.82
9	046-090-05	5.00
10	046-090-16	0.18
11	046-060-47	23.63
12	046-090-18	5.00
13	046-100-02	40.00
14	046-060-45	185.18
15	046-090-24	1.10

COUNT(cont.)	APN	ACRES
16	046-100-04	36.00
17	046-100-07	146.66
18	046-090-10	4.44
19	046-090-12	5.00
20	046-090-23	0.91
21	046-090-11	5.00
22	046-090-09	4.40
23	046-090-08	5.00
24	046-090-07	5.00
25	046-080-40	15.29
26	046-090-15	0.87
27	046-090-06	5.00
28	046-100-03	19.45
29	046-090-25	16.56

Total Sierra Reflections Acreage = 759.95 Acres

Table 2. Saint James Village Parcels

COUNT	APN	ACRES
1	156-040-09	57.02
2	156-111-23	19.48
3	156-040-15	85.82
4	046-180-14	7.97
5	156-040-14	175.21
6	156-141-04	34.26

Total Saint James Acreage = 379.76 Acres

Existing Saint James Village System Configuration:

The existing Saint James Village water system is laid out in a tree configuration, with a single arterial main that decreases in diameter over its length, which has various mains of smaller diameter connected to it. This system was designed and installed for a prior water utility and was not reviewed or approved by TMWA. TMWA received the Saint James Village water system in its existing condition during the Washoe County merger. This existing system design and layout is contrary to TMWA design standards (section 1.1.06) and does not comply with Nevada Administrative Code. For example, Nevada Administrative Code section 445A.6712 requires systems to be designed, to the extent possible, to eliminate dead ends and for a system of arterial loops. Tree systems are prohibited except as justified by an engineer. Based on TMWA's engineering opinion and reasonable utility discretion, TMWA will not support a request for variance from these standards from the Bureau of Safe Drinking Water or Washoe County Health District because perpetuating or extending system layouts contrary to TMWA design standards and/or the Nevada Administrative Code is not in the best interests of public health and safety or prudent utility operations.

Sound engineering grounds support this position, including the following. The lack of looping greatly increases the chance of pressure loss in the water system during main breaks and leaks. Loss of pressure in the system may result in potential contamination of the system due to the introduction of foreign material. Therefore, the lack of looping in the existing water system is a potential public health issue. TMWA's design standards (section 1.1.06.06) recognize dead ends are sometimes unavoidable but limit the length to 800 feet. This is the maximum radial main length that the Health District has accepted in the past and is the maximum radial main length TMWA will accept. Additionally, the lack of looping and existing main sizes significantly limits the available fire flow for existing and future units in the development. Insufficient fire flows in remote and/or wildland urban interface environments create additional public health and safety issues. The existing Saint James Village system far exceeds this maximum (>6,000 feet for one branch) and extending this existing non-compliant system to new services cannot be allowed (See NAC 445A.66655.2.b) without modifications or mitigation measures to resolve the issues and protect public health and safety. The purpose and intent of prudent water system design is not just to move water from point A to point B; it is to ensure protection of water quality, quantity, and system pressure and to provide system redundancies in the interests of public health and prudent utility operations, including for fire protection.

Water Supply:

Sierra Reflections - The planned Sierra Reflections supply is from two (2) new production wells, capable of adequate ASR, within the Sierra Reflection tanks pressure zone. It is assumed the ASR, would replenish the groundwater basin during winter months to maintain the long-term sustainability of the groundwater supply. ASR would continue in perpetuity. It is assumed that the two Sierra Reflections production wells will supply the Project's

maximum day demand (MDD). If construction of the ASR production wells is not viable per the conditions/criteria below, then additional water supply infrastructure will be required.

Saint James Village - The planned Saint James Village buildout maximum day demand supply will be from two new production wells capable of ASR, with a nominal pumping capacity of 350 gpm each, or to meet MDD. Like Sierra Reflections, these wells would be replenished during winter months and used during the next summer with continued practice in perpetuity to sustainably manage the area groundwater. The proposed Saint James Village well (and monitoring well) locations are proposed in the vicinity of each existing Saint James 1 Well and Saint James 2 Well sites.

Groundwater levels in the South Truckee Meadows have declined over 70 feet since the 1960s due to unsustainable pumping rates. In 2015 when TMWA took over the existing system from Washoe County, TMWA implemented conjunctive management in the area and only recently have water levels begun to stabilize. Depletion of groundwater poses challenges for municipal and domestic well owners and threatens the reliability of previously dedicated water supplies. Careful groundwater management is necessary to alleviate these issues, which would further threaten municipal water reliability. When determining water supply dedication, it is crucial to assess potential dedicated groundwater resources through the lens of long-term sustainability.

To address groundwater management challenges, TMWA actively monitors groundwater levels using data from its staff, the Nevada State Engineer, and various studies. Additionally, TMWA has developed detailed groundwater flow models to evaluate the long-term sustainability of the aquifer. These efforts have shown that maintaining groundwater quantity, quality, drought resilience, and operating within the sustainable yield requires the integrated management of both surface and groundwater resources. To secure future water supplies, aquifer storage and recovery projects using surface water are essential.

The Applicant will be responsible to verify that the local hydrogeology is conducive to the required recharge and yield requirements for the Project, meet water quality standards at required production rates that meets drinking water standards, and to obtain an ASR permit from Nevada Division of Water Resources, permit in addition to other necessary permits. Applicant should be advised that these efforts may require, but are not limited to, geophysical surveys, test well construction, monitoring well construction, prolonged pump tests, prolonged recharge tests, water quality testing, and public hearings for permitting.

The requirements for the Project production wells, capable of ASR for both Saint James Village and Sierra Reflections are as follows:

- Sustainable production capacity equal to or greater than the overall Project's MDD.
- On-site production wells, with all necessary recharge appurtenances, capable of pumping directly to the proposed Project tanks.
- Water quality that will not require water treatment to meet all drinking water standard.

- Dedication of suitable land for the production wells, monitoring wells and a future replacement well at each site.
- Dedication of easements for ASR-related monitoring wells.
- Approval and permitting by all necessary regulatory agencies for the ASR.
- Adequate ASR means able to inject yearly water rights dedication for each Project.
- The wells shall discharge directly to their respective tank zones.
- Standby power (generators) required.

Water Rights and Easements

Sierra Reflections: There are no resource credits appurtenant to these properties. However, according to the State of Nevada Division of Water Resources (NDWR), there are portions of Truckee River or Creek decreed water rights (Washoe/Upper Steamboat Creek) associated with some of these properties. Yield of these rights are unknown at the time of this Discovery. The developer will be required to follow TMWA's current rules, specifically Rule 7, and pay all fees for water rights needed to obtain a will serve commitment letter.

Based on the information provided by the applicant this Project is estimated to require a domestic demand of approximately 290 acre-feet (AF). This number is an estimate based on current plans. There were no landscaping or amenity plans provided to TMWA for additional demand estimates. Once final plans are submitted a more accurate demand will be calculated. This annexation approval will be within the expanded Area 15 area and will rely on supplemental surface water. Supplemental surface water rights are required for issuing will serve's based on the Project's groundwater rights. The applicant could dedicate its own Whites Creek surface water rights for dedication to TMWA and receive a reduced Area 15 fee, or it could pay the full Area 15 fee which includes an allotment for TMWA to obtain additional Whites Creek rights.

Any existing right-of-ways and public utility easements would need to be reviewed, and if needed the property owner will need to grant TMWA the proper easements and/or land dedications to provide water service to the subject properties. Property owner will be required, at its sole expense, to provide TMWA with a current preliminary title report for all subject properties. Owner will represent and warrant such property offered for dedication or easements to TMWA shall be free and clear of all liens and encumbrances. Owner is solely responsible for obtaining all appropriate permits, licenses, construction easements, subordination agreements, consents from lenders, and other necessary rights from all necessary parties to dedicate property or easements with title acceptable to TMWA.

MAJOR WATER FACILITIES AND COST OPINION

Conceptual water service plans for both developments have been prepared and appear in Figures 2 through 8. A cost opinion for the major off-site and on-site improvements for Sierra Reflections and Saint James Village developments are included in Table 3.

The Projects discussed in this Discovery are required to bring into compliance the existing system deficiencies and allow expansion of the system. The plan also includes proposed development infrastructure described below:

Off-site Improvements

The planned off-site improvements will convey the additional water supply required to serve the entire Project demand through conjunctive use management of groundwater supply and surface water supply (Mt. Rose Water Treatment Plant). This is consistent with the overall conjunctive use strategy for the area. Additionally, the improvements should be capable of providing short-term system supply redundancy in the event of a mechanical failure of the Project's wells. Saint James' reliability improvements that are also required for the Sierra Reflections supply are identified as *shared facilities* in Table 3.

A SCADA controlled pressure reducing station (PRS) located at the intersection of Austrian Pine Rd Joy Lake Rd is planned. The PRS will facilitate a regulated supply of water to the Saint James Village system from TMWA's regional conjunctive use system and extend the supplemental supply to both of the projects for long term sustainability. Project supplies and demands are summarized in Table 4.

The Project will be subject to TMWA WSF charges applicable to Charge Area 15 (currently \$16,039). Pursuant to TMWA's Rules, the Area 15 Charge may be reduced to \$11,677 per MDD GPM if the Applicant dedicates an acceptable combination of groundwater and creek water rights to satisfy supplemental conjunctive use supply as determined by the Authority.

Table 3. Project Major Facilities and Cost Opinion

Shared Facility ^(A)	Figure	Facility Description	Qty	Unit	Unit Cost	Total Cost
SIERRA REFLECTIONS PHASE 1						
yes	3,8	Off-site SCADA PRS at Joy Lake Rd and Austrian Pine	1	Each	\$250,000	\$250,000
yes	3,8	SJ Dual Zone PRS, from SJ 1 Tank to SJ 3 PRS	1	Each	\$200,000	\$200,000
yes	3,8	SJ Looping Main 1, 8" from Joy Lake Rd to Dual PRS	5,580	\$/ft	\$200	\$1,116,000
yes	3,8	SJ Looping Main 2, 8" from Dual PRS to St James Pkwy	2,500	\$/ft	\$200	\$500,000
yes	3,8	SJ Looping Main 3, 8" from Dual PRS to St James Pkwy	1,290	\$/ft	\$200	\$258,000
no	3,8	12" Diameter Offsite Main (SJ TO SR)	900	\$/ft	\$300	\$270,000
no	3,8	PRS (SCADA), SJ 3 Reg zone to SR	1	Each	\$250,000	\$250,000
no	3,8	Dual Tanks (375,000 gallons each)	750,000	gallon	\$3	\$2,250,000
no	3,8	12" Tank main	7,800	\$/ft	\$300	\$2,340,000
no	3,8	1st ASR Well & Standby Generator	1	Each	\$4,000,000	\$4,000,000
no	2,3	PRS (SCADA), from SR 1 Tnk zone to Sunrise	1	Each	\$250,000	\$250,000
n/a	n/a	Area 15 Facility Charge	11.2	MDD GPM	\$16,039	\$179,637
Phase 1 Subtotal						\$11,863,637
SIERRA REFLECTIONS PHASE 2						
no	4	PRS	1	Each	\$175,000	\$175,000
no	4	PRS (SCADA)	1	Each	\$225,000	\$225,000
no	4	2nd ASR Well & Standby Generator	1	Each	\$4,000,000	\$4,000,000
n/a	n/a	Area 15 Facility Charge	139.7	MDD GPM	\$16,039	\$2,240,648
Phase 2 Subtotal						\$6,640,648
SIERRA REFLECTIONS PHASE 3						
no	5	PRS, Dual Zone	1	Each	\$250,000	\$250,000
n/a	n/a	Area 15 Facility Charge	236.5	MDD GPM	\$16,039	\$3,793,224
Phase 3 Subtotal						\$4,043,224
SIERRA REFLECTIONS PHASE 4						
	6	PRS	4	Each	\$175,000	\$700,000
n/a	n/a	Area 15 Facility Charge	66.6	MDD GPM	\$16,039	\$1,068,197
Phase 4 Subtotal						\$1,768,197
SIERRA REFLECTIONS PHASE 5						
no	7	PRS	1	Each	\$175,000	\$175,000
n/a	n/a	Area 15 Facility Charge	80.5	MDD GPM	\$16,039	\$1,291,140
Phase 5 Subtotal						\$1,466,140
SAINT JAMES VILLAGE						
no	8	SJ Looping Main 4, 8" from Dual PRS to SJ 3 PRS	560	\$/ft	\$200	\$112,000
no	8	SJ Looping Main 5, 8" from SJ 2 PRS to Joy Lake 3 PRS	2,730	\$/ft	\$200	\$546,000
no	8	SJ Looping Main 6, 8" SJ Tnk Zone looping	1,479	\$/ft	\$200	\$295,800
no	8	SJ Looping Main 7, 10" SJ Tnk Zone Looping	1,200	\$/ft	\$250	\$300,000
no	8	Double Check Valve at Timberlake Court Termination	1	Each	\$100,000	\$100,000
no	8	ASR Well & Standby Generator	2	Each	\$4,000,000	\$8,000,000
no	8	PRS (on-site)	5	Each	\$175,000	\$875,000
n/a	n/a	Area 15 Facility Charge	330.5	MDD GPM	\$16,039	\$5,300,890
Saint James Village Subtotal						\$15,529,690
Combined Total						\$41,311,535

A: "Shared Facilities" benefit/are required for both Sierra Reflections and Saint James.

B. All costs are the responsibility of the developer, unless otherwise noted.

C. No irrigation demand was included for this Project. For reference, 1AF of irrigation would equate to 1.7 gpm of MDD.

D. The cost opinion does not include onsite water mains, meters, meter assemblies, backflow devices, and any associated private fire loop for the Project.

E. The Area 15 Charge may be reduced to \$11,677 per MDD GPM upon Applicant dedication of an acceptable combination of groundwater and creek water rights to satisfy supplemental conjunctive use supply as determined by the Authority.

F: All facilities, except for the wells, would be permitted, designed (such design to be approved by TMWA), and built by the developer and then dedicated to TMWA. Per TMWA rules, TMWA would perform the design and contract the construction of the Wells.

Table 4. Supply and Demand Summary

	Saint James Village	Sierra Reflections
Project Supplies	Supply (gpm)	Supply (gpm)
(P) ASR Well(s) Max Day Supply	700	540
Total Supply	700	540
Project Demands	MDD (gpm)	MDD (gpm)
Future	330.5	534.5
Existing	207	0
Infill	122	0
Total MDD	659.5	535.0
Net Supply (supply-demand)	41	5

Project Maximum Day Demands

The Sierra Reflections development's estimated total maximum day demand (MDD) is 534.5 gpm (Table 5). Irrigation demands are unknown and not included in this Discovery.

The Saint James Village estimated total MDD is estimated at 659.5 gpm.

- The estimated MDD for the proposed development is 330.5 gpm (228 SFR units).
- The existing MDD for Saint James Village is on the order of 207 gpm.
- The estimated MDD for committed unbuilt lots is estimated at 122 gpm.

Table 5. Sierra Reflections Project Demands

Product Type	Average Lot Size (SF)	No. Lots	MDD (gpm)	ADD (gpm)	Phase
One Acre Lots along Pagni Lane					
1-Acre Lots	43,560	8	11.2	5.3	Phase 1
Subtotal		8	11.2	5.3	
Meadow Lots					
Patio Homes	2,500	106	31.8	14.9	Phase 2
50' X 100' Lots	5,000	112	56	26.3	Phase 2
60' X 110' Lots	6,000	36	18	8.5	Phase 2
70' X 100' Lots	7,903	11	6.6	3.1	Phase 2
80' X 140' Lots	12,080	39	27.3	12.8	Phase 2
Subtotal		304	139.7	65.6	
Southeast Portion of Site					
45' X 110' Lots	5,000	121	60.5	28.4	Phase 3
60' X 110' Lots	6,600	96	48	22.5	Phase 3
70' X 120' Lots	9,676	64	38.4	18.0	Phase 3
80' X 140' Lots	11,594	28	19.6	9.2	Phase 3
70' X 140' Lots	12,433	100	70	32.9	Phase 3
Subtotal		409	236.5	111.0	
Western Lots					
80' X 120' Lots	9,600	83	49.8	23.4	Phase 4
1/3 acre min	16,192	21	16.8	7.9	Phase 4
1/4 acre min	12,154	115	80.5	37.8	Phase 5
Subtotal		219	147.1	69.1	
Total		940 lots	534.5 gpm	213.1 gpm	

Storage Capacity

Dual equally sized water storage tanks are proposed for the Sierra Reflections Project. The proposed tank site is on the Project property at a pad elevation of 5365-ft (see Figure 2). The required storage volume is 750,000 gallons (Table 6). Having an active tank will be critical for the operation of the proposed system. Thus, twin tanks are planned which will keep a tank in service when the other tank is offline for maintenance or other reasons.

The existing Saint James 1 Tank has sufficient existing storage to accommodate the Saint James Village buildout requirement.

Table 6. Sierra Reflections Project Storage

Product Type	Operating Storage (Gallons)	Emergency Storage (Gallons)	Fire Storage (Gallons)	Phase
One Acre Lots along Pagni Lane				
1-Acre Lots	2,419	7,572	240,000	Phase 1
Subtotal	2,419	7,572		
Meadow Lots				
Patio Homes	6,869	21,499	240,000	Phase 2
50' X 100' Lots	12,096	37,859		Phase 2
60' X 110' Lots	3,888	12,169		Phase 2
70' X 100' Lots	1,426	4,462		Phase 2
80' X 140' Lots	5,897	18,456		Phase 2
Subtotal	30,175	94,445		
Southeast Portion of Site				
45' X 110' Lots	13,068	40,901	240,000	Phase 3
60' X 110' Lots	10,368	32,451		Phase 3
70' X 120' Lots	8,294	25,961		Phase 3
80' X 140' Lots	4,234	13,251		Phase 3
70' X 140' Lots	15,120	47,324		Phase 3
Subtotal	51,084	159,887		
Western lots				
80' X 120' Lots	10,757	33,668	240,000	Phase 4
1/3 acre min	3,629	11,358		Phase 4
1/4 acre min	17,388	54,423		Phase 5
Subtotal	31,774	99,448	240,000 gal	
Totals	115,452 gal	361,352 gal	240,000 gal	
Grand Total Project Storage (Rounded Up)			716,804 gal	
			750,000 gal	

Project Pressures

Predicted Project pressures for the Saint James Village and the Sierra Reflections developments are shown in Figures 2 through 8.

A total of seven pressure zones are required for the Sierra Reflections development to comply with TMWA design pressure criteria summarized in the assumptions section of this report.

Individual pressure reducing valves are required to be installed on water services that are greater than 80 PSI or are within a pressure regulating zone. If the water service is a combined fire and domestic service, pressure regulating valves may need to be installed

downstream of the fire service tee, installation of the pressure reducing valves on any fire line shall be reviewed by the fire contractor.

Dead Ends and Looping

Nevada Administrative Code section 445A.6712 requires systems to be designed, to the extent possible, to eliminate dead ends. The water service plan identified in this Discovery meets the dead end and looping requirements.

Fire Flows

Fire flow requirements are established by the fire department. The assumed fire flow requirement for the Sierra Reflections development requirement is 2,000 gpm for two hours. The proposed facility improvements identified in this Discovery can convey estimated maximum day demands and provide up to 2,000 gpm fire flow for 2 hours while maintaining a residual pressure greater than 20 psi.

For Saint James Village the assumed fire flow requirement for this Project provided by the applicant in the previous Discovery (21-8275) was 2,500 gpm for two hours. Fire sprinkler systems may reduce the required fire flow as approved by the fire authority. The proposed facility improvements identified in this Discovery can convey estimated maximum day demands and provide up to 2,500 gpm fire flow for 2 hours while maintaining a residual pressure greater than 20 psi.

ASSUMPTIONS:

1. The applicant shall be responsible for all application and review fees in effect at the time of application submittal. The applicant is responsible for all inspection fees, permit fees, easements, Area Fees and Facility Charges in effect at the time the Project is approved by TMWA and the Water Service Agreement is issued. The Water Service Agreement must be executed and all fees paid within 60 days of agreement issuance.
2. The cost opinions contained herein do not include new business fees, cost of water rights specific to this area, sustainability fees and related fees.
3. Project pressure criteria are:
 - a. Maximum day pressure of 45 pounds per square inch (psi) at building pad elevation with tank level at top of emergency storage,
 - b. Peak hour pressure of 40 psi at building pad elevation with tank level at top of emergency storage, and
 - c. Maximum day plus fire flow pressure of 20 psi at center of street elevation with tank level at bottom of fire storage.
 - d. For new systems, unregulated distribution system pressures should not exceed 100 psi anywhere in the system. Individual water service pressure regulators are required for system service pressures over 80 psi and on all individual water services in regulated system pressure zones and pump zones.

4. A site grading plan with elevations was not provided by the applicant. Elevations used for this Discovery were derived from existing site topographic information.
5. Facility requirements for the Project are based on the assumed elevations, maximum day demand and fire flow requirements. Changes in elevation, demand or fire flow requirements may affect facility requirements.
6. Easements, permits and all pertinent Agency approvals shall be obtained by applicant for the design and construction of the water infrastructure necessary to serve the proposed Project.
7. All cost opinions are preliminary and subject to change. The costs presented in this study are planning level estimates based on the information available. Actual costs will be determined at the time of application for service and nothing in the foregoing cost opinions should be construed as a guaranty of cost or shall be binding on TMWA in any respect.
8. Future development (on or off-site) may alter the conclusions of this Discovery. Capacity in TMWA's system is available on a first-come, first-served basis, and commitment to provide service is not established until a contract for service is executed, all fees are paid, adequate resources dedicated and a will serve commitment issued in compliance with TMWA Rules.
9. Applicant shall comply with all applicable TMWA Rules and Regulations applicable to applications for new service.
10. Given the significant topographic relief in the vicinity of the Project, the applicant should be advised that TMWA design standards require roads that contain water facilities have a slope of 10% or less, and access roads containing TMWA water facilities with grades greater than 8% are required to be paved.

Review of conceptual site plans or tentative maps by TMWA does not constitute an application for service, nor constitute or imply a commitment by TMWA for planning, design or construction of the water facilities necessary for service, nor constitute or imply a commitment by TMWA to provide future water service. The extent of required off-site and on-site water infrastructure improvements will be determined upon TMWA receiving a specific development proposal or complete application for service and upon review and approval of a water facilities plan. After submittal of a complete Application for Service, the required facilities, the cost of these facilities, which could be significant, and associated fees will be estimated and will be included as part of the Water Service Agreement for the Project. All fees must be paid to TMWA prior to water being delivered to the Project.

Please contact Brooke Long (775-834-8104) with any questions or comments regarding this Discovery.

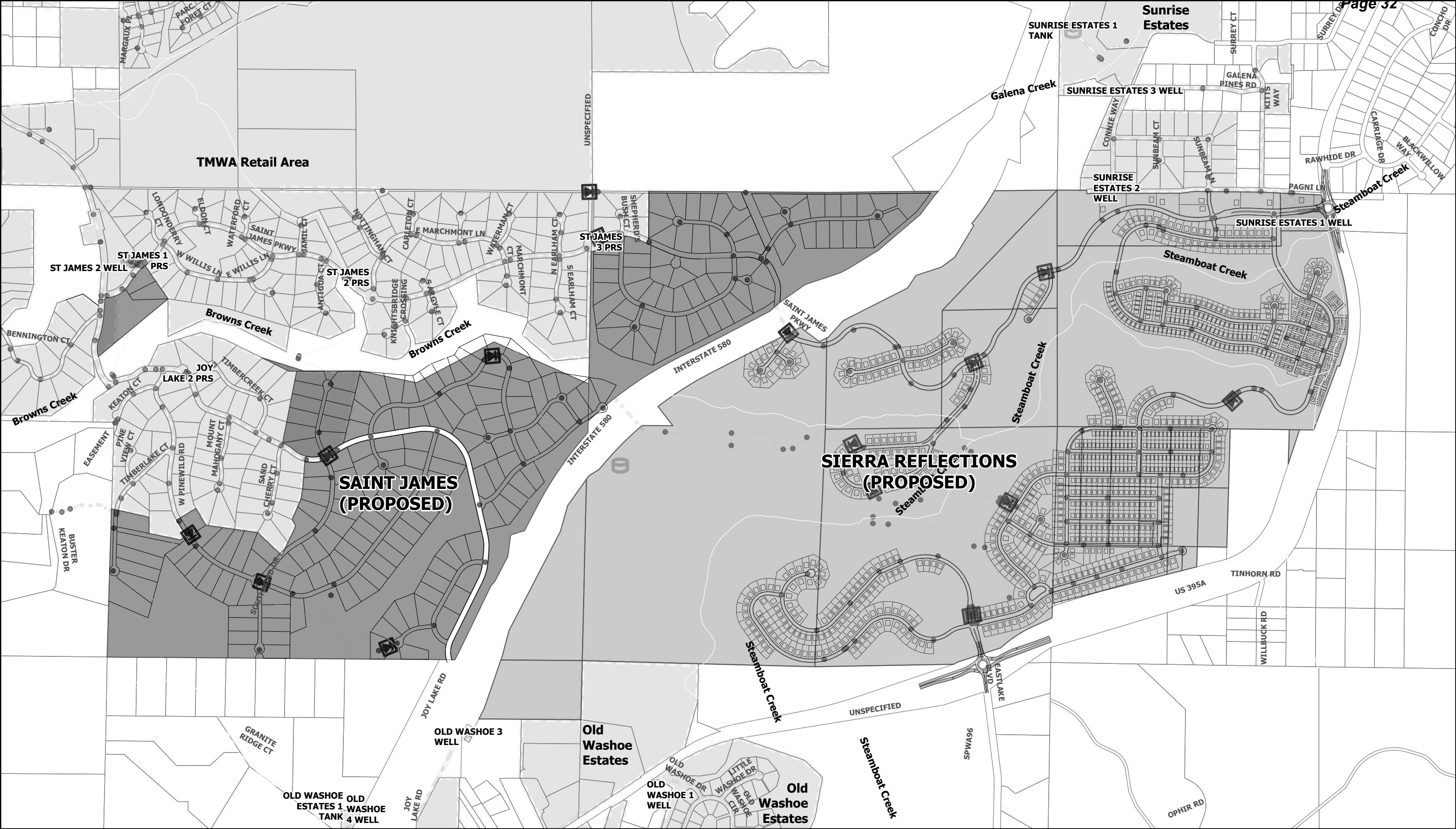
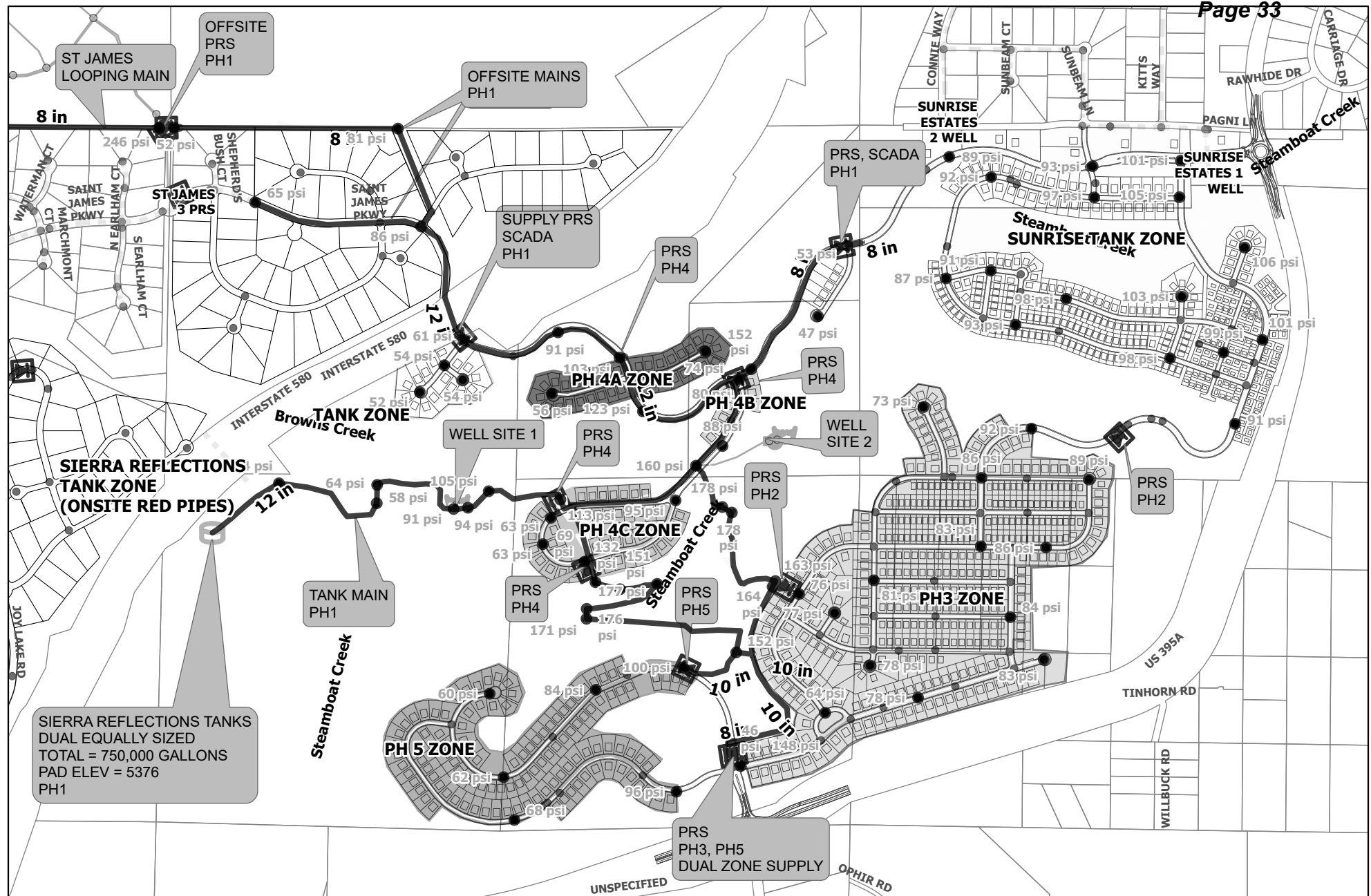


FIGURE 1
PROJECT LOCATION

DATE: 3/19/2025	NAD 83 NEVADA STATE PLANE WEST FEET
MAP BY: blong	
REQUESTED BY: NAME	
SCALE: 1 inch equals 1,000 feet	



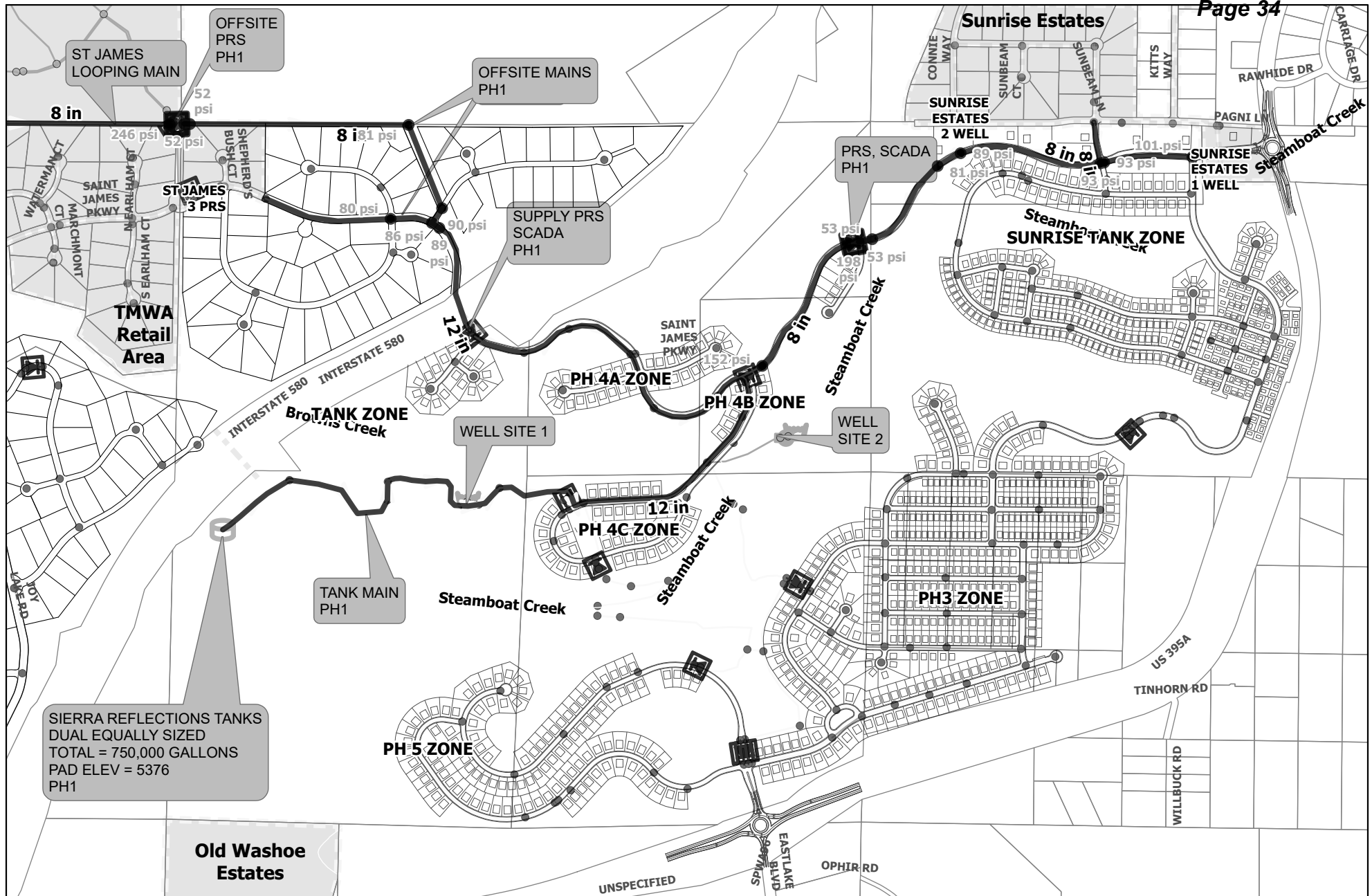


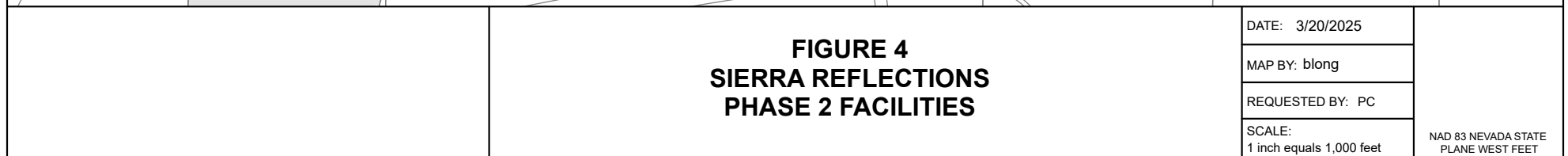
FIGURE 3
SIERRA REFLECTIONS
PHASE 1 FACILITIES

DATE: 3/20/2025

MAP BY: blong

REQUESTED BY: PC

SCALE:
1 inch equals 1,000 feetNAD 83 NEVADA STATE
PLANE WEST FEET



**FIGURE 4
SIERRA REFLECTIONS
PHASE 2 FACILITIES**

DATE: 3/20/2025

MAP BY: blong

REQUESTED BY: PC

SCALE:
1 inch equals 1,000 feet

NAD 83 NEVADA STATE
PLANE WEST FEET

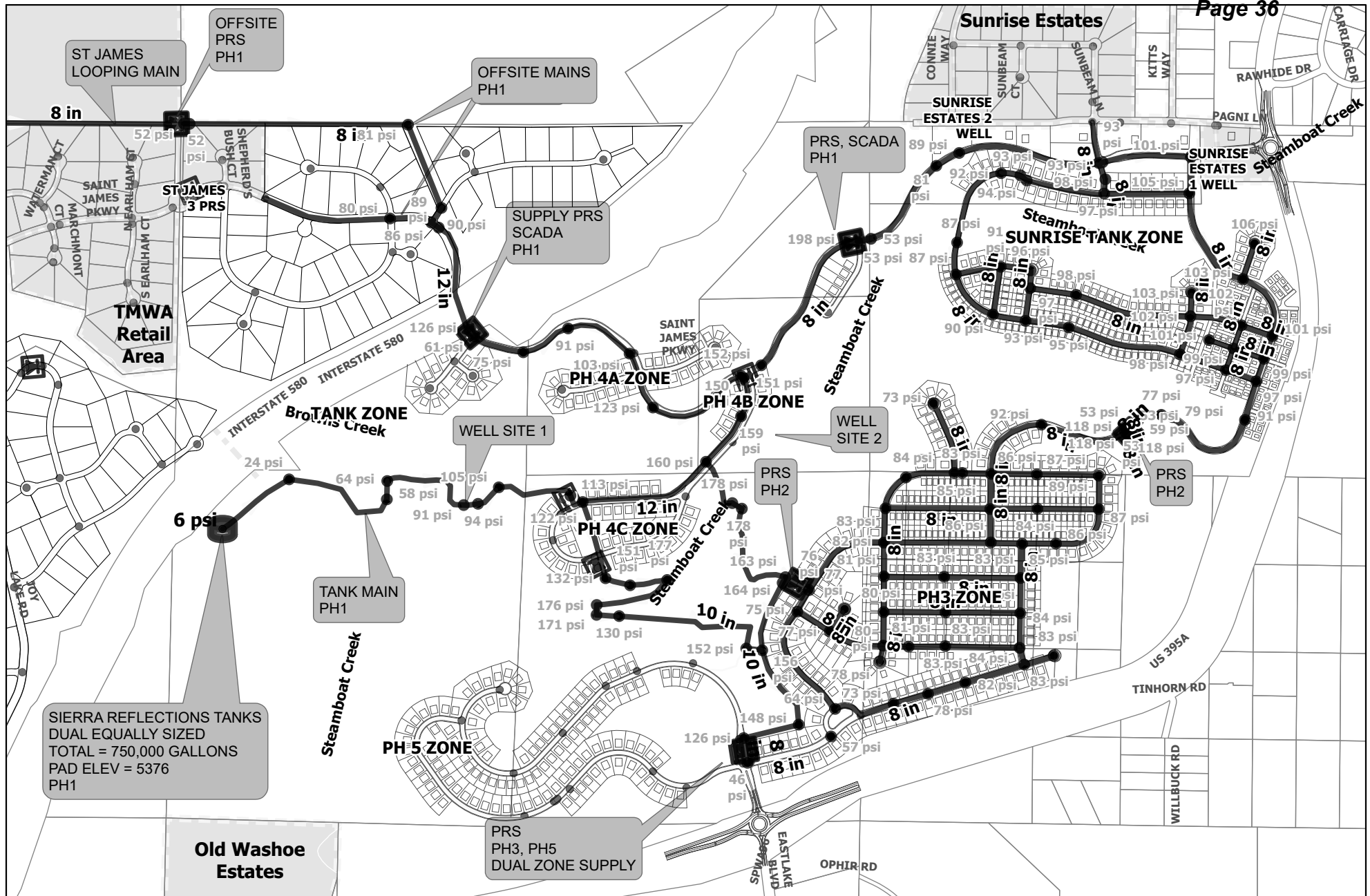


FIGURE 5
SIERRA REFLECTIONS
PHASE 3 FACILITIES

DATE: 3/20/2025

MAP BY: blong

REQUESTED BY: PC

SCALE:
1 inch equals 1,000 feetNAD 83 NEVADA STATE
PLANE WEST FEET

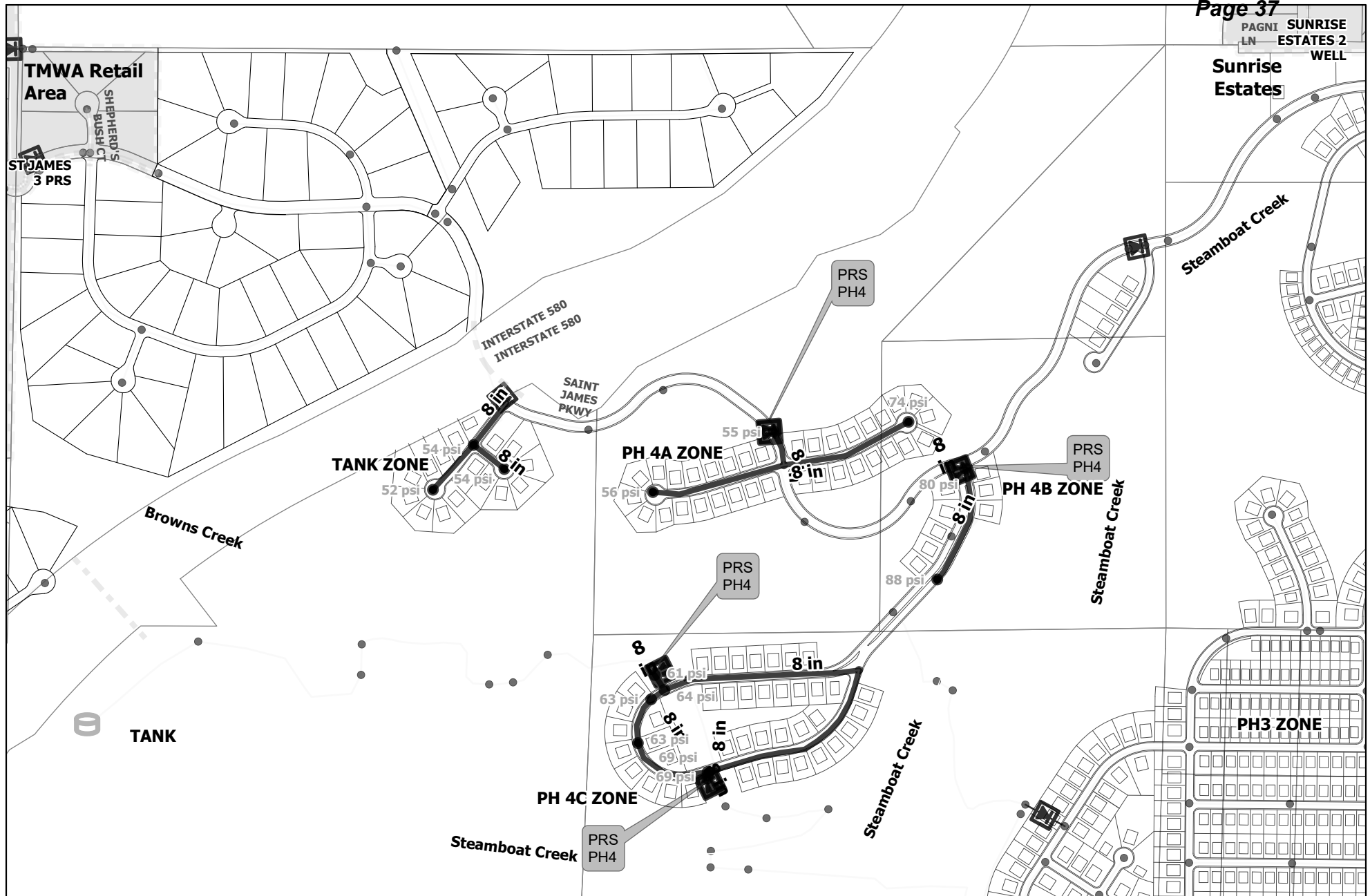


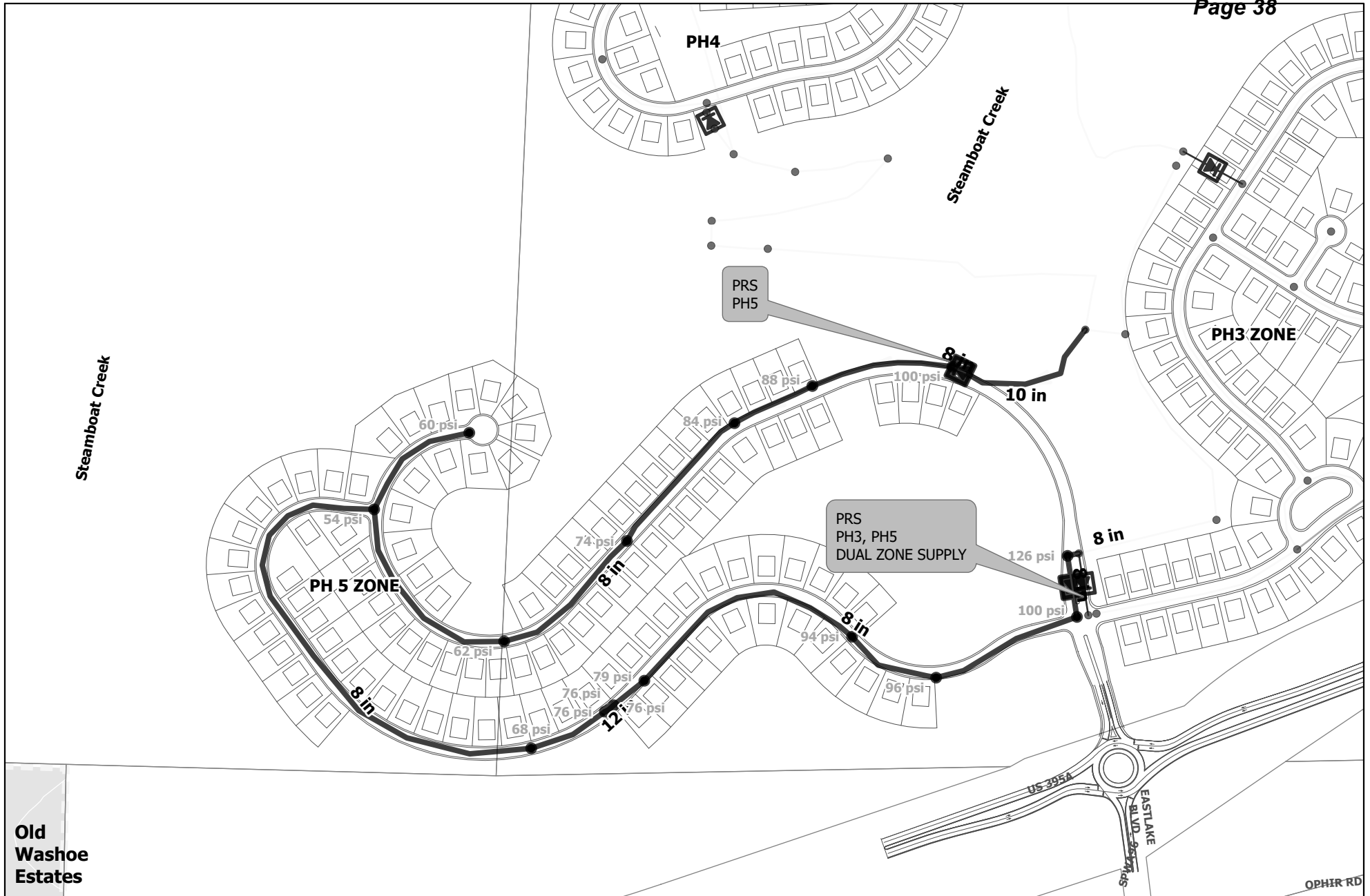
FIGURE 6
SIERRA REFLECTIONS
PHASE 4 FACILITIES

DATE: 3/20/2025

MAP BY: blong

REQUESTED BY: PC

SCALE:
1 inch equals 600 feetNAD 83 NEVADA STATE
PLANE WEST FEET



Old
Washoe
Estates

FIGURE 7
SIERRA REFLECTIONS
PHASE 5 FACILITIES

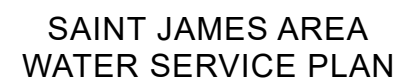
DATE: 3/20/2025

MAP BY: blong

REQUESTED BY: PC

SCALE:
1 inch equals 400 feet

NAD 83 NEVADA STATE
PLANE WEST FEET



DATE: 3/19/2025	
MAP BY: blong	
REQUESTED BY: NAME	
SCALE: 1 inch equals 800 feet	

NAD 83 NEVADA STATE
PLANE WEST FEET



TO: Nancy Raymond DATE: February 14, 2022

THRU: Scott Estes & Danny Rotter

FROM: David Kershaw

RE: **DISCOVERY: Saint James Village Annexation Units 1H & 2C¹**
TMWA WO# 21-8275

PURPOSE:

The purpose of this Discovery is to present a water service plan including the offsite water facility requirements and an estimate of their associated costs for the proposed project (Project).

DISCUSSION:

The Project is proposed to include development of up to 24-single family residences within Saint James Village Units 1H & 2C. These two subdivisions are located within portions of two Washoe County parcels with an approximate acreage of 105 acres (Washoe County APNs: 156-040-14 & 156-111-23) on the Mount Rose Fan area. Only a portion of the total parcel area is being proposed for development in this Discovery. The Project is partially located within TMWA's retail service territory, with Unit 2C within TMWA's existing service territory but without any service commitments and Unit 1H outside the service territory. Therefore, annexation is required for the portion of the Project consisting of Unit 1H.

It should be noted that a previous Discovery (W.O. 15-4624) was completed, dated December 23, 2015. The 2015 Discovery identified required improvements to provide water service for remaining infill of existing approved lots and an additional (then) proposed 239 single family residential lots.

Existing System Configuration:

The existing system is laid out in a tree configuration (Figure 2), with a single arterial main that decreases in diameter over its length, which has various mains of smaller diameter connected to it. This system was designed and installed for a prior water utility and was not reviewed or approved by TMWA. This existing system design and layout is contrary to TMWA design standards (section 1.1.06) and does not comply with Nevada Administrative Code. For example, Nevada Administrative Code section 445A.6712 requires systems to be designed, to the extent possible, to eliminate dead ends and for a system of arterial loops.

¹ As previously advised on December 23, 2021, the Discovery request is limited to Unit 1H and 2C.

Tree systems are prohibited except as justified by an engineer. TMWA will not support a request for variance from these standards from the Bureau of Safe Drinking Water or Washoe County Health District and in TMWA's engineering opinion and reasonable utility discretion does not believe perpetuating or extending system layouts contrary to TMWA design standards and/or the Nevada Administrative Code is in the best interests of public health and safety or prudent utility operations.²

Sound engineering grounds support these opinions, including the following. The lack of looping greatly increases the chance of pressure loss in the water system during main breaks and leaks. Loss of pressure in the system may result in potential contamination of the system due to introduction of foreign material. Therefore, the lack of looping in the existing water system is a potential public health issue. TMWA's design standards (section 1.1.06.06) recognize dead ends are sometimes unavoidable, but limits the length to 800 feet. This is the maximum radial main length that the Health District has accepted in the past and is the maximum radial main length TMWA will accept. Additionally, the lack of looping and existing main sizes also significantly limits the available fire flow for existing and future units in the development. Reduced fire flow in remote and/or wildland urban interface environments create additional public health and safety issues. The existing St. James's system far exceeds this maximum (>6,000 feet for one branch) and extending this existing noncompliant system to new services will not be allowed without modifications or mitigation measures to resolve the issue and protect public health and safety. The purpose and intent of prudent water system design is not just to move water from point A to point B; it is to ensure protection of water quality, quantity, and system pressure and to provide system redundancies in the interests of public health and prudent utility operations, including for fire protection.

Water Supply:

At this time, no will serve commitments have been issued for the Project. The current development is supplied by two municipal groundwater production wells, Saint James Well 1 and Saint James Well 2. These two wells have a historical nameplate total capacity of 715 gallons per minute (gpm); however, the actual sustainable capacity is far less (as discussed below)³. In an emergency, the Saint James system can be supplied water from the Mount Rose system for a limited period. Existing maximum day demand supplied from these wells without the proposed Project is estimated at approximately 207 gpm.

² Even if one were to assume that the existing water system facilities are adequate to simply move water from point A to point B, substantial evidence exists which a reasonable mind could accept as sufficient to demonstrate that design of those systems is contrary to applicable standards and interests of public health and safety such that reasonable engineering discretion could conclude the existing system is not adequately designed to permit extension for service to new development without modifications which bring it into closer conformity with applicable standards.

³ It is not uncommon for there to be a significant difference between the face value identified on a permit and the actual water the permitted source can reliably and sustainably produce.



Figure 1 shows the water level in the two production wells and the existing monitoring wells on the property. The data indicates a fairly consistent decline in water levels in both monitoring and production wells with a slow leveling off in the last four years. Notably, in the last five years TMWA has actively tried to reduce groundwater pumping from the region and supply more of the region with surface water as part of a resource conjunctive use strategy that includes the construction of the Mt. Rose Surface Water Treatment Plant. One of the purposes of these efforts is to reduce overpumping of the groundwater aquifer which was prevalent in this area prior to TMWA taking over the Washoe County utility and South Truckee Meadows GID systems.

A significant risk with any water right, whether permitted by the Nevada State Engineer or not, is whether a reliable supply of actual physical water exists year-in, year-out that can be diverted for the intended beneficial use. This is particularly true in groundwater basins where the amount of water stored in the groundwater aquifer experiences continual decline in water levels year-over-year without evidence of recovery either from natural hydrologic cycle or engineered solutions⁴ that replenish the aquifer. The impact of declining sub-surface water supplies causes hardships on municipal and domestic well owners and may threaten the sustainability of water supplies previously committed for service. These issues can be exacerbated, and reliability of municipal supplies threatened, if prudent resource management and discretion is not exercised and groundwater resources in these types of basins are accepted without considering the supply's long term- reliability and sustainability.

With these principals in mind and based on sound data and prudent utility operation practices to ensure sustainable supply sources, TMWA has derated the reliable maximum day capacity for these two wells and other wells in the area in its 2035 Water Facility Plan due to the continued decline of water levels observed since construction. Both Saint James Well 1 and Saint James Well 2 have been derated to 175 gpm each for planning purposes.

In addition to the Project and existing demands, there are an additional 81 approved, undeveloped residential lots in the subdivision, with service committed to those lots from the existing wells. The maximum day demand from the remaining 81 developed lots is estimated at 122 gpm which will be additional future demand on the groundwater basin and wells. Thus, the total maximum day demand associated with existing development and future approved development (81 lots) is 329 gpm, nearly the full sustainable rated capacity of the two wells.

Additional sources of supply and/or supply capacity improvements will be required to serve the Project. Because of the declining water levels observed in the existing Saint James' wells and prudent utility operation practices coupled with the fact that the Project demands exceed the available rated capacity of the wells, TMWA is unwilling to supply the Project or

⁴ Engineered solutions can include deploying alternate sources of supply in lieu of continued groundwater pumping, injecting other treated water supplies into the aquifer, spreading or rapid infiltration basins, pumping limitations on municipal and domestic wells, or any combination of these.



any future additional development solely from the two existing groundwater wells as proposed without additional supply capacity, other mitigation measures⁵ or until, at the earliest, the groundwater levels in the existing wells have stabilized and modelling demonstrates the stabilized wells can independently provide sustainable adequate sources of supply for future growth to TMWA's satisfaction.

However, alternate sources of supply or mitigations are available for water supply to the Project⁶. This Discovery has identified facility improvements to allow the new units to obtain a water supply from TMWA's regional, conjunctive use system without impacting the local groundwater resources. TMWA is open to consideration of other supply options that do not negatively impact the long-term reliability of existing regional groundwater resources and wells, but understandably it is contrary to public health and prudent water supply management to issue will serve commitments supported solely on unsustainable or unproven sources of water supply.

⁵ Based on data from TMWA's historical hydrogeologic monitoring and modeling efforts for the area, data from the Nevada State Engineer and other studies, groundwater levels in this area are declining and evidence indicates additional withdrawals of groundwater will exceed the sustainable yield of the basin, causing continued declines in water levels in the aquifer, and/or conflict with existing water rights. Pursuant to TMWA Rule 7, the Authority has the right, in its sole discretion, to accept or reject any water rights offered for dedication based upon its consideration of criteria set forth in that Rule and exercise of prudent utility resource management discretion.

⁶ The unique conditions of groundwater rights in this area and concerns with, among other things, the quantity, drought-year supply, and yield of groundwater rights requires surface and groundwater resources be conjunctively managed to mitigate these issues. TMWA's Rules provide mechanisms for dedication of supplemental surface water supplies at the time groundwater rights are offered for dedication to facilitate issuance of will serve commitments in Charge Area 15.

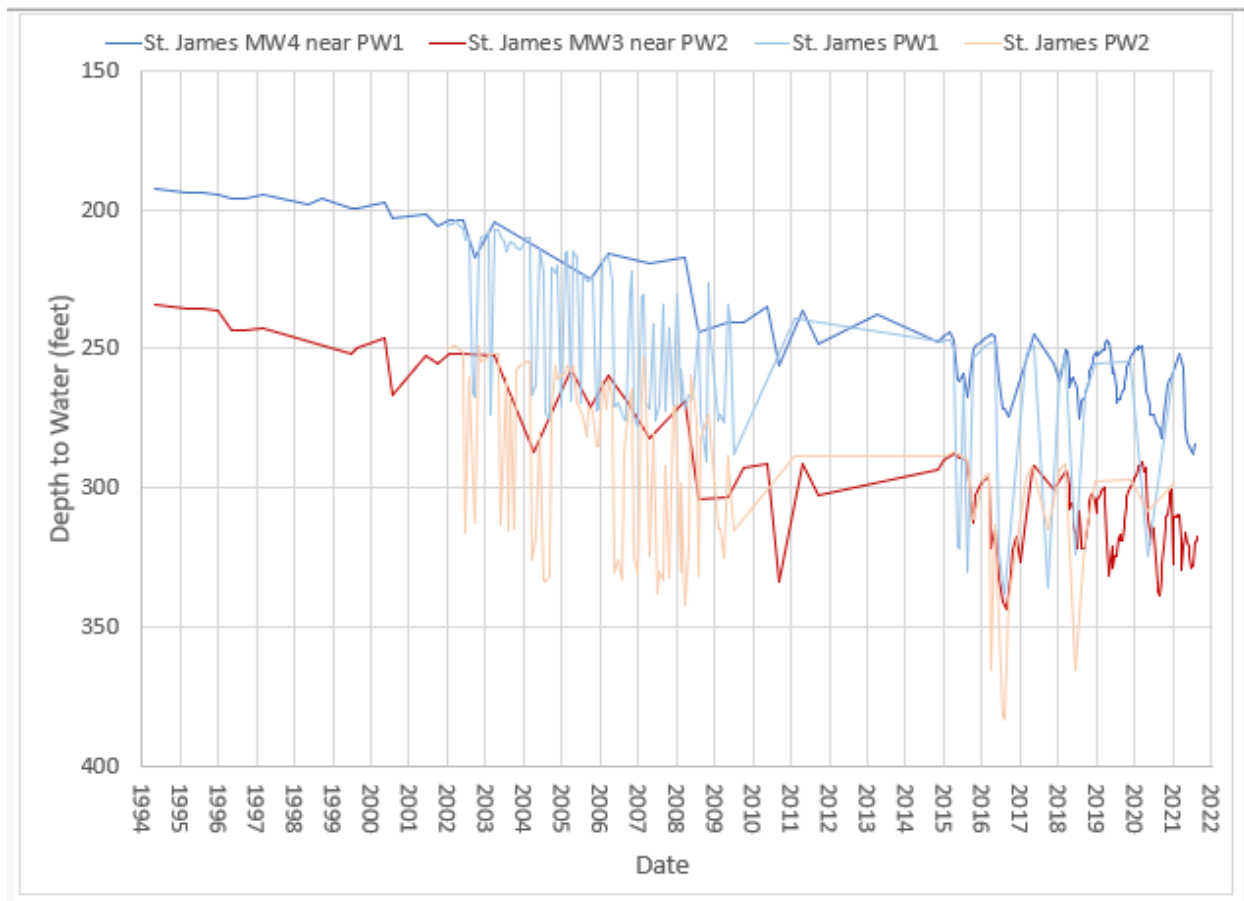


Figure 1. St. James's Production and Monitoring Wells Historic Water Levels

Location:

The Project is located on Joy Lake Road and Saint James Parkway just west of Interstate 580 at the north end of Washoe Valley (see Figure 2). Portions of the Project which are annexed into TMWA's service area (Unit 2C) are located within TMWA's Water Service Facilities Area 15. Portions of the Project outside TMWA's service area (Unit 1H) will be located within TMWA's Water Service Facilities Fee Area 15 upon annexation.

PROJECT WATER MAXIMUM DAY DEMANDS

The Project's estimated maximum day demand (MDD) is 35.1 gallons per minute. A common area irrigation demand estimate was not included in this Discovery. Current uncommitted sustainable supply from Saint James Well 1 and Saint James Well 2 is insufficient to serve the entire Project demand. Additional sources of supply and/or supply capacity improvements will be required to serve the Project.



MAJOR WATER FACILITIES AND COST OPINION

A conceptual water service plan for the Project is shown in Figure 1.

The improvements include looping mains and pressure reducing stations to supply the design fire flow event and meet design criteria regarding radial mains for the Project. The improvements also include a new SCADA controlled pressure reducing station at the intersection of Austrian Pine Road and Joy Lake Road to supply water to the Saint James system from TMWA's regional conjunctive use system to supply the Project maximum day demands. These improvements provide the additional water supply required to serve the entire Project demand through supplemental supply from conjunctive use management of groundwater supply from other municipal wells and surface water supply from the Mt. Rose Water Treatment Plant consistent with the overall conjunctive use strategy for the area. Additionally, these improvements will provide short term system redundancy in the event of a mechanical well failure on Well 1 or Well 2.

The Project is (or will be) located within TMWA Charge Area 15 and will be subject to TMWA WSF charges applicable to Charge Area 15.

An opinion of cost for the major Project water facilities and TMWA's current Water Service Facilities Fee Area 15 charge are listed in Table 1.

Table 1. Cost Opinion

Description	Quantity	Unit	Unit Cost	Cost
8" Diameter Onsite Main	750	Linear Feet	\$200	\$150,000
8" Diameter Offsite Main	11,800	Linear Feet	\$200	\$2,360,000
10" Diameter Onsite Main	800	Linear Feet	\$250	\$200,000
Pressure Reducing Station	1	Each	\$100,000	\$100,000
Pressure Reducing Station w/SCADA Control	1	Each	\$125,000	\$125,000
Area 15 Facility Charge ⁵	35.1	MDD, gpm	\$14,624	\$513,302
Total				\$3,448,302

1. All facilities must be permitted, designed (such design to be approved by TMWA), and built by the developer and then dedicated to TMWA.
2. All costs are the responsibility of the developer.
3. The cost opinion does not include meters, meter assemblies, backflow devices, and any associated private fire loop for the Project.
4. No common area irrigation demand was included in this Discovery. For reference, 1 acre-foot of irrigation demand equates to 1.7 gpm of MDD.
5. Unit Fee could be reduced to \$10,286/gpm if applicant provides and dedicates acceptable creek water rights.

STORAGE CAPACITY

TMWA has sufficient storage capacity for the Project.

PROJECT PRESSURES

Maximum Day pressures are shown in Figure 2. Individual service pressure reducing valves are required to be installed on each water service with system pressures of 80 psi and higher and on all water services in pump system pressure zones and any regulated pressure zones. If the water service is a combined fire and domestic service, pressure regulating valves may need to be installed downstream of the fire service tee, installation of the pressure reducing valves on any fire line shall be reviewed by the fire contractor.

DEAD ENDS AND LOOPING

Nevada Administrative Code section 445A.6712 requires systems to be designed, to the extent possible, to eliminate dead ends. The water facility layout proposed in this Discovery meets the dead end and looping requirements that include radial mains which do not exceed 800 linear feet per TMWA design criteria.

It should be noted that other existing water facilities in the Saint James Village development do not meet this requirement; however they are located outside of the pressure zones which will serve this Project. While outside the scope of this Discovery, please note that those

other existing water facilities will need to be addressed prior to development and/or annexation of new projects in those pressure zones.

FIRE FLOWS

Fire flow requirements are established by the fire department. The assumed fire flow requirement for this project provided by the applicant is 2,500 gpm for two hours. The proposed facility improvements identified in this Discovery can convey estimated maximum day demands and provide up to 2,500 gpm fire flow for 2 hours while maintaining a residual pressure greater than 20 psi.

REGIONAL INTEGRATION

The project lies between the existing St. James's system and proposed projects to the east and north. The proposed project to the east, Sierra Reflections, is under common ownership with the St. James development. To provide support for the Sierra Reflections project and integrate system extension, the Applicant will be requested to set aside a location for a pressure regulating station for the Sierra Reflections project.

In addition, as a condition of annexation, the Applicant will be required to grant TMWA a public utility easement for access and water facilities construction, operation and maintenance between St. James Parkway and the St. James Monitoring Well 1 site. The purpose of this easement is for integration of the St. James's system with future development to the north, and for mutual support between the St. James's system and other parts of TMWA's system.

FUTURE PHASES OF DEVELOPMENT

Additional supply and main facility improvements will be required for continued development in the area. The previous completed Discovery dated December 23, 2015 identified some of the required improvements that include distribution main looping and sizing to meet current design criteria and proposed fire flow requirements. The document has been attached for reference. Any future proposed development in the area will need to apply for a new Discovery evaluation to take into account then current supply constraints, design requirements, and development phasing, which may require updates or revisions to required improvements.

ASSUMPTIONS:

1. The applicant shall be responsible for all application and review fees in effect at the time of application submittal. The applicant is responsible for all inspection fees, permit fees, easements, Area Fees and Facility Charges in effect at the time the project is approved by TMWA and the Water Service Agreement is issued. The Water Service Agreement must be executed and all fees paid within 60 days of agreement issuance.

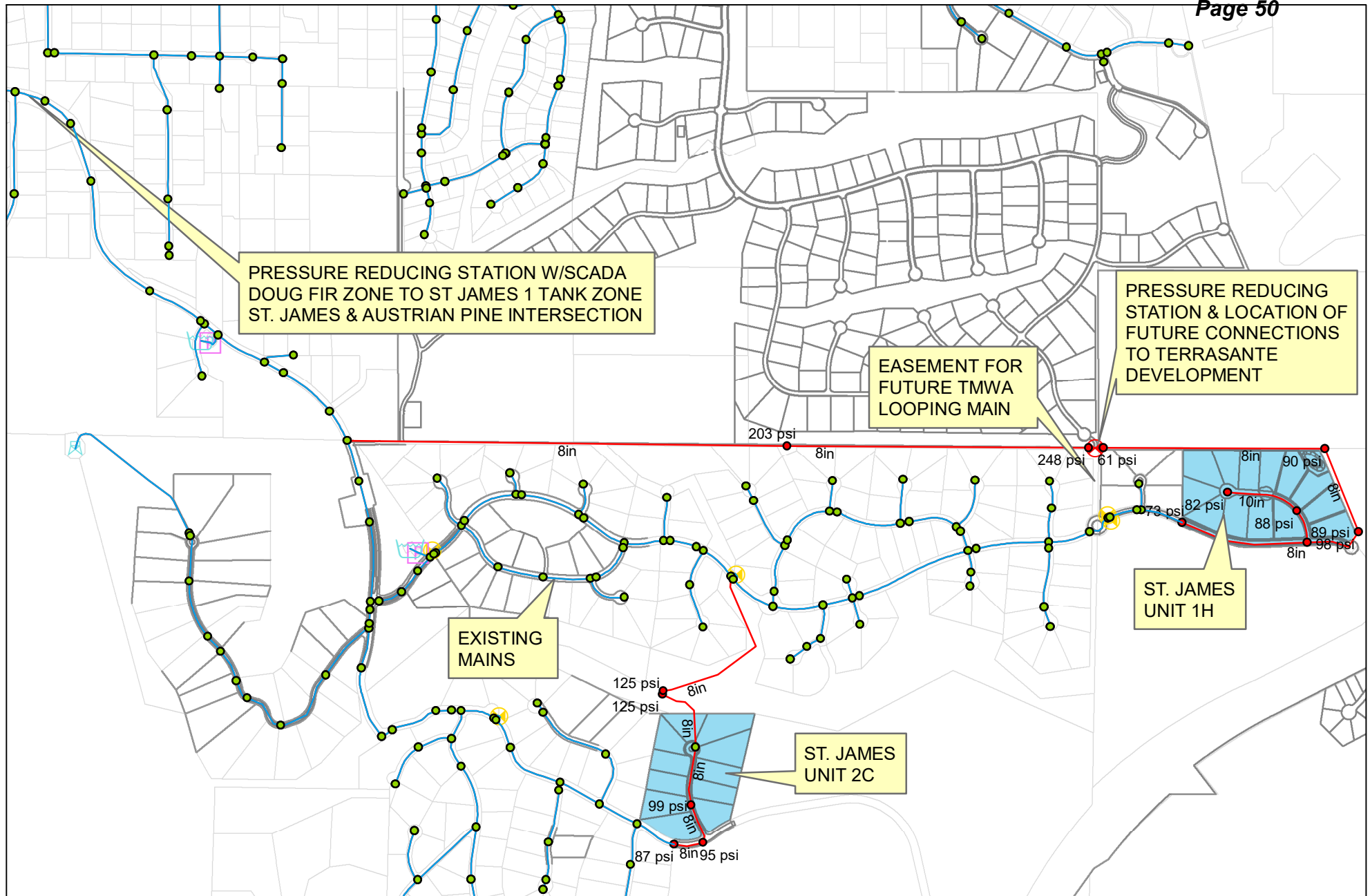
2. The cost opinions contained herein do not include new business fees, cost of water rights, sustainability fees and related fees.
3. Project pressure criteria are:
 - a. Maximum day pressure of 45 pounds per square inch (psi) at building pad elevation with tank level at top of emergency storage,
 - b. Peak hour pressure of 40 psi at building pad elevation with tank level at top of emergency storage, and
 - c. Maximum day plus fire flow pressure of 20 psi at center of street elevation with tank level at bottom of fire storage.
 - d. For new systems, unregulated distribution system pressures should not exceed 100 psi anywhere in the system. Individual water service pressure regulators are required for system service pressures over 80 psi and on all individual water services in regulated system pressure zones and pump zones.
4. A site grading plan with elevations was not provided by the applicant. Elevations used for this Discovery were derived from existing site topographic information.
5. Facility requirements for the Project are based on the assumed elevations, maximum day demand and fire flow requirements. Changes in elevation, demand or fire flow requirements may affect facility requirements.
6. Easements, permits and all pertinent Agency approvals shall be obtained by applicant for the design and construction of the water infrastructure necessary to serve the proposed Project.
7. All cost opinions are preliminary and subject to change. The costs presented in this study are planning level estimates based on the information available. Actual costs will be determined at the time of application for service and nothing in the foregoing cost opinions should be construed as a guaranty of cost or shall be binding on TMWA in any respect.
8. Future development (on or off-site) may alter the conclusions of this Discovery. Capacity in TMWA's system is available on a first-come, first-served basis, and commitment to provide service is not established until a contract for service is executed, all fees are paid, adequate resources dedicated and a will serve commitment issued in compliance with TMWA Rules.
9. Applicant shall comply with all applicable TMWA Rules and Regulations applicable to applications for new service.

Review of conceptual site plans or tentative maps by TMWA does not constitute an application for service, nor constitute or imply a commitment by TMWA for planning, design or construction of the water facilities necessary for service, nor constitute or imply a commitment by TMWA to provide future water service. The extent of required off-site and on-site water infrastructure improvements will be determined upon TMWA receiving a specific development proposal or complete application for service and upon review and approval of a water facilities plan. After submittal of a complete Application for Service, the required facilities, the cost of these facilities, which could be significant, and associated fees



will be estimated and will be included as part of the Water Service Agreement for the project. All fees must be paid to TMWA prior to water being delivered to the project.

Please contact David Kershaw (834-8201) with any questions or comments regarding this Discovery.





Quality. Delivered.

1355 Capital Blvd. • P.O. Box 30013 • Reno, NV 89520-3013
P 775.834.8080 • F 775.834.8003

TO: Nancy Raymond **DATE:** December 23, 2015
THRU: Scott Estes
FROM: Keith Ristinen
RE: ST. JAMES'S VILLAGE_DISC_ANNEX, TMWA WO# 15-4624

SUMMARY:

The Applicant proposes development of 239 single family residential lots on approximately 425 acres in Washoe County, Nevada. TMWA can serve the project, subject to the Applicant completing the improvements described in this discovery. The improvements include developing adequate well capacity to serve the project demands and providing looping to the existing system. The cost opinion of facility fees and major off-site improvements to serve the project is \$11.5 million.

Review of conceptual site plans or tentative maps by TMWA and/or agents of TMWA shall not constitute an application for service, nor implies a commitment by TMWA for planning, design or construction of the water facilities necessary for service. The extent of required off-site and on-site water infrastructure improvements will be determined by TMWA upon receiving a specific development proposal or complete application for service and upon review and approval of a water facilities plan by the local Health Authority. Because the NAC 445A Water System regulations are subject to interpretation, TMWA and/or agents of TMWA cannot guarantee that a subsequent water facility plan will be approved by the Health Authority or that a timely review and approval of the Project will be made. The Applicant should carefully consider the financial risk associated with committing resources to their Project prior to receiving all required approvals. After submittal of a complete Application for Service, the required facilities, the cost of these facilities, which could be significant, and associated fees will be estimated and will be included as part of the Water Service Agreement necessary for the Project. All fees must be paid to TMWA prior to water being delivered to the Project.

Please contact me at 775-834-8292 with any questions or comments.

PURPOSE:

Determine the service plan and off-site improvements for a 239 unit residential subdivision, "project."

LOCATION:

The project is in Washoe County on the following APNs:

046-180-13 046-180-14 156-141-04 156-040-09 156-040-11 156-040-14 156-111-23

The project parcels cover approximately 425 acres. The Project is outside TMWA's retail service boundary and will require annexation prior to service from TMWA. The project will be within Fee Area 15 once annexed, but the area fee will be modified to credit the Applicant for the Applicant's construction of existing and future facilities.

ASSUMPTIONS:

1. The applicant shall be responsible for all application, review, inspection, storage, treatment, permit, easements, and other fees pertinent to the Project as adopted by the TMWA at the time of execution of water service agreement.
2. The cost opinions contained herein do not include new business fees, cost of water rights and related fees, or contribution to the water meter retrofit fund.
3. For the purposes of discovery, the total maximum day demand is estimated at 467 gpm, and average day demands are estimated at 179 gpm. Demand calculations are attached. Demand calculations, and fees based on demands, are estimates; actual fees will be determined at the time of application for service.
4. For the purposes of discovery, fire flow requirements are assumed at 2,500 gpm for 2 hours with 20 psi residual pressure. This fire flow requirement is consistent with International Fire Code requirements for single family homes up to 9,400 square feet in size. The Truckee Meadows Fire Protection District is responsible for establishing the fire flow requirements.
5. Project pressure criteria are:
 - a. Maximum day pressure of at least 45 pounds per square inch (psi) at building pad elevation with tank level at top of fire storage,
 - b. Peak hour pressure of at least 40 psi at building pad elevation with tank level at top of emergency storage,
 - c. Maximum day plus fire flow pressure of at least 20 psi at center of street elevation with tank level at bottom of fire storage, and
 - d. Wintertime minimum demand pressure of at most 100 psi at service elevation with the tank nearly full and filling.
 - e. TMWA does not calculate pressures for multi-story buildings. Confirmation that pressure will be adequate for upper stories is the responsibility of the Applicant.
6. Site elevations were taken from existing topography provided by Washoe County. Existing elevations on the project site range from 5294 to 5970 feet. Changes in assumed site elevations may affect the facility requirements.
7. Facility requirements for the Project are based on the assumed elevations, maximum day demand, and fire flow requirements. Changes in these may affect facility requirements.
8. Easements, permits and all pertinent Agency approvals are obtained for the design and construction of the water infrastructure necessary to serve the proposed Project.
9. All cost opinions are preliminary and subject to change. The costs presented in this study are planning level estimates based on the information available. Actual costs will be determined at the time of application for service. Cost opinions do not include on-site improvements made by the applicant.
10. This discovery is based on the current status of TMWA's system. Future development may alter the conclusions of this discovery. Capacity in TMWA's system is available on

a first-come, first-served basis, and commitment to provide service is not established until a contract for service is executed and all fees are paid.

DISCUSSION:

The Applicant proposes development of approximately 239 single family residential lots in Washoe County Nevada. The project is further development of the St. James's Village and forms a portion a tentative map first approved in 1993.

The Applicant will be required to construct new facilities to serve the project. The Applicant will be responsible for the entire cost of the new facilities, including design, permitting, and construction. The design and construction need to be to TMWA's standards, and TMWA's approval of the plans, and ongoing inspection of the construction, will be required. Upon completion of construction, and acceptance by TMWA, the facilities will be dedicated to TMWA. There is no mechanism for the Applicant to recover any portion of the facilities cost from subsequent users who may tap into, extend, or otherwise benefit from the Applicant's installation of the facilities.

Issues the new facilities will need to address include:

Existing System Configuration,
Water Supply,
Storage Tanks,
Regional Integration,
Project Phasing, and
Site Topography

Existing System Configuration

The existing system is laid out in a tree configuration (Exhibit 2), with a single arterial main that decreases in diameter over its length, which has various mains of smaller diameter connected to it. This layout is contrary to TMWA design standards (section 1.1.06) and appears to not comply with Nevada Administrative Code. Nevada Administrative Code section 445A.6712 requires systems to be designed, to the extent possible, to eliminate dead ends and for a system of arterial loops. Tree systems are prohibited except as justified by an engineer.

The lack of looping greatly increases the chance of loss of pressure in the water system during main breaks and leaks. Loss of pressure in the system results in potential contamination of the system due to introduction of foreign material. Therefore, the lack of looping in the existing water system is a potential public health issue. TMWA's design standards (section 1.1.06.06) recognize dead ends are sometimes unavoidable, but limit the length to 800 feet where practical. The St. James's system far exceeds this maximum. Thus, TMWA is unwilling to extend service to additional lots in St. James's system that rely on an unlooped system. The service plan presented later in this document remedies the lack of looping in the existing system and allows for further development of the St James's system.

The lack of looping is also reflected in the available fire flow to the existing lots (Exhibit 3). TMWA does not have records to indicate what the fire flow requirements were at the time the existing portion of the St. James's development was designed.

Water Supply

The existing St. James's system wells have a nameplate capacity of 715 gpm. Existing maximum day demand is estimated at 206 gpm from 138 developed residential lots and common area landscaping. Despite the existing demand being a fraction of the rated well capacity, the static water levels in the two St. James's wells have been declining since the wells were installed in 1993. Figure 1 shows the groundwater level at the monitoring wells adjacent to the system production wells.

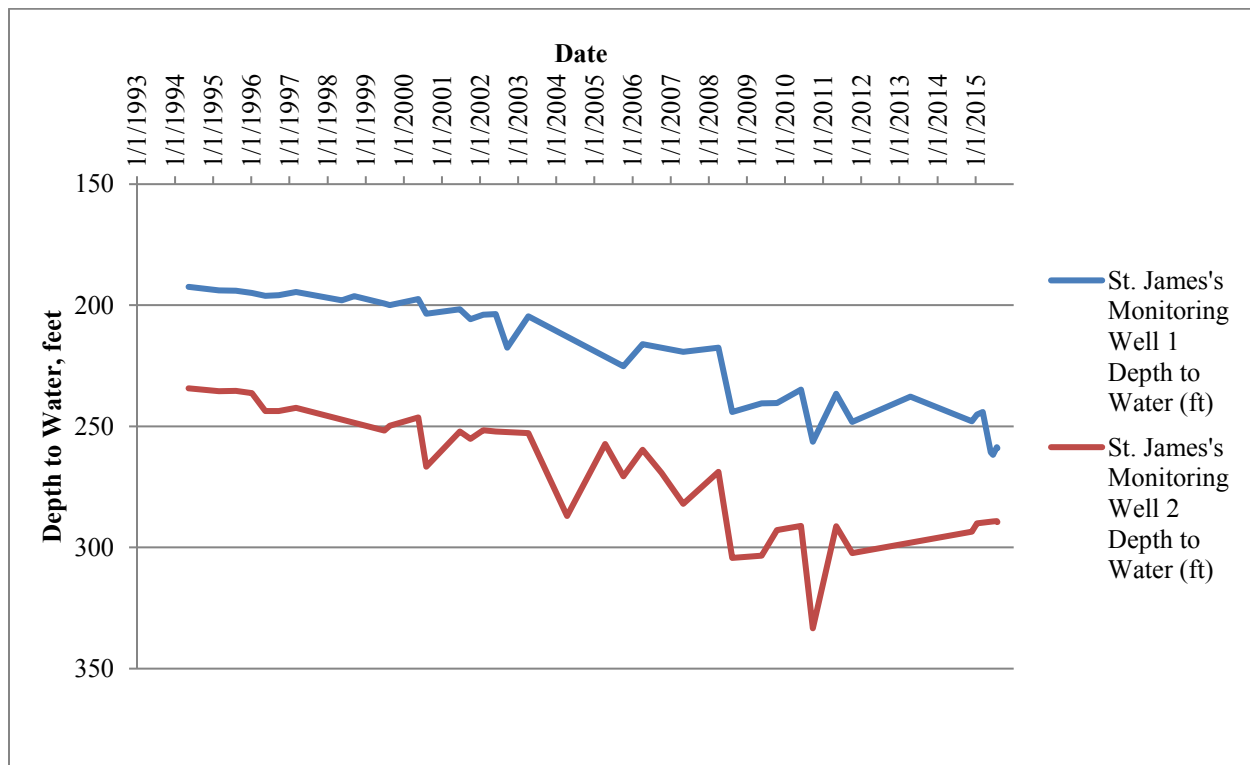


Figure 1. St. James's Monitoring Wells Historic Water Level

There are an additional 85 undeveloped residential lots in the approved subdivision, with service committed from the existing wells. The estimated maximum day demand from the remaining 85 developed lots is 145 gpm. Because of the declining water levels seen in the existing St. James's wells, TMWA is unwilling to supply any additional development from the two existing wells until the regional groundwater sustainability plan for the Mt Rose and Galena alluvial fans (see discussion below) is in place and operational, and groundwater levels in the existing wells have stabilized to TMWA's satisfaction.

For the proposed project, TMWWA will require the Applicant to complete at least two new groundwater wells. Two exploration wells have been drilled for the project, St. James's wells 3 and 4, and Applicant holds groundwater rights on these two wells. This discovery assumes the development of these two wells will be sufficient to provide the needs of the project. The following guidelines will apply to new wells:

-
1. The groundwater supplies must be proven sustainable to TMWA's satisfaction,
 2. Exploration and development shall be coordinated with TMWA.,
 3. Exploration wells shall be completed as monitoring wells,
 4. Wells, and the water produced, shall meet Nevada Administrative Code requirements,
 5. Wells shall be equipped with emergency generators,
 6. Wells shall be equipped for recharge,
 7. Wells shall discharge directly to tank zones, and
 8. Changing well locations or capacities from the values assumed in this discovery may alter the on-site improvements discussed in this discovery.

In addition, TMWA will require the Applicant to contribute to TMWA's efforts to stabilize groundwater levels in the Mt. Rose and Galena alluvial fans. TMWA's plan to stabilize groundwater levels is to use creek water while surface water runoff is seasonally available, and supplement the creek water with groundwater wells during peak demands. The applicant's responsibility toward TMWA's efforts to stabilize groundwater levels will consist of dedication of creek water rights (in addition to dedication of groundwater rights and development of groundwater wells) and financial contribution toward the construction of a new surface water treatment plant (TMWA's Area 15 Surface Water Treatment Plant). Financial contributions will be pro-rated based on the project's demand.

It is possible groundwater supplies sufficient to meet the project demand cannot be located on site. In that case, the Applicant might be able to import water from other sources. One such source would be the Sierra Reflections project located nearby and under common ownership.

For the purposes of discovery, it is assumed the project will require the completion of both St. James's wells 3 and 4, each with a nominal 300 gpm production capacity.

Fire Flows

Next to a sustainable water supply, the second most difficult aspect of service to the proposed project is the provision of fire flow. Exhibit 3 shows the existing system fire flows with existing facilities, all wells running, and the tank storage level at the bottom of fire storage. Fire flows are limited by the tree structure of the existing system, relatively high service elevations on the tree, and relatively small pipe diameters along the system backbone.

The addition of the proposed project worsens fire flows in the existing development by increasing the ordinary demands on the system. Exhibit 4 shows fire flows with the additional of the proposed project, but before any additional looping or improvements to the existing distribution system are made. As with Exhibit 3, the data used in Exhibit 4 was modeled with all wells running and the tank level set to the bottom of fire storage.

This discovery assumes the fire flow requirement for the existing and proposed development is 2,500 gpm, consistent with International Fire Code requirements for stick-built residences of up to 9,600 square feet. For reference, the largest existing residence in St. James's Village has a footprint of approximately 10,000 square feet. While the building footprint is not necessarily the square footage used in calculation of the fire flow requirement, it does give an indication of the size of residences expected. The International Fire Code allows for the reduction of fire flow requirements if internal fire suppression systems (fire sprinklers) are installed. Establishment of

the fire flow requirement is done on a building-by-building basis by the Truckee Meadows Fire Protection District at the time of application for building permits.

Fire flows are the worst for existing and proposed development south of Brown's Creek. To the north of Brown's Creek, the transmission main for the two proposed wells provides a convenient means of looping the nearby zones, and in so doing provides adequate fire flows. To the south of Brown's Creek, the existing system configuration forces all flow through a single main, which decreases in diameter from 12 inches at the tank to 8 inches in diameter at the services. To achieve a 2,500 gpm fire flow to the proposed project, several improvements were considered. Listed in order of decreasing effectiveness, the improvements considered included:

1. Additional looping from Joy Lake Road to the existing termination of Timberlake Court,
2. Installation of a double check valve on the hydrant extension into private property at the existing termination of Timberlake Court,
3. Installation of a Pressure Regulating Station on Joy Lake Road adjacent to Green Ash Road, and
4. Installation of a second pipeline crossing Brown's Creek parallel to Joy Lake Road.

These improvements are shown on Exhibit 5 and are discussed in more detail in the Service Plan section of this discovery. The final fire flow with the proposed service plan is shown in Exhibit 6.

Fire flow improvements that were considered but rejected include:

1. A parallel tank main between Joy Lake Road and Bennington Court in the existing dirt access road. This improvement had minimal impact on fire flows and was therefore rejected, and
2. A pump station at the existing termination of West Pinewild Court. This pump station would have pumped from the merged St. James 1/Joy Lake 2 zones (see service plan, below) to the termination of the St. James tank zone south of Brown's Creek. This improvement was unable to satisfy fire flow requirements.

Storage

The project is expected to add the following requirements to storage:

Emergency Storage: 1 average day @ 179 gpm =	257,760 gallons
Operating Storage: 15% of maximum day at 467 gpm =	<u>100,872</u>
Total:	358,632 gallons

The St. James's tank currently has 359,760 gallons of unattached storage capacity. TMWA's system currently has adequate storage to accommodate the project.

Regional Integration

The project lies between the existing St. James's system and proposed projects to the east and north. The proposed project to the east, Sierra Reflections, is under common ownership with the St. James's development. To provide support for the Sierra Reflections project, the

Applicant will be expected to set aside a location for a pressure regulating station to provide support for the Sierra Reflections project.

In addition, as a condition of annexation, the Applicant will be required to grant TMWA a public utility easement for waterline construction and maintenance between St. James Parkway and the St. James Well 4 site. The purpose of this easement is for integration of the St. James's system with future development to the north, and for mutual support between the St. James's system and other parts of TMWA's system.

Phasing

This discovery does not consider any potential phasing plan. The Applicant will be responsible for ensuring that all phases of the project are capable of meeting TMWA and regulatory requirements without the addition of future phases.

Site Topography

The project site is divided by the Brown's Creek drainage. The Applicant will be required to provide looping to all services despite the presence of the drainage. The maximum allowable slope of installed pipe is 10%, and the creek crossings themselves will require special construction. The Applicant is referred to TMWA design standard sections 1.1.06 and 1.1.20.04 for further information.

SERVICE PLAN

The proposed Project includes construction of 239 residential units. The lots will be distributed into five pressure zones, including two new pressure zones, and one formed by merging two existing zones. See Exhibit 5. Significant features of the service plan are:

1. Two new wells, the St. James 3 and 4 wells. These two wells have been drilled (in 1993) as exploration wells, and were tested at approximately 150 gpm each. Both had water that met the then current drinking water regulations. Each of these wells will need to be redrilled and equipped as production wells. As discussed elsewhere in this discovery, the sustainable production capacity of these wells will need to be demonstrated to TMWA's satisfaction.

The wells will discharge to the tank zone via a new pipeline installed in St. James Village HOA property along the northern boundary of the existing development.

2. A dual zone regulating station at the St. James Well 4 site. One of the zones will discharge to the St. James 2 regulated zone on the upstream side of the existing St. James Pressure Regulating Station 3 via a pipeline installed through property owned by St. James Village Inc. The second zone will discharge to the St. James 3 regulated zone via a pipeline along the northern boundary of the project to the eastern end of the project. This will provide looping to the St. James 2 and 3 regulated zones.
3. A pipeline across Brown's Creek from the St. James 2 Pressure Regulating Station to Joy Lake Road. This pipeline will merge the existing St. James 1 and Joy Lake 2 zones, and provide required looping to both zones.

-
4. Six single zone pressure regulating stations. One station provides looping for new lots added to the merged St. James 1/Joy Lake 2 zones (item 3 above). Four stations provide looped supply into each of two new pressure zones. The sixth station is on Joy Lake Road adjacent to Green Ash Road (Item 5.C. below).
 5. Fire flow improvements to tank zone lots south of Brown's Creek (see fire flow discussion above). It should be noted that while items A and D below are categorized as fire flow improvements, they also fulfill looping requirements, and that TMWA will not consider additions to any area that will not be adequately looped.
 - A. Additional looping from Joy Lake Road to the existing termination of Timberlake Court. This alignment was chosen to cover the best topography, and avoid undeveloped land. The alignment crosses land owned by St. James Village HOA, the Gourley Family Trust (APN 046-190-16), and the Marud-Rivas Family Trust (APN 156-082-01). The alignment starts at Joy Lake Road on the south side of Brown's Creek, and terminates at the existing end of Timberlake Court. The new looping pipeline will parallel existing pipe in Pine View Court and Timberlake Court. If right-of-way cannot be secured for this alignment, alternate alignments may be possible, but were not investigated.
 - B. Installation of a double check valve on the hydrant extension into private property at the existing termination of Timberlake Court. This will maintain positive pressure at the local distribution system high point during fire flow demands.
 - C. Installation of a Pressure Regulating Station on Joy Lake Road adjacent to Green Ash Road. The PRS will be used to deliver additional water from higher zones in the Mt. Rose water system during fire flows. The delivery of water from Mt. Rose will decrease the flows out of the St. James Tank, resulting in higher pressures in the St. James system during fire flows.
 - D. Installation of a second pipeline crossing Brown's Creek parallel to Joy Lake Road. This is necessary to reduce frictional losses in the current single Brown's Creek crossing and provide redundant supply to the proposed lots in the St. James Tank zone south of Brown's Creek.

Service Pressure and Elevation

Due to elevation changes in the project, two new pressure zones will be required to maintain service pressures in the project between 45 and 100 psi. Exhibits 7 through 9 show the proposed service pressures and pipe diameters.

Cost Opinion

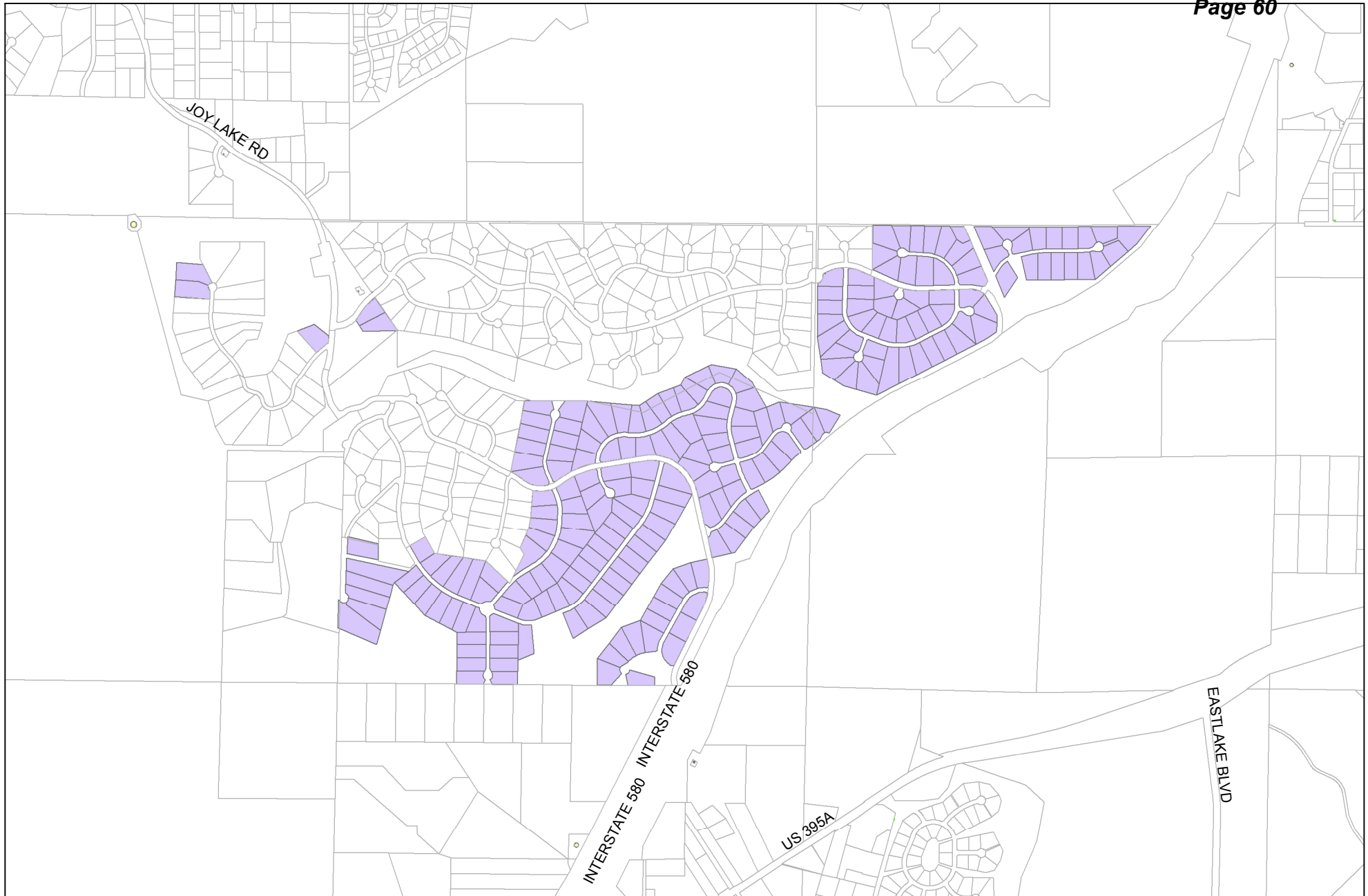
The cost opinion for the proposed project includes TMWA's facility fees, off-site improvements, and major or unusual on-site costs. The cost opinion for major improvements for the proposed Project is presented in Table 1.

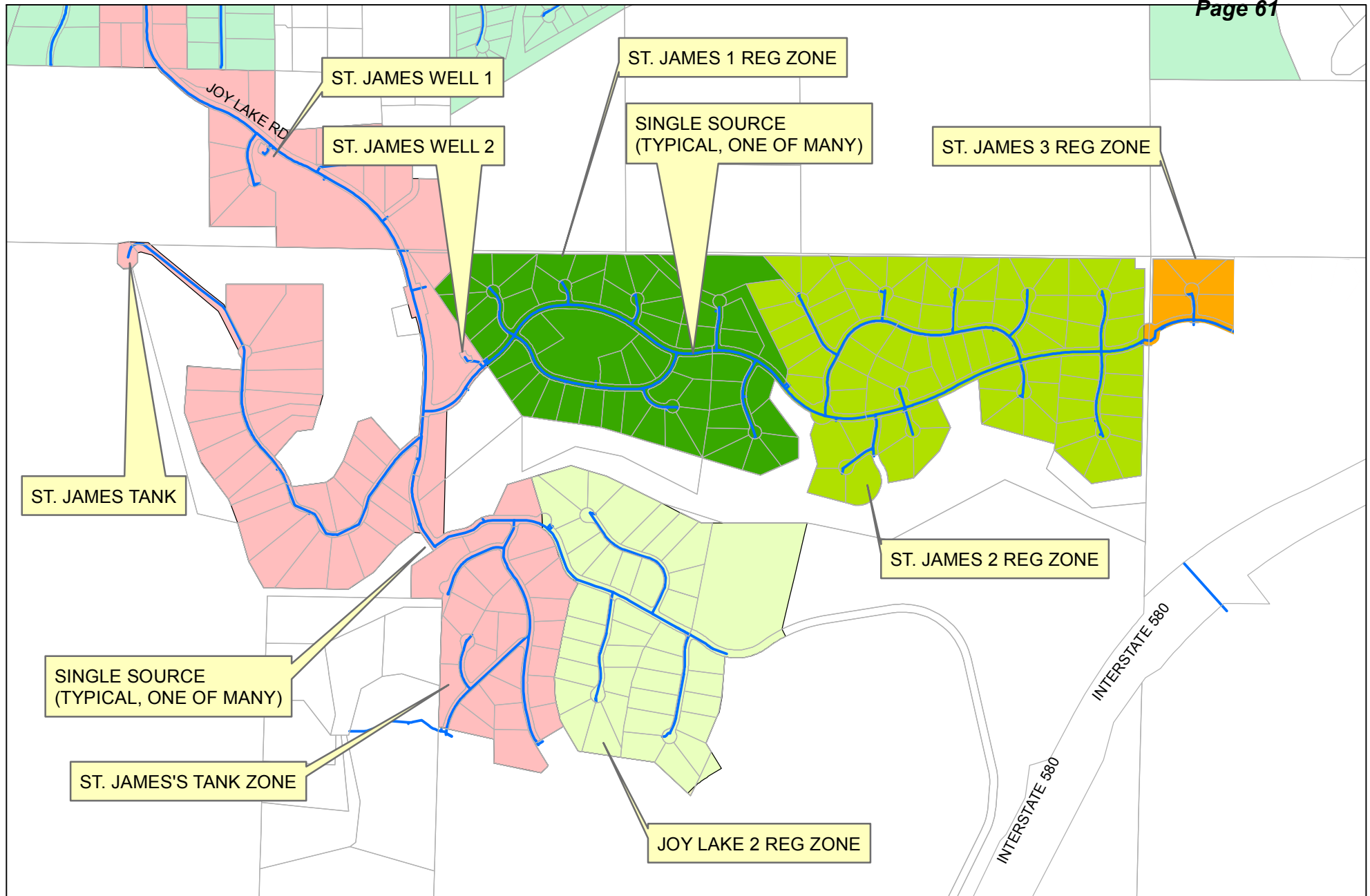
Table 1. Cost Opinion for Major Improvements

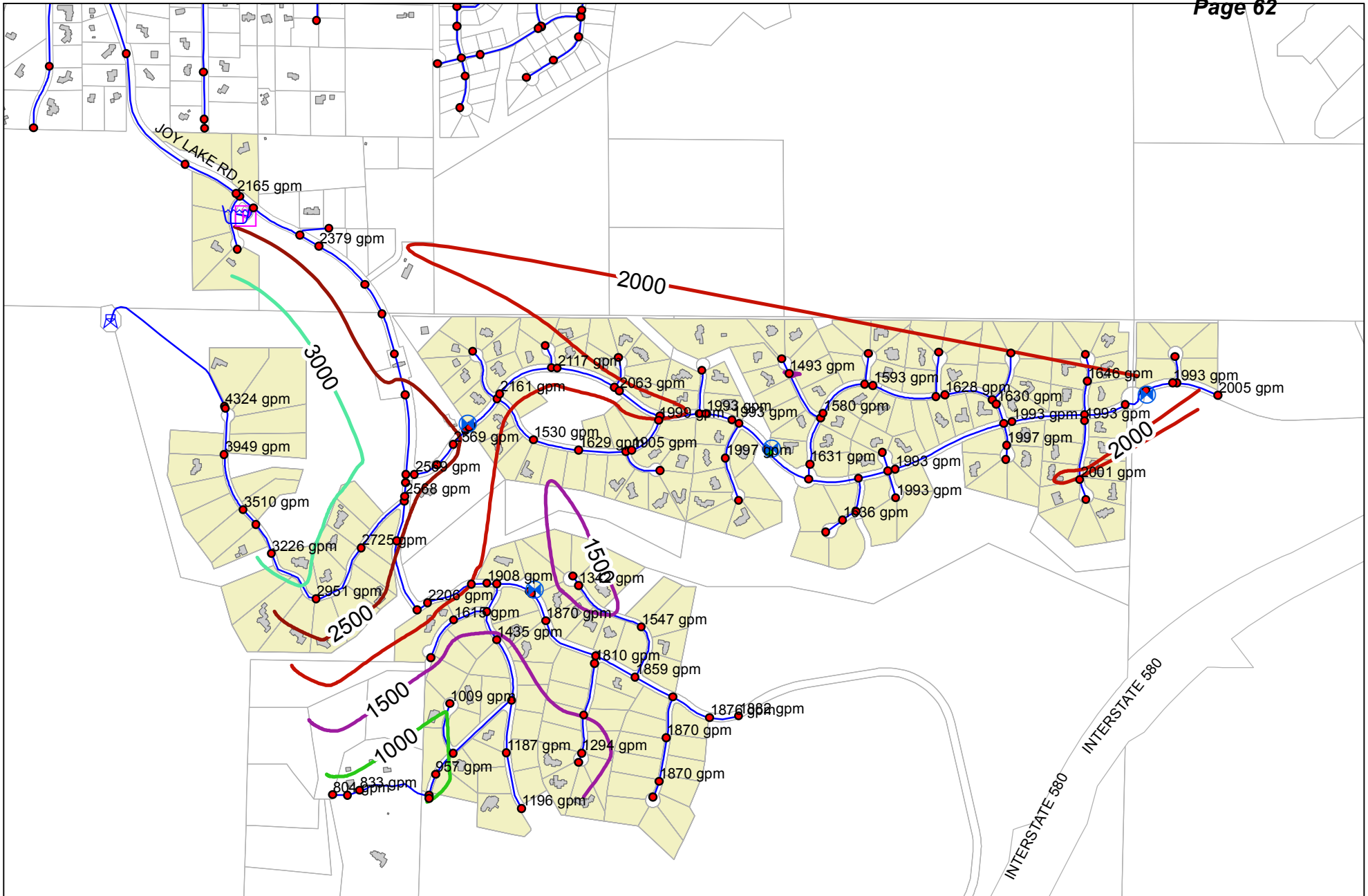
Imp. #	Description	Quantity	Units	Unit Cost	Extension
1	New Production Wells	2*	Ea.	\$2,000,000	\$4,000,000
	8" Diameter Production Well Discharge Piping	5600	LF	\$120	\$672,000
2	Dual Zone Regulating Station at SJ Well 4 Site	1	Ea.	\$125,000	\$125,000
	8" Diameter Looping pipeline to SJ 2 Reg Zone	700	LF	\$120	\$84,000
	8" Diameter Looping pipeline to SJ 3 Reg Zone	3400	LF	\$120	\$408,000
3	8" Diameter Looping Pipeline to Merge St. James 1 & Joy Lake 2 Reg Zones	2800	LF	\$160	\$448,000
4	New regulator Stations	6	Ea.	\$75,000	\$450,000
5.A	10" Diameter St. James Tank Zone Looping Pipeline	4400	LF	\$200	\$880,000
	8" Diameter St. James Tank Zone Looping Pipeline	500	LF	\$160	\$80,000
	Right-of-Way acquisition for St. James Tank Zone Looping Pipeline	1	Ea.	\$50,000	\$50,000
5.B	Double Check Valve at Timberlake Court Termination	1	Ea.	\$75,000	\$75,000
5.C	Included in item 4. above				\$ -
5.D	8" Diameter Brown's Creek Crossing Parallel to Joy Lake Road	1500	LF	\$160	\$ 240,000
---	Area 15 Surface Water Treatment Plant Fee	467	Maximum Day gpm	\$8,448**	\$3,945,216
TOTAL					\$11,457,216

*Number of wells subject to change

** Fee could be lowered to \$ 3,497/gpm if Applicant provides and dedicates acceptable creek water rights







ST. JAMES'S DISCOVERY

EXISTING FIRE FLOW

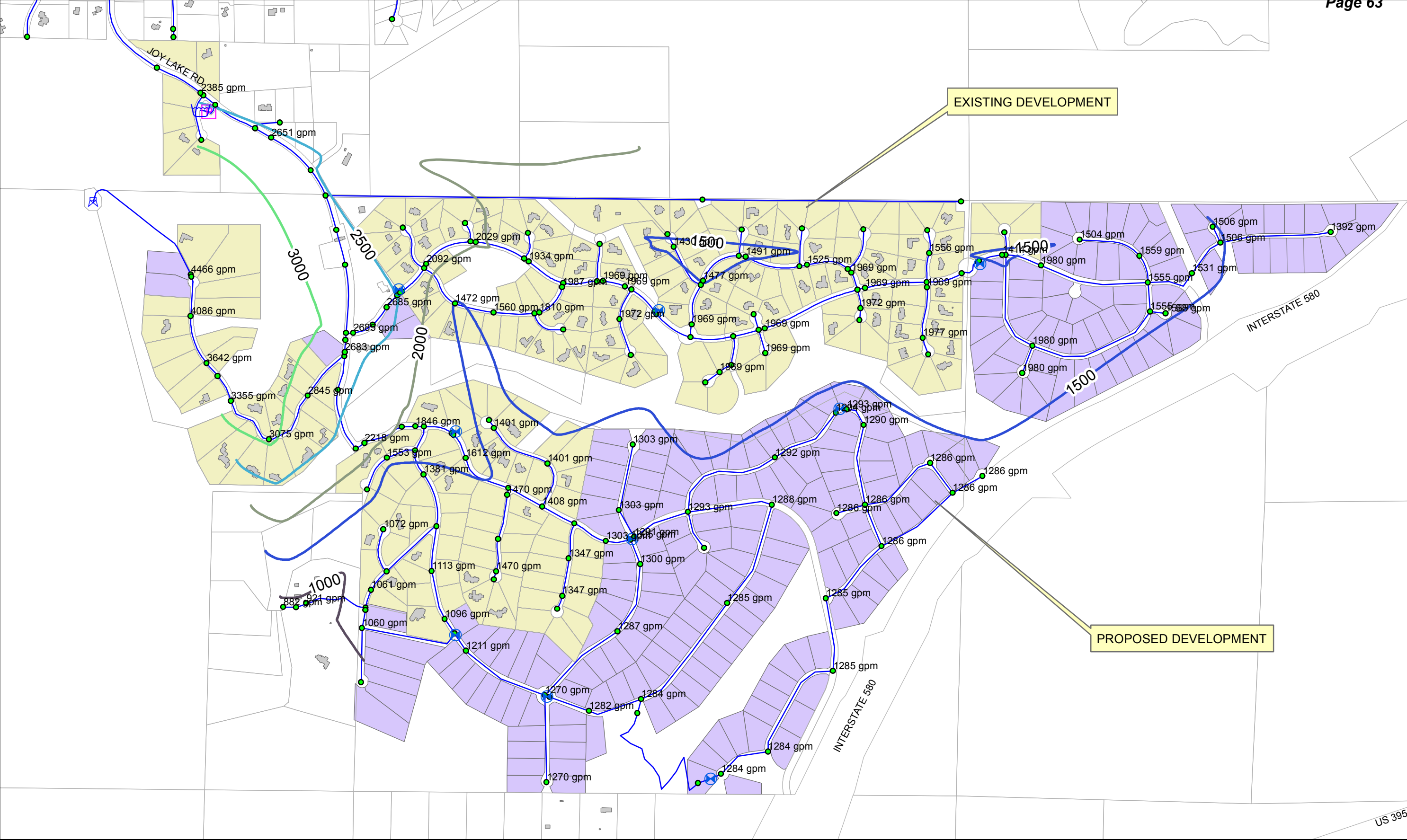
EXHIBIT 3

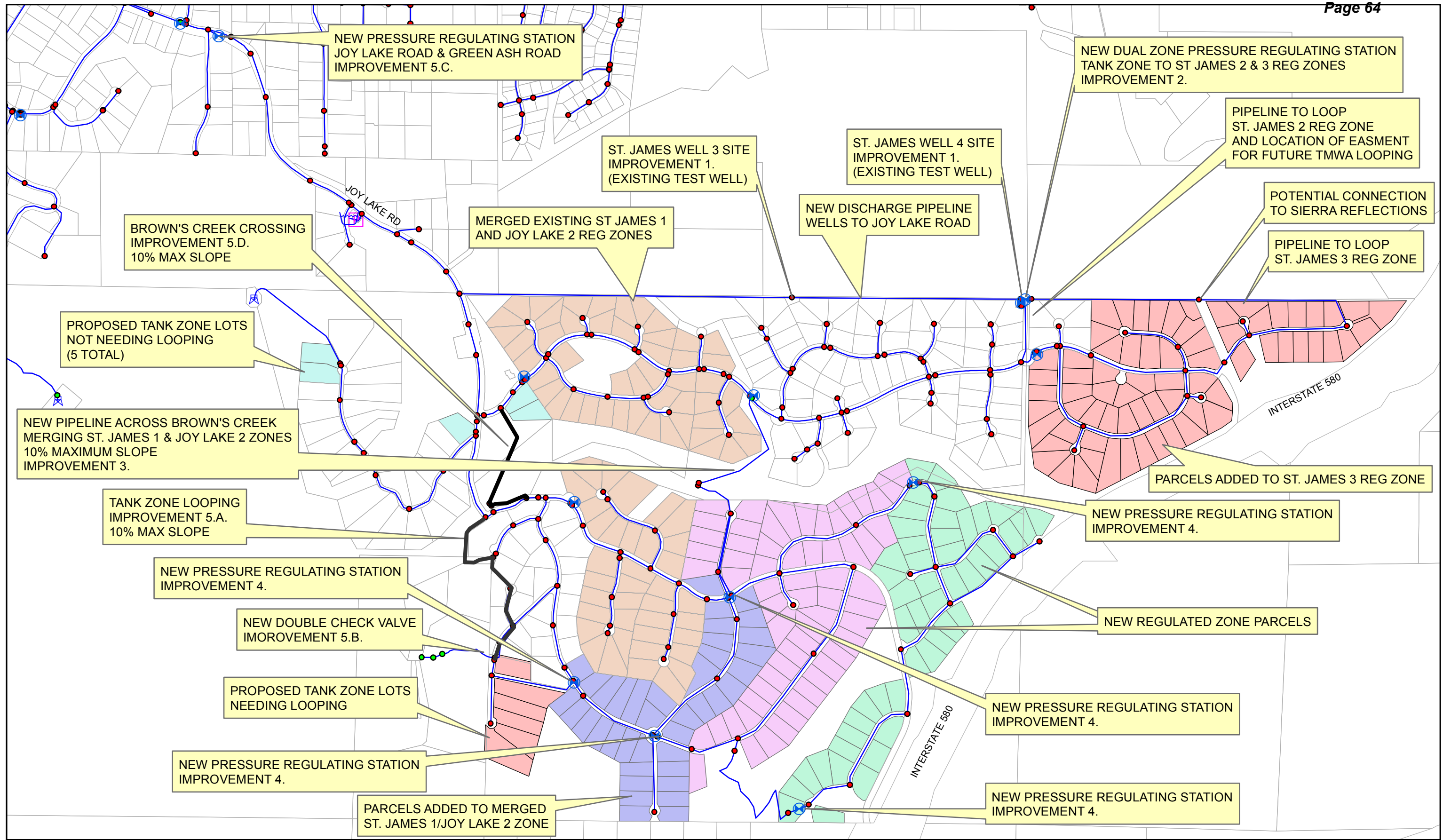
WORK ORDER: 15-4624

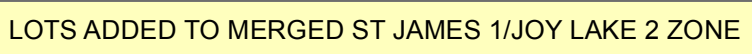
DATE: 12-7-2015

SCALE: 1 inch = 1,000 feet









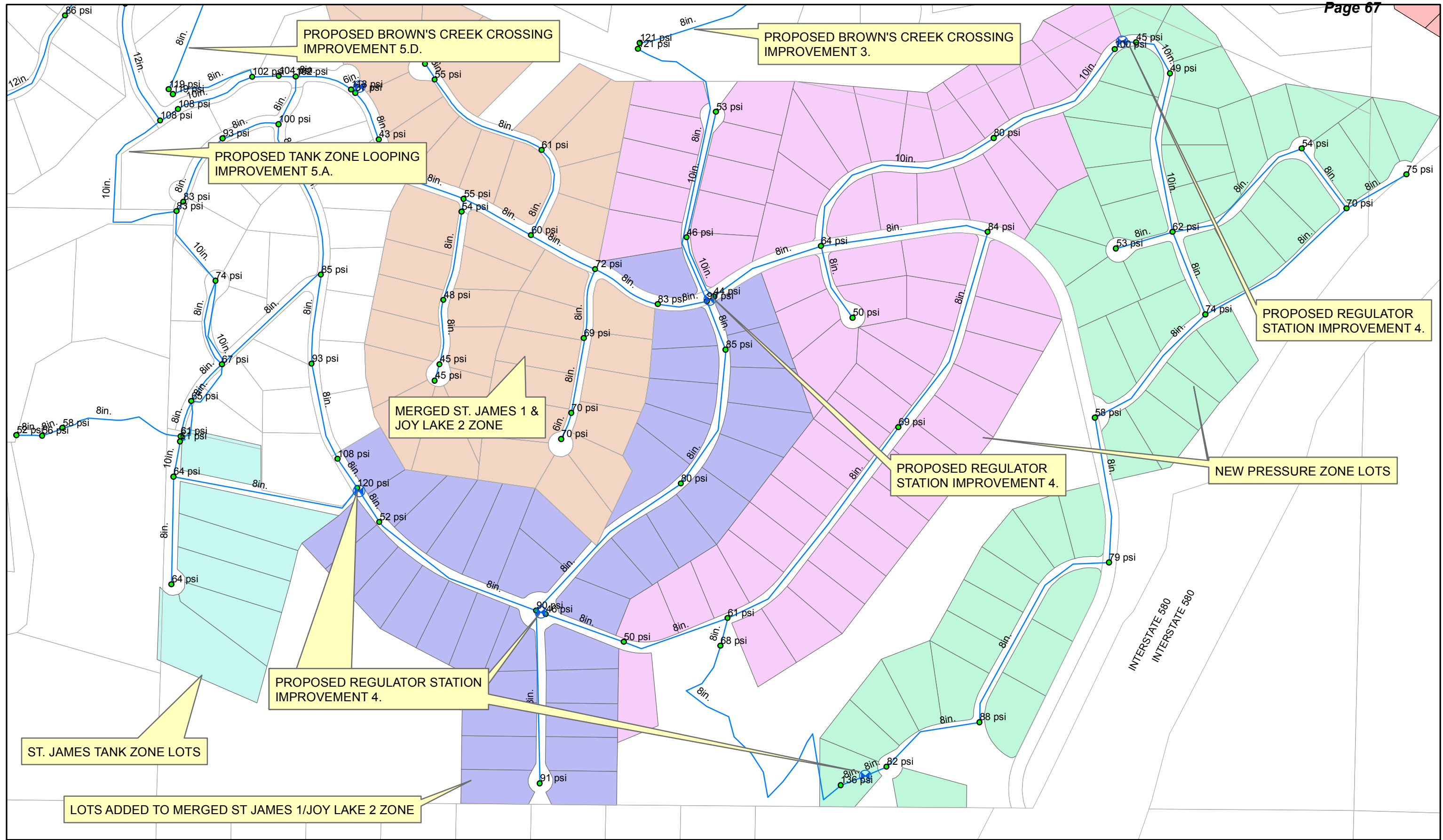




EXHIBIT 9

WORK ORDER: 15-4624

DATE: 12-8-2015

SCALE: 1 inch = 400 feet



CWR Serpa Well Pumping Test Final Report

**Serpa Well Pumping Test Report
and Assessment of Local Groundwater System**

Report Prepared for



and

Mr. Keith Serpa



Prepared by



Confluence Water Resources, LLC

June 2018

Reviewed By: Nevada Division of Water Resources

Revised: October 2018

Serpa Well Pumping Test Report & Assessment of Local Groundwater System



St. James Village

4100 Joy Lake Road
Reno, Nevada
89511



Confluence Water Resources, LLC

14175 Saddlebow Drive
Reno, NV 89511
Phone: (775) 843 1908
Email: mbanta@confluencewaterresources.com

Peer Reviewed By:



and



Nevada Division of Water Resources

Revised October 2018

Table of Contents

1 Purpose and Scope	1
2 Summary of Conclusions	1
3 Hydrogeological Setting	3
3.1 Hydrogeological Setting	3
3.2 Depth to Groundwater, Gradient and Flow Direction	4
Figure 1: Project Location Map	5
Figure 2: Geologic Map of Evaluation Area	6
Figure 3: Potentiometric Surface Map 50 Foot Contour	7
Figure 4: Potentiometric Surface Map 5 Foot Contour	8
Table 1: Well Details and Water Levels	9
4 Well and Aquifer Testing	10
4.1 Well Development and Short-Term Test.....	10
Chart 1: Cooper-Jacob Drawdown Analysis of Short-Term Test.....	11
4.2 Water Level Trends and Data Collection	12
4.2.1 Trends in St. James Wells.....	12
4.2.2 Trends in Domestic Wells.....	12
4.3 Step Drawdown Test.....	13
Chart 2: Step Drawdown Test and Recovery	13
4.3.1 Interpretations	13
Chart 3: Specific Drawdown vs. Discharge Rate	14
Table 2: Step Test Parameters	14
4.4 Constant Rate Discharge Test of FCW	15
Chart 4: FCW 10-Day Test Drawdown and Recovery vs. Time	15
Chart 5: FCW 10-Day Test Drawdown vs. Time.....	16
Chart 6: FCW 10-Day Test Recovery vs. Time	17
Chart 7: FCW 10-Day Scaled Test Recovery vs. Time	18
4.5 Analyses and Interpretation of Pumping Test Results.....	19
Table 3: Summary of Calculated Aquifer Parameters from the FCW	20
Chart 8: Theis Analysis	21
Chart 9: Cooper-Jacob Analysis	22
4.6 Analyses of Hydraulic Response in Observation Wells	23
Chart 10: OWE-3 Response to FCW Test.....	24
Chart 11: OWE-4 Response to FCW Test.....	25
4.6.1 Assessment of Transmissivity and Storativity	26

Table 4: Summary of Calculated Aquifer Parameters	26
Chart 12: OWE-3 Cooper-Jacob Computation	27
Chart 13: OWE-4 Cooper-Jacob Computation	28
Chart 14: OWE-3 Cooper-Jacob Computation Detrended Data	29
Chart 15: OWE-4 Cooper-Jacob Computation Detrended Data	30
4.6.2 Boundary Conditions	31
Chart 16: OWE-3 Analysis of Boundary Conditions Using Detrended Data	32
Chart 17: OWE-4 Analysis of Boundary Conditions Using Detrended Data	33
Chart 18: FCW Analysis of Boundary Conditions	34
5 Predicted Drawdown and Well Performance	35
Chart 19: Time Drawdown Analysis	35
6 Surface Water Interactions with Groundwater	36
7 Water Quality	37
Table 5: Summary of Water Quality Analyses	38
Chart 20: Piper Diagram	39
Chart 21: Global Meteoric Water Line	40
8 Closing Remarks	41
9 References	42
10 Certification	43

Appendices

Appendix A: Work Plan for FCW Constant Rate Pumping Test
Appendix B: Water Level Trend Charts
Appendix C: Well Drillers Reports
Appendix D: Laboratory Analytical Report

1 Purpose and Scope

This report has been prepared by Confluence Water Resources (CWR) to characterize the groundwater resources associated with Saint James Village and the Serpa Well, hereinafter referred to as the Falcon Capital Well (FCW), which is located within the NW¼, NE¼, of Section 23, T17N, R19E, Mount Diablo Baseline and Meridian. **Figure 1** shows the location of the FCW.

The results of the characterization work and the groundwater testing presented in this report are presented to examine aquifer dynamics and to determine if there is an influence with other water rights holders or domestic well owners. Although the FCW does not meet construction standards for a municipal water supply well, the well was selected to complete evaluations required to assess potential impacts to the Mount Rose Fan groundwater system and adjacent aquifers from prolonged extraction of groundwater at the FCW location. A long-term constant rate pumping and recovery test was performed to assess hydrogeological boundary conditions, groundwater quality, impacts to other wells and potential water production.

CWR worked directly with the Truckee Meadows Water Authority (TMWA) to develop a work plan and conformance criteria for administration of the long-term constant rate test. The work plan identified the monitoring network and protocol for administration of data collection. CWR and TMWA worked together to collect monitoring data, sufficient to support the assessment. The following work was thus accomplished:

- Redevelopment of FCW and Video Survey.
- Collection of Background and Pre-Test Water Levels.
- Collection of Groundwater and Surface Water Quality Samples.
- Collection of Flow Measurements along Browns Creek and Return Ditch to Washoe Valley.
- Administration of a Step Drawdown and Recovery Test of the FCW.
- Administration of a 10 Consecutive Day Constant Rate Discharge and Recovery Test of the FCW.
- Collection of Post-Pumping Test Water Levels.
- Data Analyses and Assessment of Potential Cumulative Impacts.
- Assessment of Available Water Resources and Likely Performance of New Production Wells.

The work plan, methods and equipment used to complete the work described above are provided in **Appendix A**.

2 Summary of Conclusions

The results of the testing, monitoring and analyses of data collected from the constant rate pumping and recovery test are summarized below:

- The FCW was pumped at a constant rate of 406 gallons per minute (gpm) for ten (10) consecutive days. The total drawdown over 10 consecutive days of pumping was 100.63 feet.

- The Specific Capacity at a rate of 406 gpm is about 4 gpm/Ft. Well efficiency is approximately 40.7% at 450 gpm and 67.3% at 150 gpm.
- The Transmissivity of the formation, which the FCW is screened, was estimated from both the rate of drawdown and rate of recovery in the pumped well. The range in Transmissivity values between the Theis Recovery and Cooper-Jacob drawdown is (7,163 Ft²/Day vs. 3,712 Ft²/Day).
- The rate of recovery in the well bore is thought to be influenced by borehole storage effects and not by water siphoning down the drop pipe to the pump once pumping had been terminated. The Transmissivity estimated from the recovery data is expected to be slightly over estimated based on this initial response. The late time drawdown data is expected to provide a more reliable estimate of Transmissivity.
- The Transmissivity estimated from Cooper-Jacob drawdown is approximately 3,712 Ft²/Day.
- Transmissivity at OWE-3 was estimated to be approximately 11,082 Ft²/Day with Storativity of approximately 4.53E-03. Detrended data suggests the transmissivity is closer to 7,337 Ft²/Day with Storativity of approximately 7.78E-03.
- Transmissivity at OWE-4 was estimated to be 7,460 Ft²/Day with Storativity of approximately 2.72E-03. Detrended data suggests the transmissivity is closer to 9,135 Ft²/Day with Storativity of approximately 1.24E-03.
- Total drawdown response at OWE-3 was approximately 4.0 feet after 10 consecutive days of pumping at the FCW. The 14-Day post-test recovered water level was within 68% of the pretest water level trend in the well.
- Total drawdown response at OWE-4 was approximately 3.5 feet after 10 consecutive days of pumping at the FCW. The 14-Day post-test recovered water level was within 74% of the pretest water level trend in the well.
- Derivative analyses of drawdown showed some evidence of a constant head boundary or infinite radial recharge boundary condition during the test. However, this boundary condition did not persist, and several no-flow boundaries were later identified. These no-flow boundaries provide evidence of a faulted or fractured hydrogeological regime.
- A potentiometric surface map was generated from measured water level elevations within the evaluation area. The data indicates groundwater within the vicinity of the FCW flows from west to east, 18° southeast at an average gradient of about 0.07 Ft/Ft and not in a northwest direction.
- Pre-test water levels in wells north and west of Browns Creek exhibited an increase in trend throughout the duration of the pumping test, and through the post-test recovery period. There was no response in any of the wells north of Browns Creek resulting from pumping of the FCW.
- Water quality analyses exhibit two very distinctive affinities between the FCW groundwater and SP-1 vs. the water sampled from Browns Creek.
- During the time of the evaluation, nearly 90% of the flow from Browns Creek was diverted into Washoe Valley adjacent to OWE-3. This diversion is expected to occur

per water rights permits. There are two points of diversion on Browns Creek, the upper diversion for water righted land in Washoe Valley (the old Winters Ranch) and the lower diversion to Little Washoe Lake. The lower diversion combines water from both Galena Creek and Browns Creek into storage in Little Washoe Lake.

- Impacts to water resources north of Browns Creek are not expected to occur from long-term extraction of groundwater at the FCW.
- Long-term extraction of groundwater is expected to influence domestic wells in Washoe Valley and TMWA operated municipal supply wells OWE-3 and OWE-4 also located in Washoe Valley. By applying a conservative Transmissivity of 3,721 Ft²/day from the FCW and a calculated average Storativity of .005 from the detrended data, a Theis based simulation of time and drawdown was produced. The Theis analysis generally agrees with the response observed during the long-term test since well loss was not accounted for. The simulation indicates over 800 gpm could continuously be extracted from the aquifer via a high capacity well or series of wells for a duration over five consecutive years.
- A Theis simulation was produced to assumes continuouse extraction of groundwater at a rate of 800 gpm for over five consecutive years. The simulation resulted in a drawdown stress of over 20 feet, extenuating over one (1) mile from the FCW. The stress is expected to occur in the direction of OWE-3 and OWE-4 in Washoe Valley and not in the direction of the up-gradient and cross-gradient wells, north of Browns Creek.
- Browns Creek may recharge the groundwater system. The flow measurements collected from BC-1 and BC-2 indicate Browns Creek may lose approximately 0.43 Ft³/sec or about 193 gpm between this reach during the time of the evaluation.
- This evaluation does not take into consideration recharge components from precipitation to the groundwater system, seasonal trends in water levels, moon and tide affects, pumping of other domestic or municipal wells, or other factors outside the stress exclusively induced from the pumping test of the FCW. However, the water level measurements from OWE-3 and OWE-4 were de-trended to better assess the stress induced from pumping of the FCW (*McGinley and Associates 2018*).

3 Hydrogeological Setting

3.1 Hydrogeological Setting

The FCW is located within NW ¼, NE ¼, of Section 23, T17N, R19E. **Table 1** provides the location coordinates for the FCW and the observation wells within the evaluation area. The evaluation area is located within Section 10, 11, 12, 13, 14, 15 and Section 23 of T17N, R19E. The geologic map of the *1999 Carson City 30 x 60 Minute Quadrangle, Nevada by John H. Stewart, Nevada Bureau of Mines and Geology* presents the regional geologic materials. **Figure 2** presents a map of the geology within the evaluation area. The FCW is located within Washoe Valley, Nevada Groundwater Basin 89. The evaluation area straddles both Groundwater Basins 88 (Pleasant Valley) and 89 (Washoe Valley).

The rocks at the FCW are bounded to the west by the Carson Range of the Sierra Nevada and on the east by the Virginia Range. Washoe Lake is located about 1-mile south east of

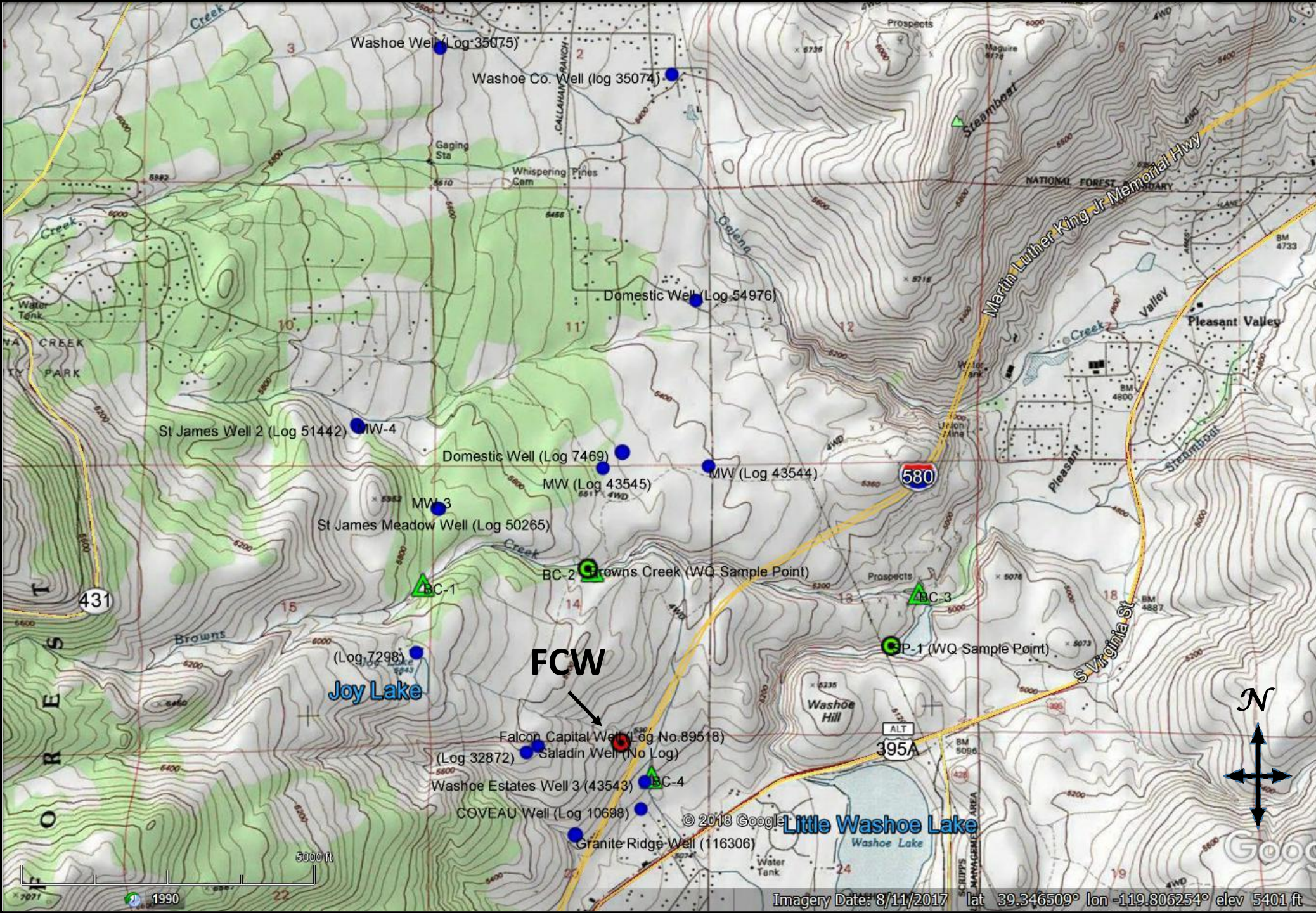
the FCW. Browns Creek is located approximately 0.6 miles to the north. The well drillers report for the FCW (**Appendix C**) indicate the underlying geology consists of broken volcanics. The geologic map indicates these rocks may consist of fractured andesite and dacite.

A series of five Pleistocene rhyolite domes (Qsh) occur along a NE-SW fault trend. The Steamboat Hills geothermal field occurs predominantly along this same NE-SW trending fault system within the granitic rocks (Skalbeck et.al 2002). According to Skalbeck, the thick zone of altered rocks along the western flank of the Steamboat Hills is coincident with a north-NW trending fault that may represent a previously unrecognized upflow zone for the steamboat geothermal system. The NE-trending fault system along the axis of the Steamboat Hills likely conducts the thermal water toward the geothermal production areas and eventually discharges to the alluvial deposits northeast of Steamboat Hills along north-trending faults (Skalbeck, et. al., 2002). The FCW is likely located along strike of this fault system. Ambient groundwater temperature typically ranges from between 50°F and 55°F. Water temperature from the FCW pumping test was measured via a dedicated down-hole Level Troll pressure transducer. Water temperature throughout the test was consistently about 70°F.

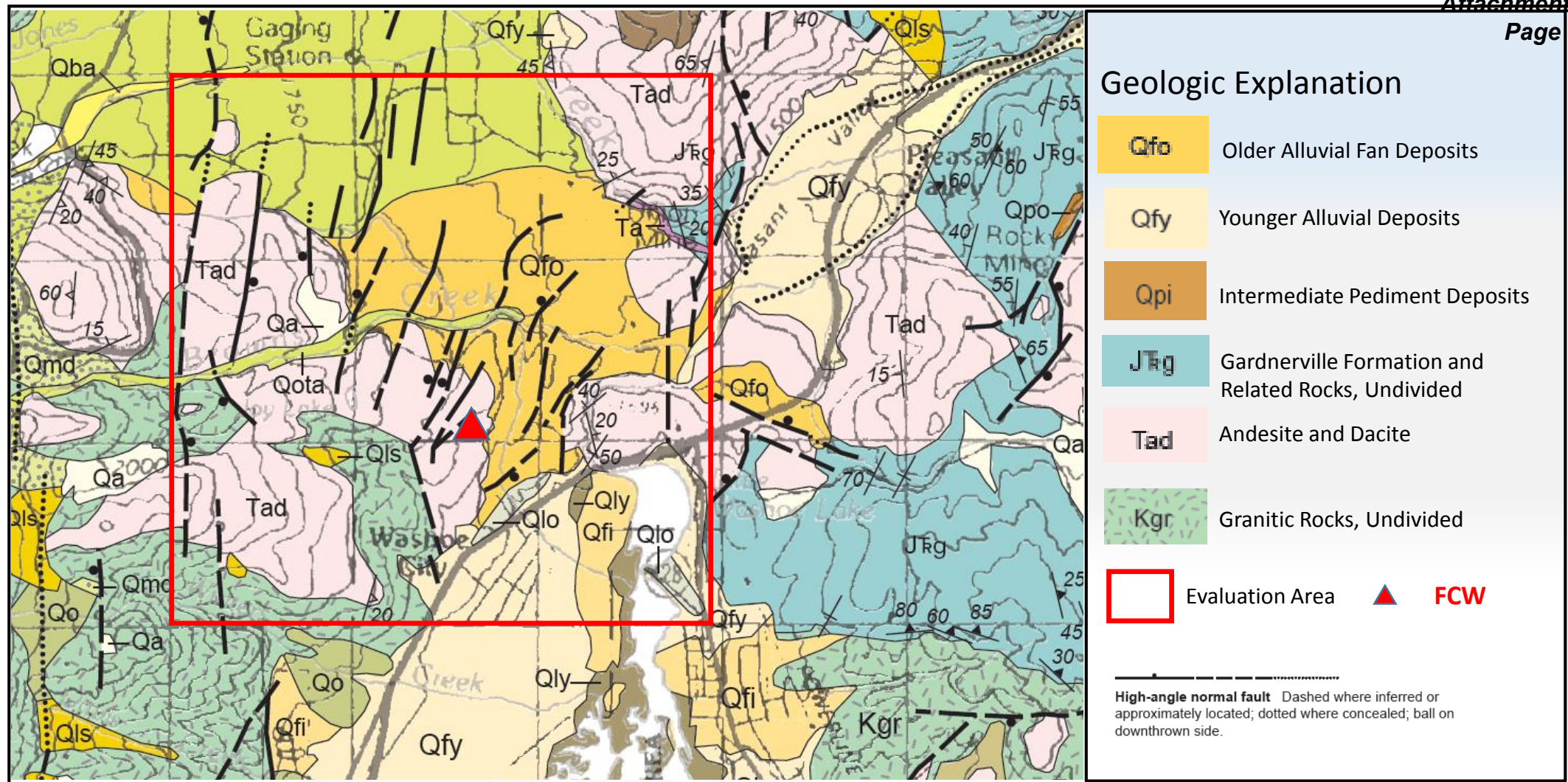
3.2 Depth to Groundwater, Gradient and Flow Direction

Groundwater elevations within the evaluation area range from between 5,440 feet above mean sea level (feet AMSL) at ST. James Production Well 1 and 5,093 feet AMSL at the Edmund Coveau Well in Washoe Valley. Groundwater elevations have been approximated based on measured or reported depth to water in wells, relative to wellhead elevations estimated from Google Earth and land topography maps. The measured water levels used to approximate groundwater elevations were collected before the pumping test began to provide a snapshot in time approximation of the groundwater contour within the evaluation area (potentiometric surface). **Table 1** presents a tabulation of details for the wells examined within the evaluation area. The well details include depth to static groundwater, well completion information, approximate location of wells and expected geology at each well. **Figure 3** and **Figure 4** present potentiometric surface maps at 50-foot contour and 5 foot contour intervals respectively. The contours were generated using groundwater contouring software (SURFER). The contours were generated using a combination of natural neighbor raster and Kriging.

Groundwater near the FCW flows from west to east, -18° southeast at an average gradient of 0.07 Ft/Ft. North of Browns Creek, groundwater appears to generally follow the land contours. Groundwater levels within the Montreux and Callahan Ranch areas suggest flow originates from the west and flows to the east towards the Mt. Rose Fan, then doglegs in a southerly direction near Washoe County Mt. Rose Well 3 and 5, and then follows the land contour along axis of Galena Creek. There is no indication that the axis of primary groundwater flow within the evaluation area is in a northerly direction. Static groundwater measured at the FCW is 247 feet below ground surface (feet bgs) from the top of the steel well casing. The elevation of groundwater at the FCW is approximately 5,080 Ft AMSL. The groundwater elevation at OWE-3 is approximately 5,079 Ft AMSL. The elevations suggest the lower diversion ditch that is located within approximately 100 feet of OWE-3 could be influencing the water level of the well. Groundwater in this area flows in an east – southeast direction (**Figure 3**).

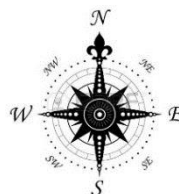


Attachment B Page 78		Figure 1 Project Area and Well Location Map	
● Observation Wells ▲ Stream Gauge Site ● Surface WQ Sampling Point		Serpa Well Pumping Test Report and Assessment of Local Groundwater System	
1-inch = 0.4 Miles		T19N R17E	
Prepared for:		ST. JAMES'S VILLAGE	



ST. JAMES'S VILLAGE

From: John H. Steward, 1999 Geologic Map of the Carson City 30 X 60 Minute Quadrangle, Nevada



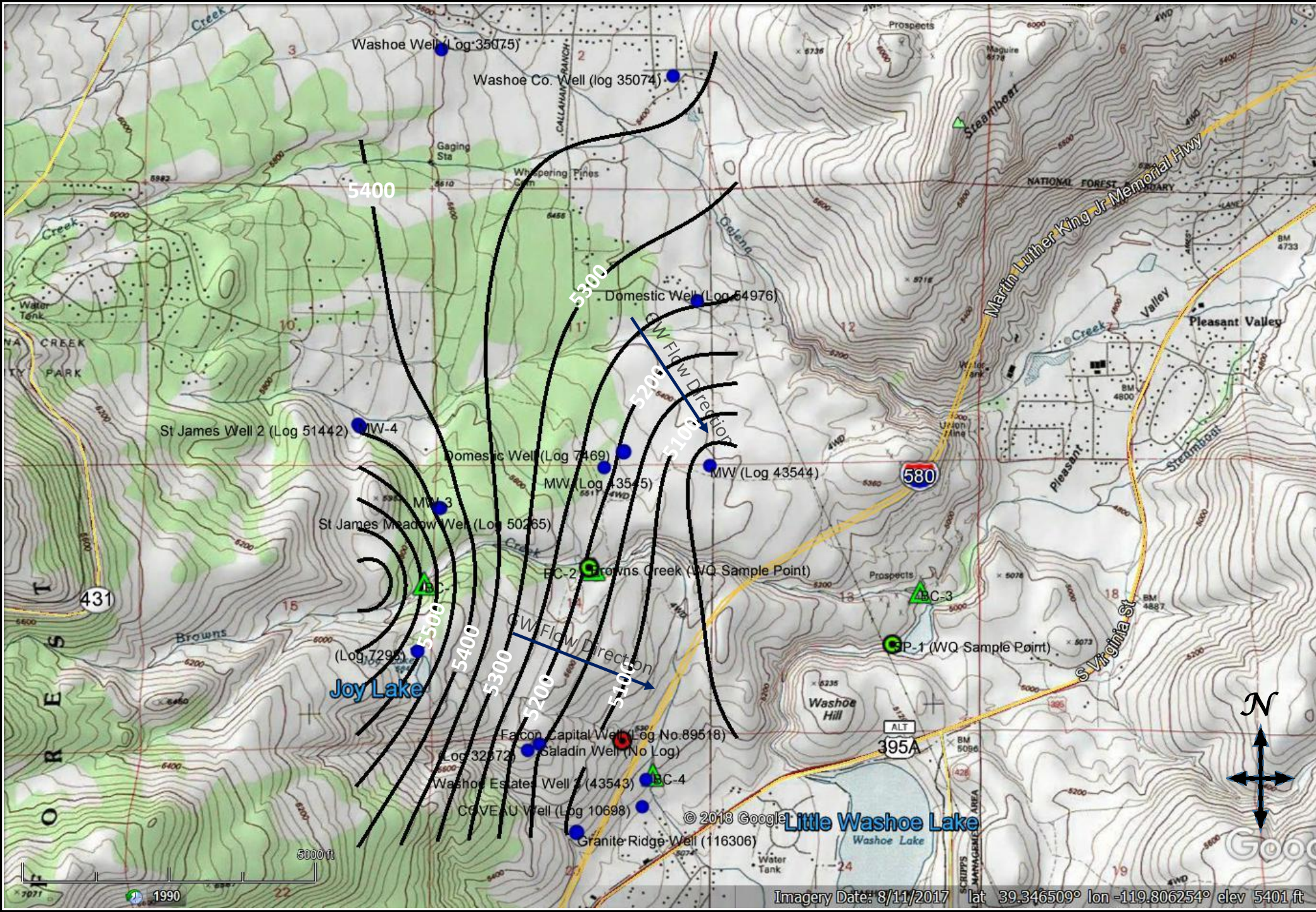
confluence
WaterResourcesLLC

1 Mile or 1.6 Km
Contour Interval: 50 Meters
Date: 5/12/2018

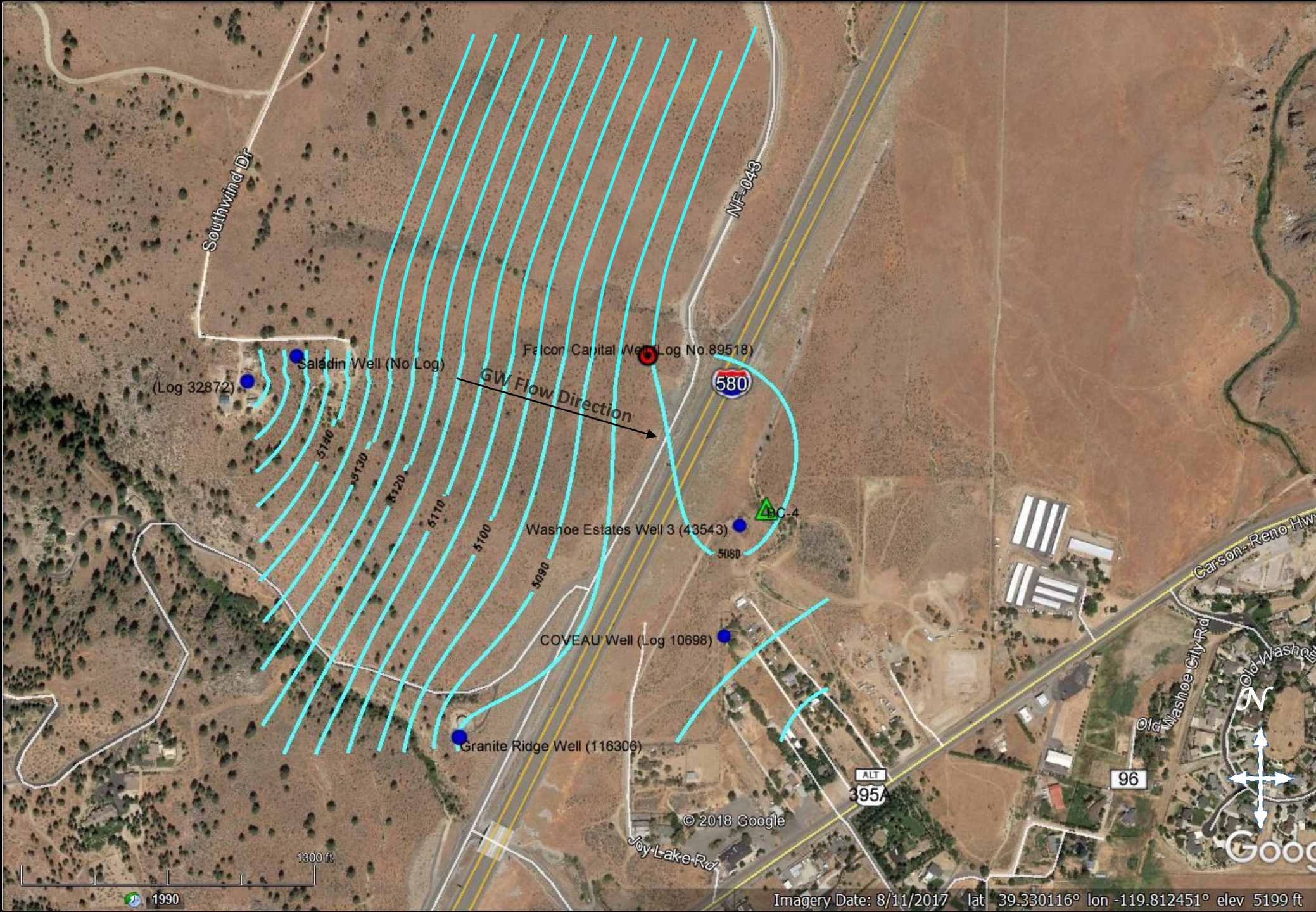
Serpa Well Pumping Test Report and Assessment of Local Groundwater System

Geologic Map of Evaluation Area

Figure 2



Attachment B Page 80		Figure 3 Potentiometric Surface Map 50 FT Contour Interval	
Serpa Well Pumping Test Report and Assessment of Local Groundwater System		Observation Wells Stream Gauge Site Surface WQ Sampling Point	
1-inch = 0.4 Mile T19N R17E			
Prepared for:		ST. JAMES'S VILLAGE	



- Observation Wells ●
- Stream Gauge Site ▲

Figure 4
Potentiometric Surface Map
5 FT Contour Interval

Serpa Well Pumping Test Report and
Assessment of Local Groundwater System

1-inch = 520 FT T19N R17E

Prepared for:



Table 1: Well Information and Water Levels

Well ID	Well Log No.	Type	APN	Latitude	Longitude	Approximate Well Collar Elv. (Ft amsl) From Top of Steel Casing	Well Depth	Screen Interval (Top) Ft bgs	Screen Interval (Bottom) Ft bgs	Screen Elevation (Top) Ft amsl	Screen Elevation (Bottom) Ft amsl	Geologic Unit Screened	Depth to Water (Ft bgs)	Approximate Groundwater Elevation (Ft amsl)	TMWA SCADA	TMWA TDX	CWR TDX	Well Responded to Pumping Test
Falcon Capital Well (Pumping Test Well)	89518	H	046-080-38	39.331428°	-119.813875°	5,327	697	290	690	5,037	4,637	Tad	247	5,080	No	No	Yes	Yes
Washoe Estates Well 3 (OWE-3)	43543	P	046-080-06	39.329199°	-119.812353°	5,168	300	190	270	4,978	4,898	Qfy	89.4	5,079	No	No	Yes	Yes
Washoe Estates Well 4	116306	P	046-080-34	39.326487°	-119.816939°	5,262	470	360	460	4,902	4,802	Tad	178.75	5,083	No	No	Yes	Yes
COVEAU, EDMUND E. Well	10698	H	046-080-43	39.326294°	-119.810825°	5,110	90	74	87	5,036	5,023	Qft	16.53	5,093	No	No	Yes	Yes
Danzinger Well	32872	H	046-060-18	39.331033°	-119.820234°	5,584	650	530	650	5,054	4,934	Tad	420	5,164	Monitoring By Home Owner			No
Saladin Well	No Log	H	046-060-19	39.331349°	-119.819464°	5,572	NA	NA	NA	NA	NA	NA	NA	NA	Monitoring By Home Owner			No
Joy Lake Well	7298	H	046-190-13	NE,SE Sec 15	T17N, R19E	5,840	390	316	348	5,524	5,492	Tad	150	5,690	No	No	No	No
St. James Production Well 1 (Nadia Ct Well)	51442	P	154-011-06	39.348043°	-119.831452°	5,694	620	260	620	5,434	5,074	Tad	255	5,439	Yes	Yes	No	No
St. James Production Well 2 (Meadow Well)	50265	P	046-131-22	39.343788°	-119.826017°	5,720	590	350	590	5,370	5,130	Tad	290	5,430	Yes	Yes	No	No
St. James MW-3 (Near Meadow Well)	NA	MW	046-131-22	39.343787°	-119.826017°	5,722	NA	NA	NA	NA	NA	NA	293.31	5,429	No	Yes	No	No
St. James MW-4 (Nadia Ct MW) Per TMWA	43547	MW	154-011-06	39.348042°	-119.831452°	5,692	360	240	360	240	360	Tad	250	5,442	No	Yes	No	No
St. James MW-1, 22 N. Earlhane Ct.	43544	MW	156-061-01	39.346006°	-119.807950°	5,414	770	470	770	4,944	4,644	Qfo	404.8	5,009	No	Yes	No	No
St. James MW-2, 189 Carlton Ct.	43545	MW	156-061-01	39.345909°	-119.815110°	5,507	640	530	630	4,977	4,877	Qfo	286.8	5,220	No	Yes	No	No
Domestic Well	4769	H	NA	SW,SE Sec 11	T17N R19E	5,485	144	135	144	5,350	5,341	Qota	135	5,350	No	No	No	No
Wayne Capurro Well	54976	H	045-270-15	39.352907°	-119.806134°	5,285	157	75	157	5,210	5,128	Qfo	56	5,229	No	No	No	No
Washoe Co. Mt. Rose Well 5	35075	P	047-040-17	39.367914°	-119.826086°	5,608	802	400	780	5,208	4,828	Qota	244	5,364	Yes	Yes	No	No
Washoe Co. Mt. Rose Well 3	35074	P	045-082-13	39.366676°	-119.810458°	5,410	223	120	210	5,290	5,200	Qota	41	5,369	Yes	Yes	No	No

Feet Above Mean Sea Level (Ft amsl).
Feet Below Ground Surface (Ft bgs).
Yellow Highlighted Cells Require Validation of Coordinates.
TDX = Pressure Transducer.

4 Well and Aquifer Testing

From October 2017 to March 2018, several tests were conducted in the FCW to assess pumping dynamics and local aquifer parameters. The following work was completed and the results of these tests are summarized in Section 4.

- Video Survey of Well (October 20, 2017)
- Well development, brushing swabbing and pumping (Week of October 30 to November 5, 2017).
- Short-Term hydraulic test of FCW (November 1 and 2, 2017).
- Background Water Level Data Collection (February 1 to February 15, 2018)
- Step Drawdown Test of FCW (February 16 and 17, 2018).
- Ten Day Constant Rate Discharge Test of FCW (February 19 to March 1, 2018).
- 14 Day Recovery of FCW (March 1 to March 14, 2018).

4.1 Well Development and Short-Term Test

Carson Pump administered well development and the short-term test, under direction of CWR. Since the FCW had not been pumped for over a decade, well development was prescribed to evaluate the current conditions and potential pumping dynamics. Well development included brushing the well screen and pump surging using a double-ended swab tool. The method proved to be effective and the well was reconditioned for testing. On November 1, 2017 a four (4) hour short term pumping test of the FCW was performed, followed by a recovery period to pre-test static conditions. An assessment of the hydraulics of the formation, for which the well is screened assuming Specific Capacity, was performed according to (Driscoll, Fletcher 1986). The transmissivity was calculated to be about 2,400 Ft²/day. A graphical presentation of these analyses are presented in **Chart 1**. These data were presented to TMWA in the work plan for the long-term constant rate test. A copy of the work plan is provided in **Appendix A**. Based on the results of the short-term test, TMWA and CWR agreed that the appropriate target duration for the long-term test would be 10 consecutive days at a target constant discharge rate between 400 to 450 gpm.

WELL ID: Falcon Capital Well

Local ID: Falcon Capital Well

Date: 11/1/2017

Time: 9:00

INPUT

Construction:	
Casing dia. (d _c)	8 Inch
Annulus dia. (d _w)	12 Inch
Screen Length (L)	400 Feet
Depths to:	
water level (DTW)	250 Feet
Top of Aquifer	250 Feet
Base of Aquifer	690 Feet
Annular Fill:	
across screen --	Gravel
above screen --	Cement
Aquifer Material -- Fractured Igneous and	
FLOW RATE	250 GPM

COMPUTED

Aquifer thickness = 440 Feet

Slope = 3.6464316 Feet/log10

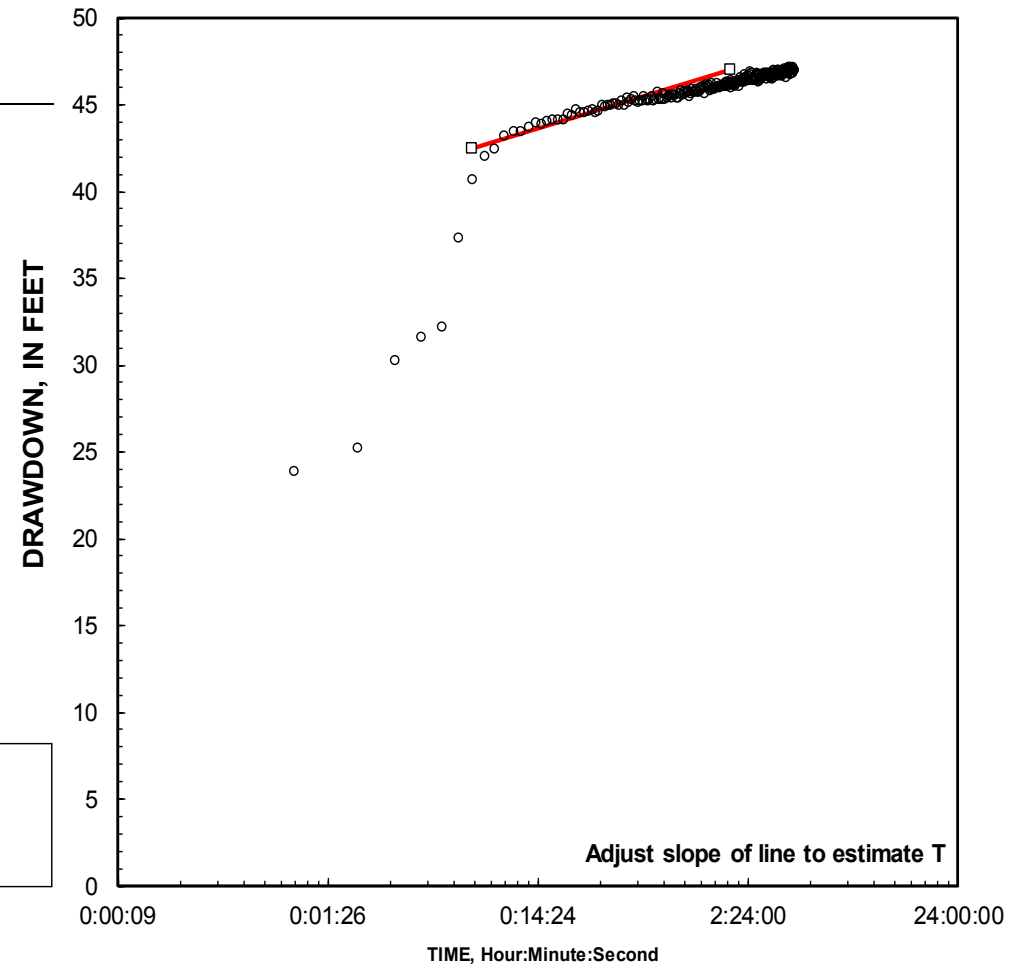
Input is consistent.

K = 5.5 Feet/Day

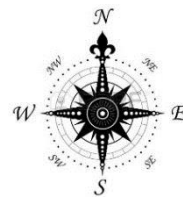
T = 2400 Feet²/Day

REMARKS: Cooper-Jacob analysis of single-well aquifer test

Falcon Capital Well, St. James Village, Nevada.



Prepared for:



Falcon Capital Well Project
Saint James Village
Washoe County, Nevada

Cooper Jacob Analysis of Single Well
Aquifer Test

Chart 1

4.2 Water Level Trends and Data Collection

Water level trends for observation wells selected within the evaluation area were monitored two weeks prior to initiation of the step test and constant rate discharge test. TMWA programmed pressure transducers located in the TMWA operated wells to begin recording water level measurements on one (1) minute time intervals on February 1, 2018. TMWA also worked with their operations management to limit pumping from production wells within the evaluation area. The TMWA SCADA system was also quarried for data two weeks prior to initiation of the constant rate test to establish baseline conditions and trends in water levels.

Initial water level measurements were collected via electrical water level indicators from all observation wells and the FCW to create a snapshot in time potentiometric surface map i.e. groundwater contour map of the evaluation area (**Figures 3 and 4**). CWR also deployed ventilated In-Situ Inc. Level Troll Pressure Transducers™ in wells without TMWA operated measuring devices or transducers, and programed them to record water level measurements on one (1) minute time intervals beginning on February 1, 2018. This time and data collection sequence allowed CWR and TMWA the ability to manage the data sets generated from each of the measuring devices and decipher trends in water levels.

4.2.1 Trends in St. James Wells

Trends in water levels from wells within the evaluation area are provided in **Appendix B**. The charts in the appendix show water level trends two weeks before the test, during the test, and up-to two weeks after the test was terminated. In general, water levels in all wells within the evaluation area appear to exhibit an upward trend. This is expected to coincide with the rate of regional recharge within the groundwater system. Despite of pumping from TMWA operated wells in St. James Village; the overall trend in water levels appears to be in an upward direction (see St. James Production Well 2 SCADA of **Appendix B**). The transducer in St. James MW-1 malfunctioned sometime during the evaluation and data was not retrievable from the device. Water level measurements collected from MW-1 via electric water level indicator did not significantly change throughout the duration of the investigation, and a trend could not be deciphered.

The upward trend in St. James wells continues through the duration of the FCW pumping test, and through the recovery period. There was no indication of change in the water level data, which would have suggested a deviation from this trend. The water level trends from wells north of Browns Creek suggests the stress propagated during the 10-Day pumping tests did not influence water levels of the St. James wells. The water level in St. James Production Well 2 (the Meadow Well) appears to have increased about three (3) feet from January to March of 2018 (see **Appendix B**).

4.2.2 Trends in Domestic Wells

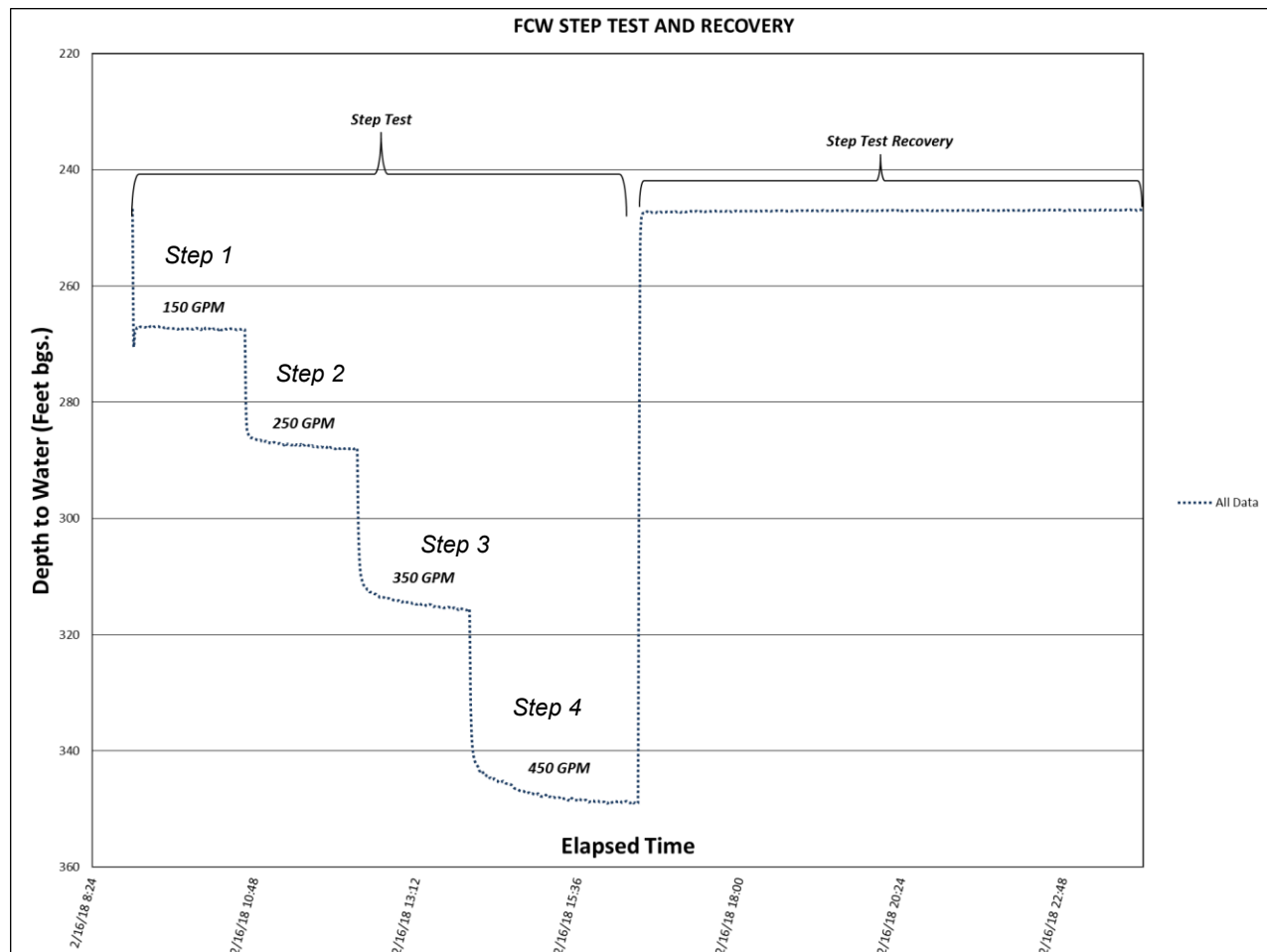
Domestic wells in Washoe Valley were inspected. However, due to constraints in well construction and pump arrangements, water level measurements were largely not achievable. The domestic well operated by Edmund Coveau provided some indication of depth to water in this area, and was monitored for trends before, during and after the FCW pumping test. A notice letter describing the proposed FCW pumping test was sent to the Danzinger and the Saladin residences who operate domestic wells west of the FCW. The notice letter advised the residence to monitor production rates from their respective wells and

report any changes in production during the time of the test to either CWR or TMWA. There was no report of loss of production from any of the domestic wells within the evaluation area.

4.3 Step Drawdown Test

CWR and Carson Pump completed a step drawdown test of the FCW beginning at 9:00 am on February 16, 2018. The step test consisted of three, 100-minute steps and one, 150-minute step (four steps). Step test procedures are summarized in the work plan, which is provided in **Appendix A**. An annotated water level and pumpage hydrograph for the FCW during the step drawdown test is presented below (**Chart 2**).

Chart 2: Step Drawdown Test and Recovery



4.3.1 Interpretations

Well efficiency calculated from specific capacity and drawdown is about 40.7% at 450 gpm. It is theoretically impossible to have a 100% efficient well due to turbulence and frictional losses. Values for aquifer loss and well loss are estimated from equation for the line of best fit for points of specific drawdown and discharge, as plotted below in **Chart 3**. **Table 2** provides a tabulation of calculated step test parameters which include drawdown, specific capacity and well efficiencies at different pumping rates. The total discharge during the step test was approximately 142,500 gallons.

Chart 3: Specific Drawdown vs. Discharge Rate

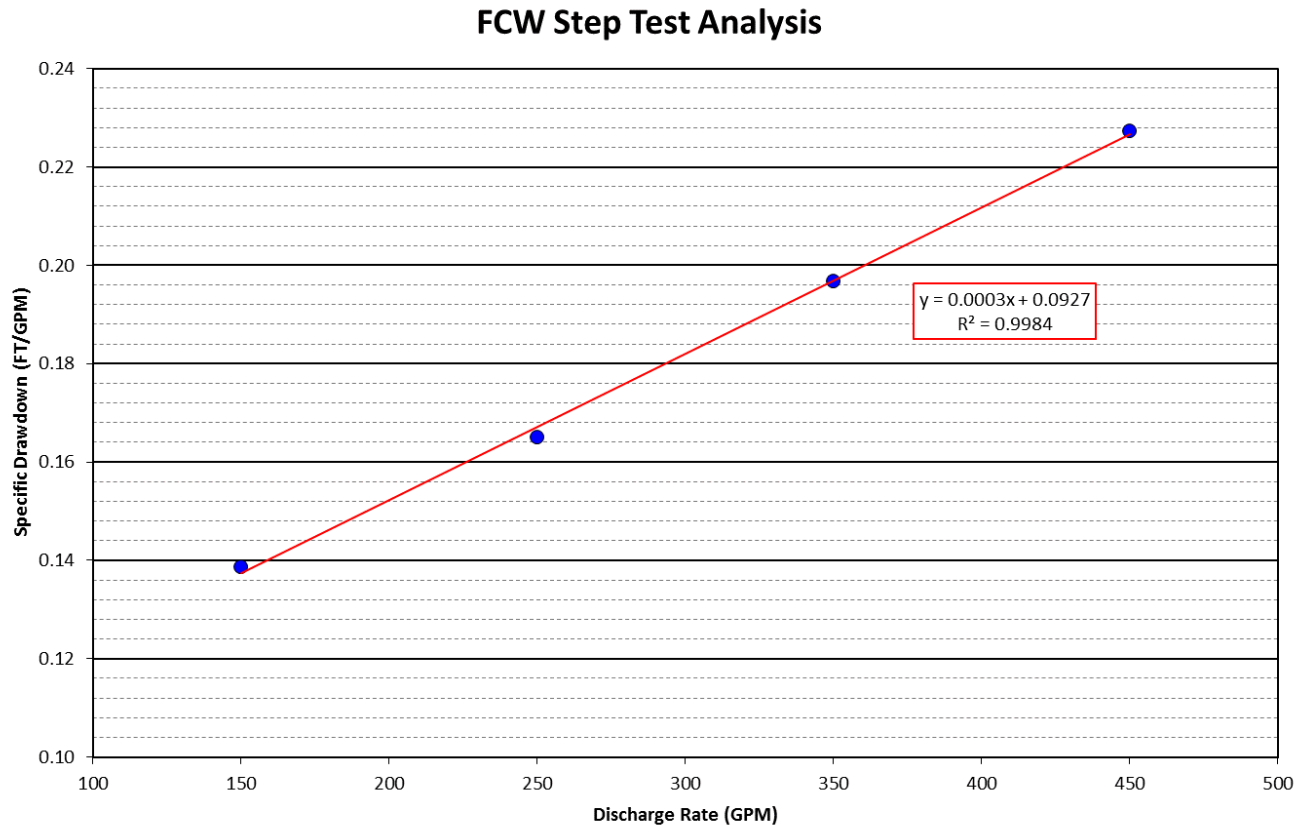


Table 2: Step Test Parameters

Step No.	Q (gpm)	Aquifer Loss BQ (ft)	Well Loss CQ ² (ft)	Calculated Drawdown S' (ft)	Calculated Specific Capacity Q/S' (gpm/ft)	Well Efficiency E (%)
1	150	13.91	6.75	20.66	7.26	67.3
2	250	23.18	18.75	41.93	5.96	55.3
3	350	32.45	36.75	69.20	5.06	46.9
4	450	41.72	60.75	102.47	4.39	40.7

4.4 Constant Rate Discharge Test of FCW

The constant rate discharge test of the FCW was conducted for ten (10) consecutive days or 240 hours. The test began at 10:00 am on February 19, 2018 and ended at 10:00 am on March 1, 2018. An average discharge rate of approximately 406 gpm was maintained through the duration of the test with approximately 60 psi of backpressure in the pump string.

Total drawdown in the FCW after 10 consecutive days of pumping was 100.63 feet. An annotated water level hydrograph showing drawdown and recovery is provided in **Chart 4**. Drawdown and depth to water for the FCW during the constant rate discharge test is presented in **Chart 5**. The total volume of groundwater pumped during the test was 5.84 Million gallons or about 18-acre feet.

Water level recovery data were collected for two weeks beginning at 10:00 am on March 1, 2018. Recovery data collection was terminated on March 14, 2018, when the recovered water level in the FCW had reached within 99% of the pre-test static water level. **Chart 6** presents a hydrograph detailing the recovery of the FCW after 10 consecutive days of pumping. **Chart 7** presents a scaled version of the latent recovery used for data analyses.

Chart 4: FCW 10-Day Test Drawdown and Recovery vs. Time

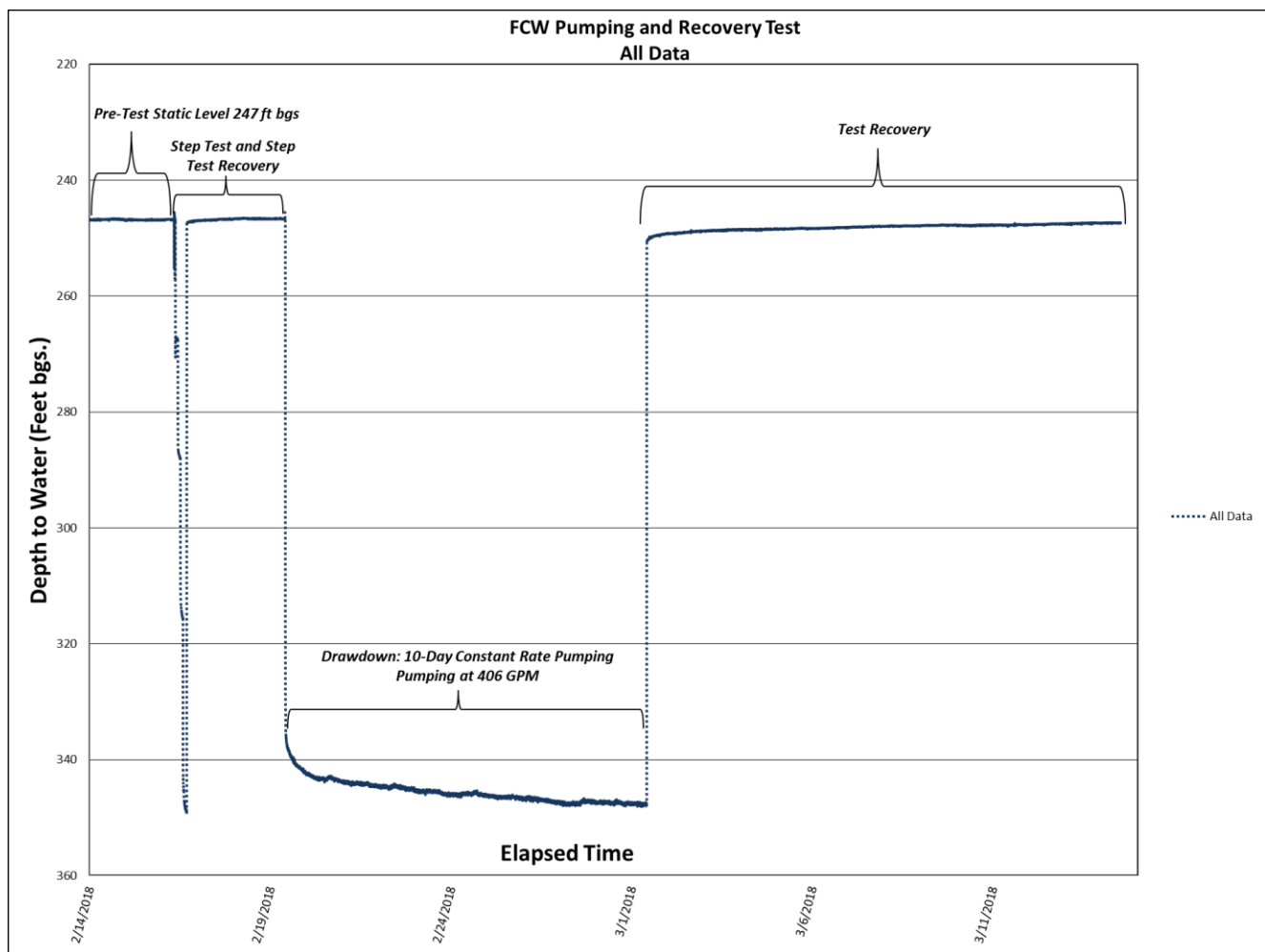


Chart 5: FCW 10-Day Test Drawdown vs. Time

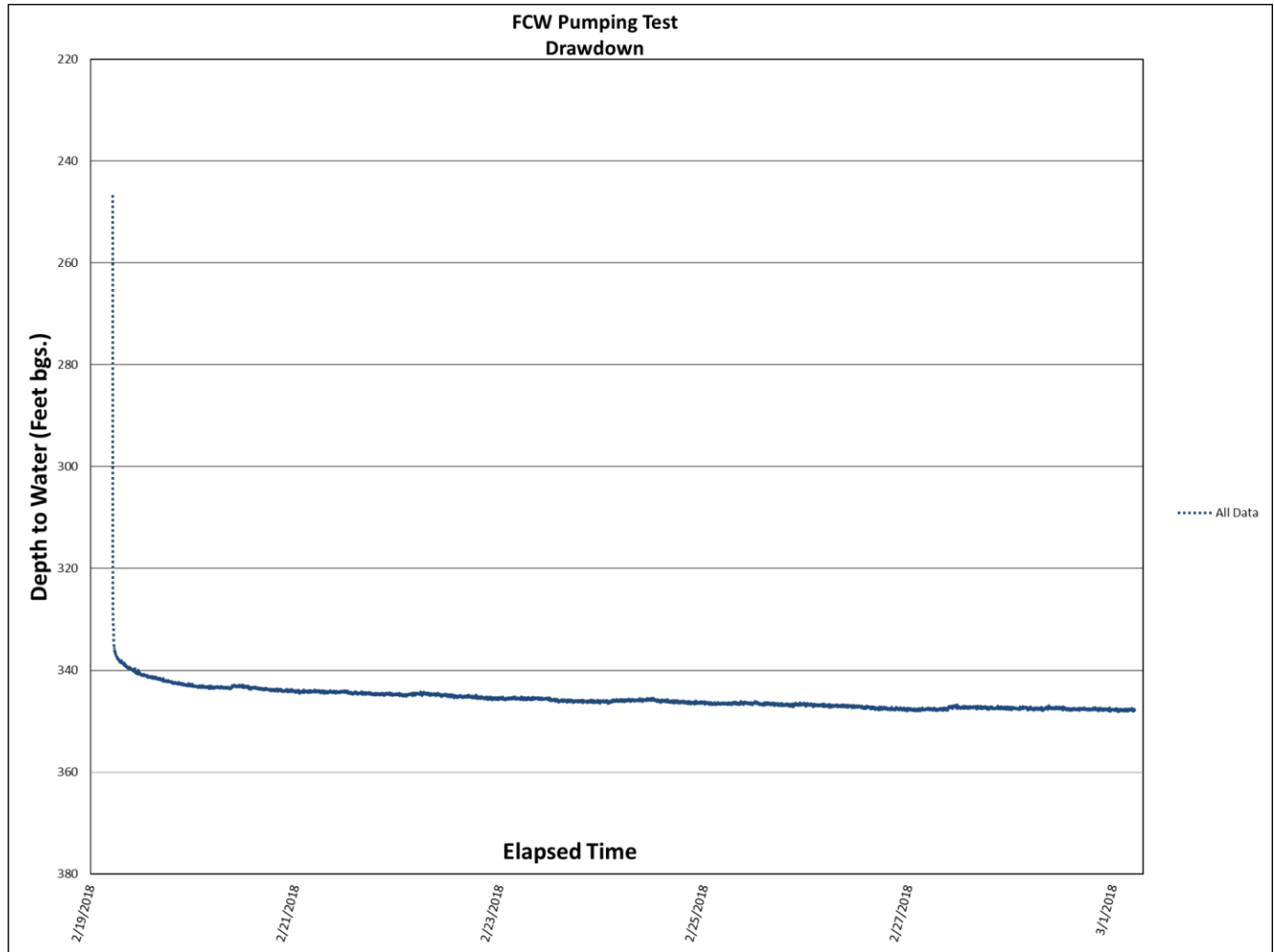
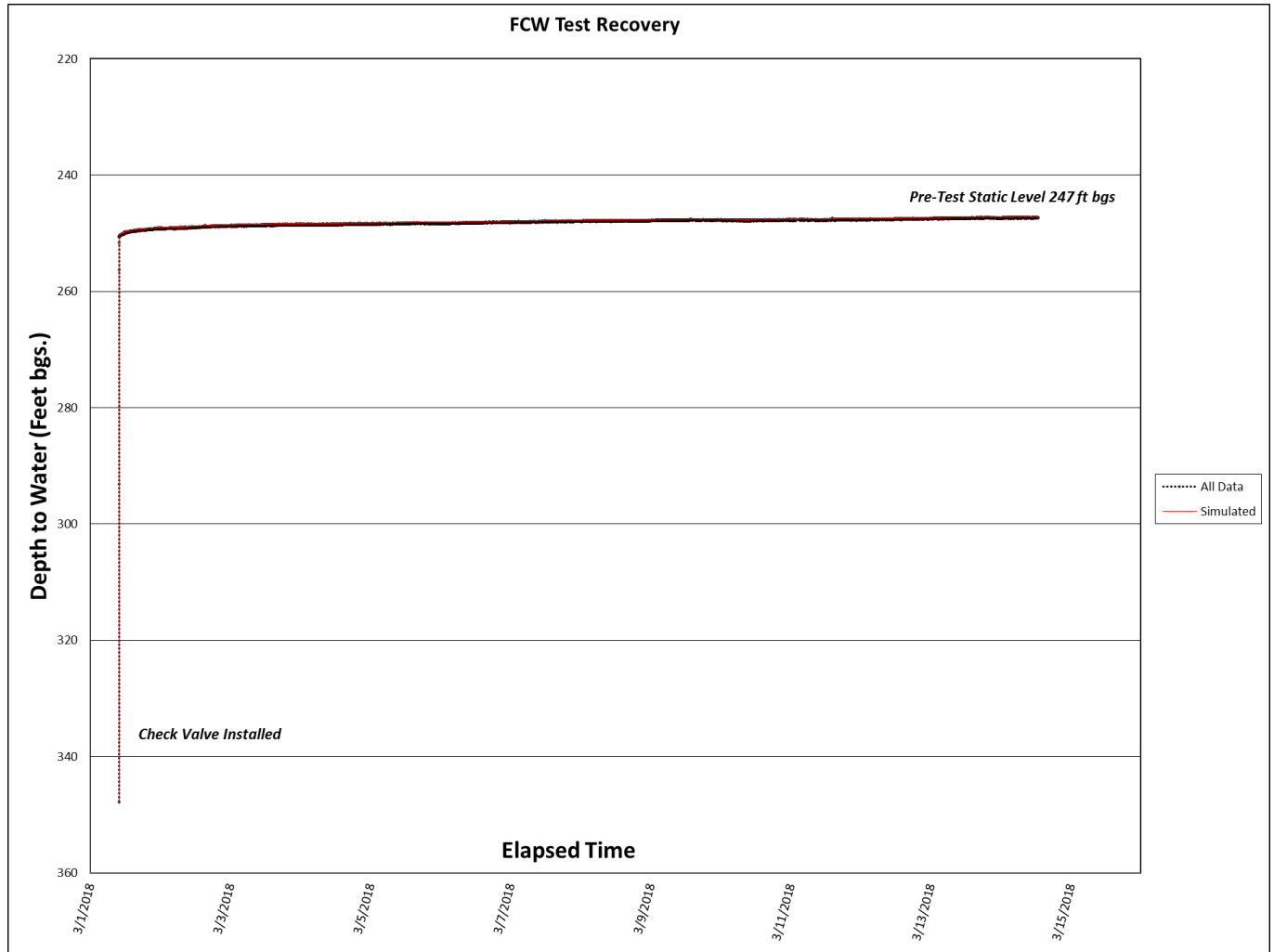
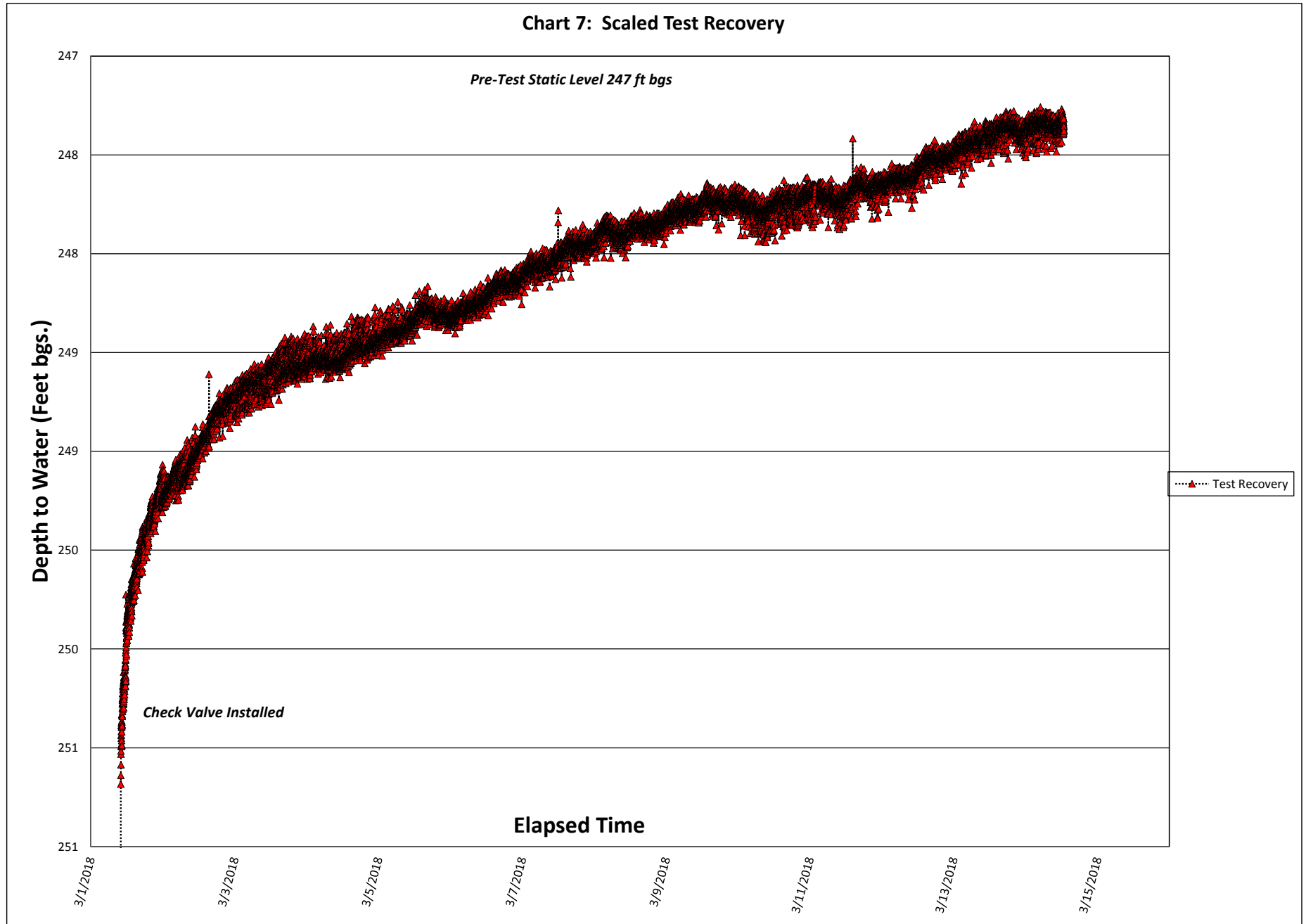


Chart 6: FCW 10-Day Test Recovery vs. Time





4.5 Analyses and Interpretation of Pumping Test Results

Drawdown and recovery data collected from the FCW tests were used to calculate hydraulic conductivity values and transmissivity. **Table 3** lists the types of analysis completed, and the hydraulic conductivity values estimated from each analysis. Water-level recovery data were analyzed using two methods:

- Recovery in the “pumped” well following constant-rate pumping, using the Theis straight-line recovery method (Kruseman and DeRidder, 1970);
- Drawdown in the “pumped” well assuming non-equilibrium radial flow in a confined aquifer, using the Cooper-Jacob Straight-Line Time-Drawdown Method as described by CW. Fetter, Applied Hydrogeology, 2001, Fourth Edition.

Recovery data from the constant rate test were analyzed using the Theis Straight Line method (**Chart 8**). The red line is used to estimate $\Delta s'$ over one log cycle. The following assumptions are made when using both Cooper-Jacob drawdown and the Theis recovery solution:

- The aquifer has infinite areal extent.
- The aquifer is homogenous, isotropic and of uniform thickness.
- The well is fully penetrating.
- Flow to the well is horizontal.
- The aquifer is confined.
- Flow to the well is unsteady.
- Water is released instantaneously from storage with decline in hydraulic head, and
- The diameter of the well is infinitesimally small so that storage in the well can be neglected.

A mathematical solution by Theis (1935) is useful for determining the hydraulic properties (transmissivity) of non-leaky confined aquifers from recovery tests. Analysis involves matching the Theis recovery solution to water-level recovery (residual drawdown) data collected after a pumping test. Theis derived the following approximate linear equation to predict residual drawdown in a homogeneous, isotropic, and non-leaky confined aquifer assuming a fully penetrating line sink that discharged at a constant rate prior to recovery:

Transmissivity (T) is determined using the slope of the line, $\Delta s'$, from the following equation:

$$T = \frac{2.3Q}{4\pi\Delta s'}$$

Drawdown data from the constant rate test were also analyzed using the Cooper-Jacob Straight-Line Time Drawdown Method (**Chart 9**), using AQTESOLVE™ solution. The analyses assume the following;

$$T = \frac{2.3Q}{4\pi\Delta(h_0 - h)}$$

Where;

T = Transmissivity (Ft²/Day)

Q = Pumping Rate (Ft³/Day)

$\Delta(h_o - h)$ is the drawdown per log cycle of time (Ft)

$\Delta s'$ is the slope of the fitted line (change in residual drawdown per log cycle equivalent time)

The late time recovery data was used to determine $\Delta s'$ due to initial response to borehole storage. Transmissivity was calculated from average discharge and residual drawdown over one log cycle of T/t' (total test time T over recovery time t'). Hydraulic conductivity is Transmissivity divided by the saturated thickness (or length of well screen) and is provided in **Table 3** for each of the analyses.

The range in Transmissivity values between the Theis Recovery and Cooper-Jacob drawdown is (7,163 Ft²/Day vs. 3,712 Ft²/Day). The rate of recovery in the well bore is thought to be influenced by secondary permeability and not by water siphoning down the drop pipe to the pump once pumping had been terminated. A check valve had been installed along the drop pipe. The check valve was inspected to insure siphoning did not occur. The resulting slope of initial well recovery is steep and presents several orders of deviation in the slope of the late stage recovery data. The Transmissivity estimated from the recovery data is thereby expected to be an over estimate based on the initial response.

This sort of response can be expected in faulted or fractured rocks where secondary permeability may be greater than the primary permeability of the formation. Fissures have an immediate elastic response to a sudden change in water levels, while porous blocks have an induced subsequent elastic response. In this case, late time drawdown data is expected to provide a more reliable estimate of primary permeability, while recovery in the pumped well may provide an estimate of secondary permeability.

Table 3: Summary of Calculated Aquifer Parameters from the FCW

Data	Solution	Transmissivity (FT ² /Day)	Hydraulic Conductivity (FT/Day)
Drawdown	Cooper-Jacob Straight Line	3,712	8.37
Recovery	Theis Straight Line Recovery	7,163	16.17

Chart 8: Theis Analysis

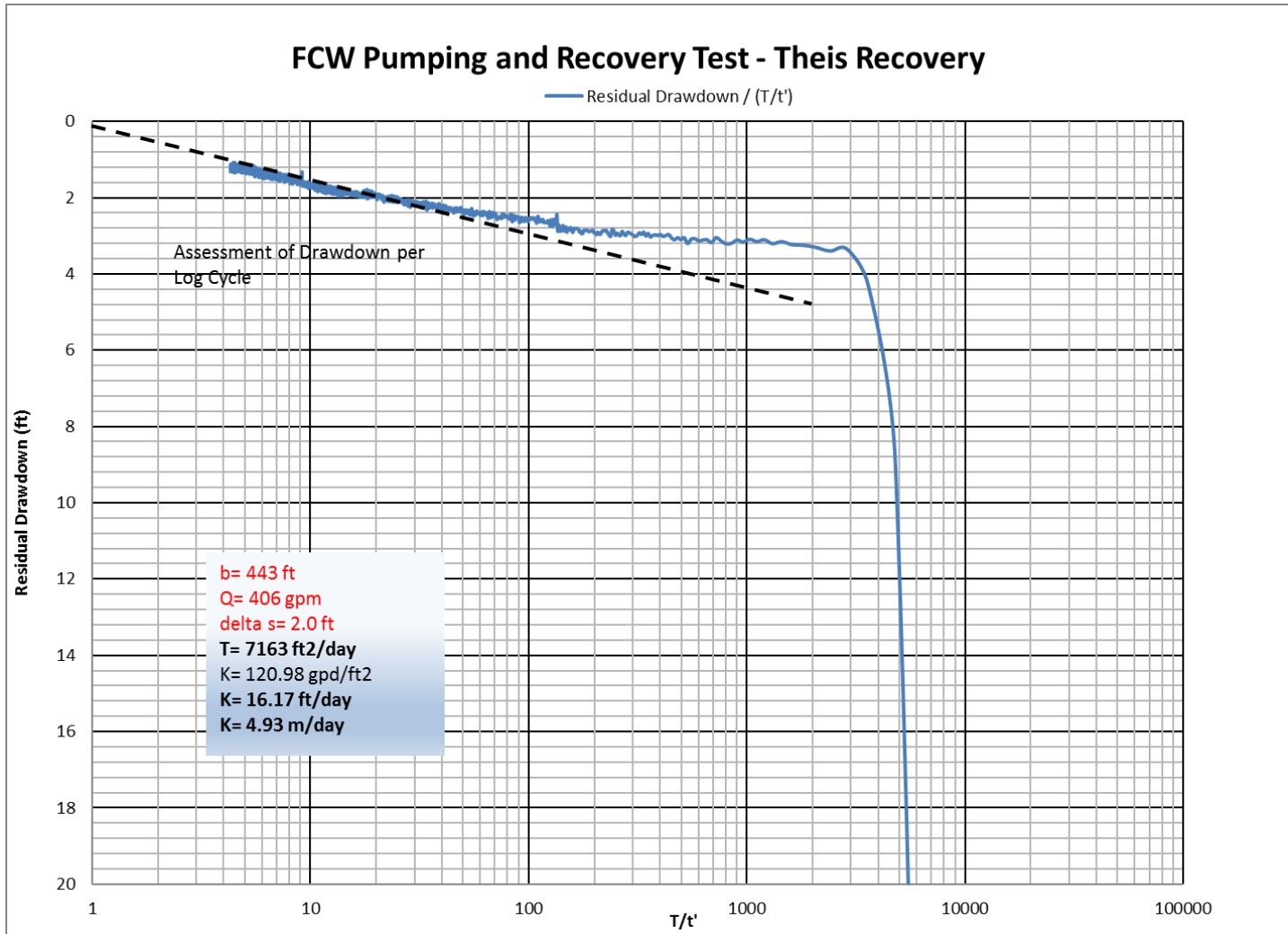
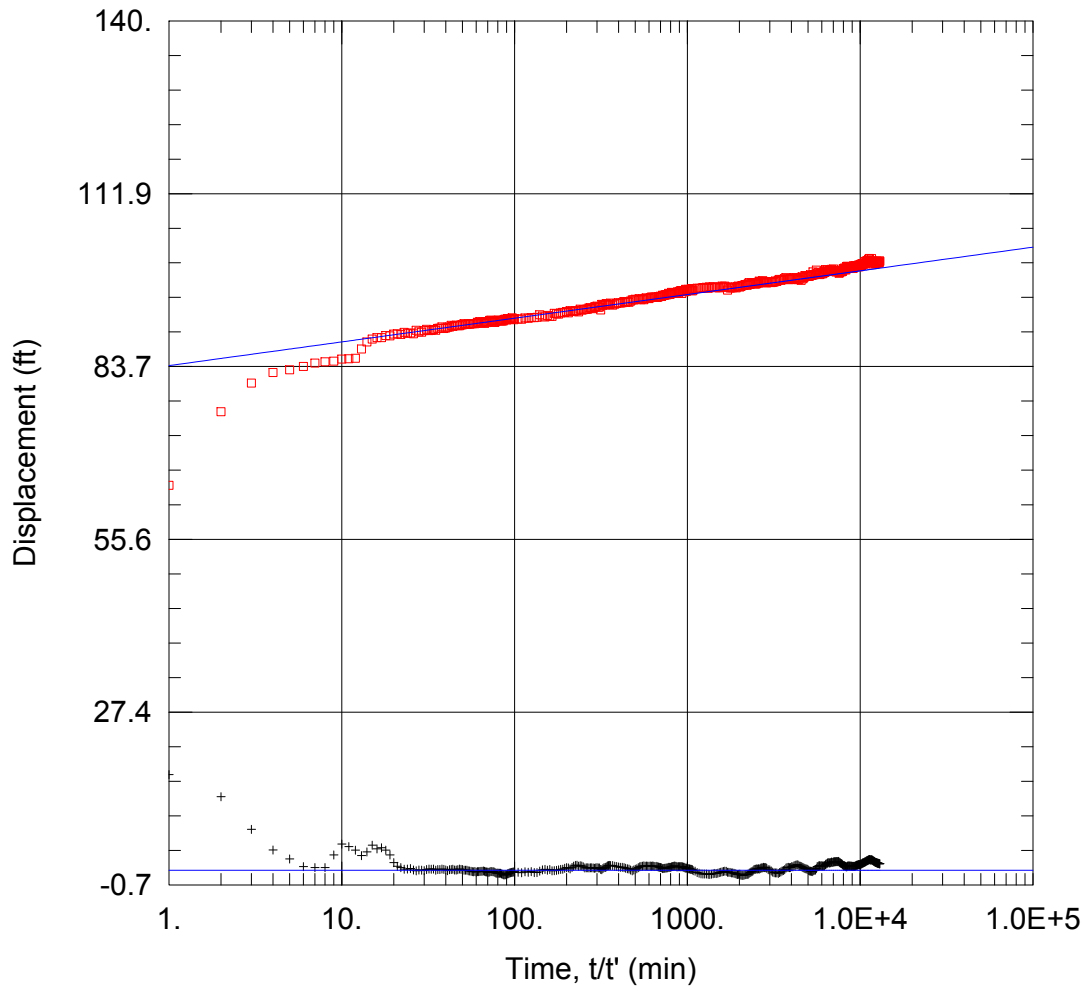


Chart 9



WELL TEST ANALYSIS

Data Set: E:\CWR\AQTESOLV Analysis jf2 - FCW.aqt

Date: 07/18/18

Time: 16:30:40

PROJECT INFORMATION

Company: MGA

Client: CWR

Project: CWR001

Location: WC

Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft

Anisotropy Ratio (K_z/K_r): 0.2

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

$T = 2.578 \text{ ft}^2/\text{min}$

$S = 1.045\text{E-}21$

4.6 Analyses of Hydraulic Response in Observation Wells

Seventeen (17) wells were evaluated during the groundwater assessment. **Table 1** provides details for the wells assessed within the evaluation area. Twelve (12) of these wells were monitored for response during the 10 day pumping test. Of these 12 wells, three (3) observation wells and the pumping well responded to the test (total of four wells). The wells that responded included the FCW, OWE-3, OWE-4 and the Coveau Well. The total drawdown response is summarized below.

- Total drawdown at OWE-3 was approximately 4.0 feet after 10 consecutive days of pumping at the FCW. The 14-Day post-test recovered water level was within 68% of the pre-test water level trend.
- Total drawdown at OWE-4 was approximately 3.5 feet after 10 consecutive days of pumping at the FCW. The 14-Day post-test recovered water level was within 74% of the pre-test water level trend. The water level trend in this well represents trends in a pumped municipal well.
- Total drawdown at Coveau Well was approximately 1.3 feet after 10 consecutive days of pumping at the FCW. The 14-Day post-test recovered water level was within 90% of the pre-test water level trend. The pre-test water level trend represents trends in a pumped domestic well.

Although a response was measured at the Coveau domestic well, the density of data was not enough to generate a high-resolution dataset that could be analyzed for aquifer parameters. **Chart 10** presents a hydrograph of pre-test water levels, drawdown and recovery in OWE-3 and **Chart 11** presents a hydrograph of pre-test water levels, drawdown and recovery in OWE-4. There was no measurable response at ST. James MW-1 or MW-2, which are located north of Browns Creek.

CWR completed a Cooper-Jacob Straight-Line Time Drawdown analyses from the drawdown response measured in both OWE-3 and OWE-4 which was later validated by an AQTESOLVE™ solution completed by McGinley and Associates. Per recommendation from NDWR, the data was detrended and another AQTESOLVE™ solution was completed by McGinley and Associates to compare between methods and results. A second independent analysis completed by NDWR provided further validation in the range of aquifer parameters. The drawdown response in these wells were used to further evaluate aquifer parameters, including Transmissivity and Storativity.

A derivative analysis of drawdown over semi-logarithmic time scale was also used to evaluate boundary conditions. The derivative analysis was completed with both raw and detrended datasets using AQTESOLVE™ solution to compare results.

During the test, OWE-4 was periodically pumped by TMWA for municipal supply and a new pump was installed in OWE-3. The hydrographs presented in **Charts 10 and 11** show the response to TMWA activities. These data have been adjusted to reflect the response of the test at the FCW and remove most of the noise from TMWA activities.

Chart 10
Old Washoe Estates Well 3

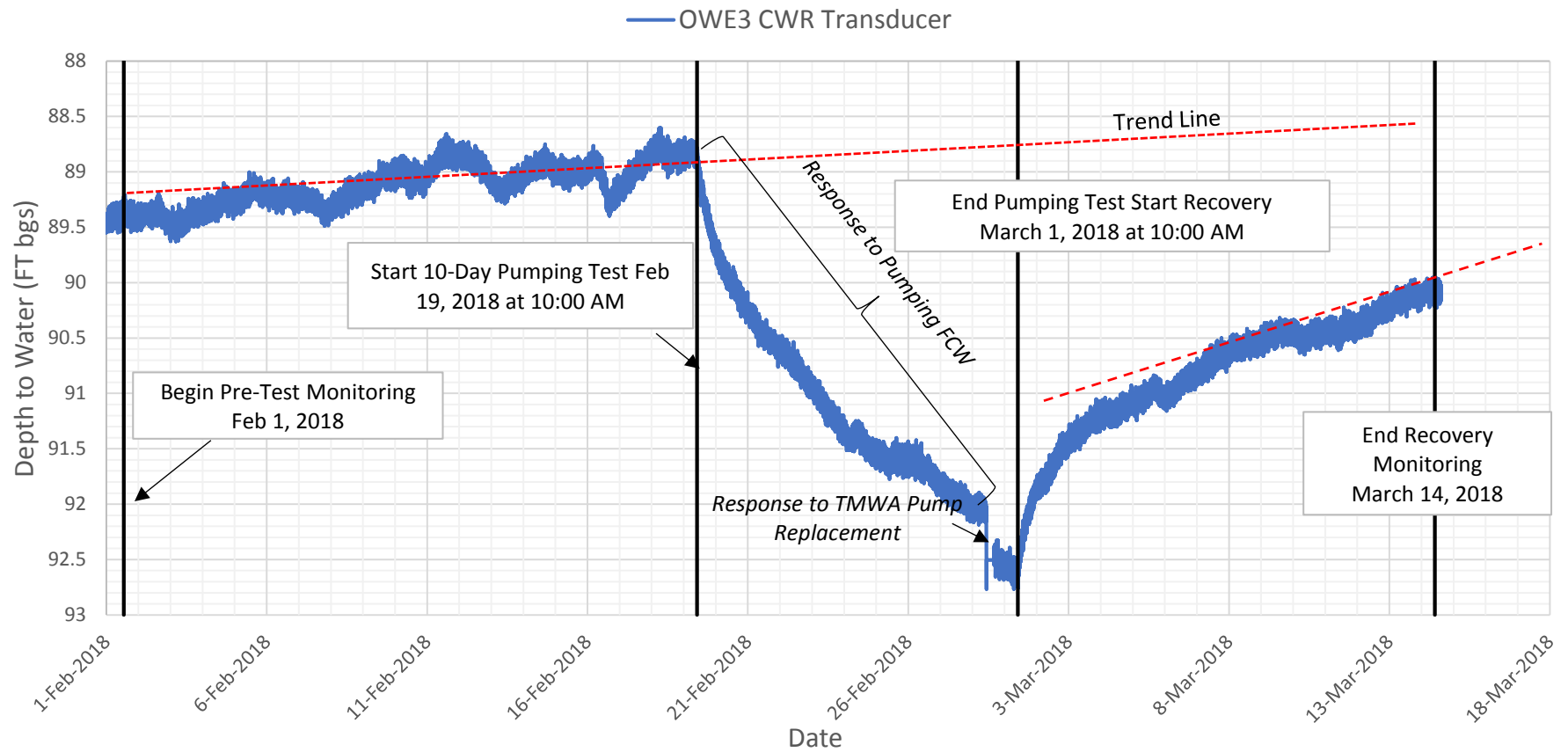
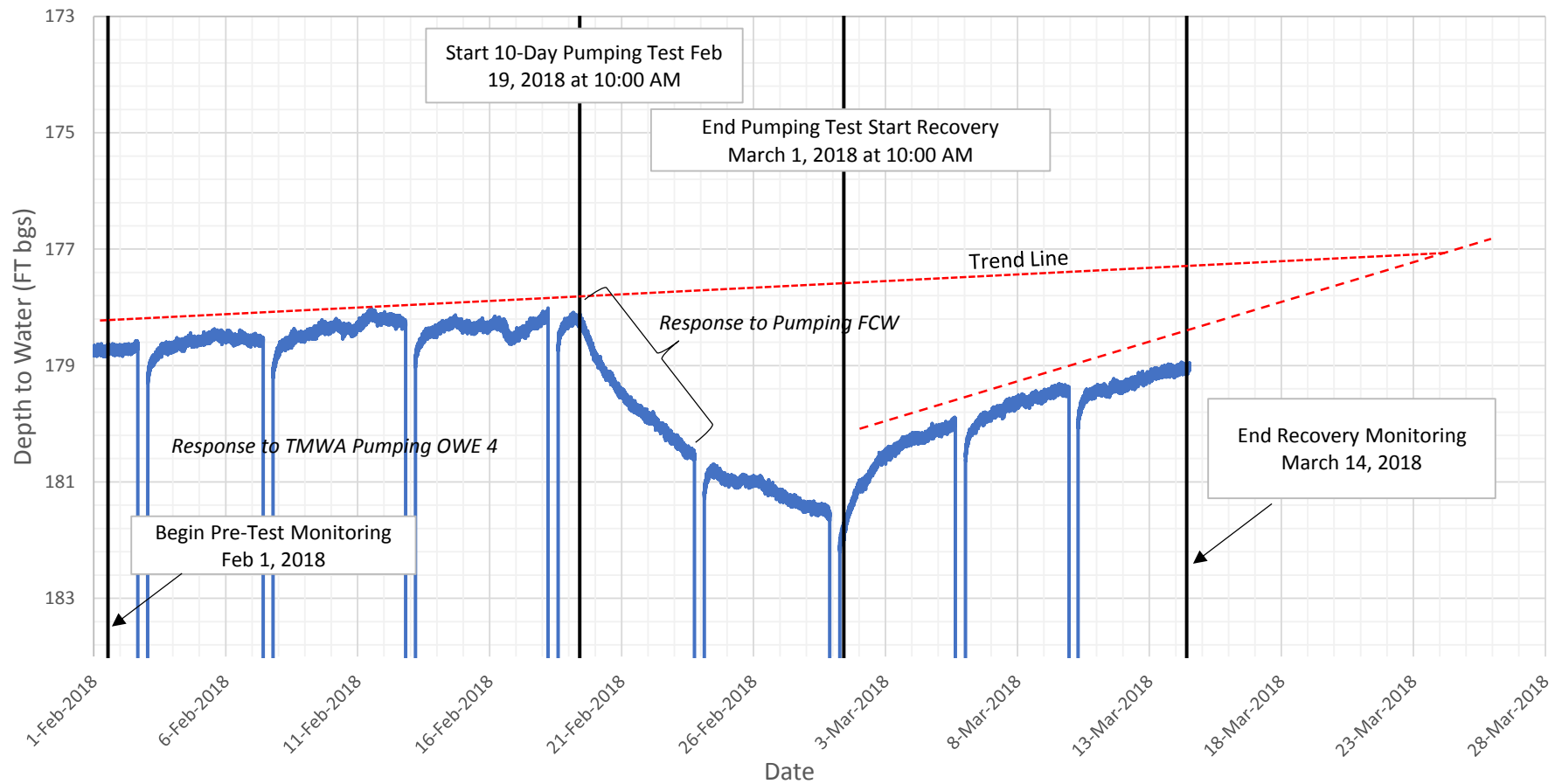


Chart 11
Old Washoe Estates Well 4
— OWE4 CWR Transducer



4.6.1 Assessment of Transmissivity and Storativity

Cooper-Jacob drawdown assumed the following to solve for Transmissivity and Storativity;

$$T = \frac{2.3Q}{4\pi\Delta(h_0 - h)}$$

$$S = \frac{2.25Tt_0}{r^2}$$

S = Storativity (Dimensionless)

r = Radial distance to the well (FT)

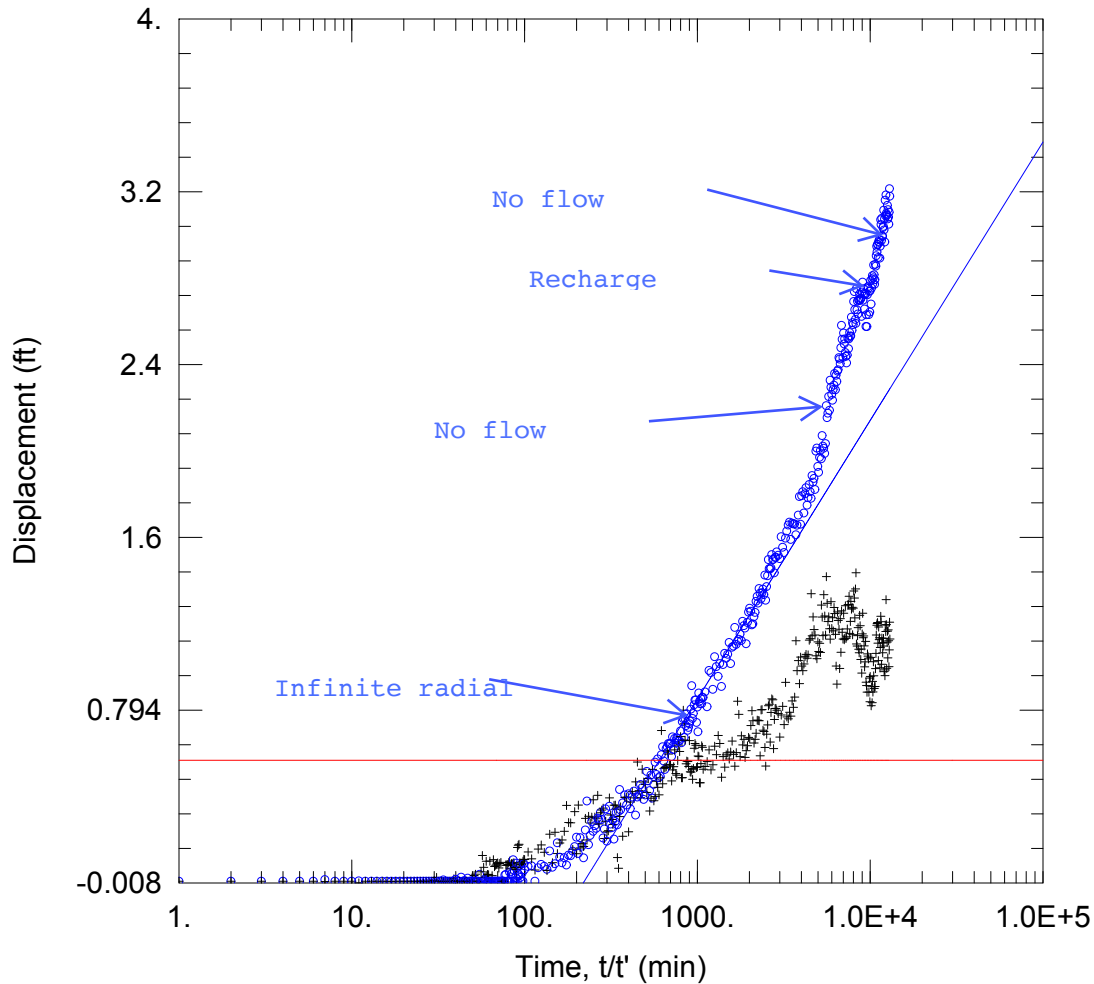
t₀ = Time, where the straight line intersects the zero-drawdown axis (Days)

Chart 12 and Chart 13 presents a graphical analysis of the AQTESOLVE™ well test analysis using Cooper-Jacob drawdown and raw data from the test. **Chart 14 and Chart 15** presents a graphical analysis of the AQTESOLVE™ well test analysis using Cooper-Jacob drawdown and the detrended data for OWE-3 and OWE-4 respectively. **Table 4** is a summary of the range in test results in addition to the results reported from the independent analysis conducted by NDWR.

Table 4: Summary of Calculated Aquifer Parameters

Well ID	Transmissivity (Ft ² /Day)	Storativity	Detrended Transmissivity (Ft ² /Day)	Detrended Storativity	NDWR Calculated Transmissivity (Ft ² /Day)	NDWR Calculated Storativity
FCW	3,712	1.045E-21	--	--	--	--
OWE-3	11,082	4.53E-03	7,337	7.78E-03	10,690	5.10E-03
OWE-4	7,460	2.72E-03	9,135	1.24E-03	7,345	1.50E-03

Chart 12



WELL TEST ANALYSIS

Data Set: E:\CWR\AQTESOLV Analysis jf2 - OWE3.aqt

Date: 07/18/18

Time: 16:56:34

PROJECT INFORMATION

Company: MGA

Client: CWR

Project: CWR001

Location: WC

Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft

Anisotropy Ratio (K_z/K_r): 0.2

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
○ OWE-3	0	920

SOLUTION

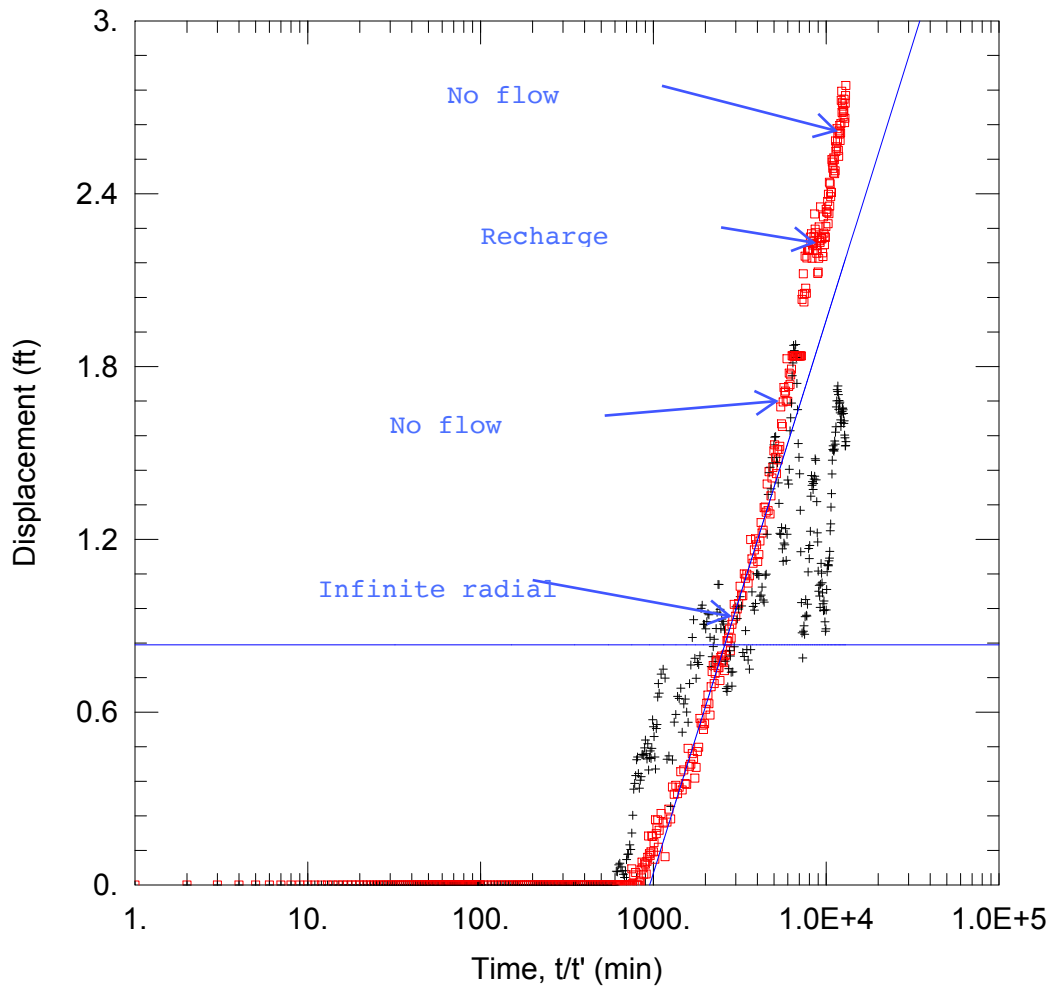
Aquifer Model: Confined

Solution Method: Cooper-Jacob

$T = 7.696 \text{ ft}^2/\text{min}$

$S = 0.004533$

Chart 13



WELL TEST ANALYSIS

Data Set: E:\CWR\AQTESOLV Analysis jf2 - OWE4.aqt

Date: 07/18/18

Time: 16:59:09

PROJECT INFORMATION

Company: MGA

Client: CWR

Project: CWR001

Location: WC

Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft

Anisotropy Ratio (K_z/K_r): 0.2

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
OMW-4	0	2000

SOLUTION

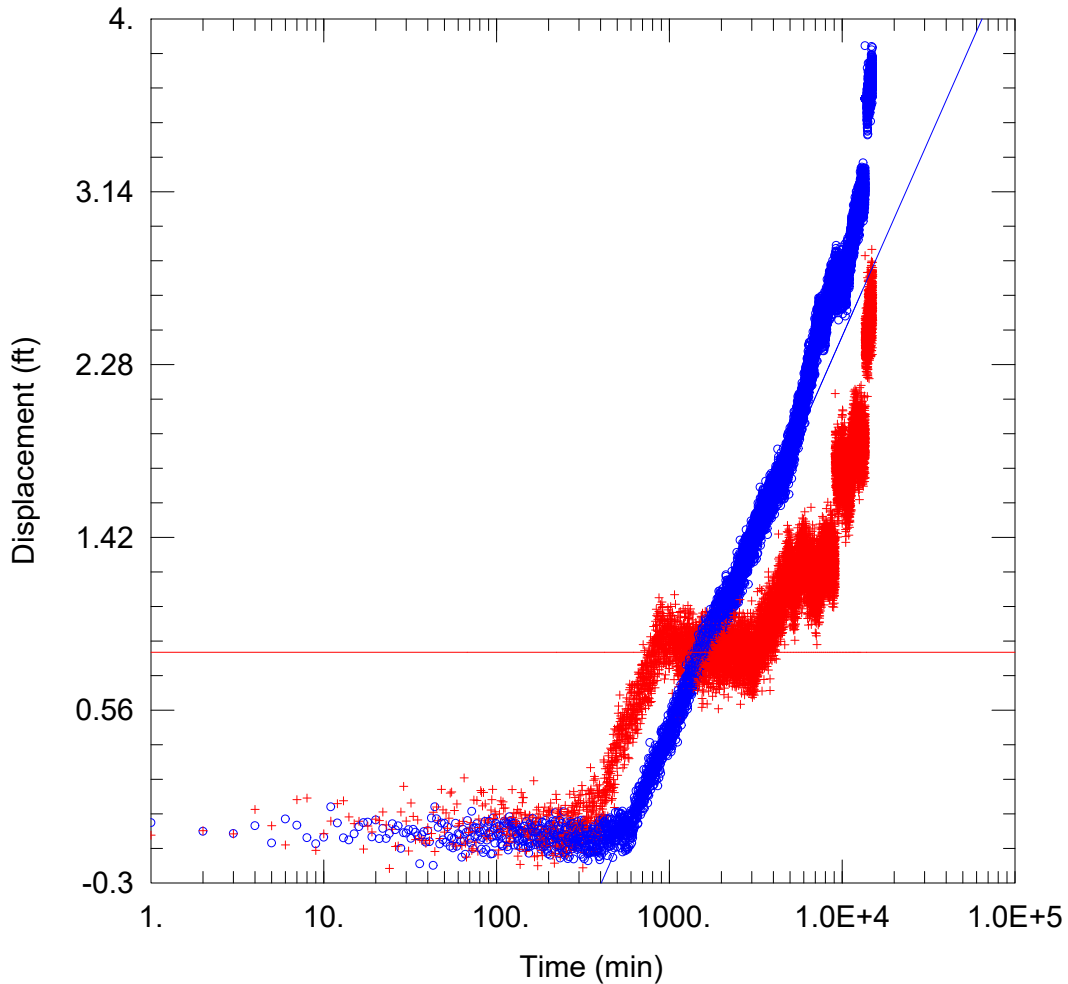
Aquifer Model: Confined

Solution Method: Cooper-Jacob

$T = 5.181 \text{ ft}^2/\text{min}$

$S = 0.002772$

Chart 14



WELL TEST ANALYSIS

Data Set: R:\Projects\CWR\Results 2\DS\AQTESOLV Analysis DS - OWE3_full.aqt
Date: 09/20/18 Time: 08:50:41

PROJECT INFORMATION

Company: MGA
Client: CWR
Project: CWR001
Location: WC
Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

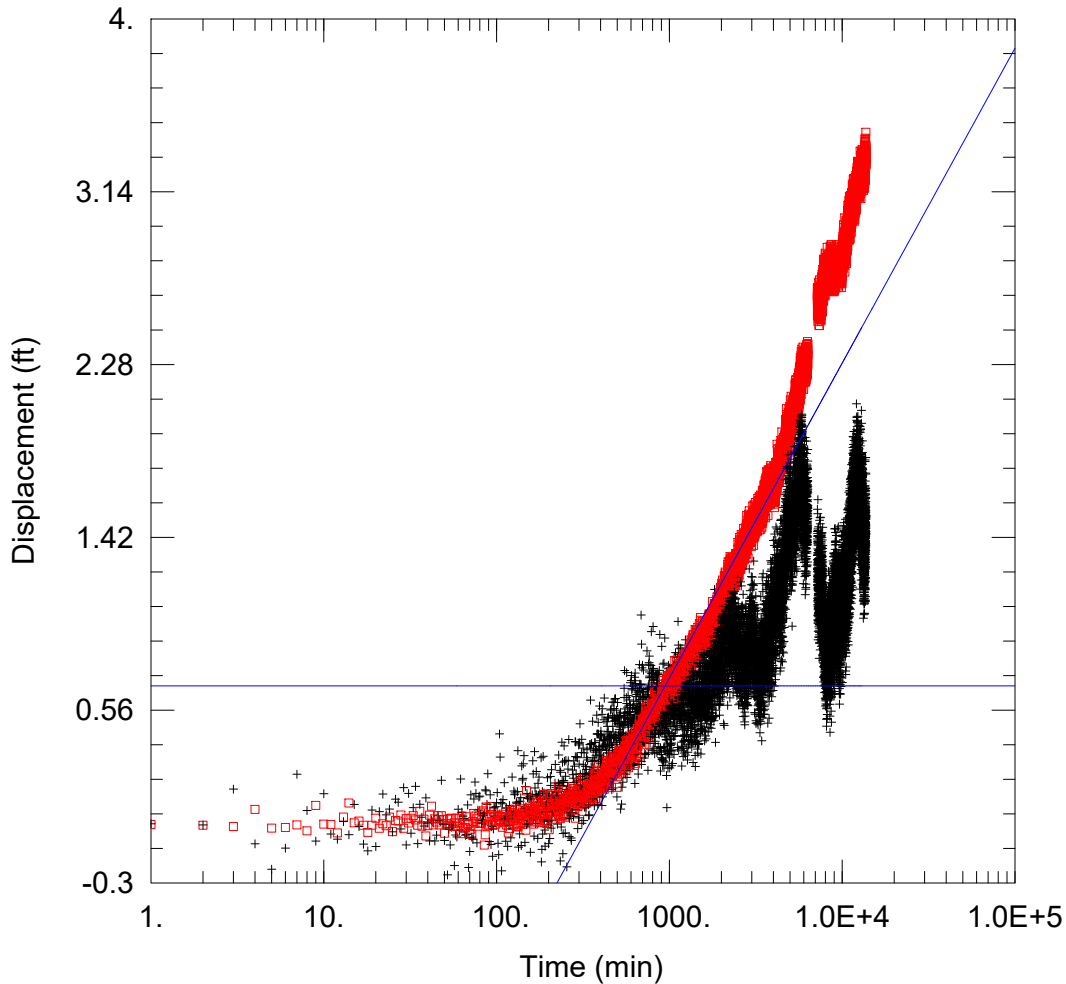
Observation Wells

Well Name	X (ft)	Y (ft)
○ OWE-3	0	920

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
T = 5.095 ft²/min S = 0.007782

Chart 15



WELL TEST ANALYSIS

Data Set: R:\Projects\CWR\Results 2\DS\AQTESOLV Analysis DS - OWE4_full.aqt
Date: 09/20/18 Time: 09:49:51

PROJECT INFORMATION

Company: MGA
Client: CWR
Project: CWR001
Location: WC
Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
FCW	0	0	□ OMW-4	0	2000

SOLUTION

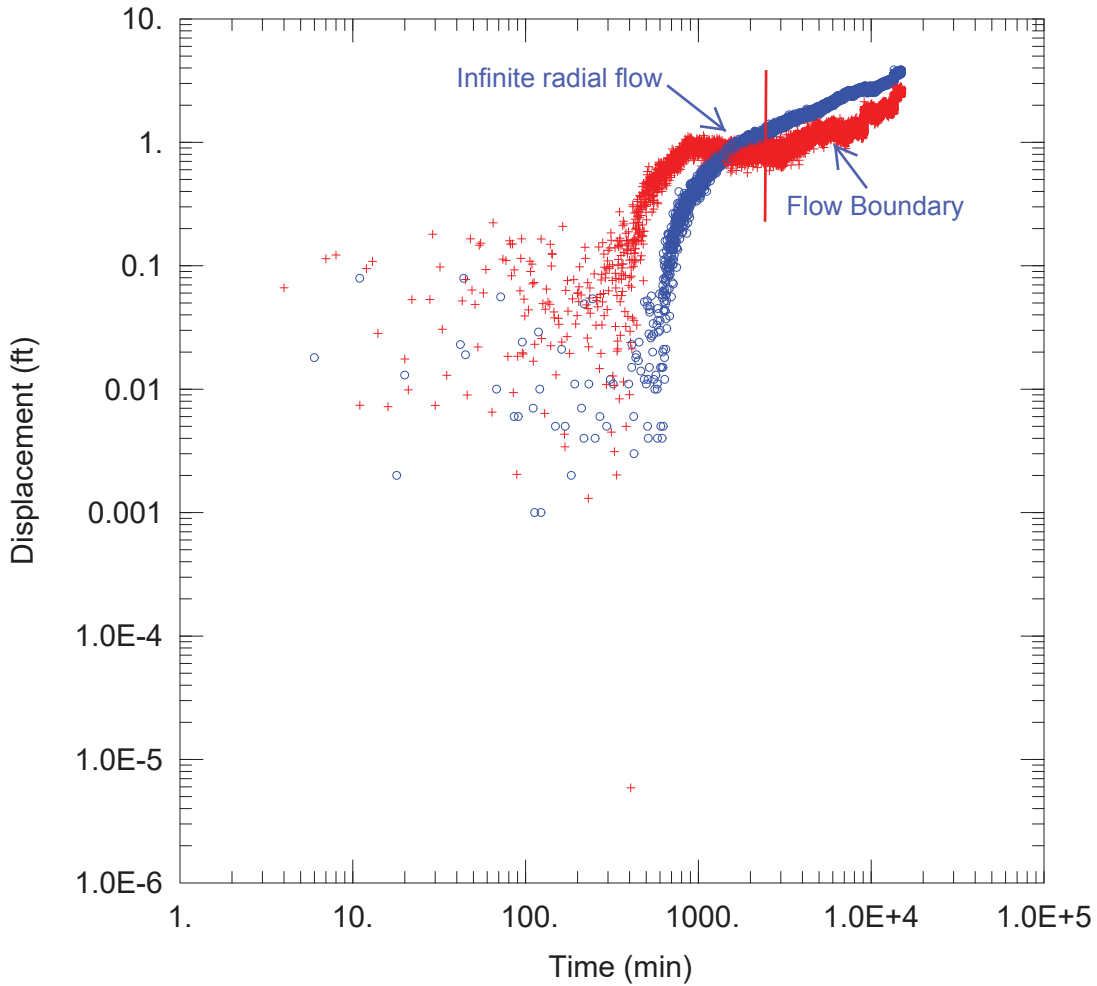
Aquifer Model: Confined Solution Method: Cooper-Jacob
T = 6.344 ft²/min S = 0.001239

4.6.2 Boundary Conditions

Chart 16 and Chart 17 presents the results of derivative analysis using an AQTESOLVE™ well test solution and detrended data from the response at OWE-3 and OWE-4 respectively. **Chart 18** also presents a derivative analysis using the AQTESOLVE™ well test solution from the response at the FCW.

Derivative analyses of drawdown over semi-logarithmic time scale showed some evidence of a constant head boundary or infinite radial recharge boundary condition during the test. However, this boundary condition did not persist, and several no-flow boundaries were later identified. These no-flow boundaries provide evidence of a faulted or fractured hydrogeological regime. No-flow boundaries are displayed as a deviation in drawdown slope of two orders of magnitude or greater. The predominant no flow boundaries during the 10-Day test are graphically identifiable and presented in the charts.

Chart 16



WELL TEST ANALYSIS

Data Set: R:\Projects\CWR\Results 2\DS\AQTESOLV Analysis DS - OWE3_full.aqt
Date: 09/20/18 Time: 08:32:12

PROJECT INFORMATION

Company: MGA
Client: CWR
Project: CWR001
Location: WC
Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft Anisotropy Ratio (K_z/K_r): 0.2

WELL DATA

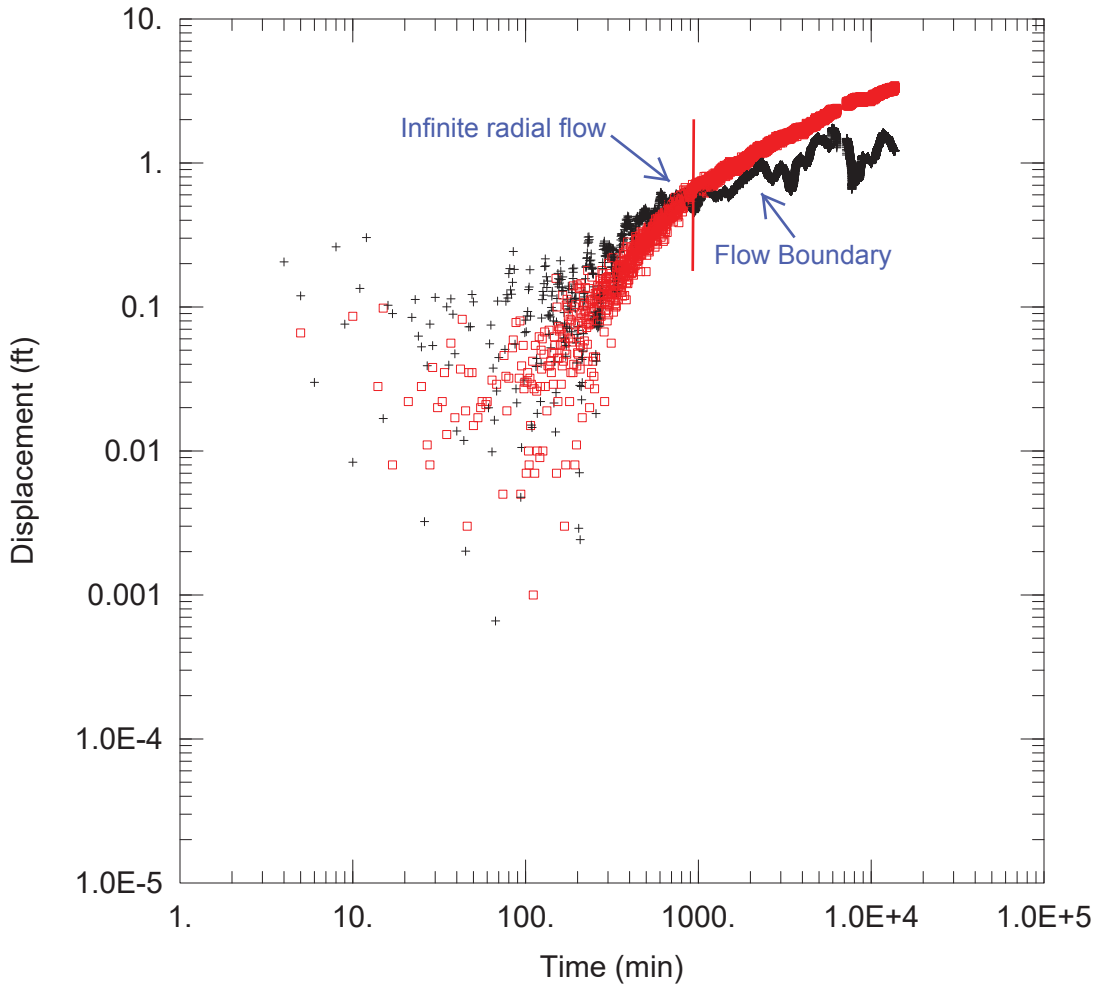
Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
○ OWE-3	0	920

Chart 17



WELL TEST ANALYSIS

Data Set: R:\Projects\CWR\Results 2\DS\AQTESOLV Analysis DS - OWE4_full.aqt
Date: 09/20/18 Time: 10:03:22

PROJECT INFORMATION

Company: MGA
Client: CWR
Project: CWR001
Location: WC
Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft Anisotropy Ratio (K_z/K_r): 0.2

WELL DATA

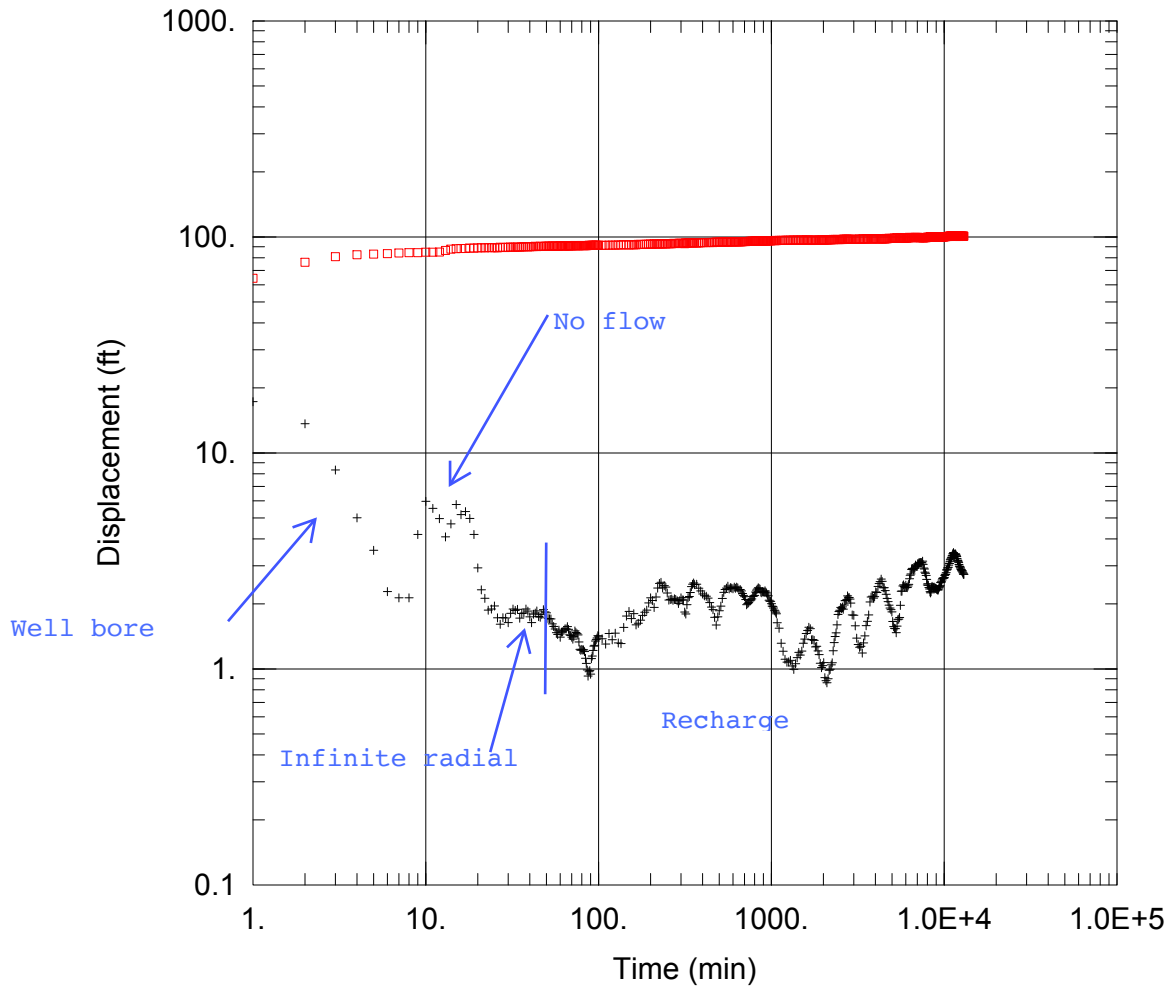
Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ OMW-4	0	2000

Chart 18



WELL TEST ANALYSIS

Data Set: E:\CWR\AQTESOLV Analysis jf2 - FCW.aqt

Date: 07/18/18

Time: 17:09:48

PROJECT INFORMATION

Company: MGA

Client: CWR

Project: CWR001

Location: WC

Test Well: FCW

AQUIFER DATA

Saturated Thickness: 443. ft

Anisotropy Ratio (K_z/K_r): 0.2

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
FCW	0	0

Observation Wells

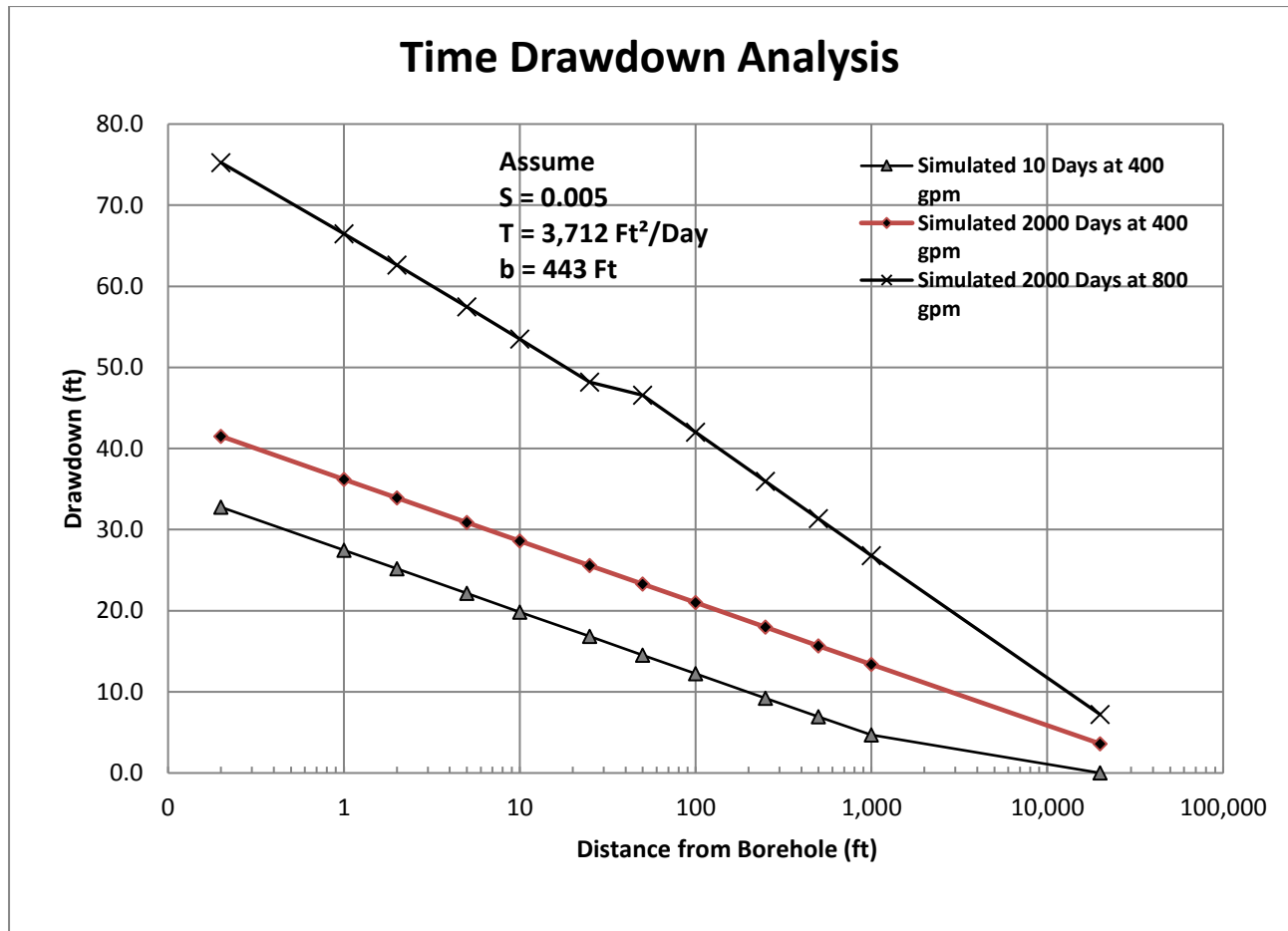
Well Name	X (ft)	Y (ft)
FCW	0	0

5 Predicted Drawdown and Well Performance

The transmissivity of the rocks at the FCW are favorable for extraction of groundwater at sustainable rates greater than 400 gpm. The limiting factor at the FCW is well efficiency and pump capacity. Both of which are limited by the diameter of the well (8-inches). A new, larger diameter well installed within the rocks at the FCW location is expected to sustainably yield more than 400 gpm. The Transmissivity (T) which the FCW is screened was calculated to be about 3,712Ft²/Day. A Theis based analysis of distance drawdown over time was applied (Driscoll, Fletcher 1986), assuming an average Storativity value of 0.005 from the detrended data, and a conservative (T) value of 3,712Ft²/Day from the pumped well. **Chart 19** provides the graphical results of the simulation. The following analysis of time and drawdown was simulated;

- Simulated distance drawdown based on 400-gpm discharge for a duration of ten consecutive days and a separate simulation for a duration of 2,000 consecutive days at the same rate.
- Simulated distance drawdown based on 800 gpm for a duration of 2,000 consecutive days.

Chart 19: Time Drawdown Analysis



The analysis slightly over estimates the response to pumping at the observation wells. The analysis generally agrees with the response observed during the long-term test since well loss was not accounted for. The simulation did indicate extraction rates of over 800 gpm could be consistently pumped from the aquifer for a duration of over five consecutive years. The simulation resulted in a drawdown stress of less than 20 feet, extending over one (1) mile from the FCW. Due to the faulted and fractured nature of the groundwater system and the presence of no flow boundaries, the stress is expected to occur in the direction of OWE-3 and OWE-4 and not in the direction of the up-gradient wells, north of Browns Creek. It should be noted that the allowable diversion rate on the FCW is 2.42 Ft³/sec, not to exceed 474.86 acre feet/annum. Pumping at 800 gpm for one year would yield a total withdrawal of over 1,290 acre feet, 2.7 times greater than what is allowed under the permits. The average pumping rate required for 474.86 acre feet is approximately 294 gpm.

6 Surface Water Interactions with Groundwater

According to the 1964, Geological Survey-Water Supply Paper 1779-S, "Along much of their courses, the streams draining the Carson Range flow across fairly impermeable deposits underlying the 5,000-foot terrace. As a result, the streams do not lose much water to the groundwater reservoir." To validate this assessment, CWR measured point stream flows via the area velocity method using a Marsh McBirney flow meter. Point flow measurements were collected from four (4) locations along the course of flow in Browns Creek. These locations are denoted as BC-1, BC-2, BC-3, and BC-4 in **Figure 3**. The discharge measured at each location is summarized below:

- BC-1 1.67 Ft³/sec
- BC-2 1.24 Ft³/sec
- BC-3 0.05 Ft³/sec
- BC-4 1.41 Ft³/sec

From BC-1 to BC-2, Browns Creek loses approximately 0.43 Ft³/sec. From the diversion at Browns Creek, (BC-2 to BC-4), flow appears to gain about 0.17 Ft³/sec. BC-2 to BC-3 is the reach of natural channel in Browns Creek downgradient of the Washoe Ditch diversion. BC-3 is located slightly upgradient from where the natural channel confluent with Steamboat Creek. BC-3 was flowing at about 0.05 Ft³/sec during the evaluation. The primary loss appears to occur within the natural channel between BC-1 and BC-2. Water is then diverted from the takeout below BC-2 and flows through the Washoe Ditch to BC-4, then towards Washoe Lake where it is stored. The net loss between BC-1 and BC-4 was about 0.26 Ft³/sec during the time of the evaluation. However, the net loss to groundwater and phreatophytes between BC-1 and BC-2 was about 0.43 Ft³/sec or about 193 gpm.

The flow measurements collected during the evaluation indicate the nearly 90% of the flow from Browns Creek was diverted into Washoe Valley adjacent to OWE-3. This diversion is expected to occur per water rights permits.

7 Water Quality

Water quality samples were collected from the FCW discharge at various stages of the constant rate test. Samples were also collected from surface water at Browns Creek and a spring located in the SE ¼ of Section 13. Surface water sample locations are denoted as Browns Creek Water Quality (WQ) Sampling Point and SP-1 WQ Sampling Point in **Figure 3**. Groundwater samples collected from the FCW were gathered at the following time intervals; 30 hours, 120 hours, and at 218 hours into the constant rate test. The samples were submitted to Western Environmental Testing Laboratory (WET Lab) in Sparks Nevada for analyses of Nevada Profile 1 constituents, and the University of Nevada Reno, Department of Geological Sciences & Engineering Laboratory for analysis of oxygen 18 and deuterium isotopes. The results of these analyses are compared to the primary drinking water maximum contaminant levels (MCL) for the constituents analyzed. In general, water quality is good with the exception of an MCL exceedance in manganese concentration (0.052 mg/L) in the sample collected from the FCW at 218 hours. **Table 5** presents a tabulation of water quality results compared to the primary drinking water MCL's.

Washoe Co. Nevada

NDEP Form 0190

Reporting Period: 1st Qtr. 2018

TABLE 5: ST. James Water Quality

Description	MCL (mg/L)*	FCW @ 30 Hrs	FCW @ 120 Hrs	FCW @ 218 Hrs	Browns Creek	SP-1
NV Certified Lab	--	Wet Lab	Wet Lab	Wet Lab	Wet Lab	Wet Lab
Lab Reference No.	--	1802633-001	1802633-003	1802633-004	1802633-002	1802633-005
Sampling Date	--	2/20/2018	2/24/2018	2/28/2018	2/24/2018	3/7/2018
Lab Test Date	--	2/21/2018	2/27/2018	3/5/2018	2/27/2018	3/9/2018
Sampled By	--	M. Banta	M. Banta	M. Banta	M. Banta	M. Banta
Alkalinity, Bicarbonate (as CaCO ₃)	--	140	150	150	38	120
Alkalinity, Total (as CaCO ₃)	--	140	150	150	38	120
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Barium	1.0	0.058	0.061	0.057	0.016	0.09
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Calcium	--	22	24	24	12	18
Chloride	250	1.3	1.1	1.0	19	3.3
Chromium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1.0	<0.040	<0.040	<0.040	<0.040	<0.040
Fluoride	2.0	<0.10	<0.10	<0.10	<0.10	0.12
Iron	0.3	<0.020	<0.020	<0.020	0.18	<0.040
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	11	11	11	2.7	11
Manganese	0.05	0.0081	0.0096	0.052	0.042	<0.0050
Mercury	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel		<0.030	<0.030	<0.030	<0.030	<0.030
Nitrate + Nitrite (as N)	10	0.22	0.22	0.25	<0.1	0.33
Nitrogen Total (as N)	10	<0.50	<0.50	<0.50	<0.50	0.94
pH (±0.1 SU)**	6.5-8.5	8.02	7.98	7.97	7.54	7.79
Potassium	--	3.9	3.9	3.9	1.8	5.2
Selenium	0.05	<0.0050	0.0050	<0.0050	<0.0050	<0.0050
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	--	19	19	19	8.8	17
Sulfate	250	2.6	2.7	2.4	<1.0	3.6
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Dissolved Solids	1000	180	190	180	96	210
Zinc	5.0	<0.020	<0.020	<0.020	<0.020	<0.020

All Metals Analysis - Dissolved Fraction Only

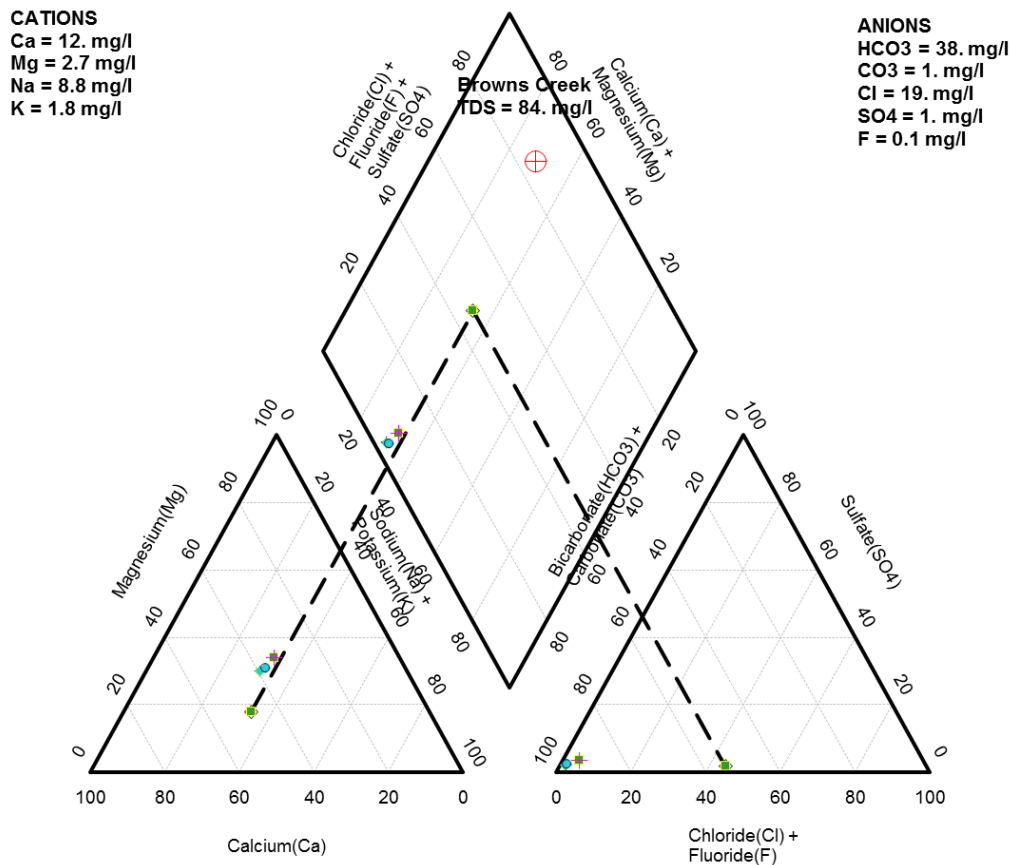
Bold Highlighted Values Exceed Primary Drinking Water Standard

*Primary Drinking Water Standards

**Analyzed Outside Recommended Hold Time

A Piper Diagram, which graphically displays the percent relative composition of major cations (Ca, Mg, Na, K) and anions (Cl, SO₄, HCO₃, CO₃) in solution, was prepared to initially evaluate the water chemistry at the site (**Chart 20**). In constructing the diagram, the milliequivalents of major cations and anions are first plotted on the lower left and right hand trilinear diagrams, respectively. A line is then projected from each of these trilinear plots from the corresponding sample and parallel to the Mg and SO₄ axes. The intersection of these two lines defines the sample location on the diamond shaped field. The chemical composition of the water sample is a reflection of water-rock interactions and/or anthropogenic contamination and indicates the hydrochemical facies (dominant ions, water type).

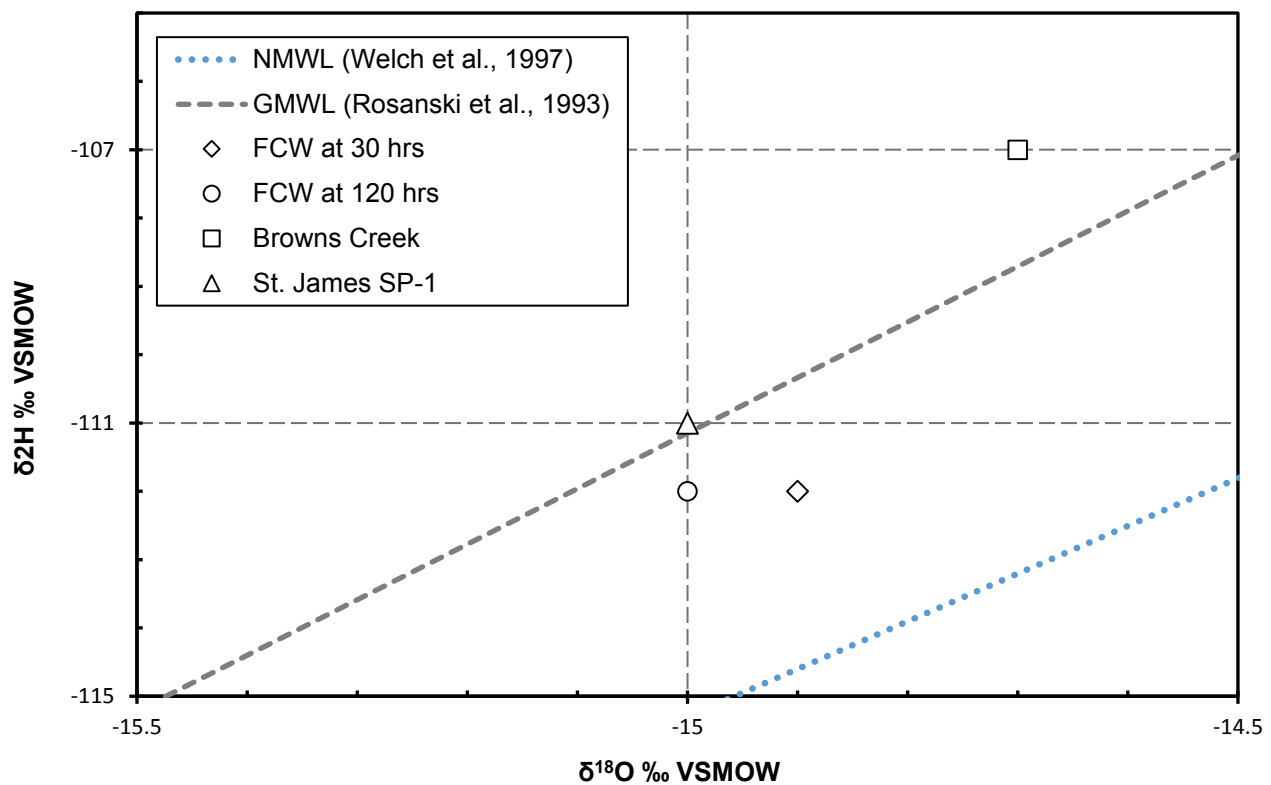
Chart 20: Piper Diagram



Water quality analyses exhibit two distinct affinities between the FCW groundwater and SP-1 v.s. Browns Creek. In this case, the dominant ions in both groundwater from the FCW and in SP-1 are calcium and bicarbonate (Ca-HCO₃ type water), typical of geochemically “young” water. Browns Creek appears to be more Chloride dominant, typical of water directly influenced by precipitation and a high proportion of impervious surfaces (i.e. Paved Roads) in the watershed.

Chart 21 presents an assessment of oxygen 18 and deuterium isotopes analyzed from the groundwater and surface water samples collected during the evaluation. The results are plotted against the global meteoric water line and a Nevada specific meteoric water line. Hydration of silicates (e.g., reaction of water with feldspars and hornblende to form clays) lightens oxygen 18 and increases deuterium. Since rocks are enriched in oxygen 18, isotopic equilibration with them at elevated temperature shifts the data points to the right in the evolution of deuterium and oxygen 18 in geothermal waters as a function of temperature during reaction with host rocks. Rocks tend to be strongly enriched in oxygen 18. The more energetic (hotter) the system, the more readily the rocks oxygen 18 is exchanged with the water. Cooler temperatures remove less oxygen 18 from the rocks. However, deuterium seems to behave in the opposite manner. This is probably because hydrogen is sparse in primary silicates. As these react, they form hydrous minerals such as phyllosilicates. As solid phases, these would tend to enrich in the heavier hydrogen isotope, (Clark and Fritz, 1997).

Chart 21: Global and Nevada Meteoric Water Line



Notes:

- 1) Global Meteoric Water Line (GMWL) Equation: $\delta^2\text{H} = 8.13\delta^{18}\text{O} + 10.8$ (Rosanski et al., 1993)
- 2) Nevada Meteoric Water Line (NMWL) Equation: $\delta^2\text{H} = 6.98\delta^{18}\text{O} - 10.6$ (Welch and others, 1997)
- 3) Units: Per mil (‰) in reference to Vienna Standard Mean Ocean Water (VSMOW)

Water from SP-1 plots along the global meteoric water line, which suggests that the source of water from SP-1 is dominated by precipitation-derived recharge. Water from FCW exhibits an oxygen shift (to the right) that commonly occurs when water is geothermally influenced by hot rock. Conversely, water from Browns Creek exhibits a hydrogen shift (to the left) that can occur during exchanges with H_2S or CO_2 , or more plausibly, through the process of hydrolysis when silicate minerals, such as hornblende, in the host rocks become hydrated. All samples shift left when compared along the Nevada meteoric water line.

8 Closing Remarks

The FCW was pumped at a constant rate of 406 gallons per minute (gpm) for ten (10) consecutive days, with a total drawdown of 100.63 feet. The Specific Capacity at a rate of 406 gpm is about 4 gpm/Ft. Well efficiency is approximately 40.7% at 450 gpm and 67.3% at 150 gpm. The Transmissivity of the formation, which the FCW is screened, was estimated from both the rate of drawdown and rate of recovery in the pumped well. The range in Transmissivity values between the Theis Recovery and Cooper-Jacob drawdown is (7,163 Ft^2/Day vs. 3,712 Ft^2/Day). The rate of recovery in the well bore is thought to be influenced by borehole storage effects and not by water siphoning down the drop pipe to the pump once pumping had been terminated. The Transmissivity estimated from the recovery data is expected to be slightly over estimated based on this initial response. This sort of response can be expected in faulted or fractured rocks where secondary permeability may be greater than the primary permeability of the formation. In this case, late time drawdown data is expected to provide a more reliable and more conservative estimate of permeability.

No flow boundaries observed in the drawdown data suggests faults, structures or less permeable rocks may present strong barriers to uniform radial groundwater flow.

Storativity of the rocks evaluated is expected to average about 0.005 based on the detrended data from OWE-3 and OWE-4.

Long-term extraction of groundwater at the FCW is expected to influence domestic wells and TMWA operated wells OWE-3 and OWE-4. By applying a Transmissivity of 3,712 Ft^2/Day , a Theis based simulation of time and drawdown was produced. The simulation indicated extraction rates of over 800 gpm could be pumped from the aquifer for a duration over five consecutive years or more. The simulation indicated about 20 feet of drawdown may extend over one (1) mile under this scenario. The stress is expected to occur primarily in the direction of OWE-3 and OWE-4 in Washoe Valley, and not in the direction of the up-gradient and cross gradient St. James Wells, located north of Browns Creek.

The assessment did not fully investigate the interaction between surface water recharge to groundwater. However, the flow measurements collected along Browns Creek indicate some loss occurs between measuring points BC-1 and BC-2.

Water quality appears to be generally good. However, prolonged pumping may result in extracting waters which are geochemically enriched with manganese. Ambient groundwater temperature typically ranges from between 50°F and 55°F. Water temperatures measured from transducer during the pumping test was consistently about 70°F. Water temperature from other wells in this area, OWE-3 and OWE-4 ranged from between 64°F to 66°F. The isotope and water quality data suggest the source waters are new in origin but perhaps are influenced by hot rocks at depth. Circulation of fluids and upwelling of waters in high angle regional faults may contribute to slightly elevated temperature of the groundwater.

The potentiometric surface map strongly indicates groundwater within the vicinity of the FCW flows from west to east, about 18° southeast at an average gradient of about 0.07 Ft/Ft and not in a northwest direction towards Reno or the Mt. Rose Alluvial Fan area. There is no indication from the data collected during this evaluation, or from the results of the 10-Day pumping test that would indicate extraction of groundwater from the aquifer south of Browns Creek in Washoe Valley, would impact wells in St. James Village, Callahan Ranch, Montreux, or the Mt. Rose Alluvial groundwater system.

9 References

- 2018 J. Fike and R. Felling, McGinley and Associates, AQTESOLVE™ Well Test Analysis
- 2016 TMWA Comments Pertaining to Previous Work Plan for Falcon Capital Well Pumping Test and Results from December 2017 TMWA Meeting - Report on Phase I Findings.
- 2003, Tec Civil Engineering Consultants Water Rights Point of Diversion and Place of Use Map for the Falcon Capital Well.
- 2003, Falcon Capital Domestic Well Pumping Test Report, Prepared By Tec 1, Inc.
- 2002, John D. Skalbeck et.al, Geothermal Resources Council Transactions, Vol. 2 6, September 22-2 5, 2002. Geothermal Reservoir Volume Estimation from Gravity and Aeromagnetic Modeling Of the Steamboat Hills Geothermal Area, Reno, Nevada.
- 1997, Clark and Fritz, Environmental Isotopes in Hydrogeology, by CRC Press. Chapter 9.
- 2001, CW. Fetter, Applied Hydrogeology, Fourth Edition.
- 1994, Report on Old Washoe Estates New Production Well, Prepared By Washoe County Utility Division, Department of Public Works.
- 1984, USGS Open File Report 84-465, Feddy E. Artega et.al, Hydrology of Washoe Valley, Washoe County, Nevada.
- 1964, Geological Survey-Water Supply Paper 1779-S, Philip Cohen and Omar Loelitz, Evaluation of Hydrogeology and Hydrochemistry of the Truckee Meadows Area, Washoe County, Nevada.
- Driscoll, F.D, 1989. Groundwater and Wells: 3rd edition, Johnson Filtration Systems.
- Kruseman, G.P., and DeRidder, N.A., 1970, Analysis and Evaluation of Pumping Test Data, 2nd Edition, International Institute for Land Reclamation and Improvement, Publication 47.
- https://nevada.usgs.gov/tech/excelforhydrology/Listing_and_Description.htm

10 Certification

CWR has exercised all due care in reviewing all information collected. Opinions presented in this report apply to the site conditions and features, as they existed at the time of CWR's assessment, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report.

Copyright

This report is protected by copyright vested in CWR. It may not be reproduced or transmitted in any form or by any means whatsoever to any person without the written permission of the copyright holder, CWR except for the purpose as set out in this report.

Prepared For:
St. James Village and,
Mr. Keith Serpa
June 2018

Revised per NDWR Comments
October 2018

Prepared By:



Mathew D. Banta, PHG (15-HGW-7004)
Confluence Water Resources LLC
Principal Consultant
775-843-1908
mbanta@confluencewaterresources.com
www.confluencewaterresources.com

Peer Reviewed By:



Donahoe Hydro-Geo
Timothy P. Donahoe, PLS, WRS, CEM
Principal Consultant
775-544-3826

Pleasant Valley Interceptor 30% Design Report

PRELIMINARY DESIGN REPORT

FOR

PLEASANT VALLEY INTERCEPTOR REACH 4 **WASHOE COUNTY, NEVADA** **JULY 2022**

PREPARED FOR:

SAINT JAMES VILLAGE, INC.
4100 JOY LAKE ROAD
RENO, NV 89511

PREPARED BY:



SHAW ENGINEERING
20 VINE STREET
RENO, NV 89503
(775) 329-5559

JULY 2022

INTRODUCTION

Note: The following preliminary design report (Report) has been prepared to accompany the “30% Design Plans for Pleasant Valley Interceptor Reach 4”, prepared by Shaw Engineering dated July 2022.

The purpose of this preliminary design report (Report) is to summarize the hydraulic analysis and preliminary design completed for the Pleasant Valley Interceptor Reach 4 (Project) lift station, sanitary sewer force main, and gravity sanitary sewer. The Washoe County (County) Community Services Department (CSD) 2021 Lift Station Design Standards and the CSD 2017 Gravity Sewer Collection Design Standards were utilized to design the Project.

The Project is located in Washoe County, Nevada along U.S. 395 Alternate (U.S. 395A), spanning between the cross streets of Pagni Lane and Towne Drive. The Project lift station will be located at the southwest corner of the intersection of U.S. 395A and Pagni Lane. The proposed lift station site will include an approach manhole, 12 ft diameter wet well, three (3) submersible sewage pumps, check and plug valve vault, a bypass pump connection, flow meter vault, SCADA controls, emergency generator, and a biofilter for odor control. The proposed lift station will convey flows from 1,400 residential units approximately 863 LF north via 10-inch HDPE force main, along U.S. 395A, and discharge into the proposed gravity sewer interceptor component of this Project. See Appendix A for Figure A1 “Lift Station Site Plan”. The gravity sewer system consists of approximately 17,325 LF of 12” PVC sewer main and 67 Type 1A 48-inch diameter sewer manholes. The Project gravity sewer will tie-in to Pleasant Valley Interceptor Reach 3, designed by others. See “30% Design Plans for Pleasant Valley Interceptor Reach 4” dated July 2022 for the gravity sewer alignment and tie-in location. A preliminary cost estimate for the Project is attached in Appendix C.

WASTEWATER FLOW RATES

The Project was designed to accommodate the peak hour flow rate. The Project will convey flows from 1,400 residential units. The CSD 2017 Gravity Sewer Collection Design Standards states that the average daily flow from a single residential unit is 270 GPD. This equates to a total average daily flow of approximately 263 GPM. A peaking factor of 3.0 was selected to calculate the peak hour flow rate. The peak hour flow rate for the Project is estimated to be 788 GPM. Table 1 below summarizes the peak hour flow calculations for the Project.

Table 1: Wastewater Flow Calculations

	No. of Units	Unit	GPD/Unit	Average Daily Flow (GPM)	Peak Hour Flow (GPM)
Residential Units - Detached	1,253	Homes	270	234.9	704.8
Residential Units - Attached	147	Townhomes	270	27.6	82.7
Totals	1,400			262.5	787.5

LIFT STATION PUMP HYDRAULICS

The Project lift station will be equipped with three (3) submersible sewage pumps, two (2) pumps in parallel to handle the peak flow and one (1) pump on standby. The pumps will be operated in an alternating lead-lag configuration. A system curve was developed for the Project lift station and force main. The system curve determined each pump will need to be capable of pumping 400 GPM at 38.5 ft TDH. The HOMA MXS2446-T54 submersible sewage pump was selected for the Project. The operating point of the selected

pump was determined to be 411 GPM at 39.2 ft TDH. See “Lift Station System Curve Development” in Appendix B. A pump data sheet for the HOMA MXS2446-T54 submersible sewage pump is also attached in Appendix B.

LIFT STATION CAPACITY AND PUMP CYCLES

To provide adequate operating room and operational flexibility for level control, the floor of the wet well will be established 24.50 feet below the proposed rim elevation. This will provide approximately 8.50 feet of liquid height (wet well floor to inlet pipe invert) for optimum operational control. The pump operating levels will be set to minimize sewage retention time within the wet well to reduce the potential for excessive odors or septic conditions. Table 2 below lists wet well elevations and pump operating levels.

Table 2: Wet Well Elevations and Pump Operating Levels

Item	Elevation (Approx.)	Depth from Rim (ft)
Rim / Surface	4803.00	0.00
Emergency Alarm	4788.50	14.50
12-inch Inlet Pipe Invert	4787.00	16.00
High Water Alarm / #3 Pump On	4786.00	17.00
Lag Pump On	4784.50	18.50
Lead Pump On	4783.00	20.00
Lead/Lag Pump Off	4781.50	21.50
Low Water Alarm	4780.50	22.50
Wet Well Floor	4778.50	24.50

The operating volume of the 12-foot diameter wet well is approximately 2,537 gallons (at 3.00 feet operating depth from pump-on level to pump-off level). With the maximum operating level established, the cross-sectional area can be determined and is sized such that pump cycle times (starts per hour) are acceptable and fill times are not excessively long. Excessive pump starts can lead to early equipment failure.

The total detention time within the wet well is a function of the time required to fill the wet well, the time required to empty the wet well, and the volume pumped. The minimum detention time is equal to half of the pumping rate. The Project’s estimated pumping rate is 822 GPM. Therefore, the minimum detention time is when the inflow is at 411 GPM. This results in a minimum detention time of approximately 12.3 minutes, or approximately 1.6 starts per hour for each alternating pump. Lift station pump cycle calculations are summarized in Table 3 below and attached in Appendix B.

Table 3: Lift Station Pump Cycle Calculations

Flow Condition	Q _{in}	Q _{out}	Op. Depth	Vol./ft	Op. Volume	Q _{out} Net	Fill Time	Empty Time	Total Det. Time	Pump Cycle
	GPM	GPM	ft	gal/ft	gal	GPM	min/ft	min/ft	min	Starts/hr
Average Daily Flow (1/3 of Peak Flow)	263	822	3	846	2537	559	9.7	4.5	14.2	1.4
Half Pump Flow (Min. Det. Time)	411	822	3	846	2537	411	6.2	6.2	12.3	1.6
Peak Flow	788	822	3	846	2537	34	3.2	74.6	77.8	0.3

FORCE MAIN PROFILE AND VELOCITY

The proposed force main will have a minimum four (4) feet of cover from finish grade to top of pipe, and a continuous positive slope from the lift station to the discharge manhole. The proposed force main will discharge into the proposed gravity sewer interceptor part of this Project, approximately 863 LF north of the proposed lift station. The velocity within the proposed 10-inch HDPE DR11 force main (inside diameter of 8.68 inches) at 822 GPM (2 pumps in parallel) is 4.5 FPS. This meets the CSD 2021 Lift Station Design Standards requirement of 2 – 6 FPS.

FORCE MAIN SURGE ANALYSIS

This section provides a brief review of cyclic surge and transient surge in the force main. Lift station piping systems are unique in that routine cyclic surging from frequent pump cycling can lead to fatigue failure in force main piping; in particular to PVC piping. For this reason, HDPE piping has been selected for the proposed force main.

The attached “Lift Station Pipe Surge Analysis” in Appendix B includes a pipe surge analysis, estimating the pressure surge that can occur from instantaneous pump stop or valve closure (transient surges). The estimated pressure surge in the proposed 10-inch HDPE DR11 force main is approximately 62.4 PSI. The lift station operating pressure is approximately 16.7 PSI (38.5 ft TDH). This results in a maximum surge pressure (surge pressure + operating pressure) of approximately 79.1 PSI, which is well below the 200 PSI pressure rating for HDPE DR11 pipe.

GRAVITY SEWER ANALYSIS

The Project gravity sewer begins approximately 400 feet north of the intersection of U.S. 395A and Rawhide Drive. See Figure A1 attached in Appendix A. The gravity sewer includes approximately 17,325 LF of 12” PVC sewer main and 67 Type 1A 48-inch diameter sewer manholes. The Project gravity sewer will tie-in to Pleasant Valley Interceptor Reach 3, designed by others. See “30% Design Plans for Pleasant Valley Interceptor Reach 4” dated July 2022 for the gravity sewer alignment and tie-in location.

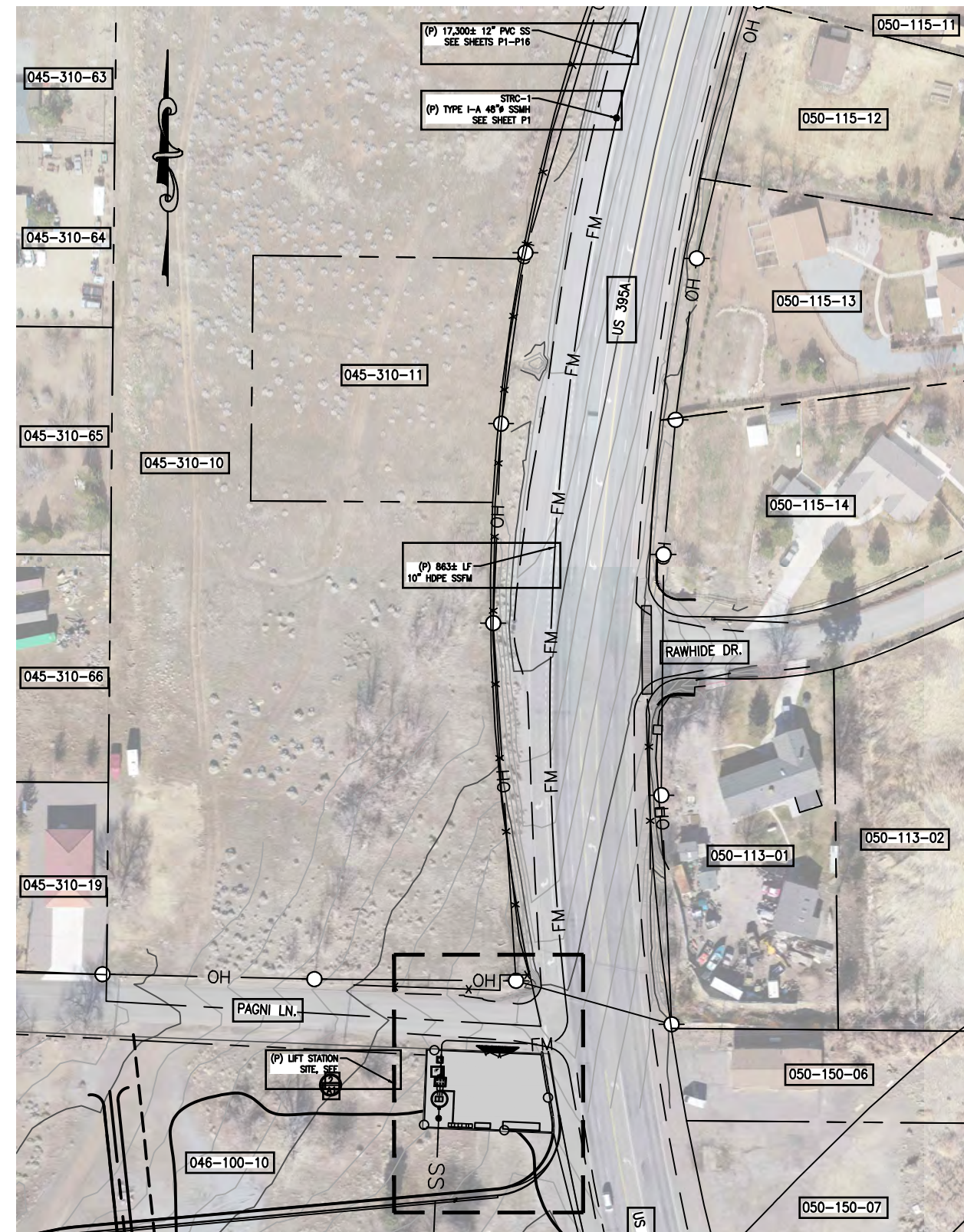
The Project gravity sewer will have a minimum four (4) feet of cover from finish grade to top of pipe. The depth of cover for the Project ranges between 4.0 and 15.8 feet, with 5.5 feet being the average. The minimum slope for 12-inch diameter pipe to maintain the required 2.5 FPS minimum velocity at half-full capacity is 0.0026 ft/ft. At this minimum slope and a peak flow rate from the pumps of 822 GPM, the maximum depth to diameter (d/D) ratio was calculated to be 0.84. See Appendix B for “Pipe Flow Depth to Diameter Calculations”.

APPENDIX A

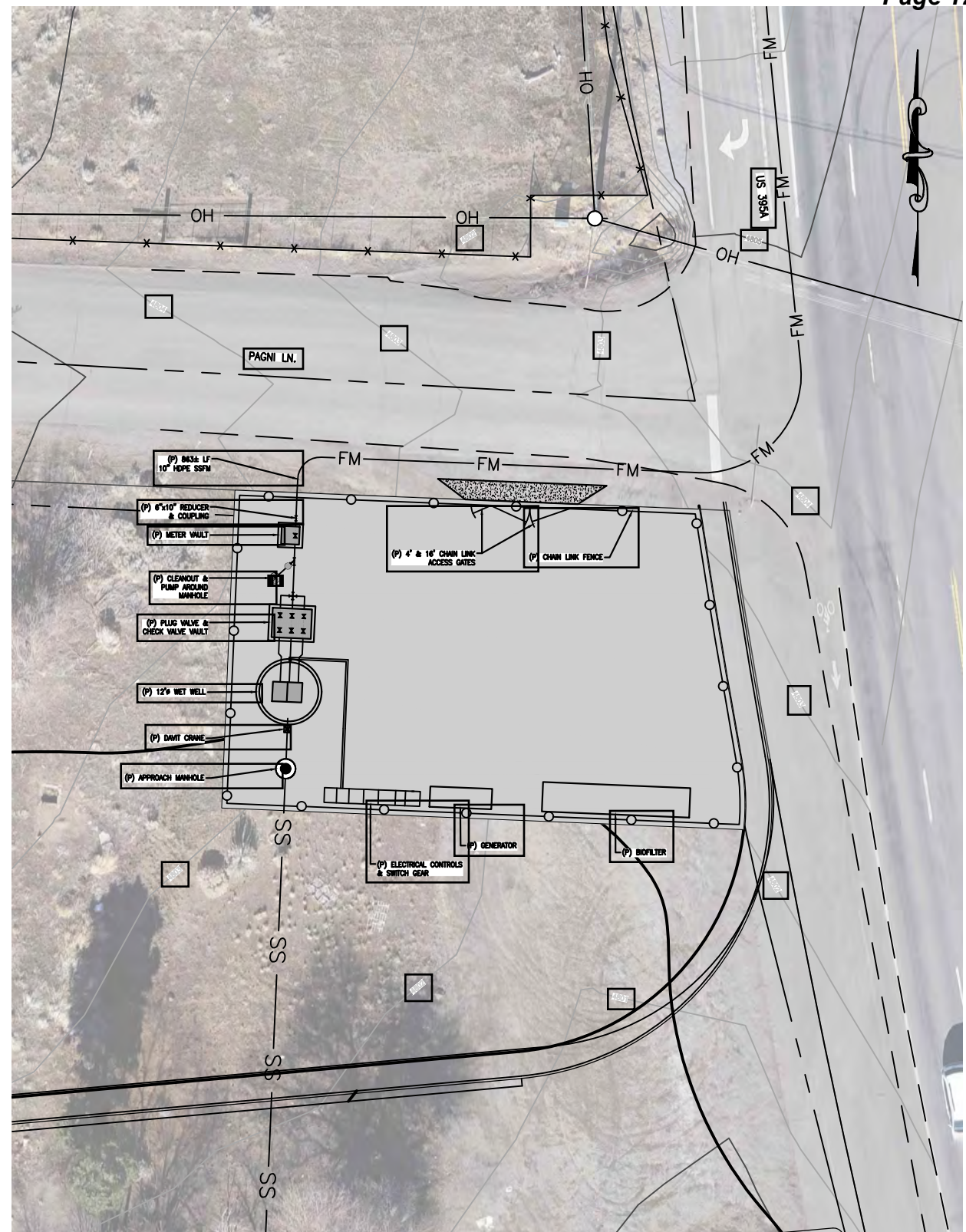
FIGURE A1

FIGURE A2

FIGURE A3

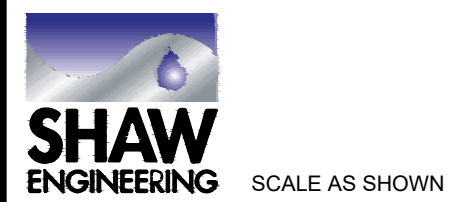


1
A1
OVERALL SITE PLAN
SCALE: 1"=120'



2
A1
LIFT STATION GENERAL SITE PLAN
SCALE: 1"=30'

PRELIMINARY
NOT FOR
CONSTRUCTION



LIFT STATION SITE PLAN
PLEASANT VALLEY INTERCEPTOR REACH 4
WASHOE COUNTY, NV
JULY 2022

FIGURE
A1

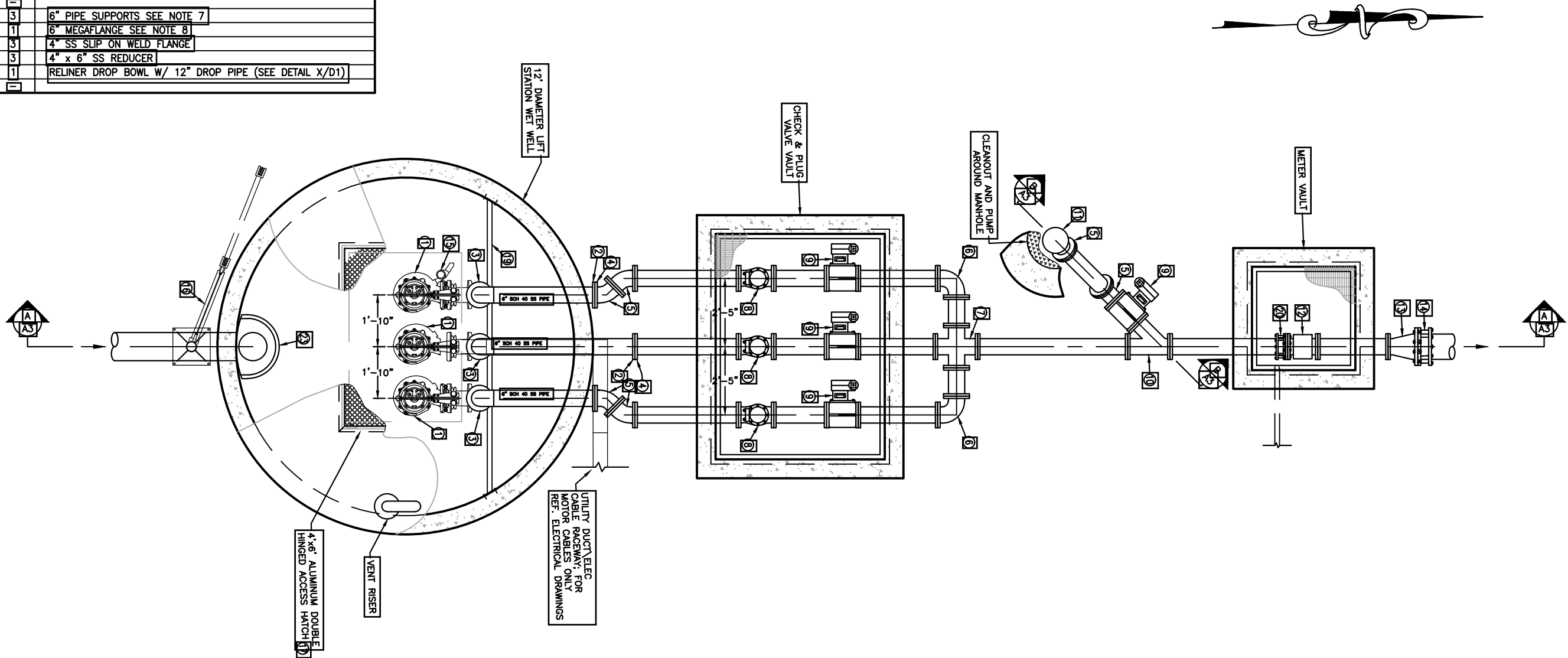
MAJOR MATERIAL EQUIPMENT LIST		
ITEM No.	QTY.	DESCRIPTION
1	3	SUBMERSIBLE SEWAGE PUMP; SEE NOTE 1
2	3	6" SS SLIP ON WELD FLANGE
3	3	6" SS 90° ELBOW
4	3	6" DIALECTIC ISOLATION FLANGE KIT
5	6	6" 45° DI ELBOW FL x FL
6	2	6" 90° DI ELBOW FL x FL
7	1	6" DIP CROSS FITTING FL x FL
8	3	6" RUBBER FLAPPER CHECK VALVE FL x FL; SEE NOTE 2
9	4	6" PLUG VALVE FL x FL; SEE NOTE 3
10	1	6" 45° DI WYE FL x FL x FL
11	1	6" BLIND FLANGE
12	1	6" MAG METER; SEE NOTE 4
13	1	6" x 10" DI REDUCER FL x FL
14	1	10" RESTRAINED FLANGE COUPLING ADAPTER
15	1	FLUSH MIX VALVE (FLYGT)
16	1	PORTABLE DAVIT CRANE; SEE NOTE 5
17	1	48" x 72" ACCESS HATCH; SEE NOTE 6
18		
19	3	6" PIPE SUPPORTS SEE NOTE 7
20	1	6" MEGAFLANGE SEE NOTE 8
21	3	4" SS SLIP ON WELD FLANGE
22	3	4" x 6" SS REDUCER
23	1	RELINER DROP BOWL W/ 12" DROP PIPE (SEE DETAIL X/D1)
24		

FLOW CALCULATIONS

	NUMBER	UNIT	GPD/UNIT	GPM (AVG. DAILY FLOW)	GPM (w/ 3.0-PEAK)
SF - DETACHED	1,253	HOMES	270	234.9	704.8
SF - ATTACHED	147	TOWNHOMES	270	27.6	82.7
TOTALS	1,400			262.5	787.5

PEAK FLOW
REQUIRED = 788 GPM
PROVIDED = 822 GPM

FORCE MAIN
10" HDPE DR11 (ID = 8.68")
V = 4.5 FPS (@ 822 GPM)



PRELIMINARY
NOT FOR
CONSTRUCTION

NOTE:

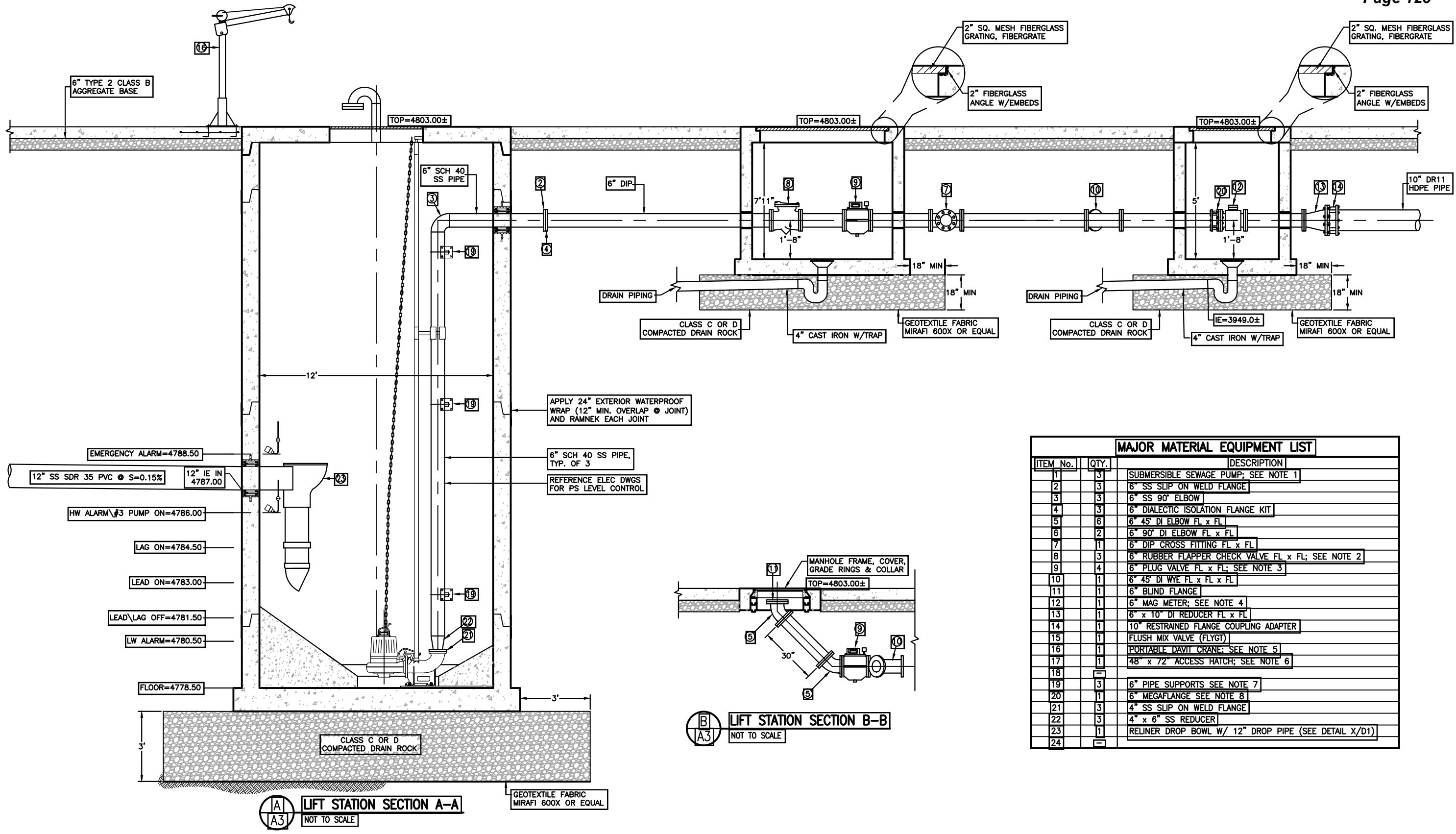
1. PUMPS SHALL BE HOMA MXS2446-T54; EACH PUMP SHALL BE CAPABLE OF PUMPING 400 GPM @ 38.5' TDH.



NOT TO SCALE

LIFT STATION SITE PLAN
PLEASANT VALLEY INTERCEPTOR REACH 4
WASHOE COUNTY, NV
JULY 2022

FIGURE
A2



MAJOR MATERIAL EQUIPMENT LIST		
ITEM No.	QTY.	DESCRIPTION
1	3	SUBMERSIBLE SEWAGE PUMP; SEE NOTE 1
2	3	6" SS SLIP ON WELD FLANGE
3	3	6" SS 90° ELBOW
4	3	6" DIALECTIC ISOLATION FLANGE KIT
5	6	6" 45° DI ELBOW FL x FL
6	2	6" 90° DI ELBOW FL x FL
7	1	6" DIP CROSS FITTING FL x FL
8	3	6" RUBBER FLAPPER CHECK VALVE FL x FL; SEE NOTE 2
9	4	6" PLUG VALVE FL x FL; SEE NOTE 3
10	1	6" 45° DI WYE FL x FL x FL
11	1	6" BLIND FLANGE
12	1	6" MAG METER; SEE NOTE 4
13	1	6" x 10" DI REDUCER FL x FL
14	1	10" RESTRAINED FLANGE COUPLING ADAPTER
15	1	FLUSH MIX VALVE (FLYGT)
16	1	PORTABLE DAVIT CRANE; SEE NOTE 5
17	1	48" x 72" ACCESS HATCH; SEE NOTE 6
18	-	
19	3	6" PIPE SUPPORTS SEE NOTE 7
20	1	6" MEGAFLANGE SEE NOTE 8
21	3	4" SS SLIP ON WELD FLANGE
22	3	4" x 6" SS REDUCER
23	1	RELINER DROP BOWL W/ 12" DROP PIPE (SEE DETAIL X/D1)
24	-	

PRELIMINARY
NOT FOR
CONSTRUCTION

- NOTE:
- PUMPS SHALL BE HOMA MXS2446-T54; EACH PUMP SHALL BE CAPABLE OF PUMPING 400 GPM @ 38.5' TDH.



LIFT STATION SITE PLAN
PLEASANT VALLEY INTERCEPTOR REACH 4
WASHOE COUNTY, NV
JULY 2022

FIGURE
A3

APPENDIX B

LIFT STATION SYSTEM CURVE DEVELOPMENT

LIFT STATION PUMP CYCLE CALCULATIONS

PUMP DATA SHEET

LIFT STATION PIPE SURGE ANALYSIS

PIPE FLOW DEPTH TO DIAMETER CALCULATIONS

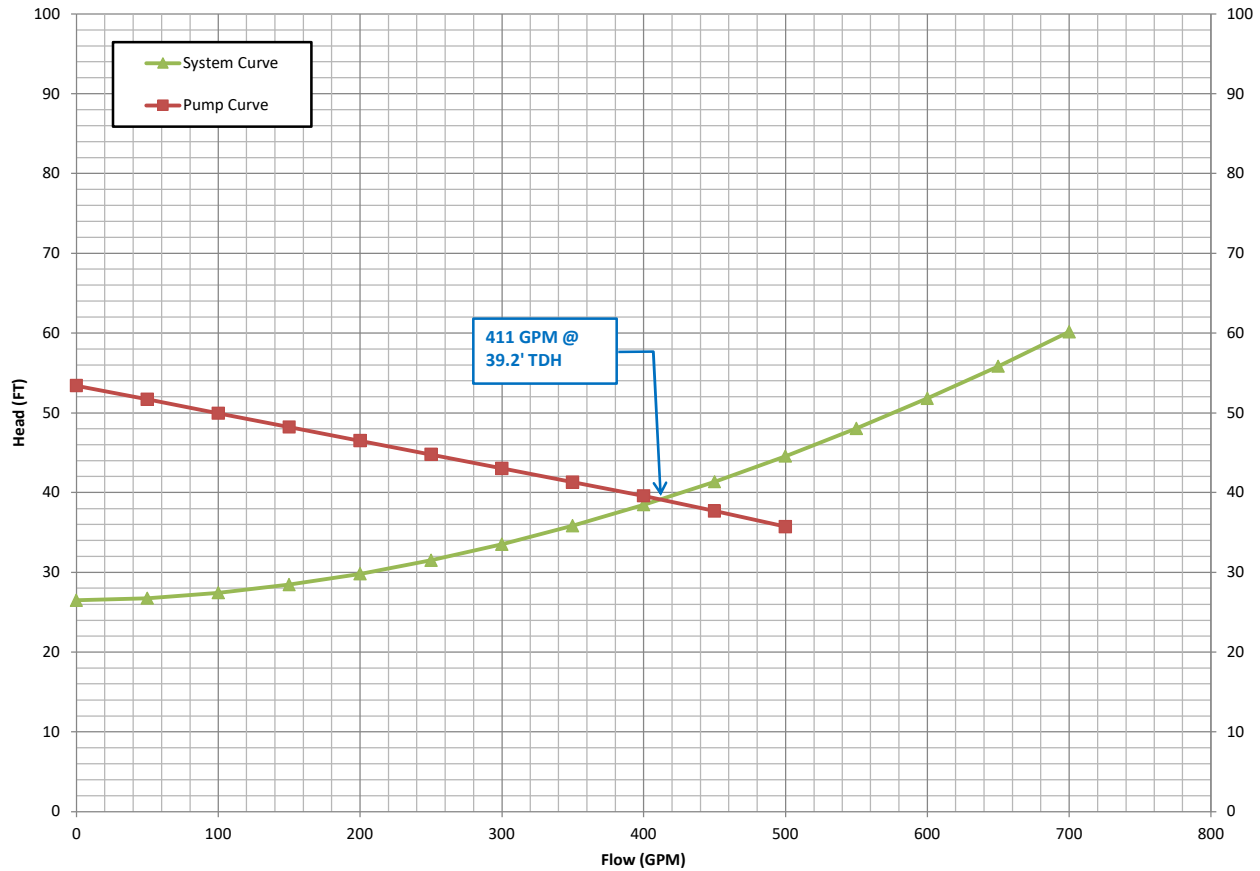


**Pleasant Valley Interceptor Reach 4
Lift Station System Curve Development**
(30% Design)

Project No: 22007.00
Calc By: TCB
Date: 7/19/2022

Description: (2) HOMA MXS2446-T54 in paralell, 10-inch DR11 HDPE SSFM

Flow, Q (gpm)	Headlosses (Hazen Williams)						Elevation		System Curve	Pump Curve
	(feet)						(feet)		TDH	Head
	6" SS	6" DIP	10" HDPE	Plug Valve	Swing Check		From	To	(feet)	(feet)
	Q Factor	1.0	1.0	2.0	1.0	1.0				
	Roughness Coeff., C	100	120	120	120	120				
	Equivalent Length, Ft	40.0	140.0	863.0	3.2	39.0				
	Pipe ID, inches	6.000	6.000	8.680	6.00	6.00				
0		0.00	0.00	0.00	0.00	0.00	4781.50	4808.00	26.5	53.4
50		0.02	0.05	0.17	0.00	0.01	4781.50	4808.00	26.8	51.7
100		0.07	0.17	0.63	0.00	0.05	4781.50	4808.00	27.4	49.9
150		0.14	0.36	1.33	0.01	0.10	4781.50	4808.00	28.4	48.2
200		0.25	0.62	2.27	0.01	0.17	4781.50	4808.00	29.8	46.5
250		0.37	0.93	3.43	0.02	0.26	4781.50	4808.00	31.5	44.8
300		0.52	1.30	4.80	0.03	0.36	4781.50	4808.00	33.5	43.0
350		0.69	1.73	6.39	0.04	0.48	4781.50	4808.00	35.8	41.3
400		0.89	2.22	8.18	0.05	0.62	4781.50	4808.00	38.5	39.6
450		1.10	2.76	10.17	0.06	0.77	4781.50	4808.00	41.4	37.7
500		1.34	3.35	12.36	0.08	0.93	4781.50	4808.00	44.6	35.7
550		1.60	4.00	14.74	0.09	1.11	4781.50	4808.00	48.0	33.8
600		1.88	4.70	17.31	0.11	1.31	4781.50	4808.00	51.8	31.8
650		2.18	5.45	20.07	0.12	1.52	4781.50	4808.00	55.8	
700		2.50	6.25	23.02	0.14	1.74	4781.50	4808.00	60.2	





Pleasant Valley Interceptor Reach 4
Lift Station Pump Cycle Calculations
(30% Design)

Project No: 22007.00
Calc By: TCB
Date: 7/19/2022

Lift Station Inflow / Outflow		
Peak Design Inflow (Q_{in})	788	GPM
Pumping Rate (Q_{out})	822	GPM

Proposed Pumps	
Model	HOMA MXS2446-T54
No. of Pumps	3

Wet Well Detention Time and Pump Cycle Calculations										
Flow Condition	Q_{in}	Q_{out}	Op. Depth	Vol./ft	Op. Volume	Q_{out} Net	Fill Time	Empty Time	Total Det. Time	Pump Cycle
	GPM	GPM	ft	gal/ft	gal	GPM	min	min	min	Starts/hr
Average Daily Flow (1/3 of Peak Flow)	263	822	3	846	2537	559	9.7	4.5	14.2	1.4
Half Pump Flow (Min. Det. Time)	411	822	3	846	2537	411	6.2	6.2	12.3	1.6
Peak Flow	788	822	3	846	2537	34	3.2	74.6	77.8	0.3

Wet Well Volume Per Foot		
Wet Well Dia. (ft)	Area (ft ²)	Vol./ft (gal/ft)
12	113.04	845.54

Force Main Flow Calculations		
Pipe Flow	822	GPM
Pipe Length	863	ft
Pipe Material	HDPE DR11	
Inside Pipe Diameter	8.68	inches
Pipe Area (ft ²) =	0.411	ft ²
Convert GPM to CFS	1.83	ft ³ /sec
Pipe Velocity =	4.46	ft/sec
Pipe Volume =	2652.65	gallons
Travel Time =	3.23	minutes
Friction Loss Coef =	140	
Headloss =	6.54	ft
Headloss =	2.83	psi

Technical Information

MXS2446-T54

Operating data

Flow	400 US g.p.m.
Head	38.5 ft
Shaft power P2	5.88 hp
Pump efficiency	69.7 %
Required pump NPSH	
Pump type	Single head pump
No. of pumps	1
Fluid	Wastewater

Pump

Pump Code	MXS2446-T54
Impeller	Single channel impeller
Impeller size	230 mm
Solid size	100 mm
Discharge port	DN100
Suction port	DN150

Motor

Rated voltage	400 V
Frequency	50 Hz
Rated power P2	6.7 hp
Rated speed	1450 rpm
Number of poles	4
Efficiency	85 %
Rated current	9.9 A
Degree of protection	IP 68

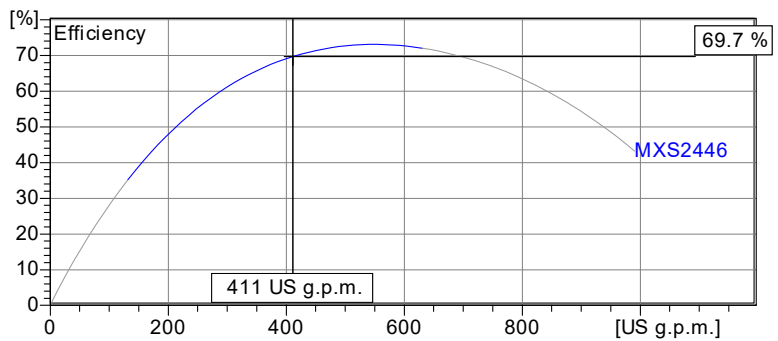
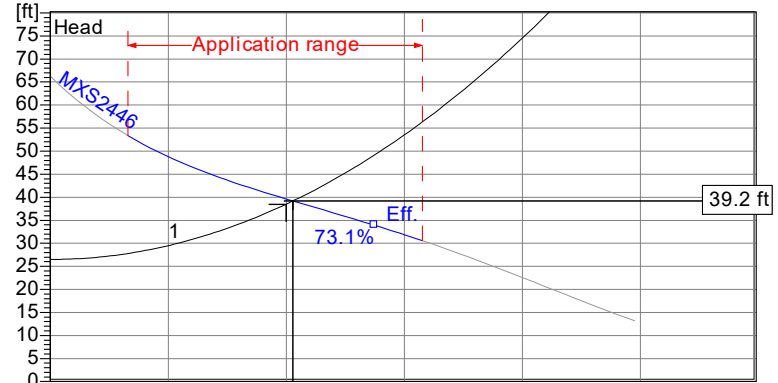
Materials

Motor housing	Grey cast iron EN-GJL-250
Pump housing	Grey cast iron EN-GJL-250
Impeller	Grey cast iron EN-GJL-250
Wear ring	Bronze
Motor shaft	Stainless steel 1.4104

Bolts	Stainless steel
Elastomers	Nitrile Rubber

Mechanical seal on motor side	SiC / SiC
Mechanical seal on medium side	SiC / SiC
Lower Bearing	Double row angular ball bearing
Upper Bearing	Deep Groove Ball Bearing

Testnorm: P2>10kW, ISO9906
P2<10kW, ISO9906



Wet well installation with coupling kit (42-46, T)
Dimensions in mm,

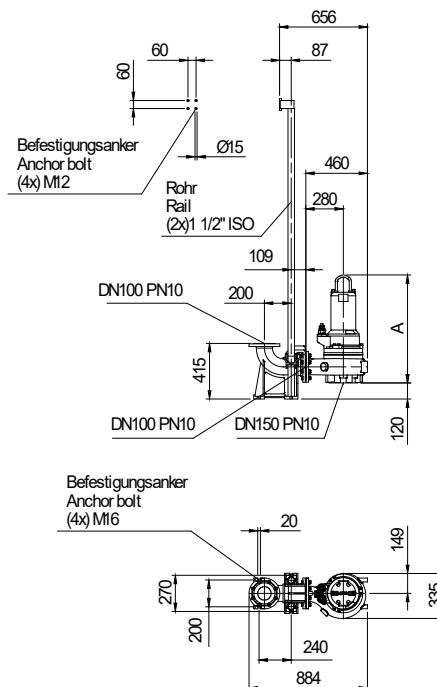


Table Dimensions
(mm)

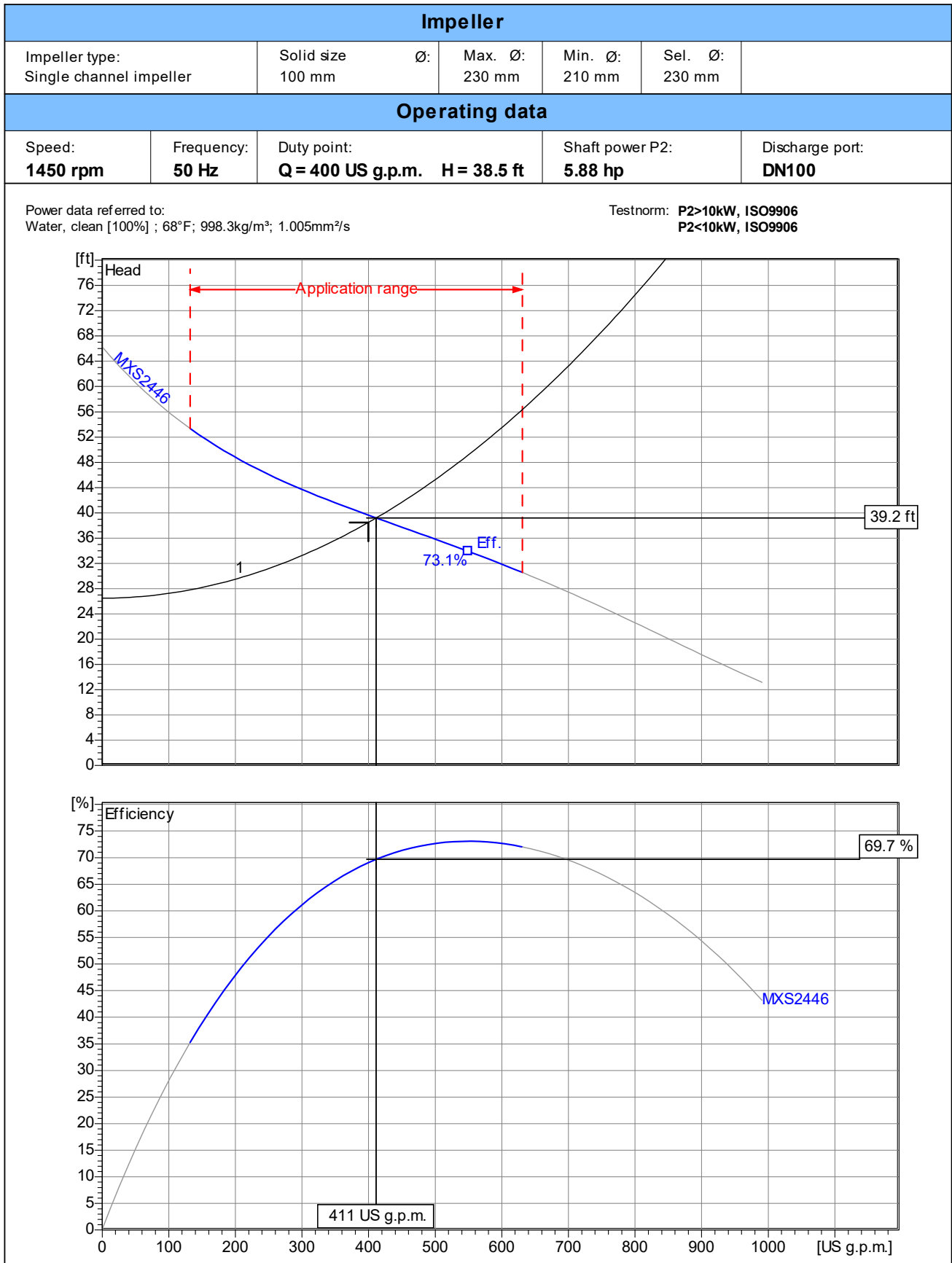
A 810

2.3.7 - 28/06/2017 (Build 1690)

Project	Project no.:	Created by:	Page: 1	Date: 20/07/2022
---------	--------------	-------------	------------	---------------------

Performance Curve

MXS2446-T54



Project	Project no.:	Created by:	Page: 2	Date: 20/07/2022
---------	--------------	-------------	------------	---------------------

Dimensions

MXS2446-T54

Wet well installation with coupling kit (42-46, T)
Dimensions in mm, ie

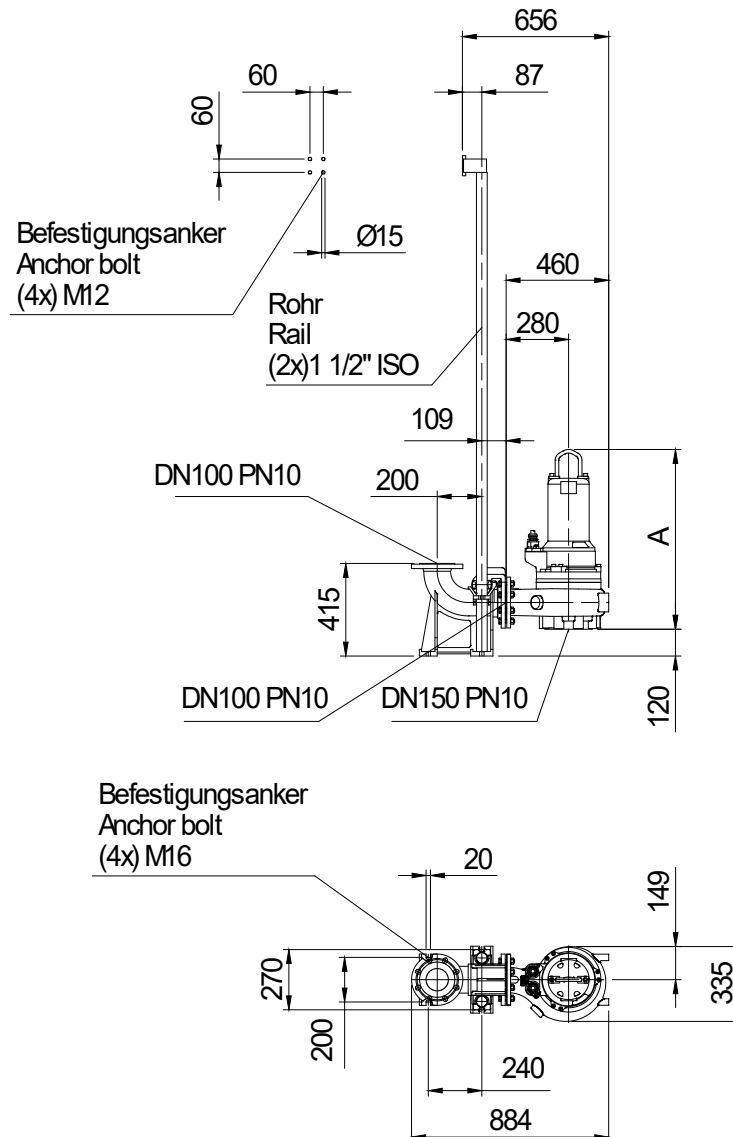


Table Dimensions (mm)

A	810		
---	-----	--	--

2.3.7 - 28/06/2017 (Build 1690)

Project	Project no.:	Created by:	Page: 3	Date: 20/07/2022
---------	--------------	-------------	------------	---------------------

Technical Data

MXS2446-T54

Operating data				
Flow	400 US g.p.m.	US g.p.m.	Head	38.5 ft ft
Shaft power P2	5.9	hp	Geodetic head	8.077 ft
Pump efficiency	69.7	%	Required pump NPSH	ft
Pump type	Single head pump		No. of pumps	1
Fluid	Wastewater		Temperature	20 °F
Density	998.3	kg/m³	Kin. viscosity	1.005 mm²/s

Pump					
Pump Code	MXS2446-T54	Speed	1450	rpm	
Suction port	DN150	Head	Max.	53.4	ft
Discharge port	DN100		Min.	30.6	ft
Impeller type	Single channel impeller	Flow	Max.	630.7	US g.p.m.
Solid size	100	mm	Pump efficiency max.	73.1	%
Impeller Ø	230	mm	Required rated power max. P2	7.6	hp

Motor					
Motor design	Submersible motor		Insulation class		H
Motor name	AM 173.6,3/4 T		Degree of protection		IP 68
Frequency	50	Hz	Temperature class		T4
Rated power P1	7.9	hp			
Rated power P2	6.7	hp	Explosion protection		
Rated speed	1450	rpm	Efficiency at % rated power	100%	85.0 %
Rated voltage	400	V 3~		75%	86.0 %
Rated current	9.9	A		50%	85.0 %
Starting current, direct starting	61.4	A	cos phi at % rated power	100%	0.85
Starting current, star-delta	20.5	A		75%	0.80
Starting mode	Star-delta			50%	0.67
Power cable	12G1,5		Control cable		
Type of power cable	H07RN8-F PLUS		Type of control cable		
Cable length	32.8 ft		Service factor		1.15
Shaft seal	Mechanical seal on motor side		SiC / SiC		
	Mechanical seal on medium side		SiC / SiC		
Bearing	Lower Bearing		Double row angular ball bearing		
	Upper Bearing		Deep Groove Ball Bearing		
Remarks					

Materials / Weight			
Motor housing	Grey cast iron EN-GJL-250	Bolts	Stainless steel
Pump housing	Grey cast iron EN-GJL-250	Elastomers	Nitrile Rubber
Impeller	Grey cast iron EN-GJL-250		
Wear ring	Bronze		
Motor shaft	Stainless steel 1.4104		
Weight aggregate	306.44 lb		

Project	Project no.:	Created by:	Page: 4	Date: 20/07/2022
---------	--------------	-------------	---------	------------------



Pleasant Valley Interceptor Reach 4
Lift Station Pipe Surge Analysis
(30% Design)

Project No: 22007.00
Calc By: TCB
Date: 7/22/2022

Design Flow, Q (gpm)	822
----------------------	-----

Material Description	Pipe Size	OD Outside Diameter in	t Wall Thickness in	A Pipe Crossectional Area ft ²	V Maximum Velocity Change f/sec	E Modulus of Elasticity of the Pipe psi	a Wave Velocity ft ²	P Pressure Surge psi
10" HDPE DR11 Force Main (200 PSI rating)	10	10.75	0.977	0.422	4.34	150,000	1,069	62.4

Maximum Velocity Change: $V=Q/A$ Q= Design Flow gpm
A= Crossectional Area

Eq. 5.7 p. 134 Handbook of PVC Pipe, 3rd Edition, Uni-Bell PVC Pipe Association
Wave Velocity: $a=4660/(1+(k/D_i)/(Ext))^2$

k= fluid bulk modulus; (300,000 psi for water)

D_i =pipe Inside diameter, inches

E= modulus of elasticity of the pipe; (24,000,000 psi for DIP, 400,000 psi for PVC, 29,000,000 for Steel; 150,000 psi for HDPE)

t= wall thickness, inches

Pressure Surge: Eq. 5.9 p. 135 Handbook of PVC Pipe, 3rd Edition, Uni-Bell PVC Pipe Association
 $P= aV/2.31g$

a= wave velocity
V= maximum velocity change
g= acceleration due to gravity, 32.2 fps



Pipe Flow Depth to Diameter Calculations

Pleasant Valley Interceptor Reach 4

Inputs

Pipe Diameter, **D** = **12** in

Manning roughness, **n_{full}** = **0.012**

WCCSD = 0.012

Pipe Slope, **S** = **0.0026** ft/ft

Min. @ Pipe Dia. (WCCSD) = 0.0026 ft/ft

Volumetric Flow Rate, **Q** = **822** gpm

Normal Depth, **d**

d (ft)	h (ft)	θ (rad)	A (ft ²)
0.840	0.160	1.643	0.705

Calculations

Pipe Diameter, **D** = **1.000** ft

Pipe radius, **r** = **0.500** ft

Volumetric Flow Rate, **Q** = **1.83** cfs

The Manning equation can be rearranged to:

$$Q/(1.49*S^{1/2}) = (A*R^{2/3})/n$$

$$Q/(1.49*S^{1/2}) = \mathbf{24.151} \text{ (target value)}$$

n	P (ft)	(A*R ^{2/3})/n	Δ target
0.0132	2.320	24.150	0.000

CALCULATE d/D



Depth to Diameter Ratio (d/D)

d (ft)	D (ft)	d/D
0.840	1.000	0.84

APPENDIX C

PRELIMINARY COST ESTIMATE JULY 2022

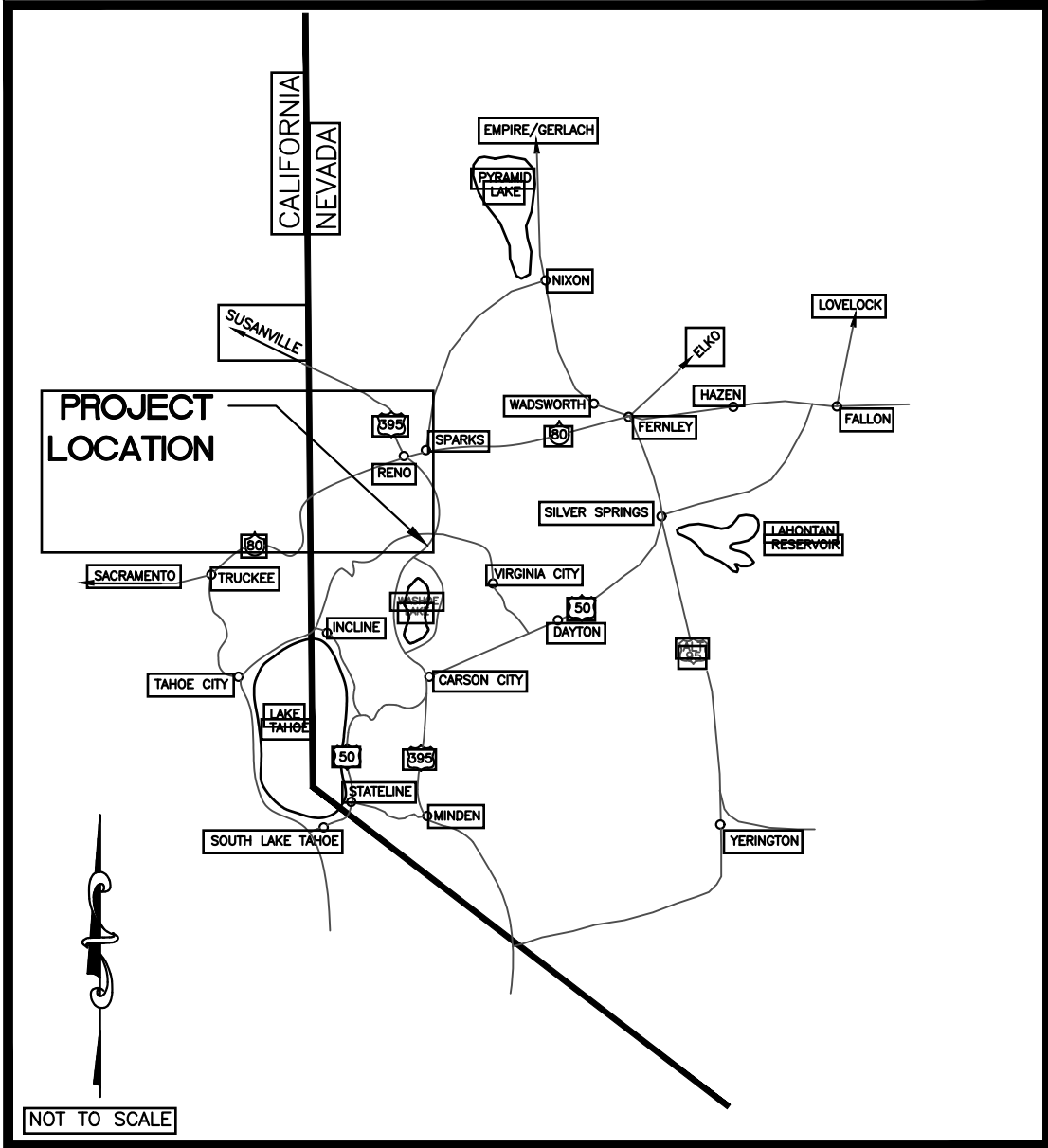
Saint James Village, Inc. Pleasant Valley Interceptor Reach 4 Preliminary Cost Estimate July 2022					
Item #	Description	Quantity	Unit	Unit Cost	Extended
1	Mobilization/Demobilization	1	LS	\$323,700.00	\$323,700.00
2	Traffic Control	1	LS	\$35,000.00	\$35,000.00
3	Environmental Protection	1	LS	\$15,000.00	\$15,000.00
4	Approach Manhole	1	LS	\$8,500.00	\$8,500.00
5	Wet Well & Vaults	1	LS	\$180,000.00	\$180,000.00
6	Pumps, Piping, Valves, & Appurtenances	1	LS	\$100,000.00	\$100,000.00
7	Bypass Connection	1	LS	\$5,000.00	\$5,000.00
8	Electrical / Control Panel	1	LS	\$200,000.00	\$200,000.00
9	Generator	1	LS	\$120,000.00	\$120,000.00
10	10" HDPE DR11 Force Main	863	LF	\$220.00	\$189,860.00
11	Misc. Site Work	1	LS	\$30,000.00	\$30,000.00
12	Type 1A 48" Dia. Sewer Manhole	67	EA	\$8,500.00	\$569,500.00
13	12" PVC Sewer Main	17,325	LF	\$280.00	\$4,851,000.00
14	Jack & Bore	80	LF	\$400.00	\$32,000.00
15	Pavement Repair	17,200	SF	\$8.00	\$137,600.00
				Total:	\$ 6,797,160.00

20% Contingency: \$ 1,359,440.00

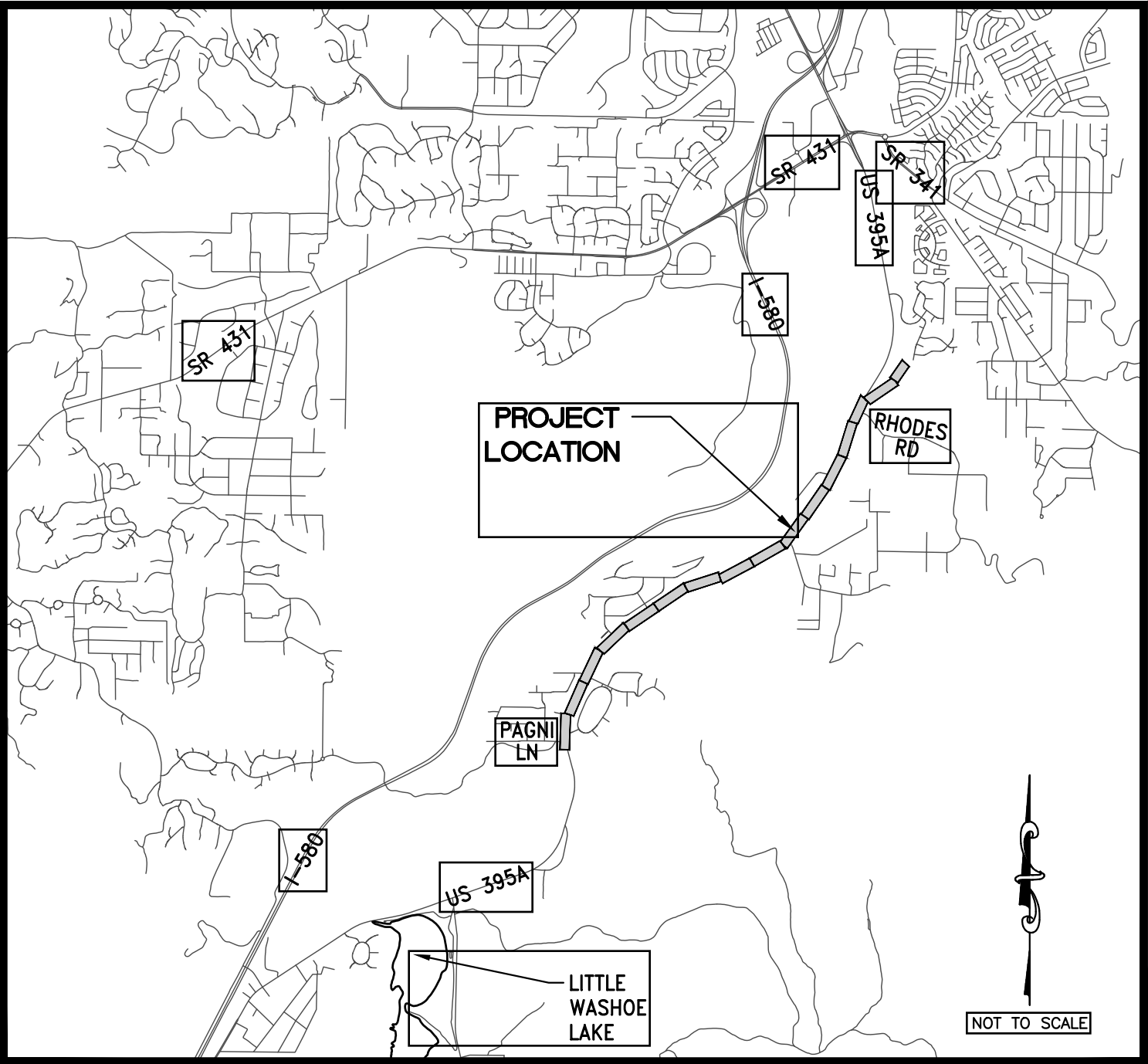
Total Estimated Project Cost: \$ 8,156,600.00

Pleasant Valley Interceptor 30% Plan Sheets 1-4

30% DESIGN PLANS
FOR
SAINT JAMES VILLAGE, INC.
PLEASANT VALLEY INTERCEPTOR REACH 4
WASHOE COUNTY, NV
JULY 2022



VICINITY MAP



LOCATION MAP

WASHOE COUNTY, NV

SHEET INDEX		
C1	COVER SHEET	1 OF 25
C2	GENERAL NOTES, LEGEND, & ABBREVIATIONS	2 OF 25
C2	SHEET INDEX MAP	3 OF 25
C3	LIFT STATION SITE PLAN	4 OF 25
C4	LIFT STATION PLAN VIEW	5 OF 25
C5	LIFT STATION SECTION VIEWS	6 OF 25
P1	PLAN & PROFILE - STA: 10+00 TO 21+00	7 OF 25
P2	PLAN & PROFILE - STA: 21+00 TO 33+00	8 OF 25
P3	PLAN & PROFILE - STA: 33+00 TO 45+00	9 OF 25
P4	PLAN & PROFILE - STA: 45+00 TO 57+00	10 OF 25
P5	PLAN & PROFILE - STA: 57+00 TO 69+00	11 OF 25
P6	PLAN & PROFILE - STA: 69+00 TO 81+00	12 OF 25
P7	PLAN & PROFILE - STA: 81+00 TO 93+00	13 OF 25
P8	PLAN & PROFILE - STA: 93+00 TO 105+00	14 OF 25
P9	PLAN & PROFILE - STA: 105+00 TO 117+00	15 OF 25
P10	PLAN & PROFILE - STA: 117+00 TO 129+00	16 OF 25
P11	PLAN & PROFILE - STA: 129+00 TO 141+00	17 OF 25
P12	PLAN & PROFILE - STA: 141+00 TO 153+00	18 OF 25
P13	PLAN & PROFILE - STA: 153+00 TO 165+00	19 OF 25
P14	PLAN & PROFILE - STA: 165+00 TO 175+00	20 OF 25
P15	PLAN & PROFILE - STA: 175+00 TO 187+00	21 OF 25
P16	PLAN & PROFILE - STA: 187+00 TO 191+88.2	22 OF 25
D1	LIFT STATION DETAILS	23 OF 25
D2	SEWER DETAILS	24 OF 25
D3	SEWER DETAILS	25 OF 25

OWNER

SAINT JAMES VILLAGE, INC.
4100 JOY LAKE ROAD
RENO, NV 89511

ENGINEER



20 Vine Street
Reno, NV 89503
Email: general@shawengineering.com
Phone: (775) 329-5559
Toll Free: (888) 329-5559
Fax: (775) 329-5406
Website: www.shawengineering.com

LAND SURVEYOR

CFA, INC.
1150 CORPORATE BOULEVARD
RENO, NV 89502
PHONE: (775) 856-1150
FAX: (775) 856-1160

SEWER SYSTEM

WASHOE COUNTY COMMUNITY SERVICES DEPARTMENT
1001 E. 9TH STREET
RENO, NV 89512
775-328-2040
ENGINEERING@WASHOECOUNTY.GOV



Know what's below.
Call before you dig.

C0

GENERAL NOTES

1. CONTRACTOR SHALL HAVE FULL RESPONSIBILITY FOR THE SAFETY AND PROTECTION OF UNDERGROUND FACILITIES AND REPAIRING ANY DAMAGE THERETO RESULTING FROM THE WORK.

2. IF AN UNDERGROUND FACILITY IS UNCOVERED OR REVEALED AT OR CONTIGUOUS TO THE SITE WHICH WAS NOT SHOWN OR INDICATED WITH REASONABLE ACCURACY IN THE CONSTRUCTION DRAWINGS, THE CONTRACTOR SHALL, PROMPTLY AFTER BECOMING AWARE THEREOF AND BEFORE DISTURBING CONDITIONS AFFECTED THEREBY OR PERFORMING ANY WORK IN CONNECTION THEREWITH (EXCEPT IN AN EMERGENCY) IDENTIFY THE OWNER OF THE UNDERGROUND UTILITY FACILITY AND GIVE WRITTEN NOTICE TO THE ENGINEER WILL PROMPTLY REVIEW THE UNDERGROUND FACILITY AND DETERMINE THE EXTENT, IF ANY, TO WHICH A CHANGE IN THE CONSTRUCTION DRAWINGS IS NECESSARY.

3. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS AND REGULATIONS RELATING TO THE SAFETY OF PERSONS OR PROPERTY, OR TO THE PROTECTION OF PERSONS OR PROPERTY FROM DAMAGE, INJURY, OR LOSS; AND SHALL ERECT AND MAINTAIN ALL NECESSARY SAFEGUARDS FOR SUCH SAFETY AND PROTECTION.

4. CONTRACTOR SHALL KEEP THE SITE AND OTHER AREAS FREE FROM ACCUMULATION OF WASTE MATERIALS, RUBBISH, AND OTHER DEBRIS. REMOVAL AND DISPOSAL SHALL CONFORM TO THE APPLICABLE LAWS AND REGULATIONS.

5. CONTRACTOR SHALL NOTIFY OWNERS OF ADJACENT PROPERTY AND UNDERGROUND FACILITIES AND OTHER UTILITY OWNERS WHEN PROSECUTION OF THE WORK MAY AFFECT THEM, AND SHALL COOPERATE WITH THEM IN THE PROTECTION, REMOVAL, RELOCATION, AND REPLACEMENT OF THEIR PROPERTY.

6. ALL DAMAGE, INJURY, OR LOSS TO ANY PROPERTY, DIRECTLY OR INDIRECTLY, OR IN PART BY THE CONTRACTOR SHALL BE REMEDIED BY THE CONTRACTOR.

7. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL CONSTRUCTION PERMITS AND LICENSES, AS REQUIRED.

8. CONTRACTOR SHALL COORDINATE HIS/HER WORK AND MINIMIZE INTERFERENCE WITH THE WORK OF THE OWNER, UTILITIES, AND OTHERS WHO MAY BE WORKING IN THE PROJECT AREA WHILE THE WORK IS IN PROGRESS.

9. THE CONTRACTOR SHALL MAINTAIN RECORDS OF ANY AND ALL CHANGES MADE DURING THE COURSE OF CONSTRUCTION. THESE RECORDS SHALL BE IN GOOD ORDER AND ANNOTATED TO SHOW CHANGES MADE DURING CONSTRUCTION. UPON COMPLETION OF THE WORK, THESE RECORD DOCUMENTS SHALL BE TURNED OVER TO THE ENGINEER OR OWNER.

10. IN THE EVENT OF EMERGENCIES AFFECTING THE SAFETY OR PROTECTION OF THE PERSONS OR THE WORK OR PROPERTY AT THE SITE OR ADJACENT THERETO, CONTRACTOR IS OBLIGATED TO ACT TO PREVENT THREATENED DAMAGE, INJURY OR LOSS.

11. IF DURING PERFORMANCE OF THE WORK, CONTRACTOR DISCOVERS ANY CONFLICT, ERROR, AMBIGUITY OR DISCREPANCY WITHIN THE CONSTRUCTION DRAWINGS OR BETWEEN THE CONSTRUCTION DRAWINGS AND ANY PROVISION OF ANY LAW OR REGULATION APPLICABLE TO THE PERFORMANCE OF THE WORK, THE CONTRACTOR SHALL REPORT TO THE ENGINEER IN WRITING AT ONCE.

12. IF GROUNDWATER IS ENCOUNTERED IN THE PERFORMANCE OF THE WORK, THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN AND OPERATE ALL THE NECESSARY MACHINERY, APPLIANCES, AND EQUIPMENT TO KEEP THE EXCAVATIONS CLEAR AND FREE FROM WATER UNTIL THE WORK IS COMPLETED, INSPECTED AND APPROVED AND ALL DANGER OF FLOTATION AND OTHER DAMAGES ARE REMOVED. ALL UNDERGROUND EQUIPMENT/STRUCTURES SHALL BE INSTALLED SO AS TO PREVENT FLOTATION.

13. THE CONTRACTOR SHALL NOTIFY THE OWNER, ALL GOVERNING AGENCIES HAVING JURISDICTION OVER THE WORK, UTILITY COMPANIES, TELEPHONE COMPANIES, CABLE TELEVISION COMPANIES, AND ANY OTHER ENTITY IMPACTED BY THE WORK 48 HOURS PRIOR TO BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL GIVE 24 HOURS PRIOR NOTICE FOR ALL CONSTRUCTION STAKING AND INSPECTIONS REQUIRED DURING CONSTRUCTION.

14. THE CONTRACTOR IS HEREBY NOTIFIED THAT PRIOR TO COMMENCING CONSTRUCTION, HE/SHE IS RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES FOR VERIFICATION AT THE CONSTRUCTION SITE OF THE LOCATIONS OF ALL UNDERGROUND FACILITIES WHERE SUCH FACILITIES MAY POSSIBLY CONFLICT WITH THE PLACEMENT OF THE IMPROVEMENTS SHOWN ON THE PLANS. CALL "UNDERGROUND SERVICE ALERT" AT 811 TWO (2) DAYS MINIMUM TO FOURTEEN (14) DAYS MAXIMUM BEFORE ANY EXCAVATION IS STARTED.

15. ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF AN APPROVED DUST PALLIATIVE AT NO EXPENSE TO THE OWNER.

16. INSTALLATION AND MAINTENANCE OF EROSION CONTROL MEASURES ARE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE PER THE APPROVED STORM WATER POLLUTION PREVENTION PLAN KEPT ON-SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREVENTION OF SIGNIFICANT EROSION AND SILTATION ENTERING THE STORM DRAIN SYSTEM, NATURAL DRAINAGE COURSES AND/OR INTRUDING UPON ADJACENT ROADWAYS AND PROPERTIES.

17. ALL UTILITY LOCATIONS, SIZES, AND DESCRIPTIONS AS SHOWN ARE FROM SURFACE OBSERVATIONS USED IN CONJUNCTION WITH REFERENCE MAPS, DRAWINGS, AND VERBAL STATEMENTS SUPPLIED BY UTILITY COMPANIES AND MAY NOT BE WHOLLY ACCURATE OR RELIABLE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL UTILITIES IN THE FIELD EITHER BY ACTUAL POTHOLING OR VISUALLY, AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES WHICH MAY BE AFFECTED BY THE WORK TO OBTAIN ASSISTANCE IN THE LOCATION OF EXISTING MAINS AND SERVICE CONNECTIONS.

18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION SIGNING, BARRICADES, AND TRAFFIC DELINEATION TO CONFORM TO THE STATE OF NEVADA, DEPARTMENT OF TRANSPORTATION "NEVADA WORK ZONE TRAFFIC CONTROL MANUAL" AND CHAPTER 6 OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (LATEST EDITION).

19. ANY EXCAVATION BY CONTRACTOR THAT UNCOVERS AN HISTORICAL OR ARCHAEOLOGICAL ARTIFACT SHALL BE ADDRESSED IN ACCORDANCE WITH THE STATE HISTORICAL PRESERVATIONS OFFICE AND ANY OTHER AHJ AS APPLICABLE.

20. THE CONTRACTOR SHALL PROTECT FROM DAMAGE EXISTING UTILITY STRUCTURES ON AND AROUND THE SITE INCLUDING, BUT NOT LIMITED TO, PAVEMENT, CURB AND GUTTER, SIDEWALK, LANDSCAPING, SIGNAGE, STORM AND SANITARY SEWERS, UTILITIES, TELEPHONE, AND CABLE TELEVISION. THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE REPAIR AND/OR REPLACEMENT OF ANY IMPROVEMENTS (NEW OR EXISTING) DAMAGED THROUGHOUT THE COURSE OF CONSTRUCTION EITHER AS A DIRECT RESULT OF THE ACTIVITIES OR THE FAILURE TO ADEQUATELY PROTECT THE IMPROVEMENT.

21. CONTRACTOR SHALL NOTIFY OWNERS OF ADJACENT PROPERTY AND UNDERGROUND FACILITIES AND OTHER UTILITY OWNERS WHEN EXECUTION OF THE WORK MAY AFFECT THEM, AND SHALL COOPERATE WITH THEM IN THE PROTECTION, REMOVAL, RELOCATION, AND REPLACEMENT OF THEIR PROPERTY.

22. THE CONTRACTOR SHALL, DURING THE COURSE OF THE PROJECT, MAINTAIN RECORD DRAWINGS INDICATING BY DIMENSION AND DESCRIPTION ANY FACILITY CONSTRUCTED CONTRARY TO THAT SHOWN ON THE DRAWINGS OR DESCRIBED IN THE SPECIFICATIONS. AT THE END OF CONSTRUCTION, THE RECORD DRAWINGS SHALL BE TURNED OVER TO THE ENGINEER.
23. PRIOR TO THEIR INCORPORATION INTO THE WORK, THE CONTRACTOR SHALL SUBMIT FOR THE ENGINEER'S APPROVAL SHOP DRAWINGS AND MATERIAL SPECIFICATIONS FOR ALL MATERIALS TO BE USED ON THE PROJECT. ANY WORK PERFORMED PRIOR TO THE ENGINEER'S REVIEW AND APPROVAL OF THE SHOP DRAWINGS WILL BE AT THE SOLE EXPENSE AND RESPONSIBILITY OF THE CONTRACTOR.

24. THE CONTRACTOR SHALL AT ALL TIMES PROVIDE AND MAINTAIN EMERGENCY ACCESS THROUGH THE PROJECT SITE IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC PROTECTION AGENCIES HAVING JURISDICTION OVER THE PROJECT SITE WHICH SHALL INCLUDE POLICE, SHERIFF, FIRE, AND AMBULANCE. THE CONTRACTOR SHALL ALSO COORDINATE WITH SAME AGENCIES ANY REQUIRED STREET CLOSURES AND/OR DETOURS.

25. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES, INCLUDING UTILITIES AND EQUIPMENT, TO ELIMINATE CONFLICTS BETWEEN THE ACTIVITIES OF ALL SUBCONTRACTORS AND OTHER UTILITY COMPANIES WHICH MAY ALSO BE WORKING IN THE SAME AREA.

26. ABANDONED UTILITIES AND STRUCTURES, WHEN ENCOUNTERED, SHALL BE REMOVED AND LEGALLY DISPOSED OF BY THE CONTRACTOR. CONFLICTS WITH OTHER EXISTING ABANDONED UTILITIES AND STRUCTURES ARE ANTICIPATED. THE CONTRACTOR WILL NOT BE PAID DIRECTLY FOR THE REMOVAL AND DISPOSAL OF THESE MATERIALS BUT MUST INCLUDE THE COST FOR THIS WORK IN THE BID ITEMS.

27. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND OTHER SURVEY MARKERS. MONUMENTS AND SURVEY MARKERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

28. PROPERTY AND RIGHT-OF-WAY LINES AS SHOWN ARE APPROXIMATE ONLY AND SHOULD NOT BE USED TO SCALE FROM, BUT ARE SHOWN FOR REFERENCE ONLY.

29. ANY HAZARDOUS OR TOXIC WASTE OR HAZARDOUS ENVIRONMENTAL CONDITION ENCOUNTERED AT THE SITE OR CREATED BY THE CONTRACTOR THROUGHOUT THE COURSE OF THE WORK SHALL BE ADDRESSED IN ACCORDANCE WITH THE GENERAL CONDITIONS, OR APPLICABLE LAWS AS REQUIRED.

30. ALL POTHOLING SHALL BE COORDINATED WITH AND REPORTED TO THE OWNER, AND POTHOLING INFORMATION SHALL BE RECORDED BY CONTRACTOR IN WRITING AND PROVIDED TO THE ENGINEER AND OWNER.

31. COORDINATE ALL LIFT STATION IMPROVEMENTS WITH THE FINAL APPROVED CIVIL IMPROVEMENT PLANS FOR THIS PROJECT.

TESTING AND INSPECTION NOTES

- FORCE MAIN, NEW PIPE & APPURTENANCES
1. FLUSHING AND PRESSURE TESTING

1.1. CONTRACTOR SHALL DEVELOP A WRITTEN FLUSHING AND PRESSURE TEST PROGRAM THAT IDENTIFIES METHODS, EQUIPMENT, DURATIONS, AND LOCATIONS

1.2. FORCE MAIN SHALL BE FLUSHED WITH A MINIMUM CLEANING VELOCITY OF 2.5 FEET PER SECOND. FLUSHING SHALL CONTINUE FOR AT LEAST 3 PIPE VOLUMES.

1.3. THE SECTION OF FORCEMAIN SHALL BE PLACED UNDER SLIGHT PRESSURE FOR 24 HOURS

1.4. THE LOCATION FOR THE INSTALLATION OF SADDLES AND TAPS IN THE FORCE MAIN FOR THE PURPOSE OF PRESSURE TESTING SHALL BE APPROVED BY THE ENGINEER.

1.5. THE TEST PRESSURE SHALL BE RAISED AND HELD AT THE TEST PRESSURE (AT THE LOWEST POINT) BY THE ADDITION OF WATER FOR A MINIMUM OF 2 HOURS AT 50 PSI.

1.6. THE LINE SHALL THEN BE ALLOWED TO STAND FOR ONE HOUR WITHOUT THE ADDITION OF WATER AND THE PRESSURE RECORDED AT THE END OF THAT HOUR.

1.7. THE INITIAL TEST PRESSURE SHALL THEN BE RESTORED BY THE ADDITION OF WATER AND THE QUANTITY OF WATER ADDED TO REACH THE TEST PRESSURE ACCURATELY MEASURED AND RECORDED. THE AMOUNT OF WATER ADDED SHALL NOT EXCEED THAT ALLOWED BY THE FOLLOWING EQUATION:

$$Q \text{ (GALLON/HOUR)} = \text{LENGTH (FT)} \times \text{DIAMETER (INCHES)} \times \text{SQRT (PRESSURE (PSI))}/148,000$$

1.8. SHOULD THE LEAKAGE EXCEED THE SPECIFIED AMOUNT OR SHOULD BE OTHERWISE NOTED, THE CONTRACTOR SHALL LOCATE POINTS OF LEAKAGE, REWORK THE LINE AND TEST THE LINE AGAIN.

1.9. EXCEPT WHERE OTHERWISE REQUIRED BY PERMITS OR THE DIRECTION OF THE ENGINEER, IT IS INTENDED THAT THE PRESSURE/LEAKAGE TEST BE CONDUCTED WITH THE TRENCH BACKFILLED.

LEGEND

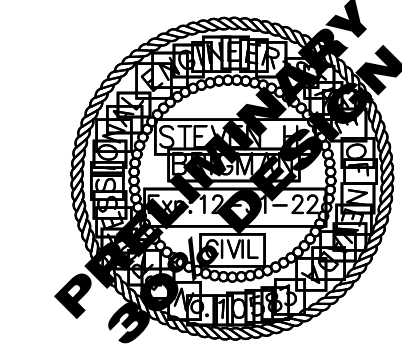
CONTOUR MAJOR (EXISTING)	
CONTOUR MINOR (EXISTING)	
EDGE OF PAVEMENT	
FENCE, CHAIN LINK	
FENCE, WIRE	
FENCE, WOOD	
GUARDRAIL	
PROPERTY LINE	
SANITARY SEWER MAIN (EXISTING)	
SANITARY SEWER MAIN (PROPOSED)	
SANITARY SEWER FORCE MAIN (PROPOSED)	
STORM DRAIN (EXISTING)	
FITTING	
OVERHEAD ELECTRIC STRUCTURE	
SANITARY SEWER MANHOLE (EXISTING)	
SANITARY SEWER MANHOLE (PROPOSED)	

ABBREVIATIONS

AC	ASPHALT CEMENT, ACRE	L	LENGTH
BH	BOREHOLE	LF	LINEAL FEET
CAV	COMBINATION AIR/VACUUM VALVE	MF	MEGAFIANGE
CI	CAST IRON	MH	MANHOLE
CL	CENTERLINE	MJ	MECHANICAL JOINT
CMP	CORRUGATED METAL PIPE	ND	NOT DETERMINED
COMH	CLEAN OUT MANHOLE	NTS	NOT TO SCALE
CONC	CONCRETE	OC	ON CENTER
CONST	CONSTRUCT, CONSTRUCTION	OF	OVERFLOW
CP	CONCRETE PIPE	OG	ORIGINAL GROUND
CPLG	COUPLING	OH	OVERHEAD
CU	COPPER	PE	PLAIN END, POLYETHYLENE
CW	COLD WATER	(P)	PROPOSED
DEG	DEGREES	PCC	PORTLAND CEMENT CONCRETE
DET	DETAIL	PL	PROPERTY LINE
DIA	DIAMETER	PVC	POLYVINYL CHLORIDE
DIP	DUCTILE IRON PIPE	REBAR	REINFORCING STEEL BARS
DR	DIMENSION RATIO	RCP	REINFORCED CONCRETE PIPE
(E)	EXISTING	REF	REFERENCE
EL	ELBOW, ELEVATION	RT	RIGHT, RINGITE
ELEV	ELEVATION	R/W	RIGHT OF WAY
EP	EDGE OF PAVEMENT	SI	SLOPE
EX	EXISTING GRADE	SCH	SCHEDULE
FCA	FLANGE COUPLING ADAPTER	SDR	STANDARD DIMENSION RATIO
FF	FINISH FLOOR	SF	SQUARE FOOT
FG	FINISH GRADE	SHT	SHEET
FL	FLANGE	STL	STEEL
GAL	GALLON	STA	STATION
GALV	GALVANIZED	SWR	SEWER
GB	GRADE BREAK	T	TELEPHONE
GPD	GALLONS PER DAY	TOE	TOE OF SLOPE
GPM	GALLONS PER MINUTE	THD	THREADED
GV	GATE VALVE	TYP	TYPICAL
HDPE	HIGH DENSITY POLYETHYLENE	UGE	UNDERGROUND ELECTRIC
HW	HOT WATER	VERT	VERTICAL
HWL	HIGH WATER LINE	WM	WATER METER
ID	INSIDE DIAMETER	WTR	WATER
IE	INVERT ELEVATION	WV	WATER VALVE

SAINT JAMES VILLAGE, INC.
PLEASANT VALLEY INTERCEPTOR REACH 4
WASHOE COUNTY, NEVADA

NOTES, LEGEND, & ABBREVIATIONS



DRAWN BY: TCB
DESIGNED BY: TCB
CHECKED BY: SHB
ISSUED DATE: 7/27/2022
JOB NO. 21084.00



Know what's below.
Call before you dig.

SHEET NUMBER

C1

2 OF 25



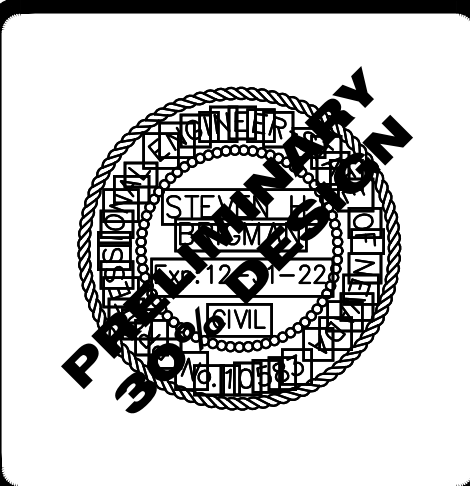
SHEET INDEX MAP

SHEET INDEX		
C1	COVER SHEET	1 OF 25
C2	GENERAL NOTES, LEGEND, & ABBREVIATIONS	2 OF 25
C3	SHEET INDEX MAP	3 OF 25
C3	LIFT STATION SITE PLAN	4 OF 25
C4	LIFT STATION PLAN VIEW	5 OF 25
C5	LIFT STATION SECTION VIEWS	6 OF 25
P1	PLAN & PROFILE - STA: 10+00 TO 21+00	7 OF 25
P2	PLAN & PROFILE - STA: 21+00 TO 33+00	8 OF 25
P3	PLAN & PROFILE - STA: 33+00 TO 45+00	9 OF 25
P4	PLAN & PROFILE - STA: 45+00 TO 57+00	10 OF 25
P5	PLAN & PROFILE - STA: 57+00 TO 69+00	11 OF 25
P6	PLAN & PROFILE - STA: 69+00 TO 81+00	12 OF 25
P7	PLAN & PROFILE - STA: 81+00 TO 93+00	13 OF 25
P8	PLAN & PROFILE - STA: 93+00 TO 105+00	14 OF 25
P9	PLAN & PROFILE - STA: 105+00 TO 117+00	15 OF 25
P10	PLAN & PROFILE - STA: 117+00 TO 129+00	16 OF 25
P11	PLAN & PROFILE - STA: 129+00 TO 141+00	17 OF 25
P12	PLAN & PROFILE - STA: 141+00 TO 153+00	18 OF 25
P13	PLAN & PROFILE - STA: 153+00 TO 165+00	19 OF 25
P14	PLAN & PROFILE - STA: 165+00 TO 175+00	20 OF 25
P15	PLAN & PROFILE - STA: 175+00 TO 187+00	21 OF 25
P16	PLAN & PROFILE - STA: 187+00 TO 191+88.2	22 OF 25
D1	LIFT STATION DETAILS	23 OF 25
D2	SEWER DETAILS	24 OF 25
D3	SEWER DETAILS	25 OF 25

[illegible]

SAINT JAMES VILLAGE, INC.
PLEASANT VALLEY INTERCEPTOR REACH 4
WASHOE COUNTY, NEVADA

SHEET INDEX MAP



DRAWN BY: TCB
DESIGNED BY: TCB
CHECKED BY: SHB
ISSUED DATE: 7/27/2022
JOB NO. 21084.00

SHEET NUMBER

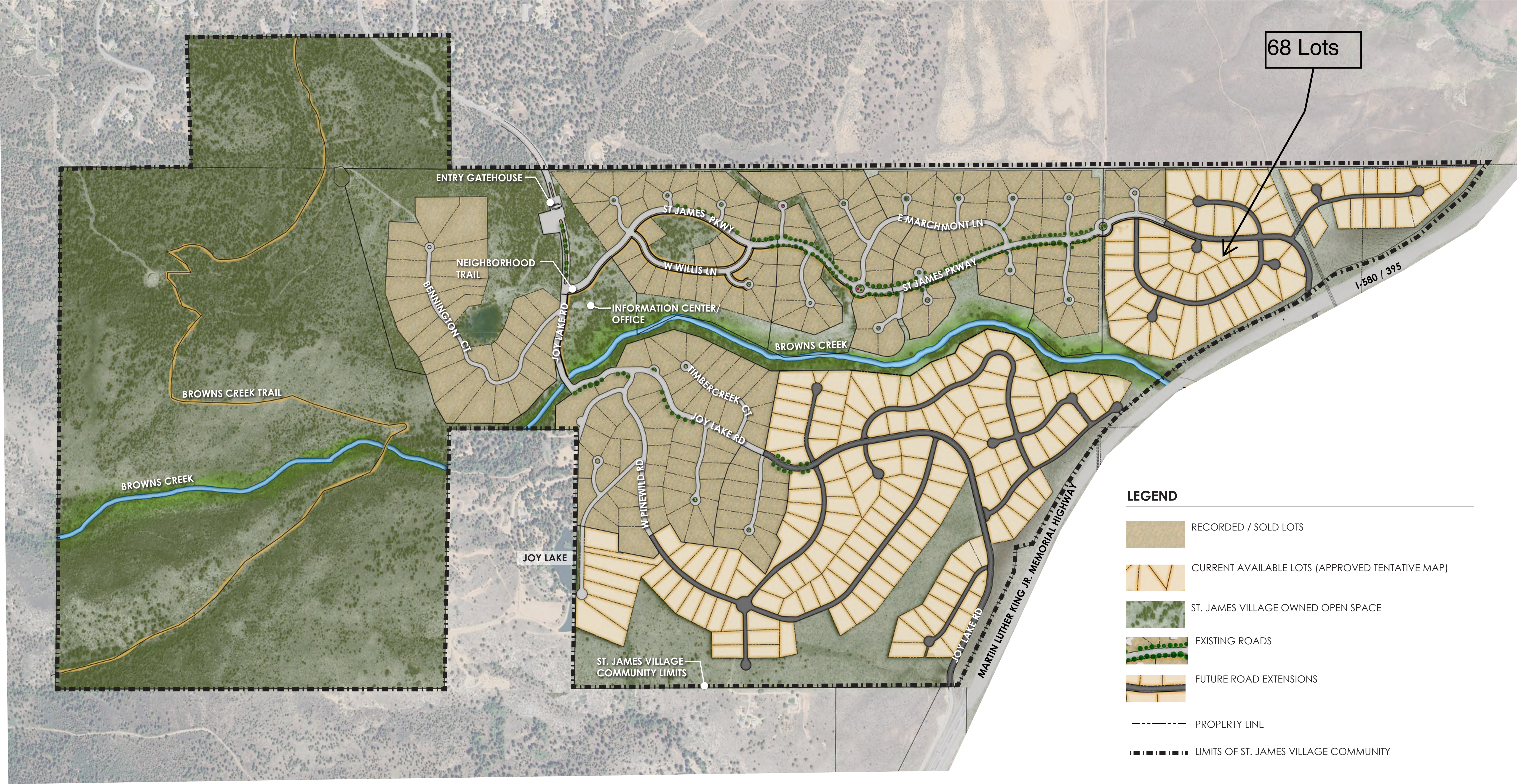
C2

3 OF 25



Know what's **below**.
Call before you dig.

St. Jame's Village Site Plan At Project Completion



Washoe County Development Application

St. James's Village Inc.

Community Services Department

Planning and Building

AMENDMENT OF CONDITIONS APPLICATION



Community Services Department
Planning and Building
1001 E. Ninth St., Bldg. A
Reno, NV 89512-2845

Telephone: 775.328.6100

Application to Amend Conditions
Development Agreement
to Extend the Tentative Map

Amendment of Conditions Development Application Submittal Requirements

Applications are accepted on the 8th of each month. If the 8th falls on a non-business day, applications will be accepted on the next business day.

If you are submitting your application online, you may do so at [OneNV.us](https://www.onenv.us)

- XX 1. **Fees:** See Master Fee Schedule. **Most payments can be made directly through the OneNV.us portal.** If you would like to pay by check, please make the check payable to Washoe County and bring your application and payment to the Community Services Department (CSD).
- XX 2. **Development Application:** A completed Washoe County Development Application form.
- XX 3. **Owner Affidavit:** The Owner Affidavit must be signed and notarized by all owners of the property subject to the application request.
- XX 4. **Proof of Property Tax Payment:** The applicant must provide a written statement from the Washoe County Treasurer's Office indicating all property taxes for the current quarter of the fiscal year on the land have been paid.
- XX 5. **Application Materials:** The completed Amendment of Conditions Application materials.
- XX 6. **Site Plan Specifications:**
 - a. Lot size with dimensions drawn using standard engineering scales (e.g. scale 1" = 100', 1" = 200', or 1" = 500') showing all streets and ingress/egress to the property.
 - b. Show the location and configuration of all proposed buildings (with distances from the property lines and from each other), all existing buildings that will remain (with distances from the property lines and from each other), all existing buildings that will be removed, and site improvements on a base map with existing and proposed topography expressed in intervals of no more than five (5) feet.
 - c. Show the location and configuration of wells, septic systems and leach fields, overhead utilities, water and sewer lines, and all easements.
 - d. Show locations of parking, landscaping, signage and lighting.
- N/A 7. **Application Map Specifications:** Map to be drawn using standard engineering scales (e.g. scale 1" = 100', 1" = 200', or 1" = 500') clearly depicting the area subject to the request, in relationship to the exterior property lines. All dimensions and area values shall be clearly labeled and appropriate symbols and/or line types shall be included in the map legend to depict the map intent.
- N/A 8. **Building Elevations:** All buildings and structures, including fences, walls, poles, and monument signs proposed for construction within the project shall be clearly depicted in vertical architectural drawings provided in accurate architectural scale. Architectural elevations of all building faces shall be presented.
- XX 9. **Submission Packets:** One (1) packet and a flash drive. Any digital documents need to have a resolution of 300 dpi. If materials are unreadable, you will be asked to provide a higher quality copy. The packet shall include one (1) 8.5" x 11" reduction of any applicable site plan, development plan, and/or application map. Labeling on these reproductions should be no smaller than 8 point on the 8.5" x 11" display. Large format sheets should be included in a slide pocket(s). Any specialized reports identified above shall be included as attachments or appendices and be annotated as such.

Notes:

- (i) Application and map submittals must comply with all specific criteria as established in the Washoe County Development Code and/or the Nevada Revised Statutes.

- (ii) Appropriate map engineering and building architectural scales are subject to the approval of the Planning and Building and/or Engineering and Capital Projects.
- (iii) All oversized maps and plans must be folded to a 9" x 12" size.
- (iv) Based on the specific nature of the development request, Washoe County reserves the right to specify additional submittal packets, additional information and/or specialized studies that clarify the potential impacts and potential conditions of development in order to minimize or mitigate impacts resulting from the project. No application shall be processed until the information necessary to review and evaluate the proposed project is deemed complete by the Director of Planning and Building.
- (v) **Labels:** If the assigned planner determines the abandonment will affect the access to a mobile home park, the applicant will be required to submit a list of mailing addresses for every tenant residing in the mobile home park.

Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Building staff at 775.328.6100.

Project Information		Staff Assigned Case No.: _____	
Project Name: St. James's Village			
Project Description: A request for approval of a development agreement to extend the time frame to record the next final map in a series of final maps by two additional years for an approved 530 unit single family residential subdivision.			
Project Address: 4100 Joy Lake Road (Sales Office)			
Project Area (acres or square feet): 1,161 AC. Excluding Recorded SFR Lots (Originally 1,626 Ac.)			
Project Location (with point of reference to major cross streets AND area locator): St. James Village is located on the south end of Joy Lake Road and includes Saint James Parkway. The project is generally located northwest of the I-580 Freeway.			
Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
Multiple - See attached.			
Indicate any previous Washoe County approvals associated with this application: WAC23-0013 Case No.(s). TM5-2-92, DA12-001, Extension of Time Request for Tent. Sub. Map Case # TM5-2-92			
Applicant Information (attach additional sheets if necessary)			
Property Owner:		Professional Consultant:	
Name: ST JAMES'S VILLAGE INC		Name: Krater Consulting Group, PC	
Address: 4100 JOY LAKE RD		Address: 1165 Mount Rose Street	
Reno, NV	Zip: 89511	Reno, NV 89509	Zip:
Phone: (775) 849-9070	Fax:	Phone: (775) 815-9561	Fax:
Email: fred.woodside@att.net		Email: ken@kcgnev.com	
Cell: (775) 722-1499	Other:	Cell: (775) 815-9561	Other:
Contact Person: Fred Woodside		Contact Person: Ken Krater	
Applicant/Developer:		Other Persons to be Contacted:	
Name: ST JAMES'S VILLAGE INC		Name:	
Address: 4100 JOY LAKE RD		Address:	
Reno, NV	Zip: 89511	Zip:	
Phone: (775) 849-9070	Fax:	Phone:	Fax:
Email: fred.woodside@att.net		Email:	
Cell: (775) 722-1499	Other:	Cell:	Other:
Contact Person: Fred Woodside		Contact Person:	
For Office Use Only			
Date Received: _____		Initial: _____	
County Commission District:		Planning Area:	
CAB(s):		Master Plan Designation(s):	
		Regulatory Zoning(s):	

Amendment of Conditions Application Supplemental Information

(All required Information may be separately attached)

Required Information

1. The following information is required for an Amendment of Conditions:
 - a. Provide a written explanation of the proposed amendment, why you are asking for the amendment, and how the amendment will modify the approval.
 - b. Identify the specific Condition or Conditions that you are requesting to amend.
 - c. Provide the requested amendment language to each Condition or Conditions, and provide both the **existing** and **proposed condition(s)**.

We respectfully request that Washoe County take action to approve the attached Development Agreement to grant an extension of time on the approved Tentative Map for St. James's Village, Tentative Map Case Number TM 05-2-92. St. James's Village originally consisted of approximately 1,626 acres, is located south of Galena Forest, and was originally approved for 530 residential lots. With construction of the I-580 freeway, 450 lots are now contemplated with 223 lots associated with remaining final maps on 1,161 Acres.

2. Describe any potential impacts to public health, safety, or welfare that could result from granting the amendment. Describe how the amendment affects the required findings as approved.

None, approval of the development agreement will have no impact on the project or the requirement to comply with county code and all conditions of approval.

This condition amendment will not affect any conditions of approval or the legal description for the current conditions of approval last approved via a Development Agreement and recorded on February 8, 2024 as Document No. #5434601.

Please see all of the supporting information included in this application.

Assessor Parcel Maps

This map/plat is being furnished as an aid in locating the herein described Land in relation to adjoining streets, natural boundaries and other land, and is not a survey of the land depicted. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the Company does not insure dimensions, distances, location of easements, acreage or other matters shown thereon.

Assessor's Map Number

046-13

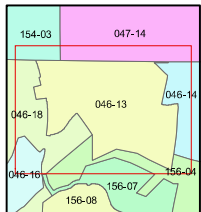
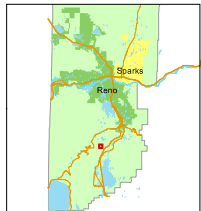
STATE OF NEVADA
WASHOE COUNTY
ASSESSOR'S OFFICE
Michael E. Clark, Assessor

1001 East Ninth Street
Building D
Reno, Nevada 89512
(775) 328-2231



Feet
0 40 80 120 160 200

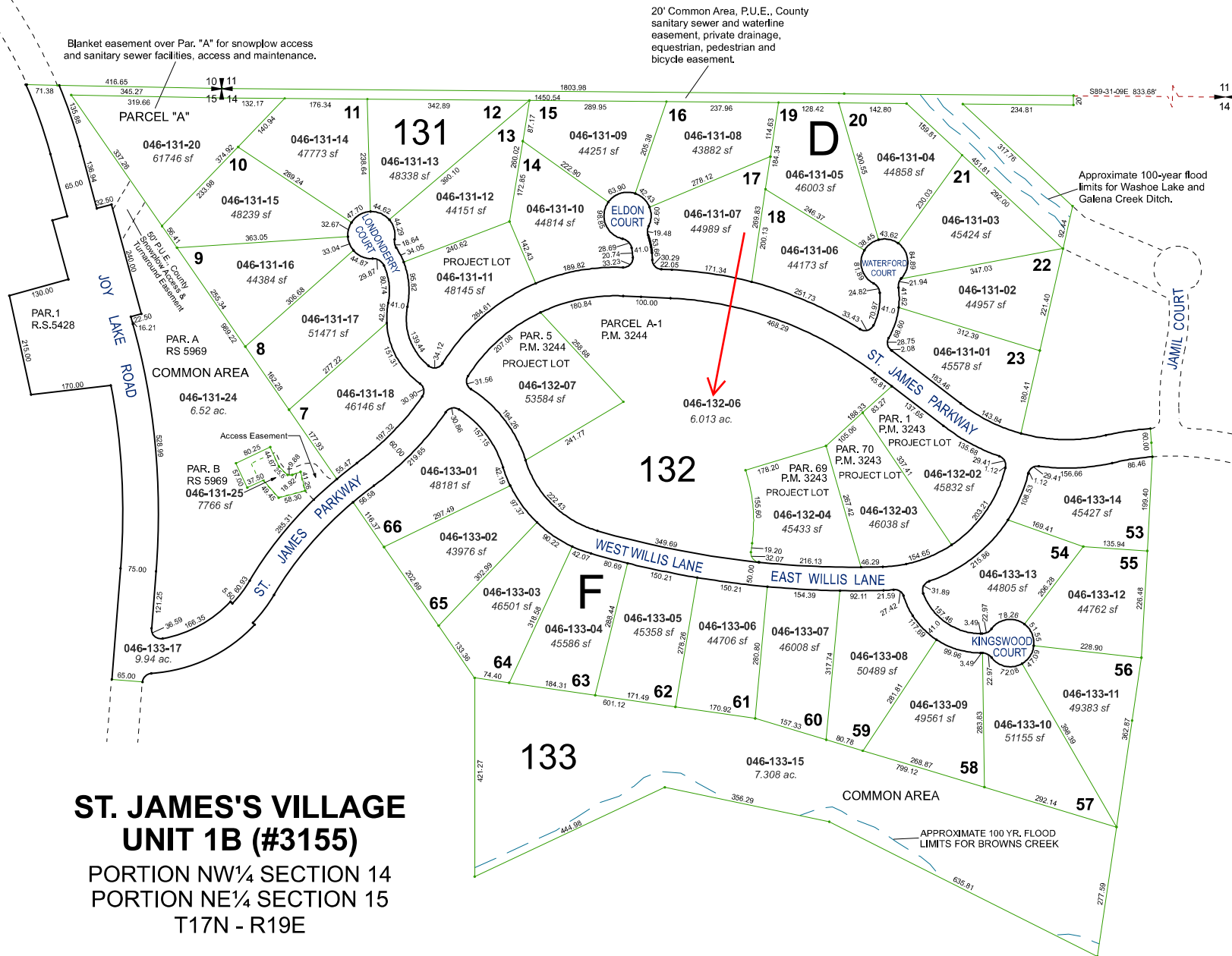
1 inch = 200 feet



created by: TWT 11/20/2009
last updated: CFB 6/6/12 JKF 6/26/18

area previously shown on map(s)
046-06

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated hereon.



Assessor's Map Number

046-18

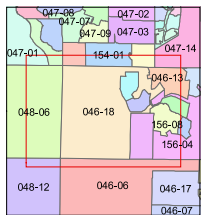
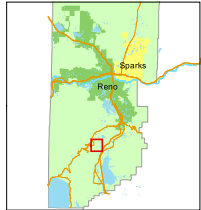
STATE OF NEVADA
WASHOE COUNTY
ASSESSOR'S OFFICE

1001 East Ninth Street, Building D
Reno, Nevada 89512
(775) 328-2231



Feet
0 150 300 450 600

1 inch = 600 feet



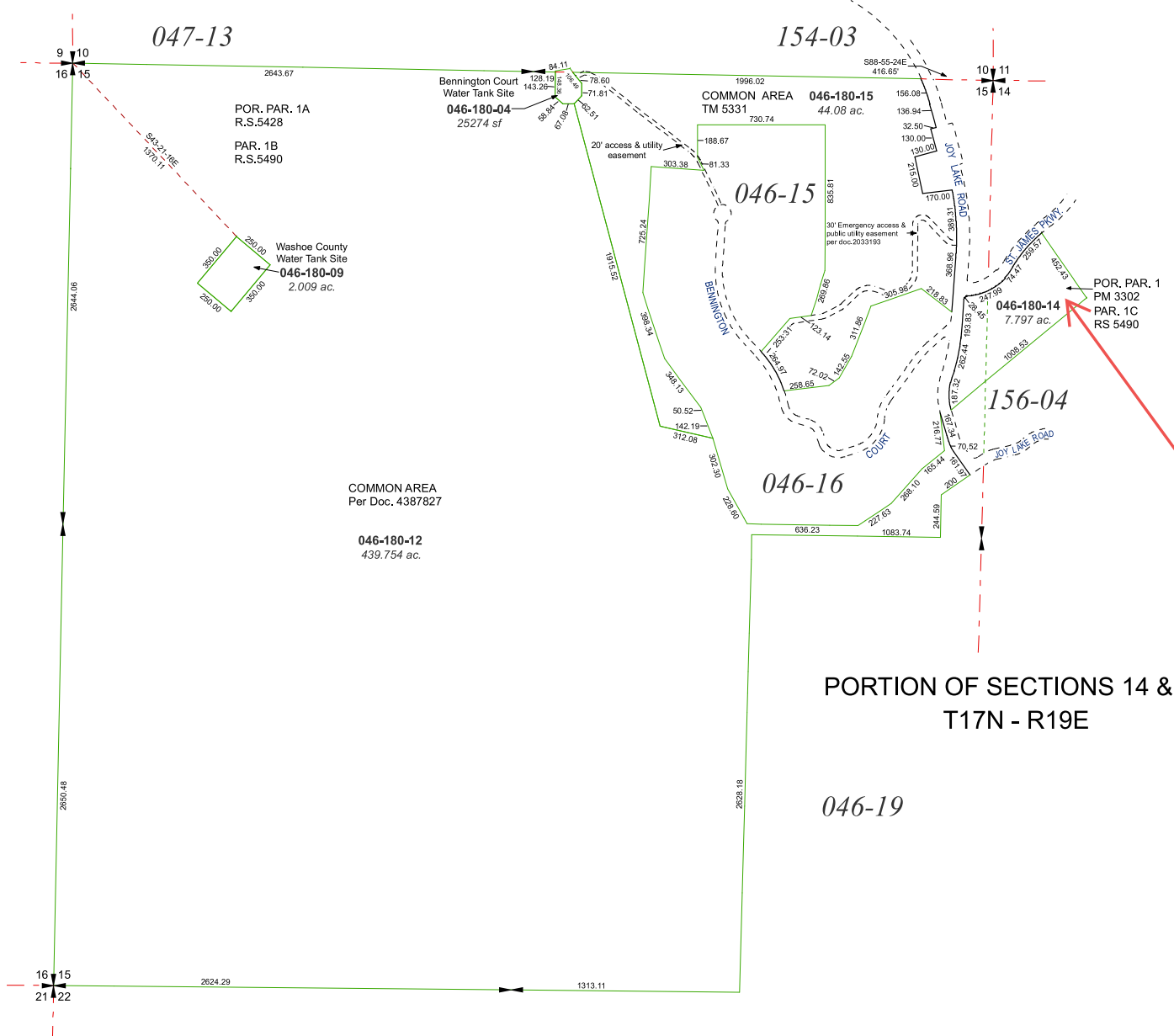
created by: CFB 03/21/2012

updated: CFB 06/06/12 KSB 06/12/13

SR 07/02/19

area previously shown on map(s):

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated herein.



This map/plat is being furnished as an aid in locating the herein described Land in relation to adjoining streets, natural boundaries and other land, and is not a survey of the land depicted. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the Company does not insure dimensions, distances, location of easements, acreage or other matters shown thereon.

Assessor's Map Number

156-04

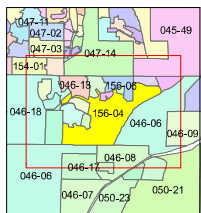
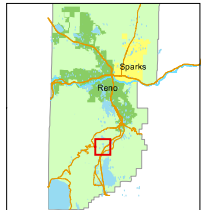
STATE OF NEVADA
WASHOE COUNTY
ASSESSOR'S OFFICE

1001 East Ninth Street, Building D
Reno, Nevada 89512
(775) 328-2231



Feet
0 200 400 600 800

1 inch = 800 feet



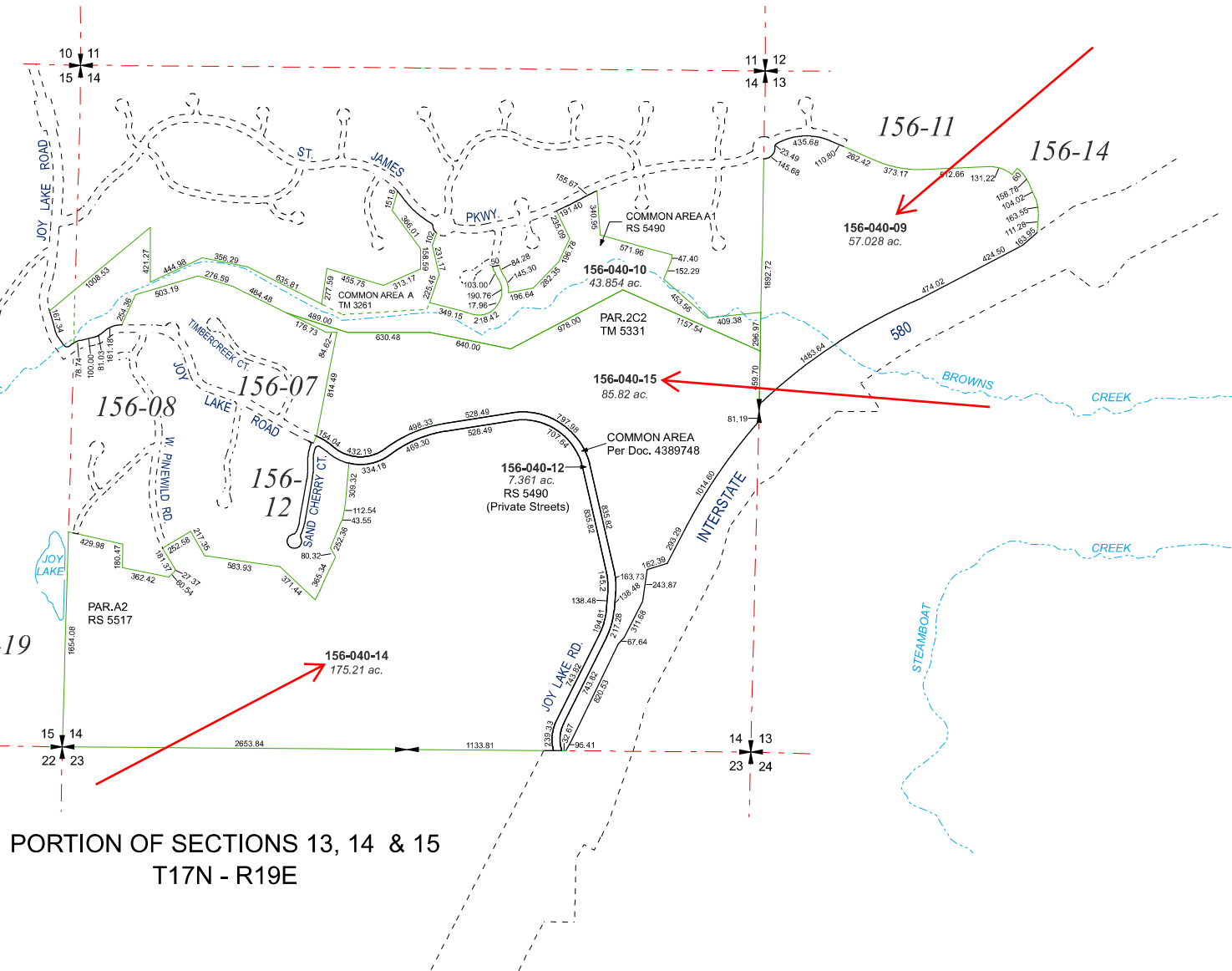
created by: NLH 04/01/2009

updated: CFB 09/26/13 SR 06/28/19

area previously shown on map(s):

046-06

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated hereon.



PORTION OF SECTIONS 13, 14 & 15
T17N - R19E

This map/plat is being furnished as an aid in locating the herein described Land in relation to adjoining streets, natural boundaries and other land, and is not a survey of the land depicted. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the Company does not insure dimensions, distances, location of easements, acreage or other matters shown thereon.

Assessor's Map Number

156-14

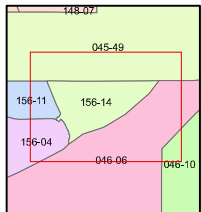
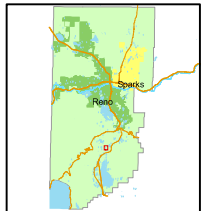
STATE OF NEVADA
WASHOE COUNTY
ASSESSOR'S OFFICE
Joshua G. Wilson, Assessor

1001 East Ninth Street
Building D
Reno, Nevada 89512
(775) 328-2231



Feet
0 25 50 100 150 200

1 inch = 200 feet



created by: NLH 10/17/2008

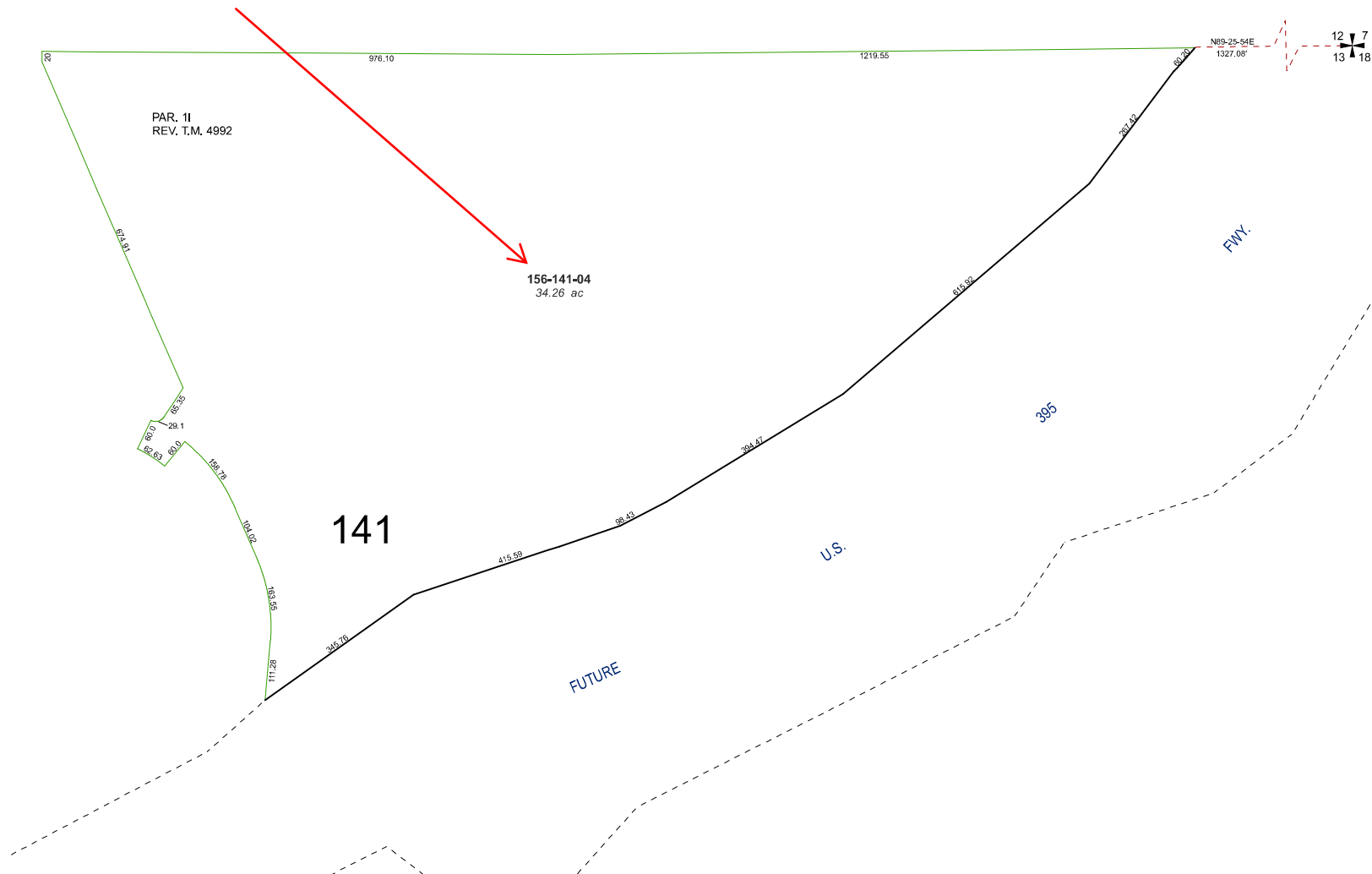
last updated: NLH 4/01/09 NLH 7/05/11

area previously shown on map(s)

156-04

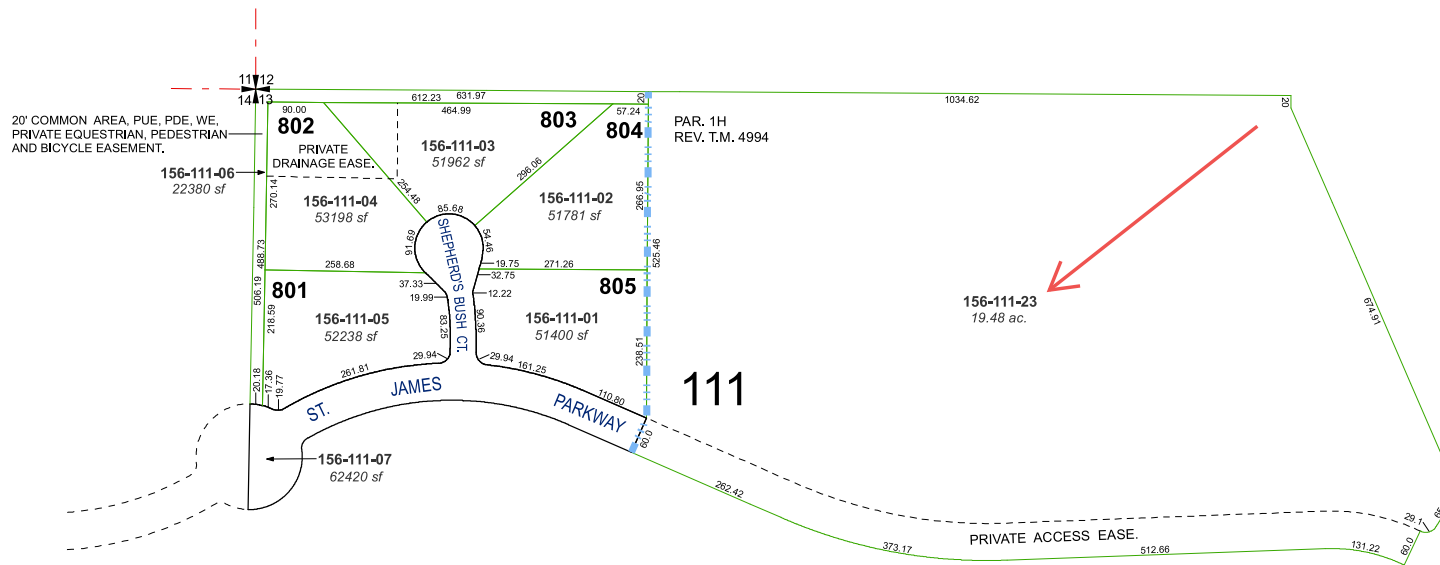
NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated hereon.

A POR. OF THE N ½ OF SEC. 13
T17N - R19E



(#4396)
ST. JAMES'S VILLAGE - UNIT 1G

A POR. OF THE NW ¼ OF SEC. 13
T17N - R19E



Assessor's Map Number

156-11

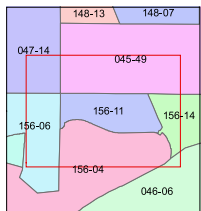
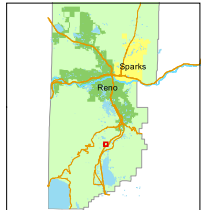
STATE OF NEVADA
WASHOE COUNTY
ASSESSOR'S OFFICE

1001 East Ninth Street, Building D
Reno, Nevada 89512
(775) 328-2231



Feet
0 50 100 150 200

1 inch = 200 feet



created by: NLH 04/01/2009

updated: NLH 07/05/11 SR 01/14/21

area previously shown on map(s):

046-06 & 156-04

This map/plat is being furnished as an aid in locating the herein described Land in relation to adjoining streets, natural boundaries and other land, and is not a survey of the land depicted. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the Company does not insure dimensions, distances, location of easements, acreage or other matters shown thereon.

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated hereon.