Agenda
Rio Linda / Elverta Community Water District
Planning Committee

Sacramento Metro Fire Dept.
6609 Rio Linda Blvd.
Rio Linda, CA 95673

Friday, July 6, 2018
2:00 pm

Public documents relating to any open session items listed on this agenda that are distributed to the Committee members less than 72 hours before the meeting are available for public inspection on the counter of the District Office.

The public may address the Committee concerning any item of interest. Persons who wish to comment on either agenda or non-agenda items should fill out the Comment Card and give it to the General Manager. The Committee Chair will call for comments at the appropriate time. Comments will be subject to reasonable time limits (3 minutes).

In compliance with the Americans with Disabilities Act, if you have a disability, and you need a disability-related modification or accommodation to participate in this meeting, please contact the District office at (916) 991-1000. Requests must be made as early as possible and at least one full business day before the start of the meeting.

Call to Order

Public Comment

This is an opportunity for the public to comment on non-agenda items with the subject matter jurisdiction of the Committee. Comments are limited to 2 minutes.

Items for Discussion and Action

1.) Discuss the transition for District Engineer.

2.) Discuss the Hexavalent Chromium treatment alternatives feasible for the Well #10 project.

3.) Update of the status of discussions with Elverta Specific Plan Owners Group regarding Water Services Agreement and Property Donation Agreement.

4.) Strategic Planning Workshop Reminder for Saturday, July 14, 2018 at 11:00 am.

Items Requested for Next Month's Committee Agenda

Adjournment

****

Next Scheduled Planning Committee Meeting: Friday, August 3, 2018

****

Planning Committee
Agenda Item: 1

Date: July 6, 2018

Subject: Transition of Contract District Engineer

Staff Contact: Timothy R. Shaw, General Manager

Recommended Committee Action:

Confirm the engagement of Coleman Engineering as Interim District Engineer and forward an item onto the July 16th Board agenda to discuss the timing and process for long-term engagement.

Current Background and Justification:

Affinity Engineering submitted formal notice of contract termination on June 20th. Subsequent correspondence with Affinity confirmed the consultant's obligation to submit all outstanding work products and files which are District property. Examples of critical-path District property and work products include; Well #16 and Well #10 designs, as well as other civil engineering files typically created using a version of AutoCAD software.

To evaluate the completeness of the submittal, and to support the Districts engineering critical-path needs, the General Manager and Coleman Engineering executed a succinct engagement letter on June 25th. Coleman has already been provided the written report from Affinity for Cr+6 treatment methods evaluation, submitted by Affinity on June 26th. Coleman has also been informed of the more extensive files submittal from Affinity on June 27th (hand delivery of flash drives).

District policy prescribes an RFQ process for professional services contracts exceeding $25,000 per year. However, section 5 (Special Circumstances) of the same policy provides some limited exceptions to the RFQ process when it is "appropriate and in the best interest of the District". The current engagement with Coleman Engineering as Interim District Engineer is not to exceed $10,000.

Staff recommendation:
I recommend the Planning committee confirm the engagement of Coleman Engineering as Interim District Engineer. I further recommend the Planning Committee forward an item onto the July 16th agenda to consider directing staff to commence an RFQ process and prescribe the timing objectives for such process.

AFFINITY
ENGINEERING

June 20, 2018

Mr. Tim Shaw
General Manager
Rio Linda/Elverta Community Water District
730 L Street
Rio Linda, CA 95673

SUBJECT: Affinity Engineering Agreement Termination Notice

Dear Mr. Shaw:

This letter is notice to Rio Linda/Elverta Community Water District (District) that Affinity Engineering Inc. (Affinity) is terminating its Agreement for Consulting Services (Agreement) executed April 18, 2018 effective June 29, 2018. As part of this Agreement, there are currently two authorized task orders that have not been completed.

Task Order 2018-001 – Hexavalent Chromium 6 Treatment Evaluation

> The hexavalent chromium treatment evaluation will be completed with the submittal of a Technical Memorandum (TM). Affinity will submit this TM as previously discussed by the end of the month.

Task Order 2018-003 – Northborough Municipal Service Review (MSR) Update

> A letter was submitted to California American Water Company concerning the District's expansion to serve the Northborough Development. No additional services have been provided since this letter was sent.

Invoices for all services provided in June will be submitted to the District by the first week in July.

Respectfully,

James D. Carson, P.E.
Affinity Engineering Inc.

COLEMAN
ENGINEERING

June 25, 2018

Tim Shaw
General Manager
Rio Linda Elverta Community Water District
730 L Street
Rio Linda, CA 95673

(Sent via e-mail to: GM@rlecwd.com)

Re: **TASK AUTHORIZATION FOR INTERIM DISTRICT ENGINEERING SERVICES**

Dear Mr. Shaw:

As we discussed last Friday, the Rio Linda Elverta Community Water District needs immediate Interim District Engineering Services due to the resignation of the former District Engineer. Coleman Engineering is pleased to offer immediate District Engineering services as requested by the District.

We anticipate that a formal written Agreement will be authorized and executed by the Board at the regularly scheduled meeting on July 16. To allow Coleman Engineering to begin providing services immediately, we agree together that there are three initial tasks we should plan to execute early in our engagement:

- Task 1: General Engineering Support – as defined in the Scope and Agreement with the former District Engineer.
- Task 2: Evaluate the services of the former District Engineer related to the feasibility of other media regeneration for the Chrome 6 treatment plant that was designed by them.
- Task 3: Review, catalog, and evaluate deliverables and other instruments of professional services that is submitted to you by the former District Engineer as a result of their resignation.

Coleman Engineering will provide services as directed by the General Manager on a Time and Materials basis, not to exceed a total of $10,000.

We will mutually determine the Scope and Schedule of each task assigned at the time that the assignment is given. Following execution of the written Agreement for Consulting Services, this letter authorization will be superseded.

We look forward to providing excellent services to the District.

Sincerely,

Chad R. Coleman

Chad R. Coleman, P.E.
President & Principal Engineer

Cc: Simon Gray – Vice President & Project Manager

Agreed:

Tim Shaw 6-25-18

Tim Shaw
General Manager, Rio Linda Elverta Community Services District

AFFINITY
ENGINEERING

June 27, 2018

Tim Shaw
Rio Linda/Elverta Community Water District
730 L Street
Rio Linda, CA 95673

Subject: RLECWD Electronic Backups

Dear Tim Shaw,

The enclosed two (2) flash drives contain the electronic backups of the work products delivered to Rio Linda/Elverta Community Water District from Affinity Engineering.

If you have any questions, please feel free to call me at (916) 613-7582.

Sincerely,

Jim Carson, P.E.
President
Affinity Engineering Inc.

Planning Committee

Agenda Item: 2

Date: July 6, 2018

Subject: Discuss the Hexavalent Chromium treatment alternatives feasible for the Well #10 project.

Staff Contact: Timothy R. Shaw, General Manager

Recommended Committee Action:

Review the written report from Affinity Engineering, which was submitted pursuant to Task Order #1 of the Affinity Contract. Discuss the need and means of evaluating the conclusions and recommendations from Affinity, as well as the impacts of such for hexavalent chromium mitigation projects.

Current Background and Justification:

Affinity designed, and the District contracted for, construction of hexavalent chromium (Cr^{+6}) treatment facilities at Well #10. Subsequent to award of construction contract, the District was notified that the subcontractor for mobile regeneration of ion exchange media discontinued its division for such services. Task Order #1, reflective of the highest priority and most critical path for the Affinity contract, was to evaluate alternatives to mobile regeneration of ion exchange media.

The written report from Affinity is included with the Committee documents package, and the report has been provided to Interim District Engineer, Coleman. In my opinion, the most feasible option included in the report is non-regeneration of ion exchange media, wherein the District will use the media for about 5-years, then buy new media and dispose of the exhausted media (potentially as non-hazardous waste).

If after thoroughly reviewing the Affinity report, the Interim District Engineer agrees with my preliminary conclusions, the next, best step should be discussed, including the feasibility of modifying the current Well #10 project design and re-bidding the project.

Staff recommendation:
I recommend the Committee ask the Interim District Engineer (who will be attending this Committee meeting) for their preliminary findings from review of the Affinity report. Such preliminary analysis should be considered for moving forward. If the Committee finds it appropriate, forward an item onto the July 16th agenda to authorize and/or direct next steps toward revising the Well #10 project design to reflect the change to ion exchange exhausted media disposition.

- This change in design, though relatively minor, and arguably an improvement under environmental impact context, may require additional CEQA analysis and filings.
- The means and documents for engaging a civil engineer to modify the Well #10 project design should be discussed with Legal Counsel. Design modification are outside the scope of the Interim District Engineer engagement letter. Even relatively simple design modifications have potential impacts on Public Works contracting documents et al.
- One preliminary action, which would be reasonable in consideration of all the circumstances, would be to request a proposal from the Interim District Engineer for formal design modification. Such a proposal, could ultimately be considered by the Board under the standardized District small-scope Professional Services Agreement form.

TECHNICAL MEMORANDUM

To:	Tim Shaw, General Manager, RLECWD
From:	Jim Carson, RLECWD District Engineer, Affinity Engineering
CC:	Christine Rice, Affinity Engineering
Subject:	Well 10 Hexavalent Chromium Treatment System Alternatives Evaluation
Date:	June 26, 2018

1. INTRODUCTION

This Technical Memorandum (TM) provides an analysis and evaluation for hexavalent chromium (Cr6) treatment system alternatives for the Rio Linda/Elverta Community Water District's (District) Well 10 site. This TM includes a background, description of alternatives and technologies, evaluation of alternatives, and recommendations.

1.1. Background

The original design for the Well 10 Hexavalent Chromium Treatment Project was a strong base anion exchange (SBA) treatment system that utilized Ionex SG's (Ionex) portable "Roll-Up™ Regen" system for regenerating media after it is has been exhausted. Since the withdrawal of the maximum contaminant level (MCL) of Cr6 by the California State Water Resources Control Board Division of Drinking Water (DDW), Ionex no longer provides this service. The District plans to redesign the project based on the analysis of available treatment alternatives described in this TM.

2. DESCRIPTION OF ALTERNATIVES AND TECHNOLOGIES

The Cr6 treatment alternatives being considered include:

- SBA with onsite media regeneration
- SBA with offsite media regeneration
- SBA with media replacement
- Weak base anion exchange

The basic treatment process for Well 10 is shown in Figure 2.1. The influent water quality is 13 ppb Cr6. A portion of the influent flow will be treated and blended with untreated water that bypasses the treatment system for a total effluent water quality of less than 8 ppb Cr6. This blending treatment process has been previously approved by DDW for other water utilities in California. Chlorine will be added to the water supply for disinfection after Cr6 treatment before discharging into the distribution system. Descriptions for each treatment alternative and technology is described in the following subsections.

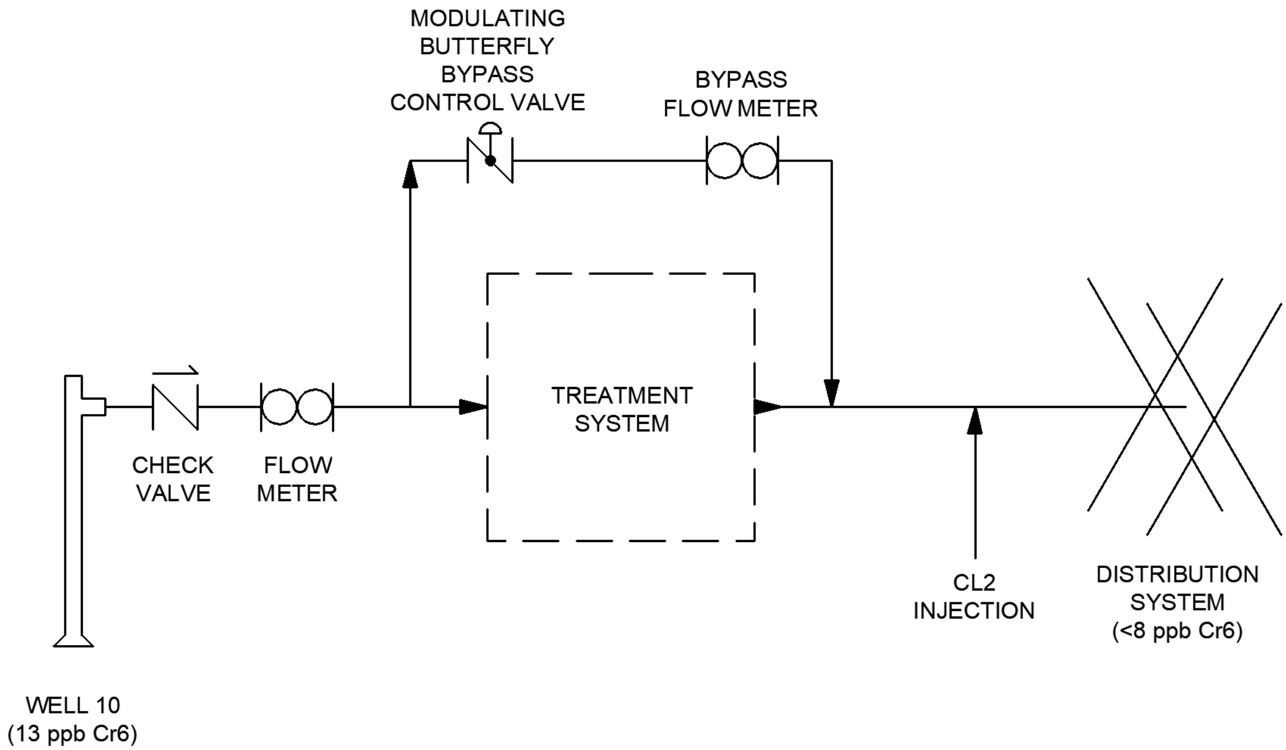


Figure 2.1 Well 10 Basic Treatment Process Schematic

2.1. Strong Base Anion Exchange

SBA treatment involves the exchange of Cr6 anions for less strongly held chloride ions on media resin beads. The water is pretreated with a bag filter to remove suspended material before it reaches the SBA treatment vessel. Treated water is discharged into the distribution system.

In 2014 and 2015, Ionex successfully performed two pilot studies at the Well 10 site, which confirmed that SBA is an effective treatment process for removing Cr6 from the Well 10 water supply.

The District is considering SBA with onsite media regeneration, offsite media regeneration, or media replacement.

2.1.1. Onsite Media Regeneration

When the media is exhausted, it will be regenerated by passing a salt-brine solution through the SBA treatment vessel and directly into a waste truck to be hauled to an approved waste facility. The Cr6 brine waste is considered a hazardous waste. Ionex has stated that they provide onsite media regeneration equipment and services. The onsite treatment process for this alternative is shown in Figure 2.2.

The onsite media regeneration alternative consists of the following components:

- Pretreatment bag filter
- Ion exchange vessel and media

- Brine tank and pump
- pH adjustment for brine solution (caustic soda)
- Hazardous waste disposal

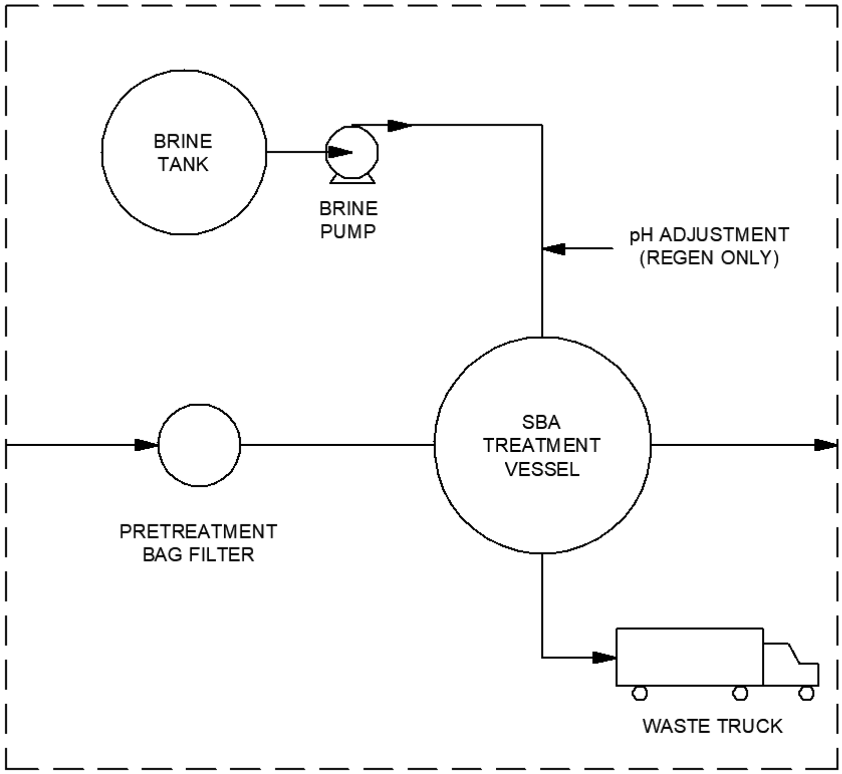


Figure 2.2 SBA with Onsite Media Regeneration Process Diagram

2.1.2. Offsite Media Regeneration

Offsite media regeneration involves the removal, delivery, and regeneration of exhausted media at an offsite facility. The removed Cr6 will be precipitated out and either reused for industrial purposes or disposed in a cake form at an approved landfill.

Affinity has identified two companies who are capable of providing these services: Sirco Industrial and Resin Tech. Other companies, such as Phibro-Tech, have expressed the possibility of offering this service in the future. The treatment process for this alternative is shown in Figure 2.3.

The offsite media regeneration alternative consists of the following components:

- Pretreatment bag filter
- Ion exchange vessel and media
- Nonhazardous waste transport
- Offsite media regeneration

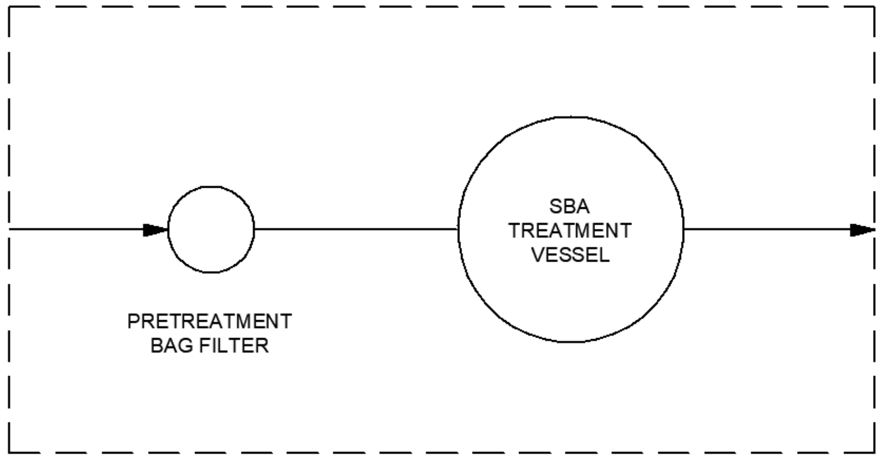


Figure 2.3 SBA with Offsite Media Regeneration or Media Replacement Process Diagram

2.1.3. Media Replacement

The media replacement alternative involves the disposal of exhausted media and replacement of new virgin media. Purolite has stated that they provide media replacement services. The onsite treatment process for this alternative is shown in Figure 2.3 and is the same as offsite media regeneration. The media replacement alternative consists of the following components:

- Pretreatment bag filter
- Ion exchange vessel and media
- Nonhazardous waste disposal/transport

2.2. Weak Base Anion Exchange

The weak base anion exchange (WBA) treatment alternative is an ion exchange process similar to SBA but does not remove as many additional constituents as SBA. This results in more water produced at lower water quality. For optimum Cr6 removal, this alternative requires pre- and post-treatment pH adjustment using carbon dioxide and aeration or caustic soda. In addition, WBA media cannot be regenerated. No treatment suppliers were identified that could provide this type of treatment system. The treatment process for this alternative is shown in Figure 2.4.

This alternative consists of the following components:

- Pretreatment bag filter
- Ion exchange vessel
- Static mixer
- Carbon dioxide (CO2) pH control system
    - CO2 storage tank including refrigeration unit, CO2 vaporizer, CO2 vapor heater, pressure regulator

  - Carbonic acid feed control panel with a human-machine interface (HMI) and programmable logic controller (PLC), control panels, skids, and valves, carbonic acid diffuser assembly
- Carrier water pump

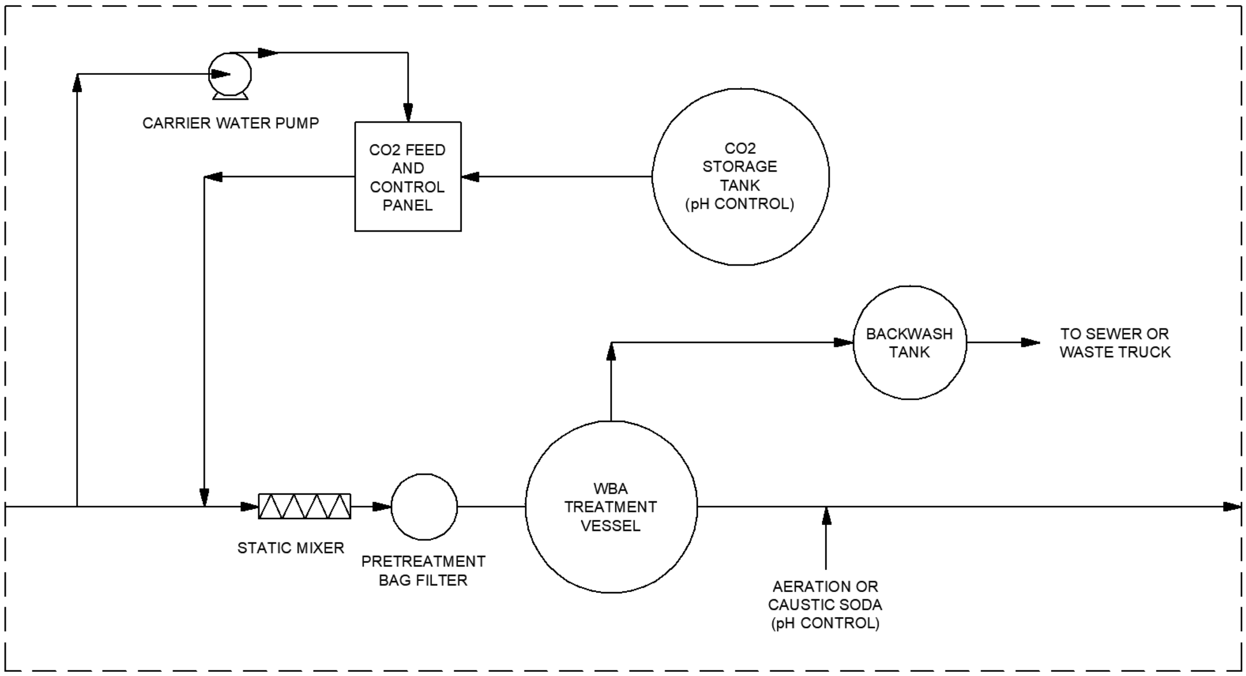


Figure 2.4 WBA Process Diagram

3. EVALUATION OF ALTERNATIVES

3.1. Strong Base Anion Exchange

Based on the SBA pilot studies performed on Well 10's water by Ionex in 2014 and 2015, the media is expected to perform for up to 160,000 bed volumes (BV) before regeneration or replacement is required. For design purposes, media life was conservatively calculated based on 50,000, 100,000, and 150,000 BV before regeneration and summarized in Table 3.1. This is based on a BV of 1,500 gallons (200 cubic feet) for an 8-ft diameter vessel and 4-ft bed depth, using treatment design criteria provided by Purolite. Based on historical usage, it is assumed that Well 10 will run approximately 4 hours per day during the summer (5 months) and 1 hour per week during the winter (7 months). The winter operation is planned to move water through the vessel during low demand times to keep the media fresh.

Table 3.1 Media Life Expectancy

No. of BV Before Regen	Media Life (years)
50,000	4
100,000	8
150,000	12

Chad Seidel (Corona Environmental Consulting), who led several studies on SBA treatment of Cr6, stated that media resin performance has improved since the pilot studies were performed in 2015. This was confirmed by Grant King, a representative from the media supplier Purolite, who provided documentation showing that the operating capacity of the new Purolite media is 25 percent higher than the media used during pilot testing (Appendix A). Both Chad Seidel and Grant King stated that even higher bed volumes may be achieved before regeneration is required. This can be confirmed once a full scale treatment system is operational.

Another media supplier, Resin Tech Inc., utilized their ion exchange resin performance projection software (Appendix B) to predict a media life of approximately 75,000 bed volumes before regeneration is required. Based on Well 10's annual demand and this projection, regeneration is estimated to be every 6 years.

As a conservative approach for the purposes of this report, and until the media life is analyzed with an operational facility, it is assumed that the media will need to be regenerated every 5 years.

3.1.1. SBA with Onsite Regeneration

Because of the estimated long media life for the Well 10 application, the extra cost and maintenance of installing onsite media regeneration equipment that will rarely be used seems unjustified. It is also likely that liquid brine solutions will grow bacteria if left unused for multiple years, which can create a safety hazard or operational hardship. Onsite media regeneration equipment, such as brine pumps and storage tanks, will also create additional operational noise and visual impacts on the well site. Additional property may be required to accommodate the brine tank to ensure well access. The onsite regeneration equipment and being a hazardous waste generator will require an update to the CEQA declaration with potential mitigation measures. It is not recommended that onsite media regeneration be used for the Well 10 Cr6 treatment project.

3.1.2. SBA with Offsite Media Regeneration

Based on the long media life, offsite media regeneration is a more practical option for the Well 10 application than onsite media regeneration and provides a lower initial capital cost. No additional onsite equipment or chemicals are required for regeneration. The services provided by offsite regeneration companies include:

- Removing exhausted media from the treatment vessel
- Testing and documentation to confirm waste is nonhazardous
- Delivering exhausted media to offsite regeneration facility
- Regenerating exhausted media
- Delivering regenerated media back to site
- Re-installing regenerated media and any new media required to fill treatment vessel

The estimated capital cost for the SBA treatment system without onsite regeneration is $350,000, which is based on the treatment system cost that was part of the original bid by JJM Engineering for the Well 10 treatment system project. The onsite equipment for this alternative is consistent with that original cost.

The estimated annual operation and maintenance (O&M) costs associated with this option are shown in Table 3.2. These costs assume a media life of 5 years. These estimated costs do not include inflation. Power costs were estimated based on overcoming an assumed 20 psi headloss across the treatment system.

Table 3.2 Annual Operation and Maintenance Costs for Offsite Media Regeneration

Cost Item	Lump Sum Cost* ($)	Annualized Cost ($)
Resin removal/hauling as non-hazardous	10,000	2,000
Resin regeneration ($100/CF)	20,000	4,000
Topping off with 10% new media ($205/CF)	4,100	1,025
Power	-	800
Total		**7,825**

**Estimated cost provided by Resin-Tech for budgetary purposes only*

It is assumed that the solid waste generated with the exhausted media for offsite media regeneration and media replacement will be non-hazardous. Justin Petruna, Director of Operations for Sirco Industrial, Inc., which is an industrial water treatment and recycling company, has stated that the media is most likely non-hazardous based on his experience with similar ion exchange treatment systems. The Toxic Characteristic Leaching Procedure (TCLP) and Waste Extraction Test (WET) test methods will be required to determine the classification of the waste. If the waste is classified as hazardous, the cost will be approximately 50 percent more to transport it.

3.1.3. SBA with Media Replacement

Similar to offsite media regeneration, media disposal and replacement is also a viable option. The estimated capital cost for this option is also $350,000 because no additional equipment or chemicals are required for regeneration.

The estimated annual O&M costs associated with this option are shown in Table 3.3. These costs assume a media life of 5 years and do not include inflation.

Table 3.3 Annual Operation and Maintenance Costs

Cost Item	Lump Sum Cost* ($)	Annualized Cost ($)
Resin Removal as non-hazardous	8,500	1,700
Non-hazardous disposal via landfill	2,300	460
Resin Replacement ($180/CF)	36,000	7,200
Power	-	800
Total		**10,160**

**Estimated cost provided by Purolite for budgetary purposes only*

Based on conversations with Grant King (Purolite), media resin loses its capacity over time and with multiple regenerations. Because of the long media life before regeneration is required, it is possible that it is more cost effective to simply replace the media rather than regenerate it. The actual life of the media for regeneration and replacement can only be determined with use and testing. Some media can last as much as 12 years before replacement is required. The media can be tested every one or two years for approximately $450 to determine the media's general state and capacity.

3.2. Weak Base Anion Exchange

The WBA treatment option is not recommended for Well 10 because of the need to use acid and base chemicals for pH adjustment. The use of chemicals creates potential environmental and operational hazards. There is greater risk of treatment system failure if any of the chemical feed systems fail. The use of pH adjustment chemicals would also require CEQA documentation updates.

In addition, this option would require a pilot study to determine design parameters and effectiveness. Chad Seidel stated that SBA systems are the current industry standard for Cr6 treatment and are more likely to provide competitive costs.

4. RECOMMENDATIONS

Based on the analysis of each alternative, SBA treatment systems with offsite media regeneration or media replacement are both practical and effective treatment systems for the Well 10 application. It is recommended that offsite media regeneration be used because it has an estimated annual cost saving of $2,335 compared to media replacement. If/when an MCL for Cr6 is reestablished, more competition by treatment suppliers can further reduce regeneration costs through competition or make it economically feasible for suppliers to provide portable regeneration units for the District to consider.

4.1. Additional Considerations

During discussions with Grant King (Purolite), it was mentioned that there is the potential of Cr6 sloughing off the media when the well has not run for a while because the water goes into equilibrium with the ion exchange media. Purolite recommends pumping two bed volumes of water to a recycling tank at each well start up after the well has been offline for a period of time. Once the well is operating, the water from the recycle tank can be reintroduced into the well's discharge prior to treatment.

Affinity followed up with Mike Waite, technical director of Ionex, to discuss Cr6 sloughing off the media resin, and he stated that this is not something they have witnessed with their systems. It is recommended that this potential issue be addressed through further evaluation during the design phase of the project.

Appendix A

Purolite Media Information

Chrome-6 Removal with Purolite PGW6002E

Limited distribution to select parties

October 8, 2016

Francis Boodoo, Director of Applied Technology
Sean Kennedy, Technical Specialist

Purolite®

Executive Summary

Over the last few years, Purolite A600E/9149 has performed exceptionally well in the growing chromium VI remediation market. As expected this has invited increased interest from competitors. In an effort to maintain our lead, Purolite has developed a second generation product, Purolite PGW6002E, that offers significantly higher operating capacity with similar regeneration efficiency as the existing product. In this interim report, Purolite A600E/9149 was used as the benchmark to compare the new Purolite resin as well to compare to a relatively new competitive product now available in the marketplace. The latter product is referred to as RESIN D. This competitive product was reported to be showing slightly more capacity than A600E/9149 in side by side column testing.

Previous determination of separation factors for A600E/9149 and the second generation resin showed both products to have high selectivity for chrome-6. Results for multiple column runs and regenerations are presented here, using feed water with typical levels of sulfate, bicarbonates and chloride, but with an elevated level of 200 ppb chrome-6 to allow for more timely completion of the study.

In this study we evaluated operating capacity, elution efficiency, and rinse characteristics for the new resin and RESIN D and compared those to results for A600E/9149 obtained previously under the same conditions.

Comparison shows that the breakthrough curves for A600E/9149 and RESIN D are very similar, almost to the point of overlapping. The shape of elution curves for the two resins were similar, with similar operating capacities and leakage.

However, we were pleased to see that the new Purolite resin performed extremely well, showing operating capacities that were in excess of 25% higher versus both the benchmark and competitive resins over a number of operating cycles.

In summary, this new resin should help Purolite to substantially extend its lead in the chrome-6 remediation market.

Experimental Procedure

Column studies were done using 25 mL of pretreated Purolite PGW6002E and RESIN D loaded into 1.5 cm diameter glass columns. Pretreatment consisted of exposure to ~100 BV of 4% HCl solution to ensure complete conversion to the chloride form prior to beginning service. A 300 liter stock solution was made up with the following water chemistry:

Table 1: Synthetic Water Chemistry

Ion	Concentration	Chemical Used	Mass Salt/300L
SO_4	2 meq/l	Na_2SO_4	42.8766 g
HCO_3	1 meq/l	$NaHCO_3$	17.5718 g
Cl	1 meq/l	NaCl	17.5609 g
CrVI	200 ppb	$Na_2Cr_2O_7.2H_2O$	0.1721 g

Columns were run at 60 BV/hour and chromium leakage was monitored to a breakpoint of 50 ppb. The two resins were regenerated using the protocol shown in Table 2:

Table 2: Co-flow Regeneration Procedure

Step	Solution	Flow Direction	Flow Rate	Volume	Sample Collection
Backwash	Raw water	Upflow	Enough to reach 50-80% expansion		None
Bed Settle	N/A	N/A	N/A	N/A	None
Brine Injection	12% NaCl	Downflow	50-100 ml/hour	125 ml	Five 25 ml Samples
Slow Rinse	DI Water	Downflow	50-100 ml/hour	50 ml	Two 25 ml Samples
Fast Rinse	DI Water	Downflow	1500 ml/hour	125 ml	One 100 ml Sample, One 25 ml Sample (End of Rinse)

For consistency, the same solutions were used to regenerate both Purolite PGW6002 and the RESIN D columns. Equal flow rates were targeted for each regeneration to ensure minimum differences in steps.

Periodic eluant samples were taken to facilitate plotting of elution curves as well as to calculate recovery rates for chrome-6.

Results

Four full service cycles were run on each resin, the results which are shown in figure 2 to 6 and summarized in Table 3.

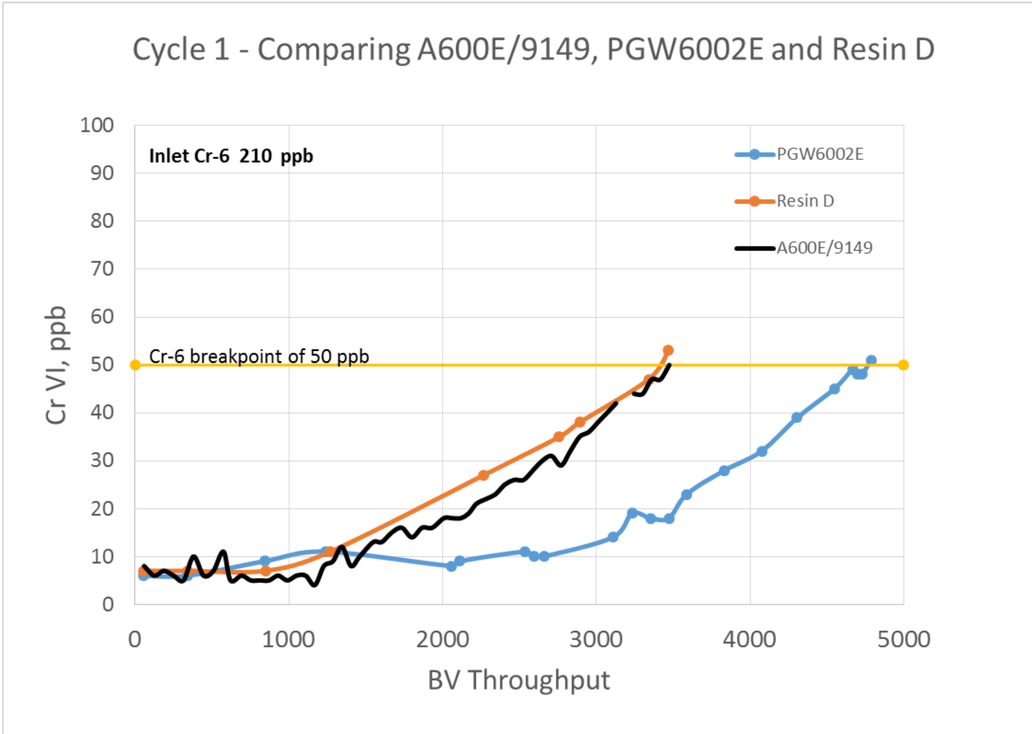


Figure 1. Service Cycle 1

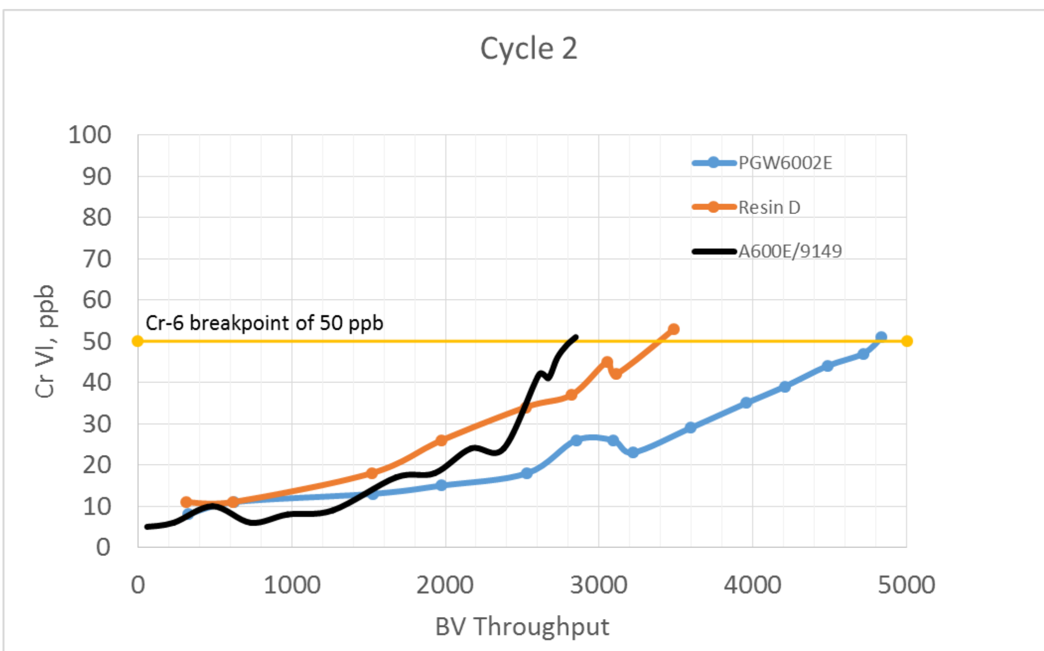


Figure 2. Service Cycle 2

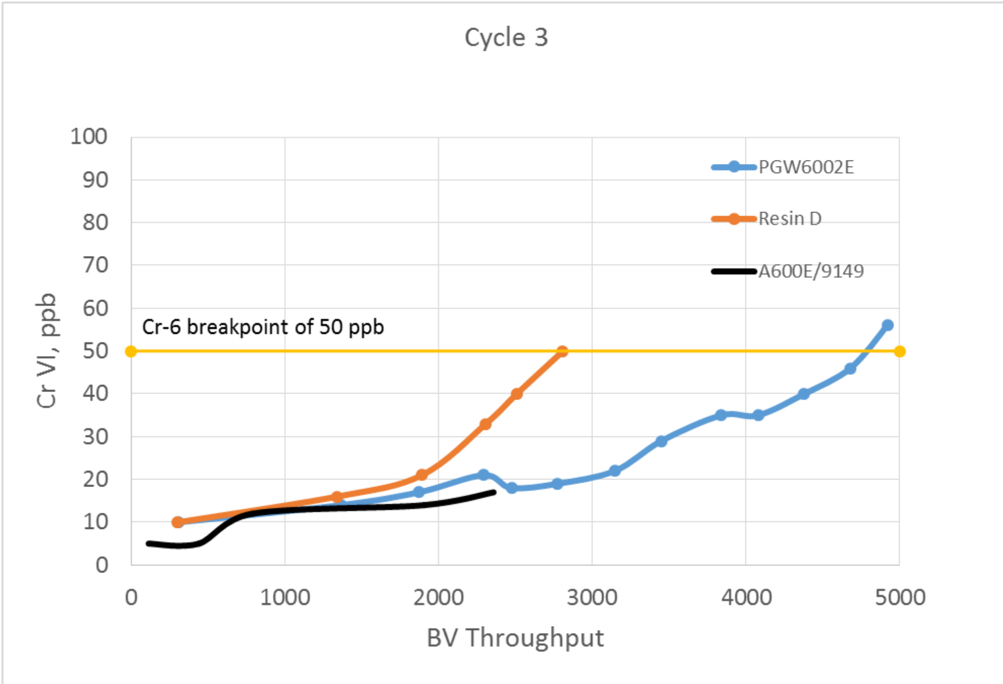


Figure 3. Service Cycle 3

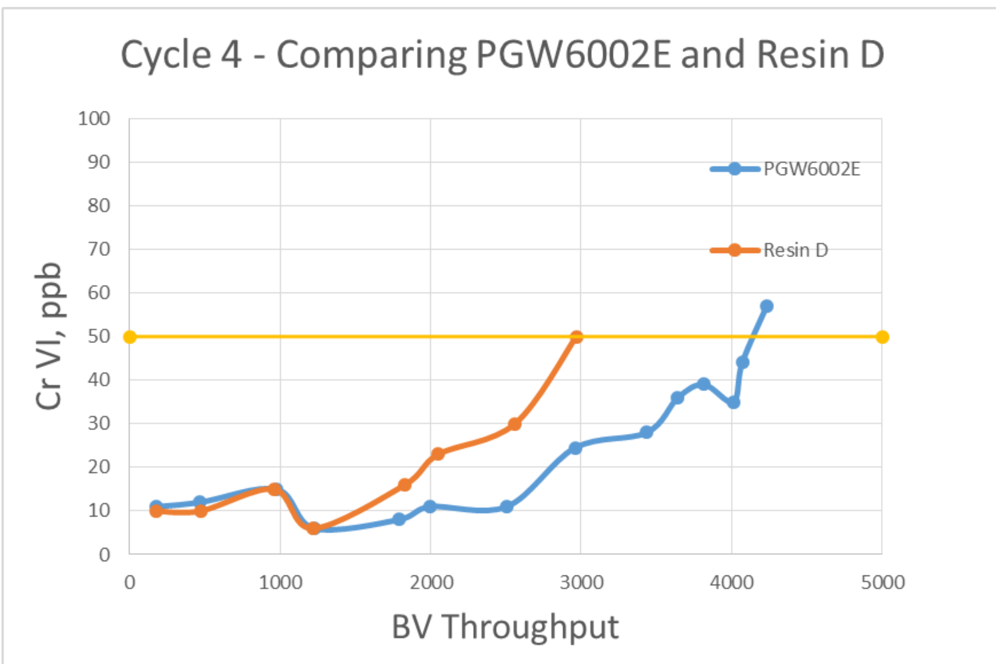


Figure 4. Service Cycle 4

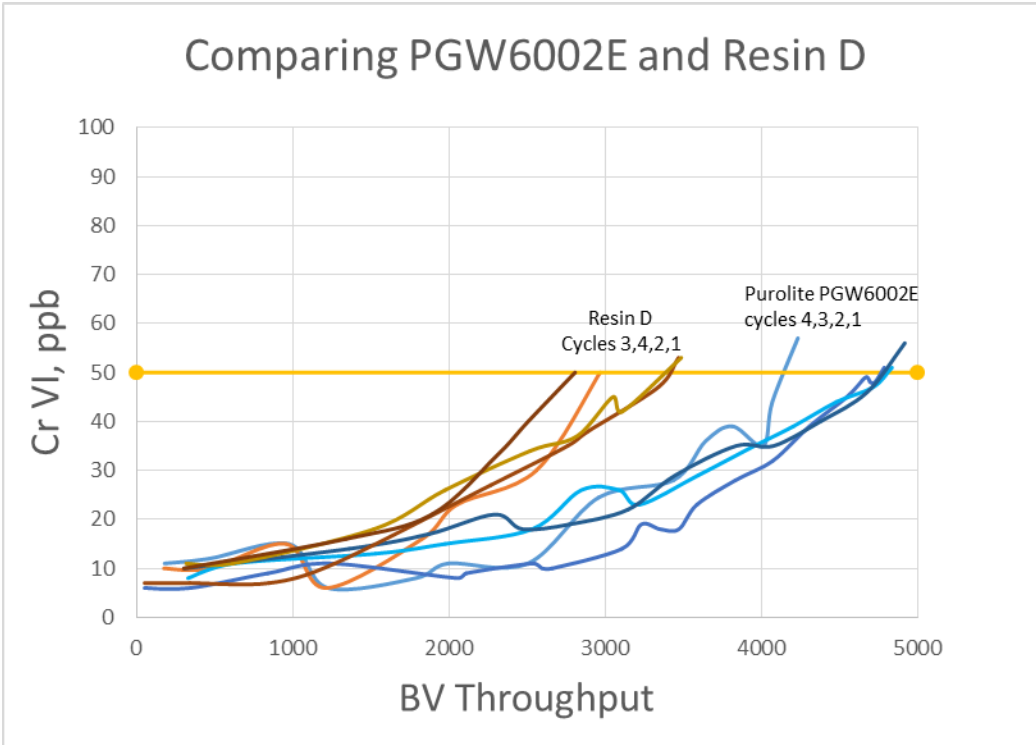


Figure 5. Comparing All 4 Cycles

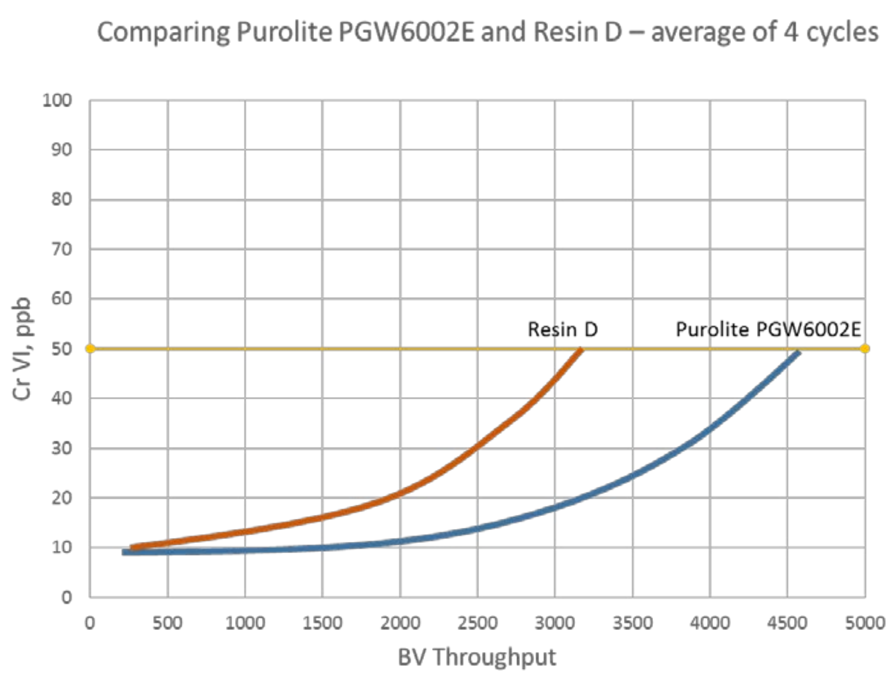


Figure 6. Average of All 4 Cycles

Table 3. Service Cycle Summary

	RESIN D		Purolite PGW6002E	
	Throughput	Average Leakage	Throughput	Average Leakage
Service Cycle 1	3470 BV	21.4 ppb	4786 BV	16.9 ppb
Service Cycle 2	3487 BV	24.4 ppb	4836 BV	21.8 ppb
Service Cycle 3	2807 BV	20.4 ppb	4744 BV	22.7 ppb
Service Cycle 4	2968 BV		4100 BV	
Average	3200 BV		4600 BV	

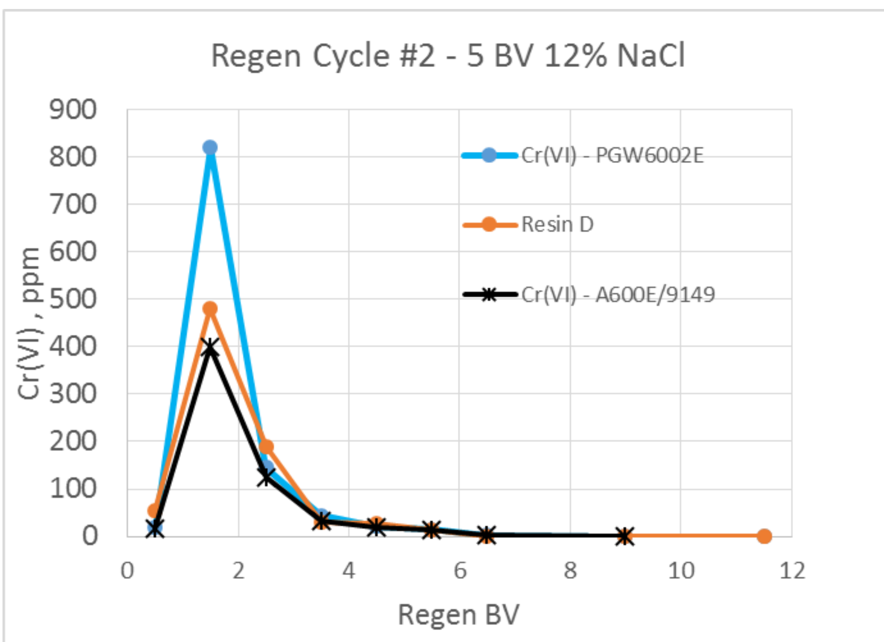


Figure 7. Regeneration #2

A summary of the stripped chromium mass in each regeneration is provided in the table 4 below:

Table 4. Chromium VI Stripped per Regeneration

	Purolite PGW6002E	Resin D	(PGW6002E / Resin D), %
Regeneration 1	21.0 mg	17.4 mg	120.7%
Regeneration 2	26.7 mg	19.9 mg	134.2%
Regeneration 3	26.5 mg	17.4 mg	152.3%

Discussion

On the fourth cycle, the Purolite PGW6002E breakthrough capacity had fallen from approximately 4700 BV to about 4100 BV in keeping with what can be expected as the resin comes to equilibrium with the inlet water and the extent of regeneration done each cycle. This represents about 15% decline which is quite normal. Thus on-going capacity appears to have stabilized within +/- 5%. On the fourth cycle the operating capacity of Resin D had also fallen from approximately 3500 BV in the first run to about 3000 BV, representing a decline of 16%, again not unusual for a resin coming to equilibrium as this depends on the capacity/selectivity of the resin for the contaminant of interest and the regenerant level which is high in this case.

For both resins, the chromium VI stripped during regeneration was consistently higher for PGW6002E which is directly related to the operating capacity at steady state. It can be expected that this product will continue to outperform Resin D in this regard.

From these interim results, Purolite PGW6002E is at steady state operation and is conservatively expected to show at least 20 to 30% % higher operating capacity versus Resin D when both resins are operated and regenerated under similar conditions as above.

Hexavalent Chrome Application
Guidelines for Purolite A600E/9149

Service

	Counter-Flow Regeneration	**Co-Flow Regeneration**
Bed Depth (minimum)	48”	36”
Hydraulic Loading Rates:		
Min	6 gpm/ft^2	6 gpm/ft^2
Max. (dP Drop Dependent)	15 gpm/ft^2	15 gpm/ft^2
Optimal	8-12 gpm/ft^2	8-12 gpm/ft^2
Expected Leakage	< 2 ppb	2 to 4 ppb

Backwash (done every regeneration cycle for Co-Flow and periodically for Counter-Flow)

	Flow	Expansion	Duration
Initial Startup Stratification	1.5 – 2 gpm/ft^2	50 to 60%	30 minutes
Pre-Regeneration- Clean Bed	1.5 – 2 gpm/ft^2	50 to 60%	10 minutes
Pre-Regeneration- fouled Bed	1.5 – 2 gpm/ft^2	50 to 60%	15 -20 minutes

Regeneration:

	Counter-Flow	**Co-Flow**
Brine Concentration	10 to 12 %	10 to 12%
Volume	3 to 5 BV	5 - 10 BV
Feed Rate	0.25 - 0.5 gpm/ft^3	0.25 - 0.5 gpm/ft^3
Duration	90 to 150 minutes	150 minutes
To Recycle	As per design	As per design
Slow Rinse	1.5 BV at 0.25 to 0.5 gpm/ft^3	2 BV at 0.25 to 0.5 gpm/ft^3
To Recycle	As per design	As per design
Fast Rinse	3 to 5 BV at service flow rate	5 to 7 BV at service flow rate
To Recycle	As per design	As per design

Considerations for Performance Optimization:

1. Capacity and breakthrough estimates can be provided by Purolite; please contact us well in advance of your expected start-up.

2. Influent levels of hexavalent chromium (“chrome-6”) and the chosen mode of operation (Counter or Co-flow regeneration) will determine to what extent influent water can be bypassed and blended with the treated water

3. Chromatographic spiking of nitrate
    a. Typically appears around 200 to 400 BV
    b. The volume of water with the spiked concentration of nitrate can potentially be stored and gradually bled back into the treated water for distribution (if allowed by the regulators)
    c. Purolite can assist in advance with modeling to determine how much storage capacity will be needed for water containing such elevated levels of nitrate
    d. If multiple vessels are used, these can be brought online in in a staged manner in order to reduce the impact of any nitrate spikes

4. Good influent & brine distribution systems are key to good resin performance
5. Brine Recycle
    a. TBD on a case by case basis
6. Slow Rinse Recycle
    a. TBD on a case by case basis
7. Fast Rinse can generally be recycles

PRODUCT DATASHEET

Purolite®
PGW6002E

Polystyrenic Gel Type I Strong Base Anion Resin Chloride form, Potable Water Grade

PRINCIPAL APPLICATIONS

- Hexavalent chromium ions removal
- Nitrate Removal
- Uranium Removal
- Sulfate Removal

ADVANTAGES

- High operating capacity
- Exceptional physical stability
- Good kinetic performance

REGULATORY APPROVALS

- Compliant with FDA Regulation 21 CFR 173.25 for Food Treatment, Ion Exchangers

TYPICAL PACKAGING

- 1 ft³ Sack
- 25 L Sack
- 5 ft³ Drum (Fiber)
- 1 m³ Supersack
- 42 ft³ Supersack

TYPICAL PHYSICAL & CHEMICAL CHARACTERISTICS:

Polymer Structure	Gel polystyrene crosslinked with divinylbenzene
Appearance	Spherical Beads
Functional Group	Type I Quaternary Ammonium
Ionic Form	Cl^- form
Total Capacity (min.)	1.6 eq/L (35.0 Kgr/ft³) (Cl^- form)
Moisture Retention	42 - 45 % (Cl^- form)
Mean Diameter	570 ± 50 µm
< 425 µm (max.)	1 %
Uniformity Coefficient (max.)	1.2
Specific Gravity	1.09
Shipping Weight (approx.)	675 - 710 g/L (42.2 - 44.4 lb/ft³)
Temperature Limit	100 °C (212.0 °F) (Cl^- form)
Temperature Limit	60 °C (140.0 °F) (OH^- form)

Appendix B

Resin Tech Ion Exchange Resin Performance Projection

RESINTECH INC
INNOVATIONS IN ION EXCHANGE

MIST-X ION EXCHANGE RESIN PERFORMANCE PROJECTION

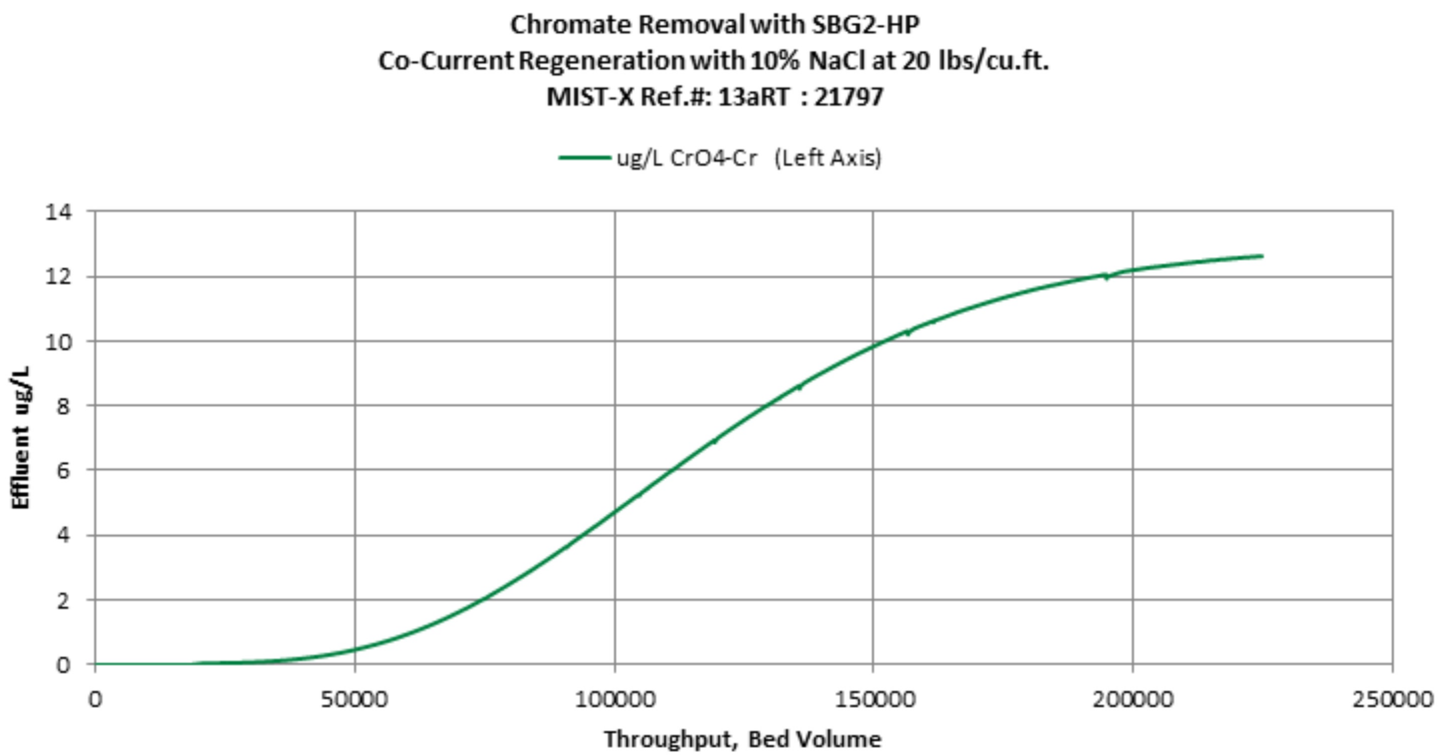
Application:	Chromate Removal with SBG2-HP			
Customer:	Affinity Engineering	**MIST-X Ref #:**	RT2767-21797	**Date:** 6/25/2018
Contact Name:	Christine Rice	**ResinTech Rep:**	Frank DeSilva	
Phone:	530 559-4506	**Phone:**	760-809-4864	
Email:	crice@affinityengineering.com	**Email:**	FDesilva@resintech.com	

INLET CONDITIONS

Ion	Symbol	as	Conc.	Unit
Chloride	Cl	Ion	13	mg/L
Bicarbonate	HCO3	Ion	133	mg/L
Sulfate	SO4	Ion	2.3	mg/L
Nitrate-N	NO3-N	Ion	0.8	mg/L
Chromate-Cr	CrO4-Cr	Ion	0.013	mg/L

SYSTEM DESIGN/PERFORMANCE

Parameter	Value	Units
System:	Potable Water	
Product:	SBG2	
Max. Throughput:	1,683,000	gals/cu.ft.
Recommended Throughput:		gals/cu.ft.
Regeneration:	Co-Current	
Regenerant:	NaCl	
Regenerant Dosage:	20	lbs/cu.ft.
Regenerant Conc.:	10	%



COMMENTS

This water has unusually low sulfate concentration and will be sensitive to the presence of organics or increases in sulfate.

This performance projection was generated from the inlet water analysis show above. Certain parameters that may affect the performance have not been taken into account such as bed depth, water temperature and flow rates. This analysis is offered in good faith and is based on information believed to be reliable. There are no guarantees or warranties stated or implied. We caution against using our products in an unsafe manner or in violation of any patents; further, we assume no liability for the consequences of any such actions.

Planning Committee

Agenda Item: 3

Date: July 6, 2018

Subject: Update on the status of discussions with Elverta Specific Plan Owners Group regarding Water Services Agreement and Property Donation Agreement.

Staff Contact: Timothy R. Shaw, General Manager

Recommended Committee Action:

Forward an item onto the July 16th agenda for Board discussion and action (if appropriate) regarding the appropriate steps to take for resolving the currently stalled discussions with Elverta Specific Plan Owners Group and Elverta Associates LLC.

Current Background and Justification:

As of the writing of this staff report, there were no substantive changes to the status of discussions with ESP developers. I submitted a marked-up Water Services Agreement Term Sheet to the developers in March. The developers hosted a meeting with District staff and proposed deferred payment of the surface water component of District capacity fees. The developers declined to pre-fund development costs. The developers rescinded their request for deferral of surface water component of capacity fees. Elverta Associates LLC conveyed their desire to withhold Well #16 property donation until the Water Services Agreement is executed. Legal Counsel and I met with the ESP developers (sans Elverta Assoc. LLC) on June 20th, with very little change in status resulting. Effectively, the ESP developers suggested the District address their concern about Well #16 property donation with Elverta Assoc. LLC and re-initiate the process of negotiating a Water Services Agreement Term Sheet with the Elverta Specific Plan Owners Group (ESPOG). ESPOG indicated they had a newly marked up draft of the Term Sheet to reflect recent concessions. After the June 20th meeting, on June 26th I requested an ETA on the newly marked up Term Sheet. The response from ESPOG was they expected to send the Term Sheet to the District following an ESPOG meeting that same day…nothing yet has been received. I also sent an e-mail to Elverta Associates LLC on June 26th requesting a meeting to resolve the unreasonable withholding of the Well #16 property donation, I received a read-receipt, but no response.

Staff recommendation:
Optimistically, we may receive some information between the written of this staff report and the July 6th Planning Committee. If so, the Committee should direct actions accordingly. If not, a status report item and discussion of actions the District could direct should be placed on the July 16th Board agenda.

Included with the items in your Planning Committee packets are documents intended to provide insights of the current stall in progress, which effectively distill down to a difference in priority between the District and ESPOG for surface water facilities.

Sacramento Groundwater Authority
Managing Groundwater Resources in Northern Sacramento County

5620 Birdcage Street, Suite 180
Citrus Heights, CA 95610

Tel: (916) 967-7692
Fax: (916) 967-7322
www.sgah2o.org

August 11, 2016

Julie Newton
Department of Community Development
Planning and Environmental Review
827 7th Street, Room 225
Sacramento, CA 95814

Dear Ms. Newton,

At the request of staff of the Sacramento County Planning Department, the Sacramento Groundwater Authority (SGA) evaluated the *Elverta Specific Plan Water Supply Strategy (Final)* dated January 2016 to determine whether it is subject to and consistent with SGA's groundwater management program.

After review, SGA believes that groundwater use within the North Area Basin under the *Strategy* would be subject to SGA's groundwater management program. In addition, such groundwater use, along with the development of a surface water supply as proposed to enhance conjunctive use within the Basin would be consistent with the SGA groundwater management program.

We appreciate the opportunity to work with County staff. Please contact me if there are any questions regarding these findings.

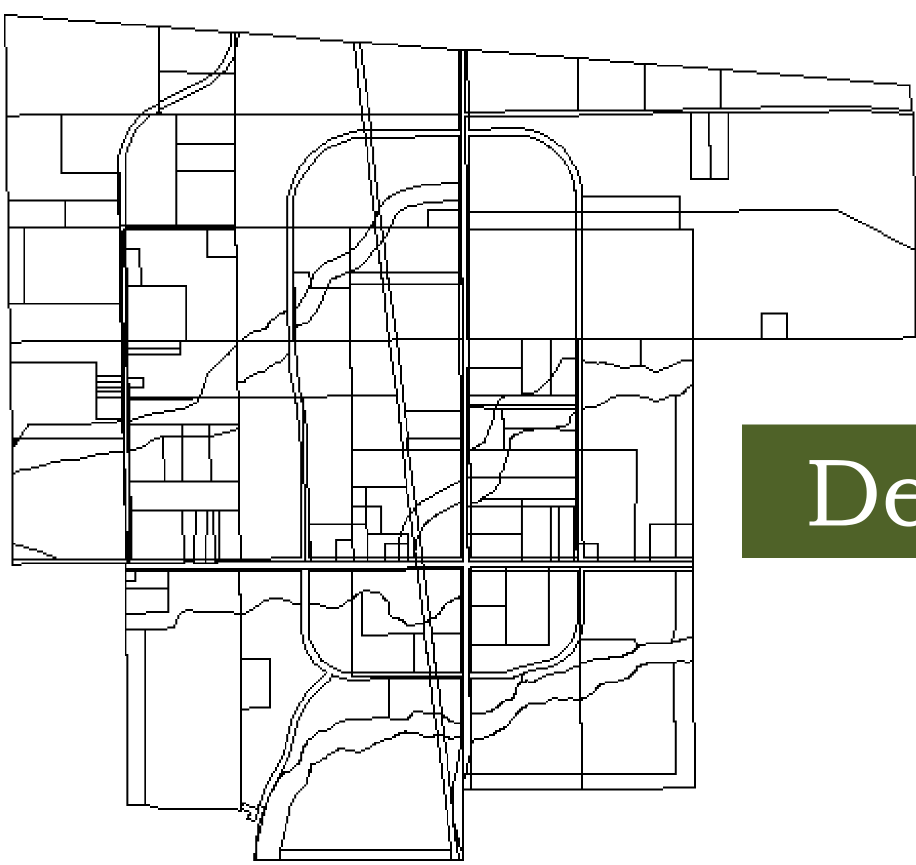
Sincerely,

John Woodling
Executive Director

Rio Linda / Elverta
Community Water District

Elverta Specific Plan Water Supply Strategy

Final Draft



December 2015

AFFINITY ENGINEERING

Table of Contents

List of Appendices

List of Tables

List of Figures

Page Left Intentionally Blank

1. Introduction

This water supply strategy update addresses the Sacramento County's PF-8 water supply requirements of the Elverta Specific Plan. This document once approve by the District's Board of Directors will be incorporated in the next District Master Plan update.

The Elverta Specific Plan (ESP) is a proposed 1,785-acre development located in the north eastern side of the Rio Linda/Elverta Community Water District's (District) service boundary (see Figure 1.1). The ESP owners provided water demand projections and a supply plan approximately six years ago, but the owners put the development on hold and that water supply plan was never implemented. The landowners group is now moving forward with the project and has requested that the District provide a current water supply plan which incorporates the localized water plans, District's Master Plan objectives, and changes in regional water supply. This report presents the current water supply strategy and infrastructure requirements for the ESP Development.

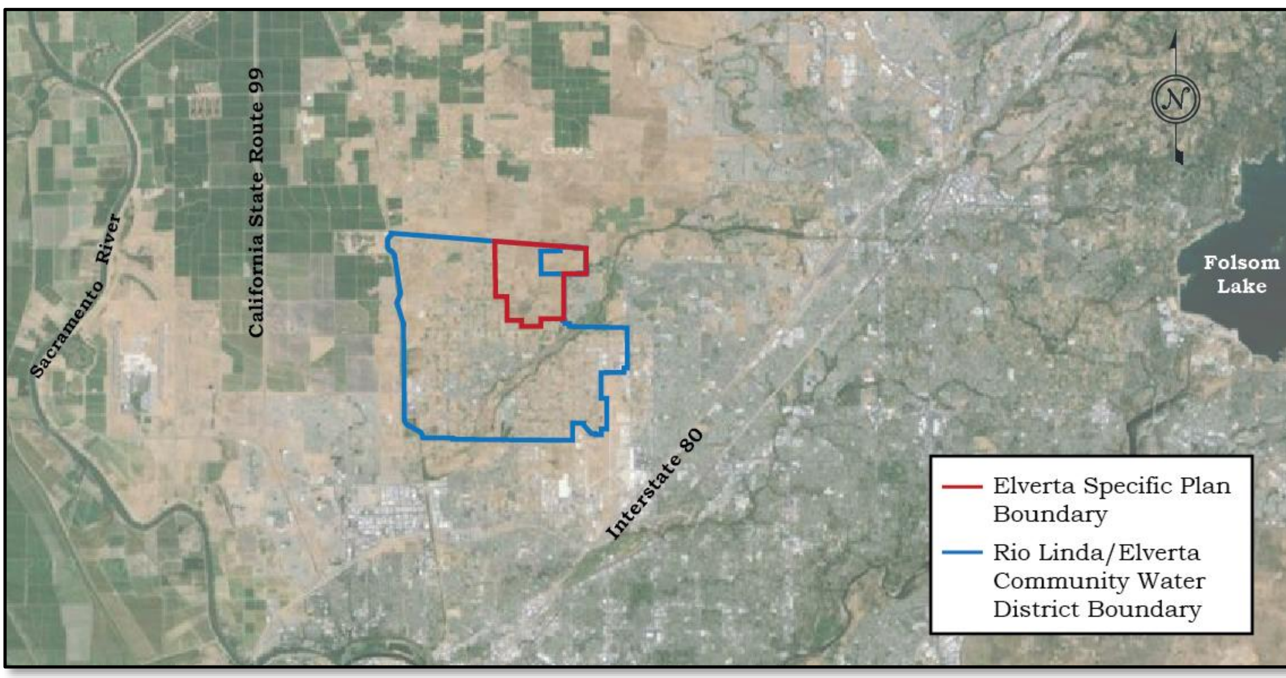


Figure 1.1 Elverta Specific Plan Area.

This Page Intentionally Left Blank

2. Projected Demand

2.1 Annual Water Demands

The projected land use water demands and totals are shown in Table 2.1. The 7,500 units includes the ESP holding capacity with the approved density bonus and the updated Northborough density. The density bonuses allow developers to obtain more favorable local development requirements in exchange for offering to build more types of homes such as senior or low income. All land use information was provided by the developers in December 2013. Demand and supply values will be updated upon final approval of land use plans and service area boundaries (see Appendix A for the last updated land use map). The industry standard for unaccounted water factor (10 percent) is added to the land use water demand total to determine the total water demand of 4,400 acre-feet per year (AFY). For the use of supply investigation, total water demands are rounded up to 5,000 acre-feet per year to account for above-average annual demands.

Table 2.1 Land Use Demand Projections

Land Use ID	Area (acres)	Density Bonus Total Dwelling Units	Unit Demand Factor (AF/DU or AF/ac)	Water Demand (AFY)
AR 1,5	247	248	1	248
AR 1	41.6	63	1	63
RD 1,2	4.3	13	1	13
RD 2	5.5	8	0.7	5
RD 3,4,5	846.5	4,961	0.5	2,481
RD 6,7	143.9	1,139	0.4	456
RD 10	17.7	198	0.3	59
RD 20	37.7	873	0.3	262
Commercial	17.1	--	2.5	43
Office/Professional	3.7	--	2.5	9
Parks	102.9		2.5	257
Schools	20.0	--	3.1	61
Drainage/Trails/Detention/Open Space	219.5	--	0.0	--
Major Roads/Other	77.2		0.5	39
Total Residential	1,344	7,500	--	3,585
Total Non-Res	440	0	--	409
Total:	**1,785**	**7,500**	**--**	**3,994**
Unaccounted Water (10%)				399
Total Demand (rounded)				**4,400**

2.2 Initial Development Demands

The initial development phase demands are used to size the initial infrastructure required to serve development. Initial supply infrastructure will be installed to meet the first phase of demand projections. Supply infrastructure will be expanded beyond that time to match the pace of development growth. However, to eliminate redundancy and its associated higher ultimate cost, major supply infrastructure such as pipelines or other elements will be sized for ultimate build out initially as determined by the District. For planning purposes, it is assumed the initial development demands will total 2,500 acre-feet per year.

The projected monthly and total demands for the ESP initial development and build out are summarized in Tables 2.2 and 2.3.

Table 2.2 ESP Initial Development Monthly Demands (2,500 acre-feet per year)

Month	Month Factor	Average Monthly Demand (AF)	Average Day (MGD)	Maximum Day (MGD)	Peak Hour (MGD)
January	0.47	97	1.0	1.1	1.6
February	0.43	89	1.0	1.1	1.7
March	0.54	113	1.2	1.3	1.9
April	0.71	147	1.6	1.7	2.6
May	1.16	242	2.5	2.7	4.1
June	1.58	329	3.6	3.8	5.7
July	1.86	387	4.1	4.3	6.5
August	1.78	372	3.9	4.2	6.3
September	1.41	293	3.2	3.4	5.1
October	0.99	206	2.2	2.3	3.5
November	0.57	119	1.3	1.4	2.1
December	0.50	104	1.1	1.2	1.8
Total:	--	2,500	--	--	--

Table 2.3 ESP Build Out Monthly Demands (5,000 acre-feet per year)

Month	Month Factor	Average Monthly Demand (AF)	Average Day (MGD)	Maximum Day (MGD)	Peak Hour (MGD)
January	0.47	194	2.0	2.2	3.3
February	0.43	178	2.1	2.2	3.3
March	0.54	226	2.4	2.5	3.8
April	0.71	295	3.2	3.4	5.1
May	1.16	484	5.1	5.4	8.2
June	1.58	658	7.2	7.7	11.5
July	1.86	773	8.1	8.7	13.0
August	1.78	743	7.8	8.4	12.5
September	1.41	587	6.4	6.8	10.2
October	0.99	413	4.3	4.6	7.0
November	0.57	239	2.6	2.8	4.2
December	0.50	209	2.2	2.3	3.5
Total:	--	5,000	--	--	--

2.3 Equivalent Dwelling Unit

Equivalent Dwelling Unit (EDU) demand values are required to determine infrastructure phasing needs. An EDU and other respective design parameters are summarized in Table 2.4. The design parameters are based on the design criteria developed in the District's Master Plan (2014).

Table 2.4 EDU Analysis

Parameter	Value	Units	Notes
ESP Total Demand	3,585	AFY	DU demand only
ESP Dwelling Units	7,500	DU	Maximum bonus density DU
Demand/DU	0.478	AF/DU	Average annual
10 Percent UAW	0.0478	AF/DU	Average annual
Total Demand/DU, AFY	0.5258	AF/DU	Average annual
Total Demand/DU, gpd	469	gpd/DU	Average annual
Avg Day in Max Month, gpd	821	gpd/EDU	1.86 factor from SRF Report monthly peaking factor analysis
Max Day, gpd	934	gpd/EDU	1.07 times max month average day
Peak hour, gpm	0.97	gpm/EDU	1.5 factor on max day based on SRF report
Storage Factors			Total Storage = three parameters added together
Peak Hour Storage	234	gal/EDU	Peak hour for 4 hours
Emergency Storage	234	gal/EDU	25 percent of max day
Fire Flow Storage	960,000	gallons	4,000 gpm for 4 hours

This Page Intentionally Left Blank

3. Supply Strategy

The previous 2008 supply strategy was developed under different circumstances and requirements. Since that time, the region has increased regional supply management efforts through the Water Forum Agreement implementation, SGA and West Placer Groundwater Management Plans, and the RWA Integrated Regional Water Management Plan. The supply strategy is updated to support these regional supply planning efforts and goals.

3.1 Previous Supply Strategy

The ESP supply planning documents from previous efforts evaluated numerous supply sources and strategies to serve the development under the PF-8 requirements. PF-8 was conditioned on the Development by the County to ensure proper long-term groundwater management. The selected strategy included a mix of groundwater, surface water, and recycled water. The supply strategy proposed a conjunctive use of groundwater and surface water. New wells would be drilled to supply groundwater in the quantity required for the ESP's maximum day demand. The District would purchase surface water from the Sacramento Suburban Water District (SSWD) during the off peak seasons and serve both ESP and other District demands in quantities sufficient to offset the annual groundwater pumping volumes. SSWD would sell surface water from its contract with Placer County Water Agency (PCWA), treated at the San Juan Water District's surface water treatment plant, and delivered to the District through the existing and extended Cooperative Transmission Pipeline. The District would also implement a recycled water program with the City of Roseville. The District would buy reclaimed water from Roseville and divert it from Dry Creek to serve the Cherry Island Golf Course and Gibson Ranch Park. These two parks would in turn cease groundwater pumping, providing a reduction in basin groundwater pumping.

As part of this updated Water Supply Analysis, the previous supply strategy was re-evaluated with respect to reliability, cost, and complexity. Both PCWA and SSWD staff indicated concern with the surface water reliability, as it is projected that SSWD will only receive supply from PCWA approximately six in ten years (based on inflow to Folsom Reservoir and other parameters). SSWD staff also indicated that PCWA may no longer have the available surface water rights to supply the District even during wet years. In addition, the draft supply agreement with SSWD indicated that the District would be the first customer eliminated in the event of supply shortages. Past planning efforts were halted before supply costs were developed. However, the draft supply agreement included high connection fees that were associated with numerous non-supply payments to address past legal, environmental, design, and construction issues between the District and SSWD concerning the Cooperative Transmission Pipeline. Delivering the supply to the District would require coordination between four agencies (RLECWD, SSWD, SJWD, and PCWA). The coordination between these agencies that is required to schedule supply availability and treatment capacity is considered complex.

The City of Roseville staff was contacted regarding the recycled water supply strategy. The staff indicated that they now may not have excess recycled water supply to sell the District due to their potential needs within their city. The City of Roseville staff are re-evaluating their needs and are not prepared at this time to commit to any recycled water supply.

The previous supply strategy is not recommended due to the low water supply reliability and the associated high connection fees and supply costs.

No reclaimed water is available in this area of Sacramento County. Discussions with SRCSD should be conducted about the possibility of adding a scalping plant to enable the use of reclaimed water.

3.2 Recommended Supply Strategy

Alternative supply strategies were investigated with the goal to develop a supply strategy that maximizes supply reliability and minimizes long-term operational costs. Each potential supply partner was contacted to review supply opportunities and constraints. Supply alternatives were either eliminated or not investigated further based on these initial discussions. High potential supply options were identified and further investigated as the District developed its recommended water supply strategy. A supply strategy for the entire RLECWD service area was developed in the 2014 Master Plan. The Master Plan supply strategy supports the regional planning efforts to enhance conjunctive use abilities region-wide.

3.2.1 Regional Planning Efforts

The North American River Groundwater Basin is extensively managed through current management plans and regional planning efforts to increase conjunctive use. The basin is not adjudicated, but managed through regional cooperation. Multiple public agencies and governmental boundaries overlay the basin. The Sacramento Groundwater Authority (SGA) manages the basin portion within Sacramento County, known locally as the North Area Basin. SGA is a joint powers authority formed in 1998 as a result of the Sacramento Area Water Forum. SGA developed and actively maintains the Groundwater Management Plan and produces an annual Basin Management Report that provides an update on basin objectives and programs and results (SGA Basin Management Report – 2013 Update). SGA has developed the water accounting framework (SGA Water Accounting Framework Phase III Effort, June 2010) to facilitate conjunctive use strategies and partnerships within the basin. SGA also leads ongoing basin monitoring activities as the reporting agency for the California Statewide Groundwater Elevation Monitoring Program (CASGEM). SGA monitors groundwater elevations and quality throughout the basin through a network of 23 groundwater-sampling sites.

The Water Forum process is a regional multi-stakeholder process to help meet water needs through 2030 and also meet environmental flow requirements on the lower American River. Extensive groundwater modeling and analysis was conducted as part of the process. Results recommended a total safe sustainable yield for the North Basin of

131,000 acre-feet per year (AFY). The 2014 SGA Groundwater Management Plan estimates the average pumping over the last 13 years of approximately 99,500 AFY. The ESP groundwater supply is estimated at 5,000 AFY, well within the Water Forum sustainable yield.

Additional modeling and planning of the groundwater basin has been conducted since the Water Forum Agreement. The Regional Water Authority developed and updates the American River Basin Integrated Regional Water Management Plan (ARB IRWMP). The ARB IRWMP provides a framework for the region to implement the vision: “The American River Basin Region will responsibly manage water resources to provide for the lasting health of our community, economy, and environment”. The document contains numerous goals, principals, objectives, and strategies to meet the vision. Water Resources Strategy 2 calls for an increase of groundwater production to 550 mgd by 2030. The 2013 production capacity is approximately 400 mgd. The ESP wells (approximately 9 mgd) will help meet this goal and will support the other goals of conjunctive use opportunities for increased reliability.

The West Placer County Groundwater Management Plan (WPCGMP) was developed by Placer County Water Agency, City of Roseville, City of Lincoln, and California American Water. The plan covers the North American Groundwater Basin portion that is in west Placer County, which abuts the northern edge of RLECWD’s service area. Both the SGA GWP and the WPCGMP address the same groundwater basin, although the plans cover two different political boundaries. Both the Water Forum and SGA participated in the WPCGMP, and each WPCGMP agency also is a member of the Water Forum, SGA, RWA, and/or the ARB IRWMP. The WPCGMP identifies the WFA estimated sustainable yield in Sacramento County at 131,000 AFY, Placer County at 95,000 AFY, and Sutter County at 175,000 AFY. Basin Management Objective 2 indicates groundwater use will result in basin level fluctuations, and the management goal is to maintain an acceptable “operating range.” The ESP supply wells are within the 131,000 AFY sustainable yield, and will also help conjunctive use strategies, supporting the goals of the WPCGMP.

The District investigated supply options through the SGA Groundwater Accounting Framework. The District solicited purchasing groundwater credits from City of Sacramento, SSWD, and Carmichael WD, no agreement with any of these Agencies could be made.

3.2.2 RLECWD Supply Strategy

The Master Plan recommended supply strategy supports the regional planning efforts to enhance conjunctive use abilities region-wide. To achieve this, the region needs to increase its groundwater production capacity and enhance surface water supply sources and volumes. Cooperative efforts amongst agencies throughout the region will involve conjunctive use strategies between groundwater pumpers, surface water users, and those with both supplies. RLECWD will continue to serve existing and new customers with groundwater. RLECWD will collaborate within the region to enhance conjunctive use strategies. As part of this effort, RLECWD is participating in efforts to develop a new surface water treatment plant on the Sacramento River. The new treatment plant will increase regional supply reliability, and also afford RLECWD a potential supplemental supply for conjunctive use within its own service area. However, regardless of regional partner participation, RLECWD intends to construct a surface water treatment plant and obtain surface water supplies to enhance service to its customers as stated in its April 2014 Water Master Plan. RLECWD will continue to develop a surface water treatment plant project on two parallel efforts: one with other partners, and one with just RLECWD.

3.2.3 ESP Supply Strategy

Based on the evaluation of several water supply strategies, it is recommended that RLECWD serve the ESP Development with groundwater. New groundwater wells will be constructed in or near the ESP development area. The ESP distribution system will be connected to the existing RLECWD distribution system to increase system-wide reliability and operational efficiencies.

The District is currently completing a rate case study that sets a connection fee to fund supply, storage, and distribution associated with growth. Surface water facilities are included as a component of the connection fee. Once surface water is made available to the District, it will be used to supplement the groundwater and assist in the overall health of the regional groundwater management efforts.

A new transmission loop is also included as part of the connection fee. This loop will enable the distribution of surface and groundwater throughout the District.

4. Phases of Development

The infrastructure will be phased to match ESP growth. The initial infrastructure must be in place to provide supply before any new customers can be connected. Additional infrastructure will be added as necessary to match growth.

4.1 Initial Development Infrastructure Phasing Requirements

The initial infrastructure is planned to serve the initial development areas as shown in Figure 4.1. Table 4.1 lists the initial development infrastructure requirements that must be built prior to connecting customers. It is assumed some form of groundwater treatment will be required. Actual requirements will be determined after the well is drilled, pump tested, and the well's water quality is sampled. Initial development infrastructure is shown on Figure 4.1.

Figure 4.1 shows the transmission mains that will be needed to serve the initial phases of ESP. These initial developments are shown in red hatching on the figure. ESP will be connected to the District's existing system with two initial off-site main extensions. The first main extension will be from ESP to Dry Creek Road and Q Street. The second main extension will be from ESP in 16th Street to Q Street then east to 24th Street. The two main extensions will provide redundant connectivity from ESP to the District's water system. The second main extension will enable the District's newest well (Well 15) to provide water supply backup to the wells being drilled as part of ESP initial infrastructure phase. The location of the wells, reservoir, and pump station are shown at a tentative location. The exact location will be based on the results of the hydrogeological study and the property available (See Figure 4.1).

Figure 4.2 shows the initial phase of the conceptual groundwater treatment plant (GWP) that is planned to be constructed as part of the initial development of ESP. The facility consists of drilling groundwater Wells 16 and 17 and equipping only Well 16 for this initial phase. It is planned that both wells will be located on the same property. The exact location will be based on the recommendations within the hydrogeological study to avoid treatment and minimize cross effect that each well may have on each other. Both wells are being drilled with the water quality sampled to determine the type, if any, of treatment that is required. Well 16 will pump through treatment if necessary and fill a new 3 MG reservoir to supply ESP as its source of supply during normal operations. There will be four booster pumps that will draw from the reservoir and pump into the distribution system to supply ESP's MDD and PHD for their initial development. The facility will be equipped with a generator that will be sized for the initial electrical load and provide power to the facility during utility power outages.

Table 4.1 Initial Development Infrastructure Requirements

Parameter	Capacity	Units	Notes
Groundwater Well	1,500 gpm	1	Assumes one well will produce 1,500 gpm.
Groundwater Treatment	1,500 gpm	1	Assumes treatment is required.
Booster Pumping Station	4,530 gpm	1	Sized for initial development peak hour.
Storage Tanks	3 MG	2	Assumes one 3-million gallon tank, construction would be phased within initial development.
Transmission Mains	12-inch 16-inch 24-inch	23,000 LF 23,500 LF 13,500 LF	Pipelines would be phased within initial development depending on actual location of individual development.

4.2 ESP Buildout Infrastructure Requirements

The full infrastructure requirements at buildout for ESP are shown on Figure 4.3. Once initial infrastructure is installed, the District will monitor the rate of new connections, demands, capacities, and water quality. The District will implement the remaining infrastructure requirements in a phased approach to meet the water demand as development occurs. Ultimate buildout infrastructure requirements are summarized in Table 4.2.

Figure 4.3 shows the ultimate build out of the groundwater supply system. This includes the equipping of Well 17, expanding treatment if necessary, increasing backup power, and expanding the capacity of the booster station to supply ESP to meet their ultimate MDD and PHD. ESP Build Out Infrastructure Requirements

Parameter	**Capacity**	**Units**	**Notes**
Groundwater Wells	1,500 gpm	4	4 wells with assumed 1,500 gpm capacity.
Groundwater Transmission	16-inch	5,000 LF	Assume 2,500 for wells 3 and 4 each to connection to transmission loop.
Groundwater Treatment	8.7 mgd	4	Max day demands, assume treatment at each well.
Booster Pumping Station	9,000 gpm	2	Peak hour demands, up to two stations depending on ultimate storage tank locations.
Storage Tanks	5.5 MG	4	Assume one 3-million gallon tank at well treatment site and remainder combined with other storage throughout District.
Transmission Mains	12-inch 16-inch 24-inch	30,500 LF 23,500 LF 13,500 LF	

4.3 Supplemental Supply Infrastructure Requirements

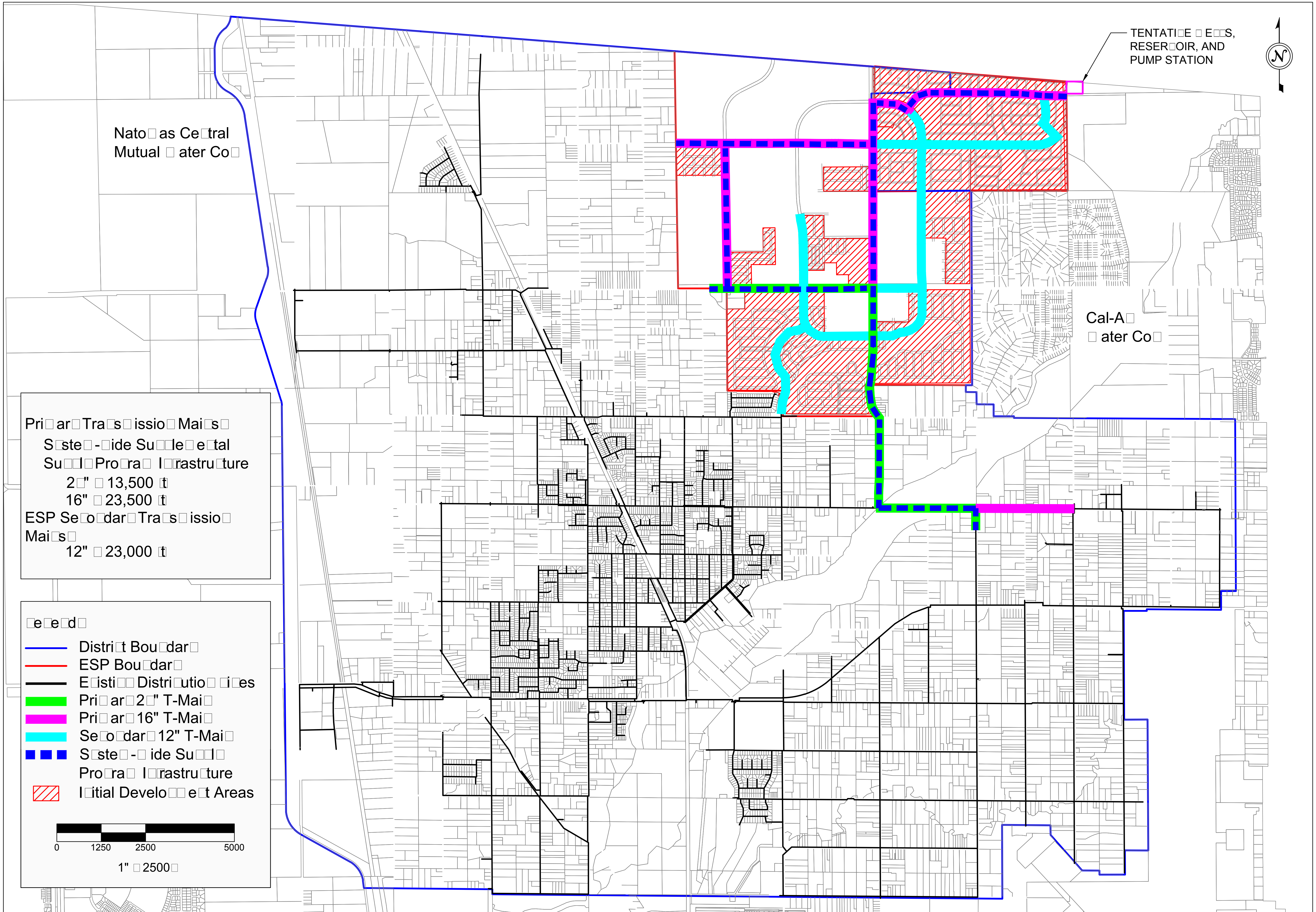
The supplemental surface water supply project will require 25 mgd capacity (14,500 AFY) for RLECWD conjunctive use needs (RLECWD Master Plan – 2015 Update). The project may be larger depending on participation of other partners. For the purposes of this study and apportioning costs, it is assumed the project will be for RLECWD only. The initial capacity of the Supplemental Water Project (SWP) will be 5 MGD with 5 MGD capacity increases up to an ultimate capacity of 25 MGD. All new connections will pay a proportionate share to fund this program.

The program includes a service water treatment plant, raw water transmission main, and a transmission loop throughout the RLECWD service area. The SWP infrastructure requirements are summarized in Table 4.3. Figure 4.4 illustrates the supplemental supply project infrastructure. Locations shown are for illustrative purposes only; actual locations will be determined in the design phase.

Table 4.2 Supplemental Supply Infrastructure Requirements

Parameter	Capacity	Units	Notes
		Surface Water Infrastructure	
Raw Water Pumping Station	25 MGD		14,500 AFY ultimate build out max day demand. Located at NCMWC Pritchard Lake Intake structure.
Raw Water Pipeline	36-inch, 32,000 LF		Sized for total 14,500 AFY District build out. Actual alignment selected will affect total length.
Raw Water Storage	50 MGal		Located at treatment plant site, number of cells to be determined during design.
Pre-Treatment Booster Pumping Station	25.2 MGD		Pump water from raw water ponds into treatment plant.
Surface Water Treatment Plant	25.2 MGD		Includes treatment and solids handling.
Treated Booster Pumping	25.2 MGD		Max day only, peak hour pumping met by distribution system booster pumping/storage sites.
		Distribution System Infrastructure	
System Storage	13.5 MGal		Size and unit number to be determined. Located throughout District.
36-inch T-Main	6,000 LF		See figure for general location, actual locations and length determined in design.
24-inch T-Main	53,400 LF		
16-inch T-Main	31,000 LF		

This Page Intentionally Left Blank



JUNE 2015

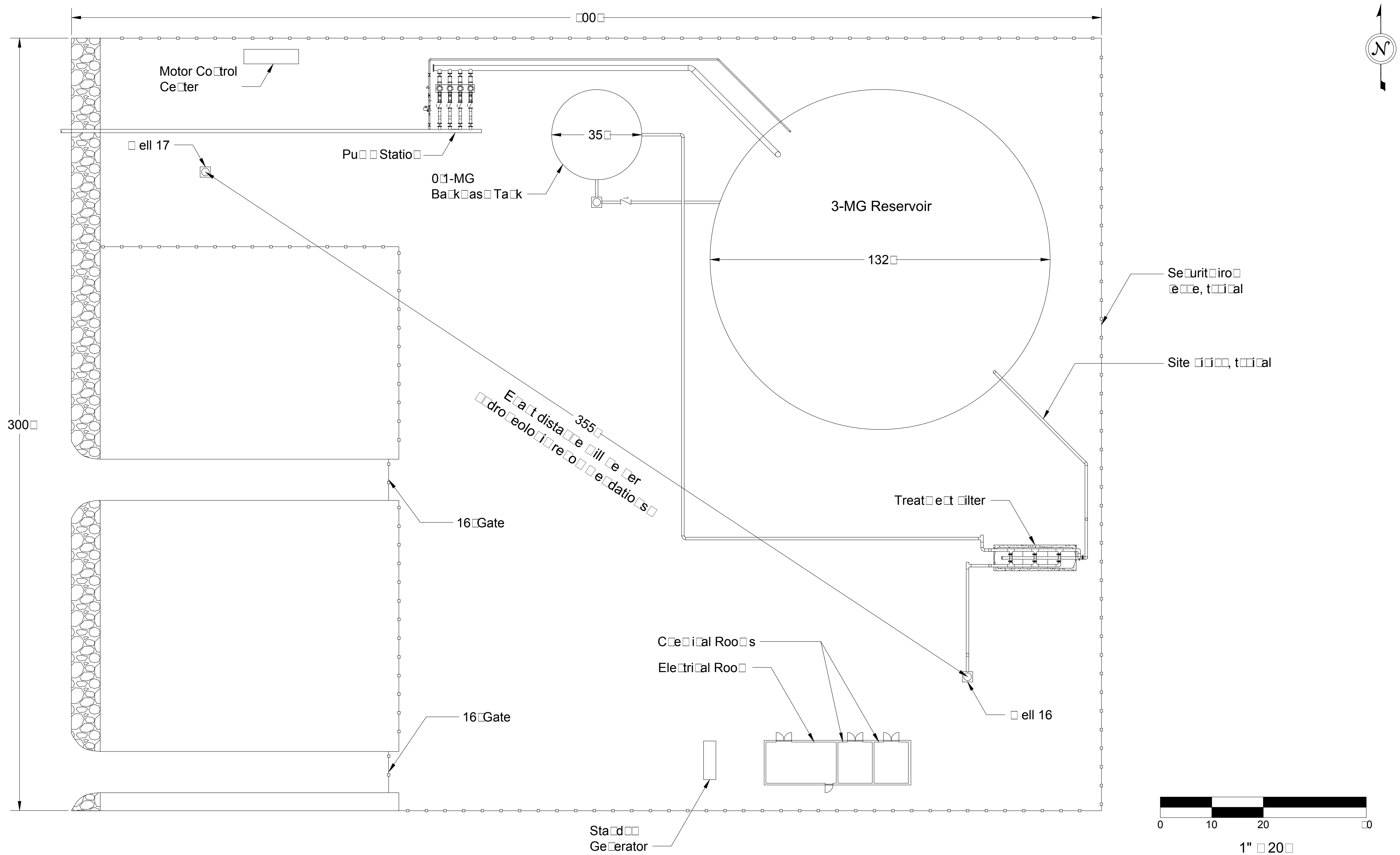
AFFINITY ENGINEERING

FIGURE 4.1

ELVERTA SPECIFIC PLAN
INITIAL DEVELOPMENT INFRASTRUCTURE

Rio Linda / Elverta Community Water District
730 □ Street
Rio □i□da, CA 95673

This Page Intentionally Left Blank



Rio Linda / Elverta Community Water District
730 □Street
Rio □i□da, CA 95673

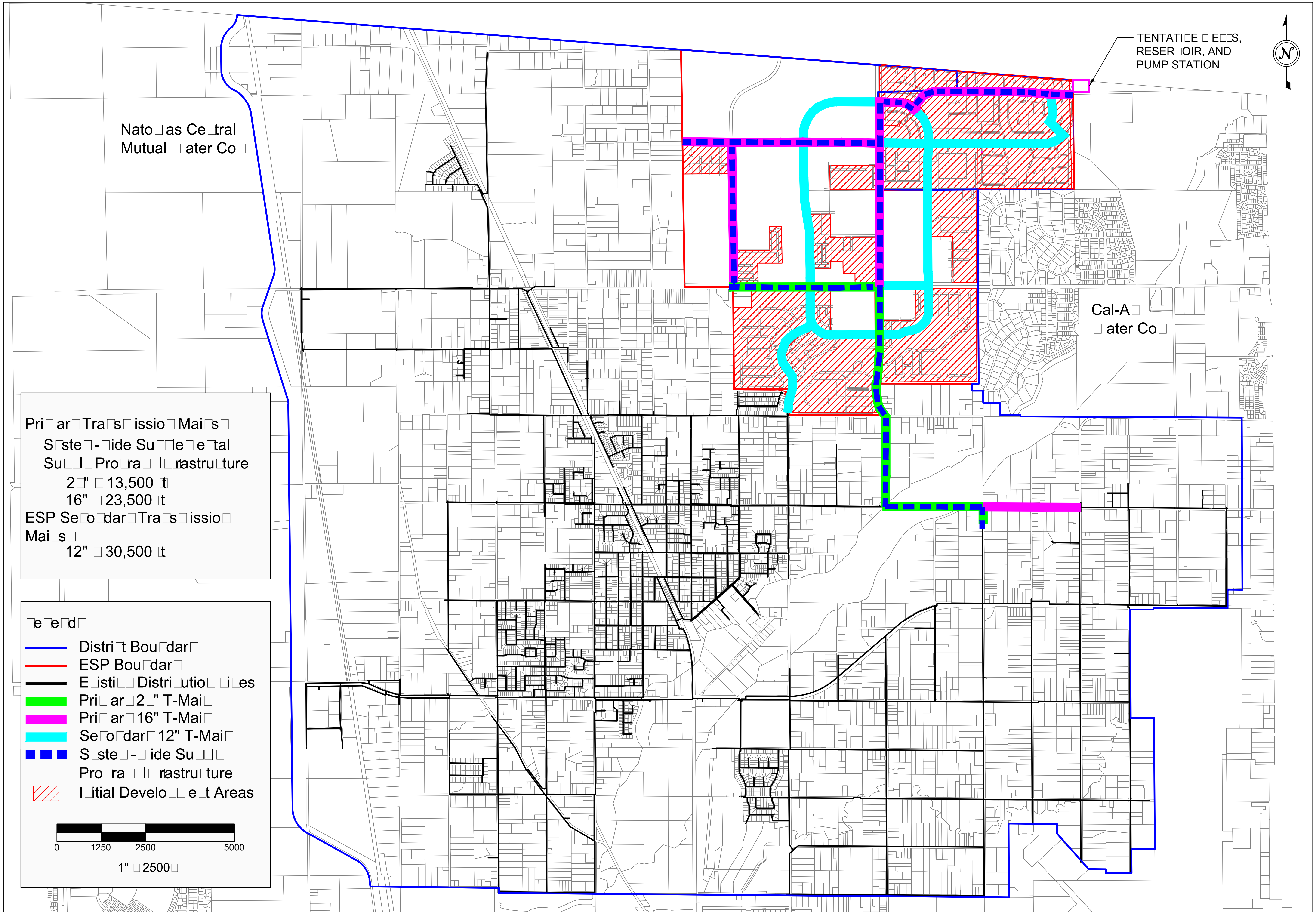
FIGURE 4.2

CONCEPTUAL ESP GROUNDWATER SUPPLY/TREATMENT FACILITY INITIAL DEVELOPMENT

JUNE 2015

AFFINITY ENGINEERING

This Page Intentionally Left Blank



JUNE 2015

AFFINITY ENGINEERING

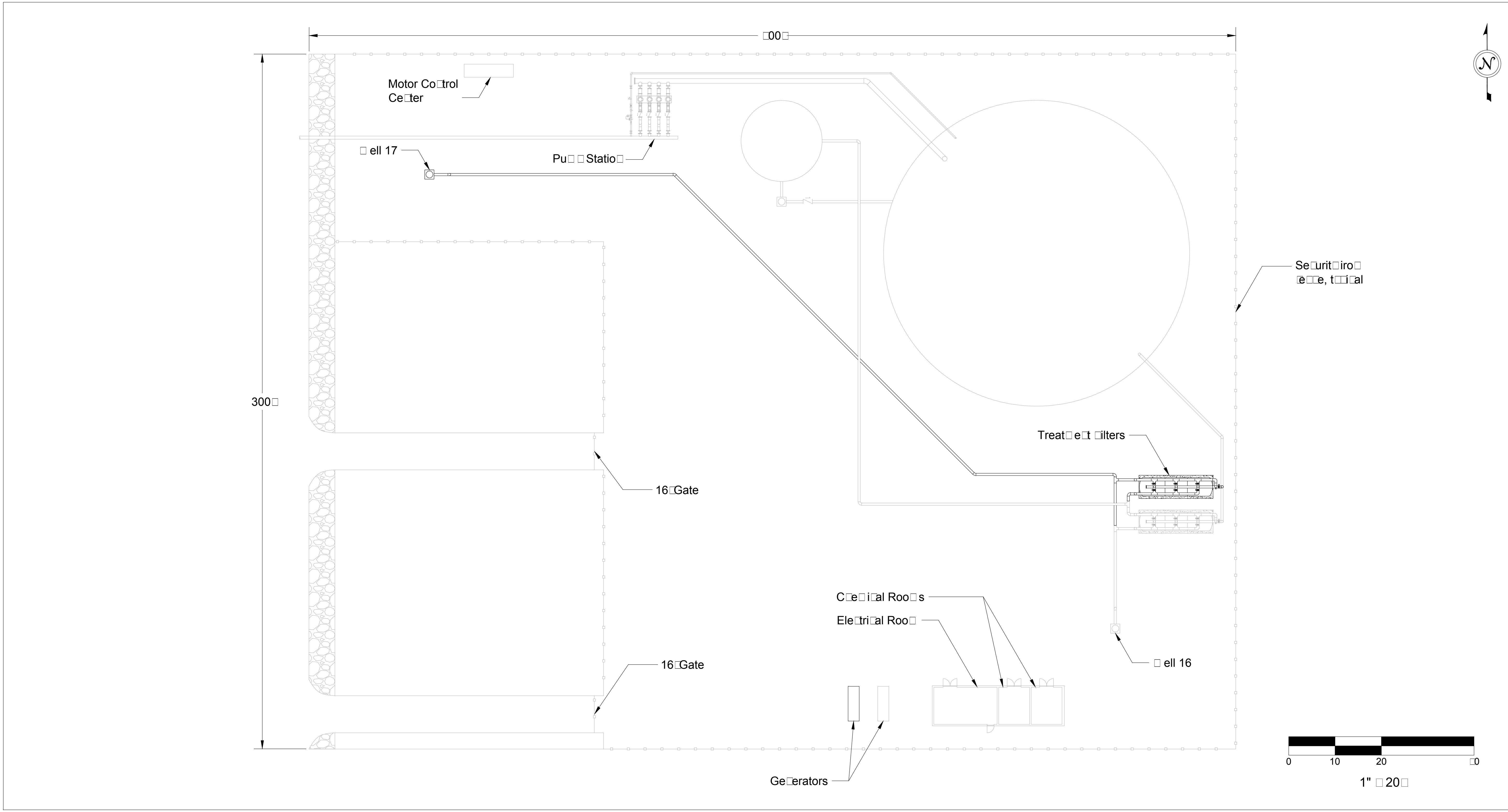
FIGURE 4.

ELVERTA SPECIFIC PLAN
FULL BUILD OUT INFRASTRUCTURE

Rio Linda / Elverta Community Water District

730 L Street
Rio Linda, CA 95673

This Page Intentionally Left Blank



Rio Linda / Elverta
Community Water District
730 □Street
Rio □i□da, CA 95673

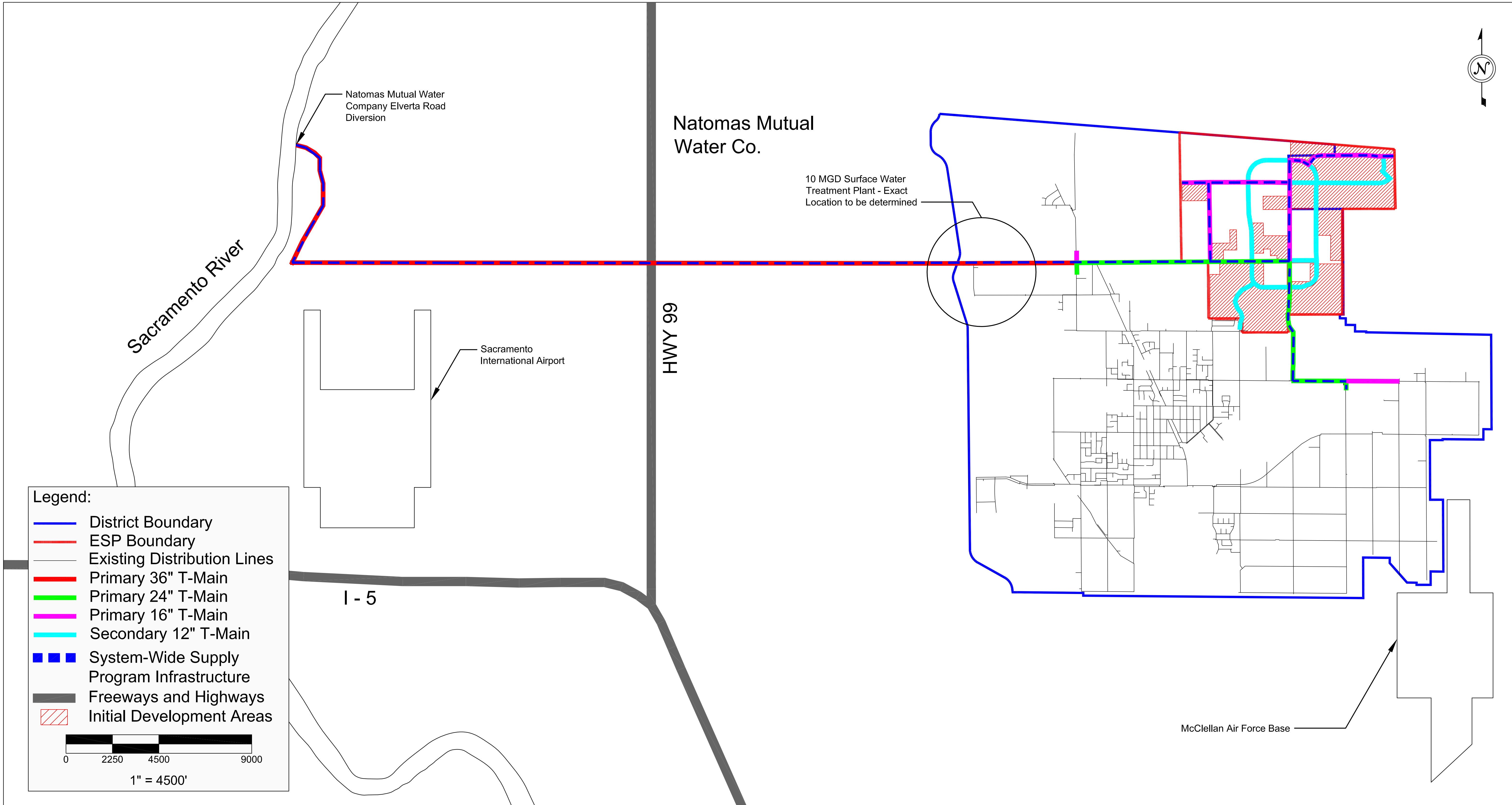
FIGURE 4.4

CONCEPTUAL ESP GROUNDWATER
SUPPLY/TREATMENT FACILITY ULTIMATE □UILD OUT

JUNE 2015

AFFINITY
ENGINEERING

This Page Intentionally Left Blank



Rio Linda / Elverta Community Water District
730 L Street
Rio Linda, CA 95673

FIGURE 4.5

SURFACE WATER SUPPLY PROJECT

JUNE 2015

AFFINITY ENGINEERING

This Page Intentionally Left Blank

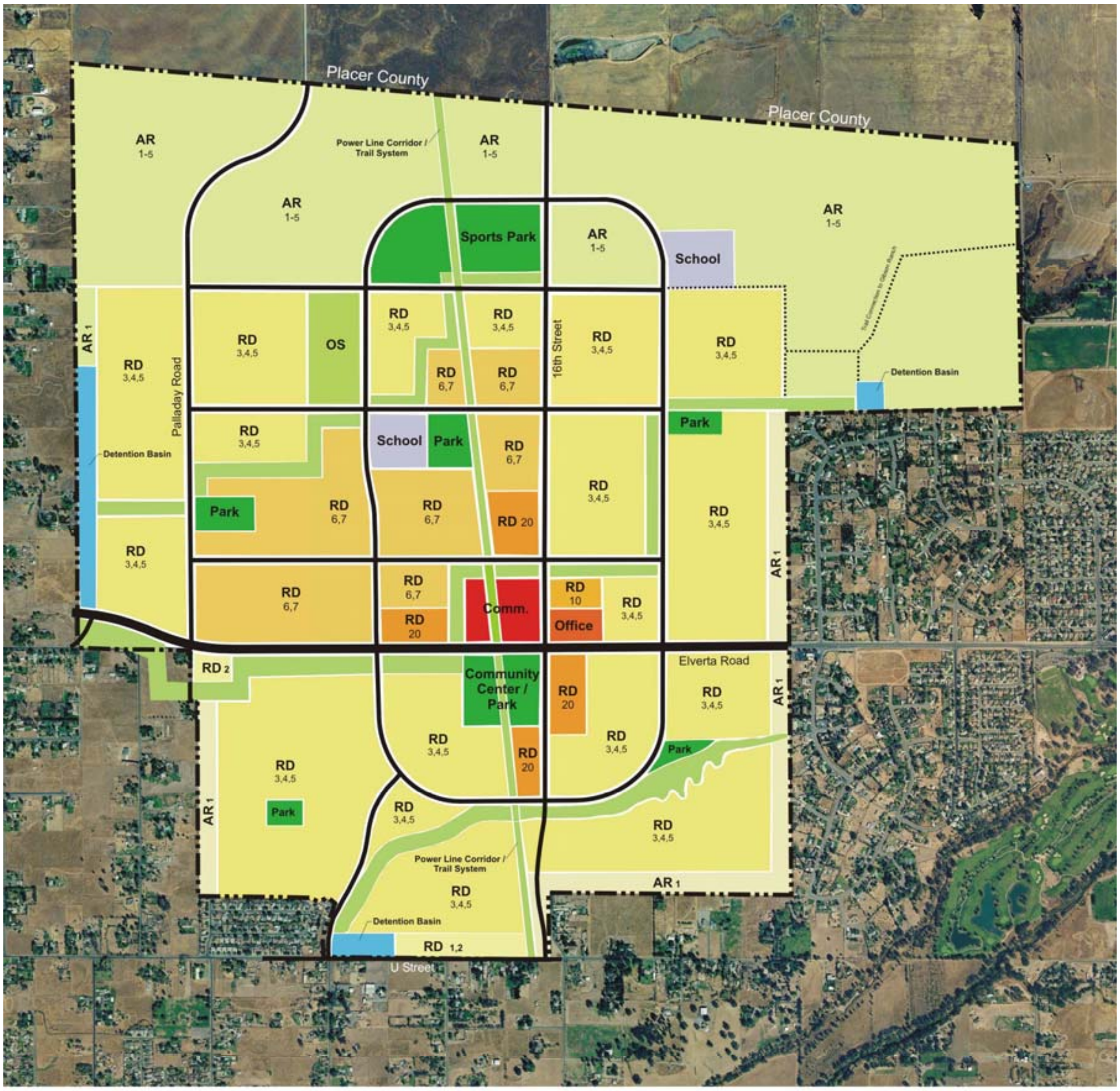
5. Infrastructure Probable Costs

Tables 5.1 and 5.2 provide the probable costs for ESP's initial development phase and ultimate buildout, respectfully. The ESP costs are compared to the full groundwater and supplemental supply infrastructure costs for the 14,500 AFY ultimate demand in Table 5.3 (from the RLECWD Master Plan – 2015 Update). The ESP financing plan will assign costs in a fee program to fund the construction of the necessary infrastructure.

This Page Intentionally Left Blank

Appendix A. ESP Land Use Plan Map

This Page Intentionally Left Blank



Land Use	Acreage
Agricultural Residential (AR) 1-5	502.3
Agricultural Residential (AR) 1	49.5
Residential Development (RD) 2	3.2
Residential Development (RD) 1, 2	6.9
Residential Development (RD) 3, 4, 5	662.7
Residential Development (RD) 6,7	161.7
Residential Development (RD) 10	7.0
Residential Development (RD) 20	38.8

Land Use	Acreage
Office / Professional	4.4
Commercial	15.0
Community / Sports / Neighborhood Parks	73.3
Elementary School	20.2
Drainage / Trails	101.3
Detention / Joint Use	
Powerline Corridor*, and Trail System	16.3
Open Space	18.4
Major Roads - Other	74.3
Total	1,744.6

*Includes 10.68 acres of powerline corridor acreage in park, RD 20 and Commercial landuse statiestics where corridor is adjacent to or within said landuse designations. (Total acreage nets out these 10.68 acres)

Total Plan Holding Capacity of 4,950 Dwelling Units

Rio Linda / Elverta
Community Water District

Elverta Specific Plan
Water Supply Strategy

Final Draft

January 2016

AFFINITY
ENGINEERING

Table of Contents

List of Appendices

List of Tables

List of Figures

1. Introduction

This water supply strategy update addresses the Sacramento County's PF-8 water supply requirements of the Elverta Specific Plan. This document once approve by the District's Board of Directors will be incorporated in the next District Master Plan update.

The Elverta Specific Plan (ESP) is a proposed 1,756-acre development located in the north eastern side of the Rio Linda/Elverta Community Water District's (District) service boundary (see Figure 1.1). The ESP owners provided water demand projections and a supply plan approximately six years ago, but the owners put the development on hold and that water supply plan was never implemented. The landowners group is now moving forward with the project and has requested that the District provide a current water supply plan which incorporates the localized water plans, District's Master Plan objectives, and changes in regional water supply. This report presents the current water supply strategy and infrastructure requirements for the ESP Development.

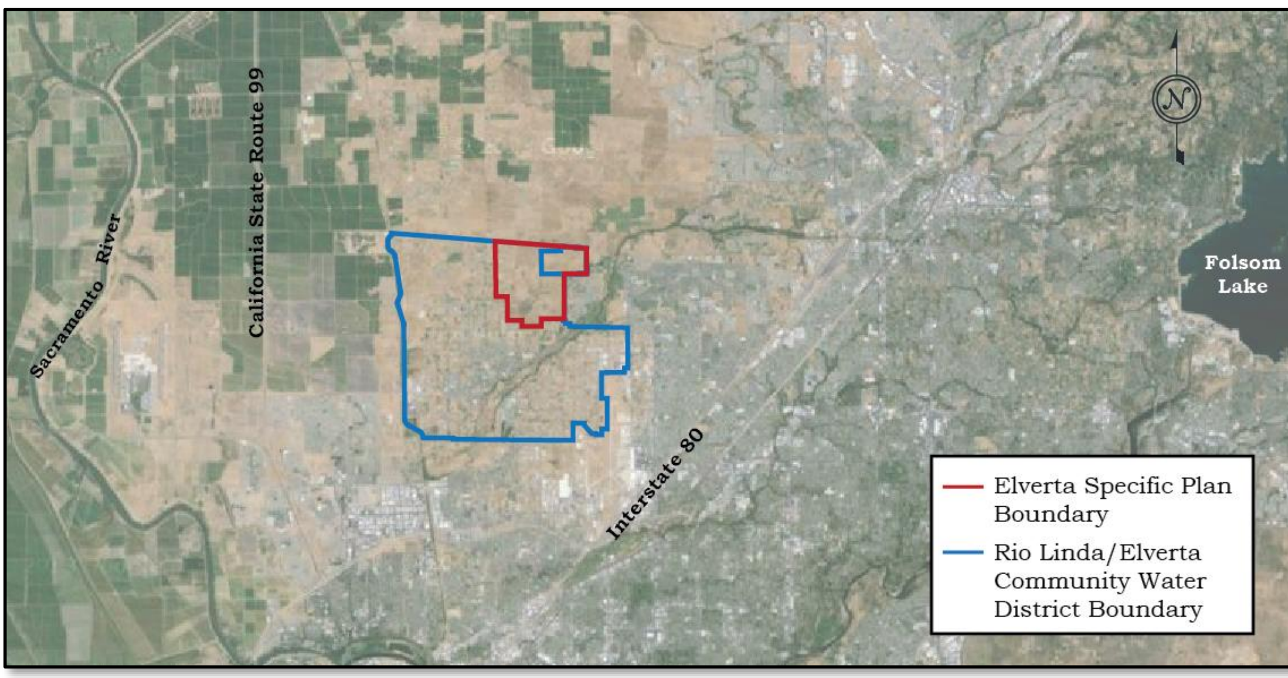


Figure 1.1 Elverta Specific Plan Area.

This Page Intentionally Left Blank

2. Projected Demand

2.1 Annual Water Demands

The projected land use water demands and totals are shown in Table 2.1. The 6,425 units includes the ESP holding capacity with the approved density bonus and the updated Northborough density. The density bonuses allow developers to obtain more favorable local development requirements in exchange for offering to build more types of homes such as senior or low income. All land use information was provided by the developers in December 2015. Demand and supply values will be updated upon final approval of land use plans and service area boundaries (see Appendix A for the last updated land use map). The industry standard for unaccounted water factor (10 percent) is added to the land use water demand total to determine the total water demand of 4,303 acre-feet per year (AFY). For the use of supply investigation, total water demands are rounded up to 5,000 acre-feet per year to account for above-average annual demands.

Table 2.1 Land Use Demand Projections

Land Use ID	Area (acres)	Dwelling Units	Unit Demand Factor (AF/DU or AF/ac)	Water Demand (AFY)
AR 1,5	237.74	216	1	216.0
AR 1	44.54	48	1	48.0
RD 1,2	10.98	19	1	19.0
RD 2	0	-	0.7	-
RD 3,4,5	717.6	3,339	0.6	2,003.4
RD 6,7	282.11	1,486	0.4	594.4
RD 10	5.7	46	0.3	13.8
RD 20	42.49	687	0.3	206.0
Commercial	17.5	--	2.5	43.8
Office / Professional	4.4	--	2.5	11.0
Parks	88.8		2.5	222.0
Schools	20.1	--	3.1	62.3
Drainage / Trails / Detention / Open Space (Irrigated)	51	--	1.3	63.8
Drainage / Trails / Detention / Open Space	163	--	0	0.0
Major Roads (irrigated)	39.4	--	2.5	98.5
Major Roads / Other	30.9	--	0	0.0
Total Residential	**1,341**	**5,841**	**--**	**3,101**
Residential Density Bonus	**--**	**584**	**--**	**310**
Total Non-Res	**415**	**--**	**--**	**501**
Subtotal:	**1,756**	**6,425**	**--**	**3,912**
Unaccounted Water (10%)	**--**	**--**	**--**	**391**
Total:	**1,756**	**6,425**	**--**	**4,303**

2.2 Initial Development Demands

The initial development phase demands are used to size the initial infrastructure required to serve development. Initial supply infrastructure will be installed to meet the first phase of demand projections. Supply infrastructure will be expanded beyond that time to match the pace of development growth. However, to eliminate redundancy and its associated higher ultimate cost, major supply infrastructure such as pipelines or other elements will be sized for ultimate build out initially as determined by the District. For planning purposes, it is assumed the initial development demands will total 2,500 acre-feet per year, which are approximately the total demands for ESP Phase 1 and Northborough.

The projected monthly and total demands for the ESP initial development and build out are summarized in Tables 2.2 and 2.3.

Table 2.2 ESP Initial Development Monthly Demands (2,500 acre-feet per year)

Month	Month Factor	Average Monthly Demand (AF)	Average Day (MGD)	Maximum Day (MGD)	Peak Hour (MGD)
January	0.47	97	1.0	1.1	1.6
February	0.43	89	1.0	1.1	1.7
March	0.54	113	1.2	1.3	1.9
April	0.71	147	1.6	1.7	2.6
May	1.16	242	2.5	2.7	4.1
June	1.58	329	3.6	3.8	5.7
July	1.86	387	4.1	4.3	6.5
August	1.78	372	3.9	4.2	6.3
September	1.41	293	3.2	3.4	5.1
October	0.99	206	2.2	2.3	3.5
November	0.57	119	1.3	1.4	2.1
December	0.50	104	1.1	1.2	1.8
Total:	--	2,500	--	--	--

Table 2.3 ESP Build Out Monthly Demands (5,000 acre-feet per year)

Month	Month Factor	Average Monthly Demand (AF)	Average Day (MGD)	Maximum Day (MGD)	Peak Hour (MGD)
January	0.47	194	2.0	2.2	3.3
February	0.43	178	2.1	2.2	3.3
March	0.54	226	2.4	2.5	3.8
April	0.71	295	3.2	3.4	5.1
May	1.16	484	5.1	5.4	8.2
June	1.58	658	7.2	7.7	11.5
July	1.86	773	8.1	8.7	13.0
August	1.78	743	7.8	8.4	12.5
September	1.41	587	6.4	6.8	10.2
October	0.99	413	4.3	4.6	7.0
November	0.57	239	2.6	2.8	4.2
December	0.50	209	2.2	2.3	3.5
Total:	--	5,000	--	--	--

2.3 Equivalent Dwelling Unit

Equivalent Dwelling Unit (EDU) demand values are required to determine infrastructure phasing needs. An EDU and other respective design parameters are summarized in Table 2.4. The design parameters are based on the design criteria developed in the District's Master Plan (2014).

Table 2.4 EDU Analysis

Parameter	Value	Units	Notes
ESP Total Demand	3,411	AFY	DU demand only
ESP Dwelling Units	6,425	DU	Maximum bonus density DU
Demand/DU	0.53	AF/DU	Average annual
10 Percent UAW	0.053	AF/DU	Average annual
Total Demand/DU, AFY	0.583	AF/DU	Average annual
Total Demand/DU, gpd	520	gpd/DU	Average annual
Avg Day in Max Month, gpd	967	gpd/EDU	1.86 factor from SRF Report monthly peaking factor analysis
Max Day, gpd	1,034	gpd/EDU	1.07 times max month average day
Peak hour, gpm	1.08	gpm/EDU	1.5 factor on max day based on SRF report
Storage Factors			Total Storage = three parameters added together
Peak Hour Storage	259	gal/EDU	Peak hour for 4 hours
Emergency Storage	258	gal/EDU	25 percent of max day
Fire Flow Storage	960,000	gallons	4,000 gpm for 4 hours

This Page Intentionally Left Blank

3. Supply Strategy

The previous 2008 supply strategy was developed under different circumstances and requirements. Since that time, the region has increased regional supply management efforts through the Water Forum Agreement implementation, SGA and West Placer Groundwater Management Plans, and the RWA Integrated Regional Water Management Plan. The supply strategy is updated to support these regional supply planning efforts and goals.

3.1 Previous Supply Strategy

The ESP supply planning documents from previous efforts evaluated numerous supply sources and strategies to serve the development under the PF-8 requirements. PF-8 was conditioned on the Development by the County to ensure proper long-term groundwater management. The selected strategy included a mix of groundwater, surface water, and recycled water. The supply strategy proposed a conjunctive use of groundwater and surface water. New wells would be drilled to supply groundwater in the quantity required for the ESP's maximum day demand. The District would purchase surface water from the Sacramento Suburban Water District (SSWD) during the off peak seasons and serve both ESP and other District demands in quantities sufficient to offset the annual groundwater pumping volumes. SSWD would sell surface water from its contract with Placer County Water Agency (PCWA), treated at the San Juan Water District's surface water treatment plant, and delivered to the District through the existing and extended Cooperative Transmission Pipeline. The District would also implement a recycled water program with the City of Roseville. The District would buy reclaimed water from Roseville and divert it from Dry Creek to serve the Cherry Island Golf Course and Gibson Ranch Park. These two parks would in turn cease groundwater pumping, providing a reduction in basin groundwater pumping.

As part of this updated Water Supply Analysis, the previous supply strategy was re-evaluated with respect to reliability, cost, and complexity. Both PCWA and SSWD staff indicated concern with the surface water reliability, as it is projected that SSWD will only receive supply from PCWA approximately six in ten years (based on inflow to Folsom Reservoir and other parameters). SSWD staff also indicated that PCWA may no longer have the available surface water rights to supply the District even during wet years. In addition, the draft supply agreement with SSWD indicated that the District would be the first customer eliminated in the event of supply shortages. Past planning efforts were halted before supply costs were developed. However, the draft supply agreement included high connection fees that were associated with numerous non-supply payments to address past legal, environmental, design, and construction issues between the District and SSWD concerning the Cooperative Transmission Pipeline. Delivering the supply to the District would require coordination between four agencies (RLECWD, SSWD, SJWD, and PCWA). The coordination between these agencies that is required to schedule supply availability and treatment capacity is considered complex.

The City of Roseville staff was contacted regarding the recycled water supply strategy. The staff indicated that they now may not have excess recycled water supply to sell the District due to their potential needs within their city. The City of Roseville staff are re-evaluating their needs and are not prepared at this time to commit to any recycled water supply.

The previous supply strategy is not recommended due to the low water supply reliability and the associated high connection fees and supply costs.

No reclaimed water is available in this area of Sacramento County. Discussions with SRCSD should be conducted about the possibility of adding a scalping plant to enable the use of reclaimed water.

3.2 Recommended Supply Strategy

Alternative supply strategies were investigated with the goal to develop a supply strategy that maximizes supply reliability and minimizes long-term operational costs. Each potential supply partner was contacted to review supply opportunities and constraints. Supply alternatives were either eliminated or not investigated further based on these initial discussions. High potential supply options were identified and further investigated as the District developed its recommended water supply strategy. A supply strategy for the entire RLECWD service area was developed in the 2014 Master Plan. The Master Plan supply strategy supports the regional planning efforts to enhance conjunctive use abilities region-wide.

3.2.1 Regional Planning Efforts

The North American River Groundwater Basin is extensively managed through current management plans and regional planning efforts to increase conjunctive use. The basin is not adjudicated, but managed through regional cooperation. Multiple public agencies and governmental boundaries overlay the basin. The Sacramento Groundwater Authority (SGA) manages the basin portion within Sacramento County, known locally as the North Area Basin. SGA is a joint powers authority formed in 1998 as a result of the Sacramento Area Water Forum. SGA developed and actively maintains the Groundwater Management Plan and produces an annual Basin Management Report that provides an update on basin objectives and programs and results (SGA Basin Management Report – 2013 Update). SGA has developed the water accounting framework (SGA Water Accounting Framework Phase III Effort, June 2010) to facilitate conjunctive use strategies and partnerships within the basin. SGA also leads ongoing basin monitoring activities as the reporting agency for the California Statewide Groundwater Elevation Monitoring Program (CASGEM). SGA monitors groundwater elevations and quality throughout the basin through a network of 23 groundwater-sampling sites.

The Water Forum process is a regional multi-stakeholder process to help meet water needs through 2030 and also meet environmental flow requirements on the lower American River. Extensive groundwater modeling and analysis was conducted as part of the process. Results recommended a total safe sustainable yield for the North Basin of

131,000 acre-feet per year (AFY). The 2014 SGA Groundwater Management Plan estimates the average pumping over the last 13 years of approximately 99,500 AFY. The ESP groundwater supply is estimated at 5,000 AFY, well within the Water Forum sustainable yield.

Additional modeling and planning of the groundwater basin has been conducted since the Water Forum Agreement. The Regional Water Authority developed and updates the American River Basin Integrated Regional Water Management Plan (ARB IRWMP). The ARB IRWMP provides a framework for the region to implement the vision: "The American River Basin Region will responsibly manage water resources to provide for the lasting health of our community, economy, and environment". The document contains numerous goals, principals, objectives, and strategies to meet the vision. Water Resources Strategy 2 calls for an increase of groundwater production to 550 mgd by 2030. The 2013 production capacity is approximately 400 mgd. The ESP wells (approximately 9 mgd) will help meet this goal and will support the other goals of conjunctive use opportunities for increased reliability.

The West Placer County Groundwater Management Plan (WPCGMP) was developed by Placer County Water Agency, City of Roseville, City of Lincoln, and California American Water. The plan covers the North American Groundwater Basin portion that is in west Placer County, which abuts the northern edge of RLECWD's service area. Both the SGA GWP and the WPCGMP address the same groundwater basin, although the plans cover two different political boundaries. Both the Water Forum and SGA participated in the WPCGMP, and each WPCGMP agency also is a member of the Water Forum, SGA, RWA, and/or the ARB IRWMP. The WPCGMP identifies the WFA estimated sustainable yield in Sacramento County at 131,000 AFY, Placer County at 95,000 AFY, and Sutter County at 175,000 AFY. Basin Management Objective 2 indicates groundwater use will result in basin level fluctuations, and the management goal is to maintain an acceptable "operating range." The ESP supply wells are within the 131,000 AFY sustainable yield, and will also help conjunctive use strategies, supporting the goals of the WPCGMP.

The District investigated supply options through the SGA Groundwater Accounting Framework. The District solicited purchasing groundwater credits from City of Sacramento, SSWD, and Carmichael WD, no agreement with any of these Agencies could be made.

3.2.2 RLECWD Supply Strategy

The Master Plan recommended supply strategy supports the regional planning efforts to enhance conjunctive use abilities region-wide. To achieve this, the region needs to increase its groundwater production capacity and enhance surface water supply sources and volumes. Cooperative efforts amongst agencies throughout the region will involve conjunctive use strategies between groundwater pumpers, surface water users, and those with both supplies. RLECWD will continue to serve existing and new customers with groundwater. RLECWD will collaborate within the region to enhance conjunctive use strategies. As part of this effort, RLECWD is participating in efforts to develop a new surface water treatment plant on the Sacramento River. The new treatment plant will increase regional supply reliability, and also afford RLECWD a potential supplemental supply for conjunctive use within its own service area. However, regardless of regional partner participation, RLECWD intends to construct a surface water treatment plant and obtain surface water supplies to enhance service to its customers as stated in its April 2014 Water Master Plan. RLECWD will continue to develop a surface water treatment plant project on two parallel efforts: one with other partners, and one with just RLECWD.

3.2.3 ESP Supply Strategy

Based on the evaluation of several water supply strategies, it is recommended that RLECWD serve the ESP Development with groundwater. New groundwater wells will be constructed in or near the ESP development area. The ESP distribution system will be connected to the existing RLECWD distribution system to increase system-wide reliability and operational efficiencies.

The District is currently completing a rate case study that sets a connection fee to fund supply, storage, and distribution associated with growth. Surface water facilities are included as a component of the connection fee. Once surface water is made available to the District, it will be used to supplement the groundwater and assist in the overall health of the regional groundwater management efforts.

A new transmission loop is also included as part of the connection fee. This loop will enable the distribution of surface and groundwater throughout the District.

4. Phases of Development

The infrastructure will be phased to match ESP growth. The initial infrastructure must be in place to provide supply before any new customers can be connected. Additional infrastructure will be added as necessary to match growth.

4.1 Initial Development Infrastructure Phasing Requirements

The initial infrastructure is planned to serve the initial development areas as shown in Figure 4.1. Table 4.1 lists the initial development infrastructure requirements that must be built prior to connecting customers. It is assumed some form of groundwater treatment will be required. Actual requirements will be determined after the well is drilled, pump tested, and the well's water quality is sampled. Initial development infrastructure is shown on Figure 4.1.

Figure 4.1 shows the transmission mains that will be needed to serve the initial phases of ESP. These initial developments are shown in red hatching on the figure. ESP will be connected to the District's existing system with two initial off-site main extensions. The first main extension will be from ESP to Dry Creek Road and Q Street. The second main extension will be from ESP in 16th Street to Q Street then east to 24th Street. The two main extensions will provide redundant connectivity from ESP to the District's water system. The second main extension will enable the District's newest well (Well 15) to provide water supply backup to the wells being drilled as part of ESP initial infrastructure phase. The location of the wells, reservoir, and pump station are shown at a tentative location. The exact location will be based on the results of the hydrogeological study and the property available (See Figure 4.1).

Figure 4.2 shows the initial phase of the conceptual groundwater treatment plant (GWP) that is planned to be constructed as part of the initial development of ESP. The facility consists of drilling groundwater Wells 16 and 17 and equipping only Well 16 for this initial phase. It is planned that both wells will be located on the same property. The exact location will be based on the recommendations within the hydrogeological study to avoid treatment and minimize cross effect that each well may have on each other. Both wells are being drilled with the water quality sampled to determine the type, if any, of treatment that is required. Well 16 will pump through treatment if necessary and fill a new 3 MG reservoir to supply ESP as its source of supply during normal operations. There will be four booster pumps that will draw from the reservoir and pump into the distribution system to supply ESP's MDD and PHD for their initial development. The facility will be equipped with a generator that will be sized for the initial electrical load and provide power to the facility during utility power outages.

Table 4.1 Initial Development Infrastructure Requirements

Parameter	Capacity	Units	Notes
Groundwater Well	1,500 gpm	1	Assumes one well will produce 1,500 gpm.
Groundwater Treatment	1,500 gpm	1	Assumes treatment is required.
Booster Pumping Station	4,530 gpm	1	Sized for initial development peak hour.
Storage Tanks	3 MG	2	Assumes one 3-million gallon tank, construction would be phased within initial development.
Transmission Mains	12-inch 16-inch 24-inch	23,000 LF 23,500 LF 13,500 LF	Pipelines would be phased within initial development depending on actual location of individual development.

4.2 ESP Buildout Infrastructure Requirements

The full infrastructure requirements at buildout for ESP are shown on Figure 4.3. Once initial infrastructure is installed, the District will monitor the rate of new connections, demands, capacities, and water quality. The District will implement the remaining infrastructure requirements in a phased approach to meet the water demand as development occurs. Ultimate buildout infrastructure requirements are summarized in Table 4.2.

Figure 4.3 shows the ultimate build out of the groundwater supply system. This includes the equipping of Well 17, expanding treatment if necessary, increasing backup power, and expanding the capacity of the booster station to supply ESP to meet their ultimate MDD and PHD. ESP Build Out Infrastructure Requirements

Parameter	**Capacity**	**Units**	**Notes**
Groundwater Wells	1,500 gpm	4	4 wells with assumed 1,500 gpm capacity.
Groundwater Transmission	16-inch	5,000 LF	Assume 2,500 for wells 3 and 4 each to connection to transmission loop.
Groundwater Treatment	8.7 mgd	4	Max day demands, assume treatment at each well.
Booster Pumping Station	9,000 gpm	2	Peak hour demands, up to two stations depending on ultimate storage tank locations.
Storage Tanks	5.5 MG	4	Assume one 3-million gallon tank at well treatment site and remainder combined with other storage throughout District.
Transmission Mains	12-inch 16-inch 24-inch	30,500 LF 23,500 LF 13,500 LF	

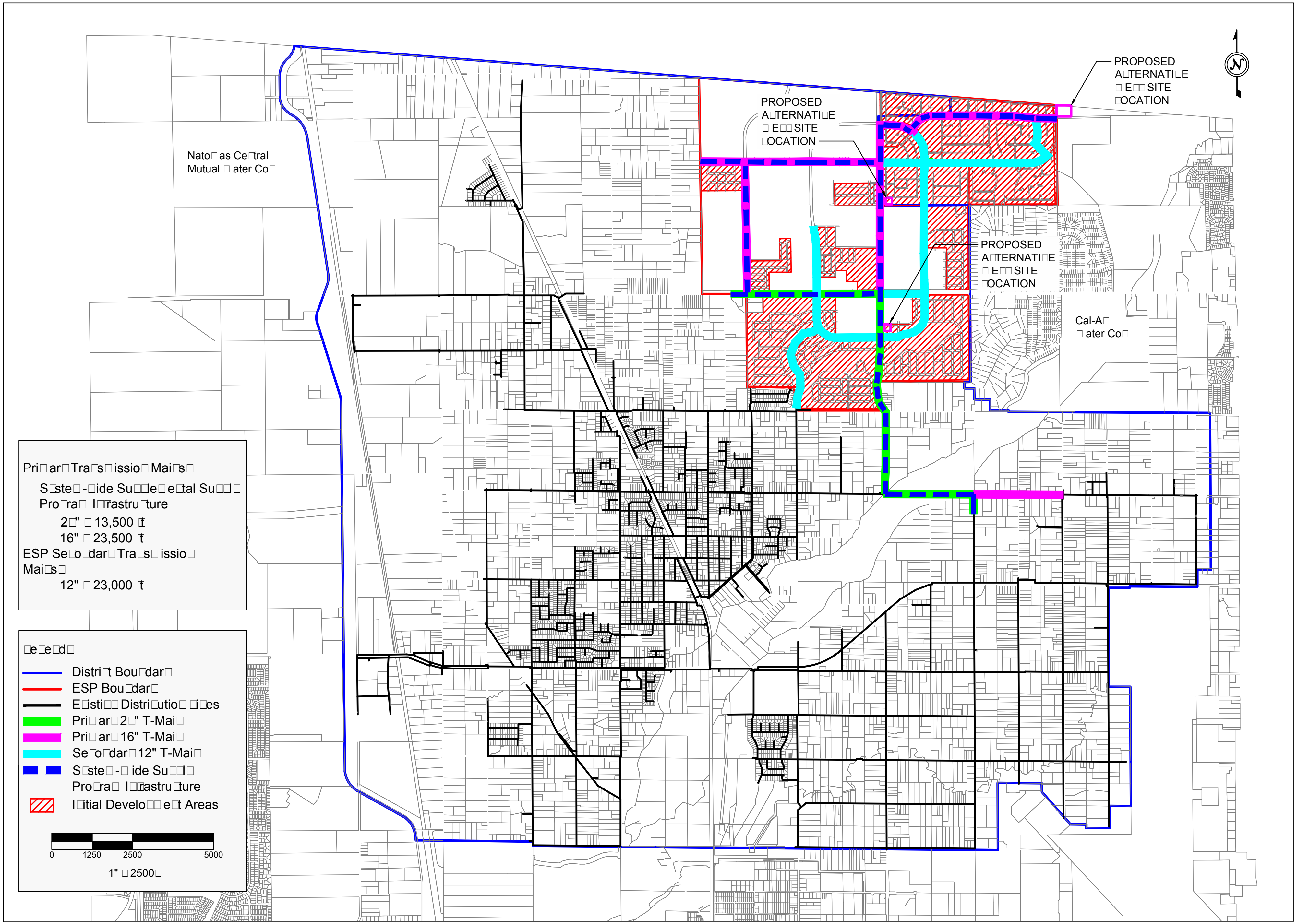
4.3 Supplemental Supply Infrastructure Requirements

The supplemental surface water supply project will require 25 mgd capacity (14,500 AFY) for RLECWD conjunctive use needs (RLECWD Master Plan – 2015 Update). The project may be larger depending on participation of other partners. For the purposes of this study and apportioning costs, it is assumed the project will be for RLECWD only. The initial capacity of the Supplemental Water Project (SWP) will be 5 MGD with 5 MGD capacity increases up to an ultimate capacity of 25 MGD. All new connections will pay a proportionate share to fund this program.

The program includes a service water treatment plant, raw water transmission main, and a transmission loop throughout the RLECWD service area. The SWP infrastructure requirements are summarized in Table 4.3. Figure 4.4 illustrates the supplemental supply project infrastructure. Locations shown are for illustrative purposes only; actual locations will be determined in the design phase.

Table 4.2 Supplemental Supply Infrastructure Requirements

Parameter	Capacity Units	Notes
	Surface Water Infrastructure	
Raw Water Pumping Station	25 MGD	14,500 AFY ultimate build out max day demand. Located at NCMWC Pritchard Lake Intake structure.
Raw Water Pipeline	36-inch, 32,000 LF	Sized for total 14,500 AFY District build out. Actual alignment selected will affect total length.
Raw Water Storage	50 MGal	Located at treatment plant site, number of cells to be determined during design.
Pre-Treatment Booster Pumping Station	25.2 MGD	Pump water from raw water ponds into treatment plant.
Surface Water Treatment Plant	25.2 MGD	Includes treatment and solids handling.
Treated Booster Pumping	25.2 MGD	Max day only, peak hour pumping met by distribution system booster pumping/storage sites.
	Distribution System Infrastructure	
System Storage	13.5 MGal	Size and unit number to be determined. Located throughout District.
36-inch T-Main	6,000 LF	See figure for general location, actual locations and length determined in design.
24-inch T-Main	53,400 LF	
16-inch T-Main	31,000 LF	



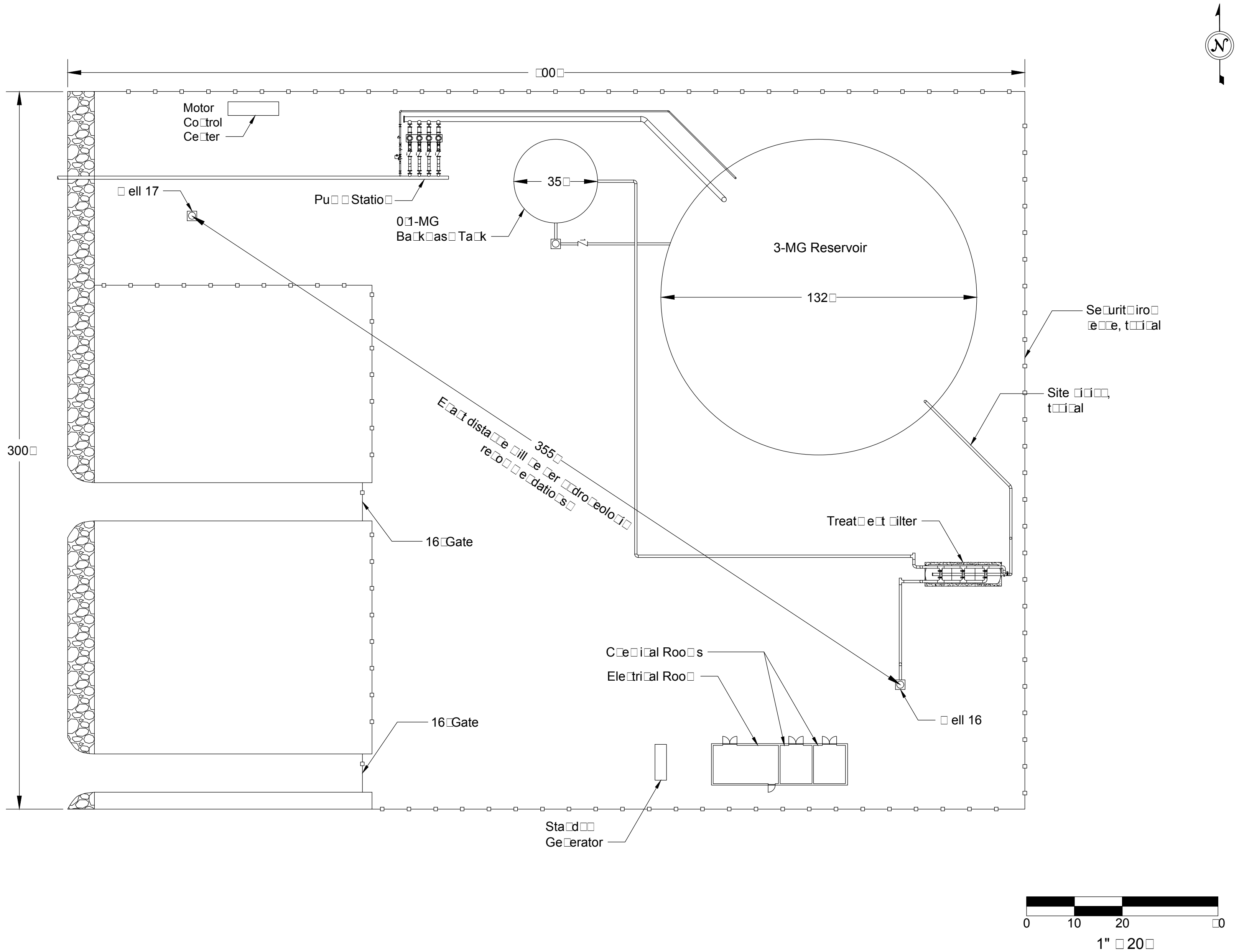
Rio Linda / Elverta Community Water District
730 □ Street
Rio □i□da, CA 95673

FIGURE 4.1

JANUARY 2016

AFFINITY ENGINEERING

ELVERTA SPECIFIC PLAN INITIAL DEVELOPMENT INFRASTRUCTURE



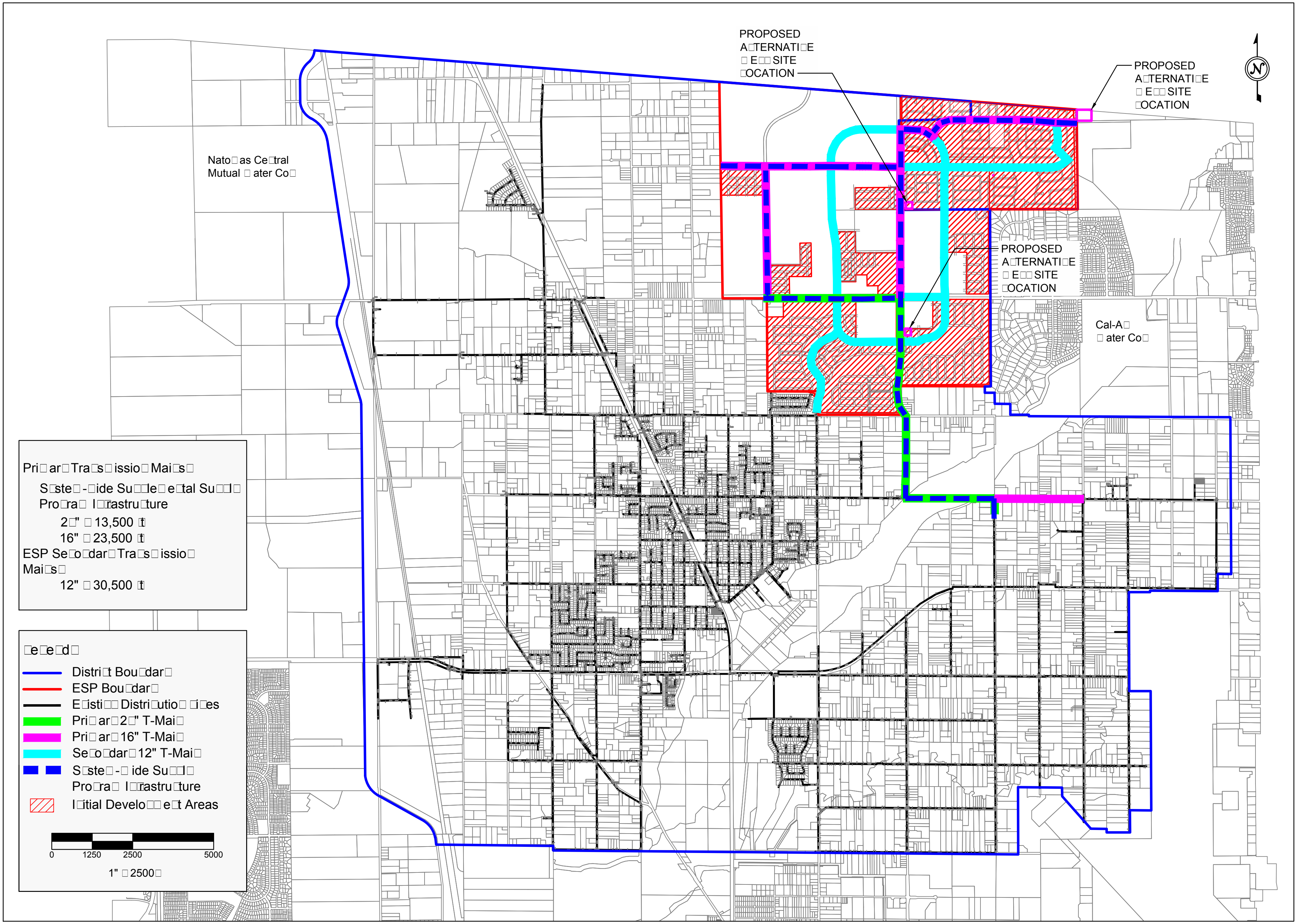
Rio Linda / Elverta Community Water District

FIGURE 4.2

JANUARY 2016

CONCEPTUAL ESP GROUNDWATER SUPPLY/TREATMENT FACILITY INITIAL DEVELOPMENT

AFFINITY ENGINEERING



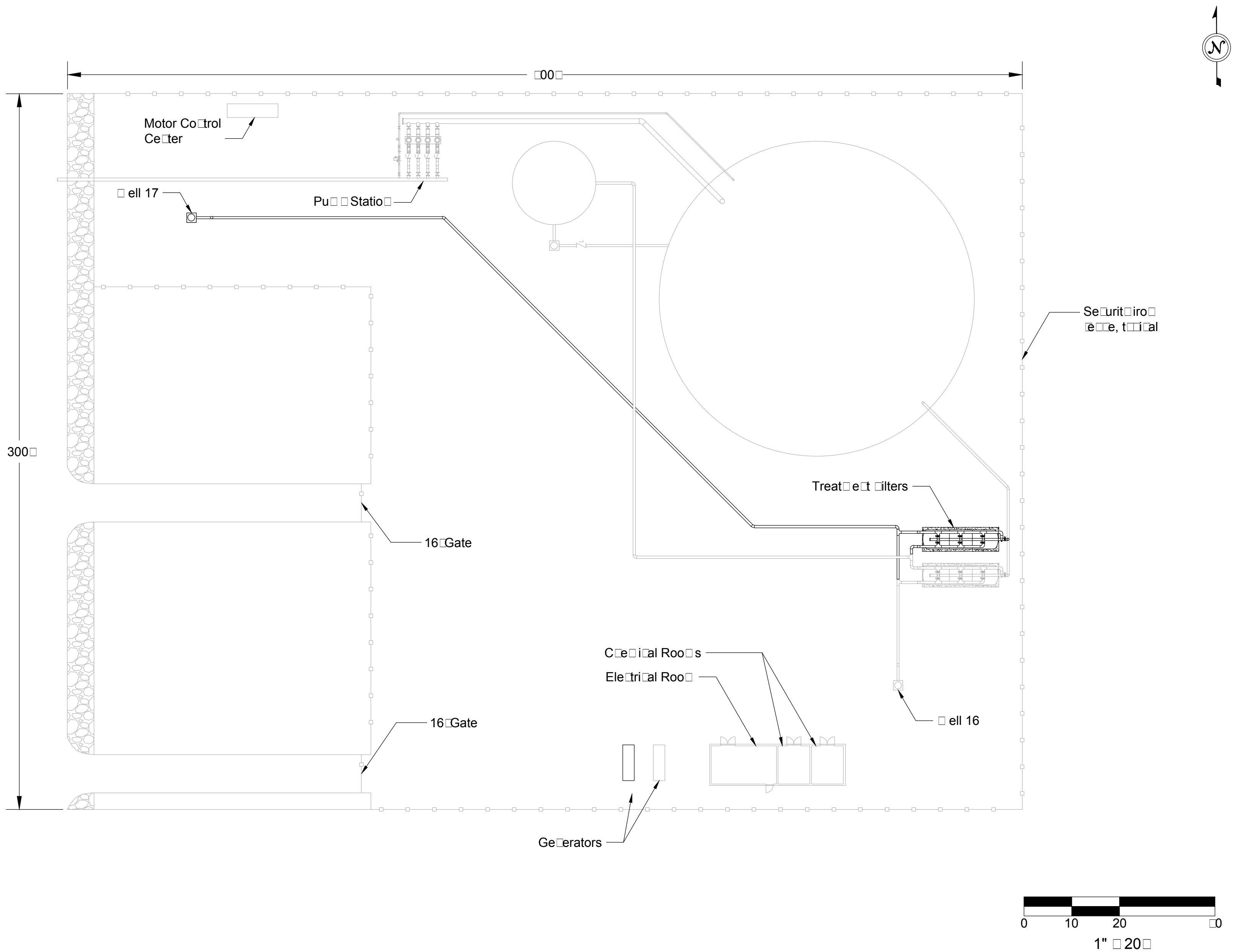
Rio Linda / Elverta Community Water District
730 □ Street
Rio □i□da, CA 95673

FIGURE 4.□

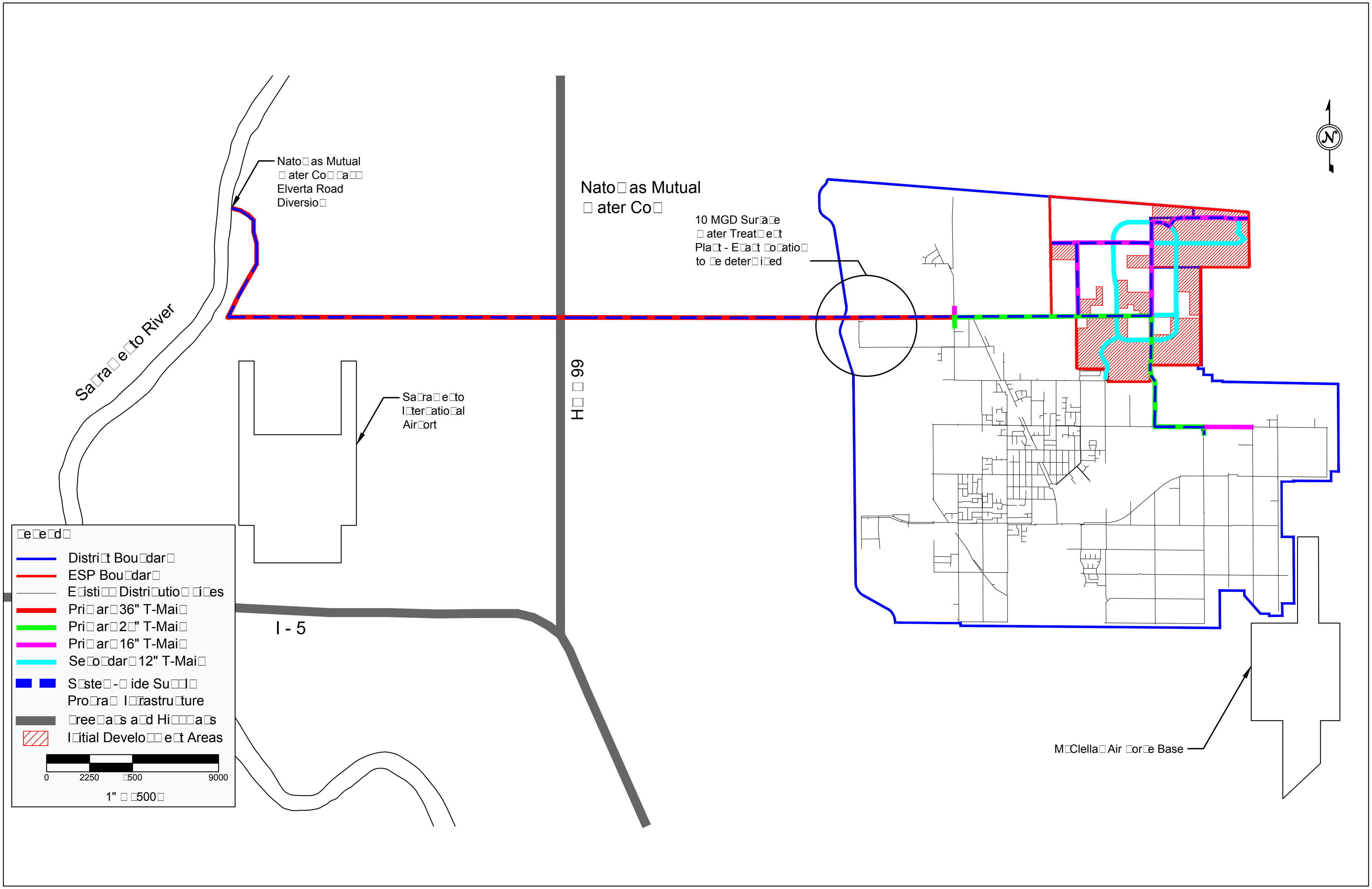
ELVERTA SPECIFIC PLAN FULL □UILD OUT INFRASTRUCTURE

JANUARY 2016

AFFINITY ENGINEERING



Rio Linda / Elverta Community Water District 730 □ Street Rio □i□da, CA 95673	**FIGURE 4.4**	**JANUARY 2016**
	CONCEPTUAL ESP GROUNDWATER SUPPLY/TREATMENT FACILITY ULTIMATE □UILD OUT	AFFINITY ENGINEERING



Rio Linda / Elverta Community Water District
730 □ Street
Rio □i□da, CA 95673

FIGURE 4.5

SURFACE WATER SUPPLY PROJECT

JANUARY 2016

AFFINITY ENGINEERING

5. Infrastructure Probable Costs

Tables 5.1 and 5.2 provide the probable costs for ESP's initial development phase and ultimate buildout, respectfully. The ESP costs are compared to the full groundwater and supplemental supply infrastructure costs for the 14,500 AFY ultimate demand in Table 5.3 (from the RLECWD Master Plan – 2015 Update). The ESP financing plan will assign costs in a fee program to fund the construction of the necessary infrastructure.

Table 5.1 ESP Initial Development - Opinion of Probable Supply Infrastructure Costs

Item	Capacity	Unit Cost	Cost	Notes
Groundwater Well	1,500 gpm	$2,000,000/well	$2,000,000	Assumes one well will produce 1,500 gpm.
Groundwater Treatment	3,000 gpm	$1,000/gpm	$3,000,000	Assumes treatment is required.
Booster Pumping Station	4,530 gpm	$600/gpm	$2,718,000	Sized for initial development peak hour.
Storage Tanks	3.1 MG	$1/gal	$3,100,000	Construction could be phased within initial development.
12-inch Trans. Main	23,000 LF	$150/ LF	$3,450,000	Pipelines could be phased within initial development depending on actual location of individual development.
16-inch Trans. Main	23,500 LF	$200/ LF	$4,700,000	
24-inch Trans. Main	13,500 LF	$310/ LF	$4,185,000	
		Subtotal:	$23,153,000	
		Contingency:	$6,945,900	Construction contingency at 30 percent
		Construction Total:	$30,098,900	
		Program Costs	$6,320,769	Engineering, construction management, administration, permitting, CEQA, legal, right of way at 20 percent – assume 20 percent.
		Total:	$37,000,000	Rounded.

Table 5.2 ESP Ultimate Buildout - Opinion of Probable Supply Infrastructure Costs

Item	Capacity	Unit Cost	Cost	Notes
Groundwater Well	1,500 gpm	$2,000,000/well	$8,000,000	Assumes 4 wells each produce 1,500 gpm.
Water Transmission	10,000 LF	$200/LF	$2,000,000	Each well assume 2,500 LF to connect to loop.
Groundwater Treatment	6,000 gpm	$1,000/gpm	$6,000,000	Assumes treatment is required.
Booster Pumping Station	9,061 gpm	$600/gpm	$5,436,600	Sized for initial development peak hour.
Storage Tanks	5.3 MG	$1/gal	$5,300,000	Assumes one 3-million gallon tank, construction could be phased within initial development.
12-inch Trans. Main	30,500 LF	$150/ LF	$4,575,000	Pipelines could be phased within initial
16-inch Trans. Main	23,500 24-	$200/ LF	$4,700,000	development depending on actual
24-inch Trans. Main	13,500 LF	$310/ LF	$4,185,000	location of individual development.
		Subtotal:	$40,196,000	
		Contingency:	$12,058,980	Construction contingency at 30 percent
		Construction Total:	$52,255,580	
		Program Costs	$10,973,700	Engineering, construction management, administration, permitting, CEQA, legal, right of way - assume 20 percent.
		Total:	$63,500,000	Rounded.

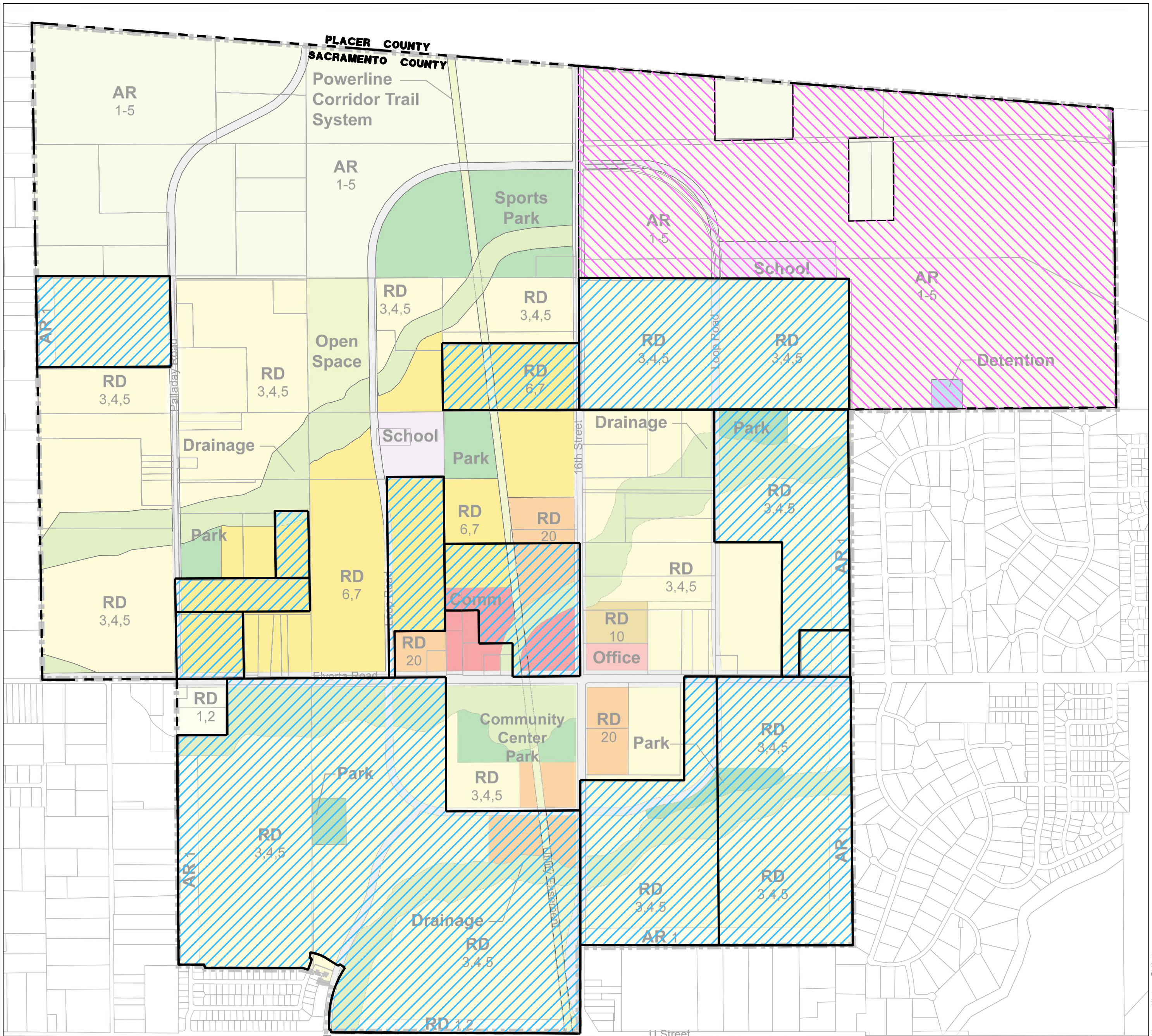
Table 5.3 Comparison of Supply Infrastructure Costs

	ESP Phase 1	ESP Ultimate Buildout	Full District Buildout
Annual Demand	2,500 AFY	5,000 AFY	14,500 AFY
Total Cost	$37,000,000	$63,500,000	$351,000,000

This Page Intentionally Left Blank

Appendix A. ESP Land Use Plan Map

This Page Intentionally Left Blank



LEGEND

(blue hatch)	PHASE 1 PROPERTIES
(pink hatch)	NORTHBOROUGH
(light green)	REMAINDER

Elverta SPA

MACKAY & SOMPS
ENGINEERS PLANNERS SURVEYORS
1552 Eureka Road, Suite 100, Roseville, CA 95661 (916) 773-1189

Date: 12/16/15
Job No: 7501-30

12-16-2015 08:26:29 ecrow P:\7501\exhibits\Backbone Impact\Elverta-Backbone-Water-PH1.dwg
[1] P:\7501\PLN\Exh-P\Phase 1 Composite.dwg [2] P:\7501\PLN\Elverta Specific Plan 2014 Approved LUP.dwg [3] P:\7501\master plans_Mstrs\P-UH-ELV-SPA.dwg [4] P:\7501\topo\WAVD88\WAVD88-C3D-DTM.dwg [5] P:\7501\PLN\Elverta-Adj.dwg