Las Virgenes – Triunfo Joint Powers Authority
4232 Las Virgenes Road, Calabasas, CA 91302
818.251.2100

Call and Notice of Special Meeting of the Governing Board of the
Las Virgenes – Triunfo Joint Powers Authority

A Special Meeting of the Governing Board of the Las Virgenes – Triunfo Joint Powers Authority is hereby called, and notice of said Special Meeting is hereby given for 5:00 p.m. on Monday, July 10, 2017, at Las Virgenes Municipal Water District, 4232 Las Virgenes Road, Calabasas, California 91302, to consider the following:

PLEDGE OF ALLEGIANCE

1. Call to Order and Roll Call
2. Special Meeting of July 10, 2017 (Agenda attached)
3. Adjourn

By Order of the Board of Directors
JAMES WALL, Chair

Josie Guzman, CMC
Deputy Secretary

Dated: July 5, 2017

c: Each Director

LAS VIRGENES - TRIUNFO
JOINT POWERS AUTHORITY
AGENDA

4232 Las Virgenes Road, Calabasas, CA 91302

CLOSING TIME FOR AGENDA IS 8:30 A.M. ON THE TUESDAY PRECEDING THE MEETING. GOVERNMENT CODE SECTION 54954.2 PROHIBITS TAKING ACTION ON ITEMS NOT ON POSTED AGENDA UNLESS AN EMERGENCY, AS DEFINED IN GOVERNMENT CODE SECTION 54956.5 EXISTS OR UNLESS OTHER REQUIREMENTS OF GOVERNMENT CODE SECTION 54954.2(B) ARE MET.

5:00 PM July 10, 2017

PLEDGE OF ALLEGIANCE

1 CALL TO ORDER AND ROLL CALL

2 APPROVAL OF AGENDA

3 PUBLIC COMMENTS

Members of the public may now address the Board of Directors **ON MATTERS NOT APPEARING ON THE AGENDA**, but within the jurisdiction of the Board. No action shall be taken on any matter not appearing on the agenda unless authorized by Subdivision (b) of Government Code Section 54954.2

4 CONSENT CALENDAR

A Minutes: Regular Meeting of June 5, 2017 and Special Meeting of June 19, 2017 (Pg. 3)

Approve.

5 ILLUSTRATIVE AND/OR VERBAL PRESENTATION AGENDA ITEMS

A Pure Water Project Las Virgenes-Triunfo: Update (Pg. 13)

6 ACTION ITEMS

A Rancho Las Virgenes Raw Sludge Wet Well Recirculation Modifications Project: Construction Award (Pg. 14)

Appropriate an additional $240,328; award a construction contract to Pacific Hydrotech Corporation, in the amount of $355,900; and reject all remaining bids upon receipt of duly executed contract documents for the Rancho Las Virgenes Raw Sludge Wet Well Recirculation Modifications Project.

B Rancho Las Virgenes Centrate Equalization Tank Project: Approval of Scope Changes for Design Services During Construction and Construction Management (Pg. 17)

Authorize the General Manager to execute a Change in Scope to the professional services agreement with Pacific Advanced Civil Engineering (PACE), in the amount of $31,474, for additional design services during construction; and to the professional services agreement with Kennedy/Jenks Consultants, in the amount of $62,700, for additional construction management services for the Centrate Equalization Tank Project.

C Pure Water Project Las Virgenes-Triunfo: Draft Preliminary Design Report for Pure Water Demonstration Project (Pg. 25)

Provide input and feedback on the proposed vision, layout and scope of the Pure Water Demonstration Project.

7 BOARD COMMENTS

8 ADMINISTERING AGENT/GENERAL MANAGER REPORT

9 FUTURE AGENDA ITEMS

10 INFORMATION ITEMS

A Pure Water Project Las Virgenes-Triunfo: Preliminary Financial Feasibility Report (Pg. 122)

11 PUBLIC COMMENTS

Members of the public may now address the Board of Directors **ON MATTERS NOT APPEARING ON THE AGENDA**, but within the jurisdiction of the Board. No action shall be taken on any matter not appearing on the agenda unless authorized by Subdivision (b) of Government Code Section 54954.2

12 CLOSED SESSION

A Conference with JPA Legal Counsel - Potential Litigation (Government Code Section 54956.9): One Case

In the opinion of Legal Counsel, disclosure of the identity of the litigants would be prejudicial to the JPA.

13 ADJOURNMENT

Pursuant to Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132), and applicable federal rules and regulations, requests for a disability-related modification or accommodation, including auxiliary aids or services, in order to attend or participate in a meeting, should be made to the Executive Assistant/Clerk of the Board in advance of the meeting to ensure availability of the requested service or accommodation. Notices, agendas, and public documents related to the Board meetings can be made available in appropriate alternative format upon request.

LAS VIRGENES – TRIUNFO
JOINT POWERS AUTHORITY
MINUTES
REGULAR MEETING

5:00 PM June 5, 2017

PLEDGE OF ALLEGIANCE

The Pledge of Allegiance to the Flag was led by James Wall.

1. CALL TO ORDER AND ROLL CALL

The meeting was called to order at **5:00 p.m.** by Chair Wall in the Board Room at Las Virgenes Municipal Water District headquarters at 4232 Las Virgenes Road in Calabasas, California. Josie Guzman, Clerk of the Board, conducted the roll call.

Present: Directors Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, and Wall.
Absent: Director Iceland.

2. APPROVAL OF AGENDA

Director Peterson moved to approve the agenda. Motion seconded by Director Caspary. Motion carried by the following vote:

AYES: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, Wall
NOES: None
ABSENT: Iceland
ABSTAIN: None

3. PUBLIC COMMENTS

Tony Vitullo stated that he was an organic farmer, and he has been using the free compost from the Rancho Las Virgenes Compositing Facility for the past two years. He expressed his appreciation for access to a free and excellent product. Director Caspary thanked Mr. Vitullo for providing his comments.

4. CONSENT CALENDAR

A Minutes: Special Meeting of April 18, 2017 and Regular Meeting of May 1, 2017

Director Orkney moved to approve the Consent Calendar. Motion seconded by Director Paule. Motion carried by the following vote:

Minutes of Special Meeting of April 18, 2017:
AYES: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger
NOES: None
ABSENT: Iceland
ABSTAIN: Wall

Minutes of Regular Meeting of May 1, 2017:
AYES: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, Wall
NOES: None
ABSENT: Iceland
ABSTAIN: None

5. ILLUSTRATIVE AND/OR VERBAL PRESENTATION AGENDA ITEMS

A Recognition of Westlake High School Mentorship Program Participants

Chair Wall provided introductory remarks and presented certificates of recognition to participants Marissa Huang, Nhuvi Tran, Jorge Avalos, and Evan Posner, and to staff mentors Jan Dougall, Joanne Bodenhamer, and Coleman Olinger.

Marissa Huang expressed appreciation for a well-organized program and a gratifying experience.

B Recognition of Director Steven D. Iceland's Service to the JPA

This item was postponed to a future meeting.

C Pure Water Project Las Virgenes- Triunfo: Update

David Lippman, Director of Facilities and Operations, provided the following update:

Funding and Financing: The U.S. Bureau of Reclamation awarded the JPA a grant, in the amount of $150,000, to be used for the preparation of a Title XVI Feasibility Study and a grant, in the amount of $300,000, to assist in funding the Demonstration Project. Staff submitted an application to the State Water Resources Control Board for a $75,000 grant that would also be used to assist in funding the Title XVI Feasibility Study.

Outreach: Mr. Lippman reported that staff had participated in 18 speaker engagements, including one for the Sierra Club, Angeles Chapter. The Sierra Club

offered to prepare a support letter. Staff will also speak at the Ventura County Special Districts Association meeting on June 6, 2017.

Demonstration Project: Mr. Lippman explained that staff was reviewing the preliminary design report submitted by CDM Smith, which would be presented to the Board in July. The Board will also be provided a tour of Building No. 1 in July. Staff will provide an update on the next steps at the August 7th Board meeting.

Mixing Study: The bathymetric survey for the mixing study was reported to be completed.

Advanced Water Treatment Site: Mr. Lippman reported that the purchase option agreement had been executed, allowing staff to proceed with the 60-day due diligence period. The option deposit, in the amount of $100,000, was wired to the escrow company. Due diligence will consist of RMC studying the previous reports of the site, including those for geotechnical, environmental and biological issues. Staff will meet with City of Agoura Hills staff to discuss the compatibility of the proposed use for the site with the City's general and specific plans. The preliminary title report and draft appraisal were received. Mr. Lippman explained that staff was working on scheduling tours for the JPA Board of the Westlake Filtration Plant, Westlake Pump Station, Las Virgenes Reservoir and the Leo Vander Lans Advanced Water Treatment Facility in Long Beach.

Director Renger inquired regarding the surface area of Las Virgenes Reservoir. Mr. Lippman responded that staff would follow-up and provide the information.

Director Pan inquired regarding the status of the financing plan. Administering Agent/General Manager David Pedersen responded that The PFM Group would present the report at the July 10th Board meeting.

D Federal Affairs Update: John Freshman, Best Best & Krieger LLP

John Freshman, Best Best & Krieger LLP, provided an update via teleconference regarding lobbying efforts, including the award of the two grants by the U.S. Bureau of Reclamation. He also provided an update regarding funding for water projects under the Fiscal Year 2018 Congressional Appropriation process.

Ana Schwab, Best Best & Krieger LLP, joined the teleconference and introduced herself.

Mr. Freshman responded to a question regarding feedback from legislative staff following the lobbying trip to Washington D.C. by stating that the main feedback was the approval of the Title XVI grants. He noted that he had been in contact with Congressman Ted Lieu's office, which had expressed support for the project. Administering Agent/General Manager David Pedersen added that staff had provided a tour of JPA facilities to Congressman Lieu's staff.

A discussion ensued regarding receiving future communications from Mr. Freshman. Administering Agent/General Manager David Pedersen stated that materials provided by Mr. Freshman would be included as Information Items on future agendas.

6. ACTION ITEMS

A Digester No. 1 Rehabilitation Project: CEQA Determination and Call for Bids

Find that the work is exempt from the California Environmental Quality Act and approve the issuance of a Call for Bids for the Digester No. 1 Rehabilitation Project.

Administering Agent/General Manager David Pedersen presented the report.

Director Polan moved to approve Item 6A. Motion seconded by Director Orkney.

Administering Agent/General Manager David Pedersen responded to questions related to the budget allocated for this item by noting that the project was included as CIP Job No. 10565, Rancho Las Virgenes Digester Cleaning and Repair. He also responded to a question regarding the Engineer's Estimate for the project by stating that staff would follow-up and provide the information to the Board.

Motion carried by the following vote:

AYES: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, Wall
NOES: None
ABSENT: Iceland
ABSTAIN: None

B Financial Review: Third Quarter of Fiscal Year 2016-17

Receive and file the financial review for the third quarter of Fiscal Year 2016-17.

Angela Saccareccia, Finance Manager, presented a PowerPoint presentation.

Director Orkney requested that staff provide percentages in the future. Don Patterson, Director of Finance and Administration, responded that staff would include the percentages for future financial reviews.

Director Orkney requested an explanation regarding the large difference in the Fiscal Year 2016-17 Year-To-Date Budget and the Year-To-Date Actual.

Director Peterson moved to approve Item 6B. Motion seconded by Director Caspary. Motion carried by the following vote:

AYES: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, Wall
NOES: None
ABSENT: Iceland
ABSTAIN: None

C Proposed JPA Budget for Fiscal Year 2017-18: Adoption

Adopt the proposed Fiscal Year 2017-18 JPA Budget.

Angela Saccareccia, Finance Manager, presented a PowerPoint presentation.

Director Caspary inquired whether the manhole rehabilitation budget included work on the F2/F3 line. David Lippman, Director of Facilities and Operations, responded that this budget includes rehabilitation of the stacks and manhole structures; however, he indicated that this project was deferred because repairs had been made, and the budget was reduced substantially.

Director Orkney inquired regarding the $50,000 budgeted for "Other Professional Services". Don Patterson, Director of Finance and Administration, responded that this item included the budget for lobbyists and a retainer for accounting advice.

Director Orkney requested clarification on the budget, in the amount of $377,798, for "Rental Charge – Facility." Angela Saccareccia, Finance Manager, responded that this budget covered the JPA's use of a portion of the Headquarters building.

Director Orkney referred to the budget for sewers and inquired whether staff monitored the condition of the sewers annually. David Lippman, Director of Facilities and Operations, responded that the JPA owns 60 miles of trunk sewers and that a portion of the sewers are inspected annually via camera. He noted that this function is budgeted under labor, outside services and materials.

Director Orkney expressed concern with the budget, in the amount of $5.2 million, to produce and maintain compost. She suggested revisiting this budget once the Pure Water Project Las Virgenes-Triunfo gets underway.

Director Orkney referred to the "Treatment/Composting" budget, in the amount of $2.3 million, for "Administrative Expenses - Allocated Support Services" and "Allocated Operations Services", and the "Administration" budget, in the amount of $1 million. She inquired regarding the reason the costs were higher to produce and maintain compost as compared to the costs for administration. Administering Agent/General Manager David Pedersen responded that the "Treatment/Composting" costs were for staff who work at the composting facility, and the Administration costs were for his time and that of other managers who do

not necessarily work at the composting facility.

Director Orkney referred to the District Staffing Plan and noted that the Resource Conservation and Public Outreach Department shows 15 positions under "Customer Service Operations." She inquired regarding their job duties. Don Patterson, Director of Finance and Administration, responded that the District Staffing Plan identifies all Las Virgenes Municipal Water District positions and that those positions were primarily tasked with performing 100% LVMWD customer service duties. Director Orkney suggested that it would be helpful in the future to have the number of full-time equivalents that are budgeted for the JPA identified in the staffing plan.

Director Peterson moved to approve Item 6C. Motion seconded by Director Caspary. Motion carried by the following vote:

AYES: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, Wall
NOES: None
ABSENT: Iceland
ABSTAIN: None

7. BOARD COMMENTS

Director Polan noted that representatives from the First Neighborhood Property Owners' Association informed him of a piece of JPA equipment that had fallen into disrepair. He stated that JPA staff had determined that the equipment was an air-vacuum release valve for the recycled water system, and staff made the necessary repairs. He complimented staff on their quick response.

Director Paule reported that he attended the California Special Districts Association Legislative Days in Sacramento. He noted that the Little Hoover Commission was working on a report to review special districts and how special districts could improve public outreach efforts.

Director Caspary reported that he attended the Regional Water Quality Control Board's (Regional Board) hearing on June 1st regarding the issuance of the NPDES Permit and Time Schedule Order for the Tapia Water Reclamation Facility. He noted that Heal the Bay did not provide comment, and the Regional Board was very cooperative and complimentary. He commended staff on their efforts related to the issuance of the new permit. Director Orkney also commended staff and Director Caspary on their outreach efforts.

Director Polan reported that he and Administering Agent/General Manager David Pedersen attended Dr. Randal Orton's presentation at UCLA related to the impacts of the Monterey/Modelo Formation on stream health and algal growth in the Malibu Creek Watershed.

Director Pan echoed Director Paule's comments on the importance of public outreach. She also commended staff on the quarterly infrastructure tours and School Mentorship Program. She noted that the County of Ventura Public Works provides a one-day program to showcase equipment, and local schools are invited to view the equipment and exhibits.

8. ADMINISTERING AGENT/GENERAL MANAGER REPORT

Administering Agent/General Manager David Pedersen thanked the Board for their positive feedback related to the issuance of the new NPDES permit for Tapia. He also commended the Board for their efforts on the stakeholders' workshops and recognized staff for their efforts. He noted that there was still an issue with the lower limit for chloride concentrations for discharges to the Los Angeles River, and staff would need to study the sources of chloride for the Time Schedule Order and a Basin Plan Amendment.

9. FUTURE AGENDA ITEMS

None.

10. INFORMATION ITEMS

A U.S. Bureau of Reclamation Grant Funding Awards for Pure Water Project Las Virgenes-Triunfo

11. PUBLIC COMMENTS

None.

12. CLOSED SESSION

None.

13. ADJOURNMENT

Seeing no further business to come before the Board, the meeting was duly adjourned at **6:32 p.m**.

James Wall, Chair

ATTEST:

Glen Peterson, Vice Chair

LAS VIRGENES – TRIUNFO
JOINT POWERS AUTHORITY
MINUTES
SPECIAL MEETING

5:00 PM June 19, 2017

PLEDGE OF ALLEGIANCE

The Pledge of Allegiance to the Flag was led by Chair James Wall.

1. CALL TO ORDER AND ROLL CALL

The meeting was called to order at **5:03 p.m.** by Chair James Wall in the Board Room at Las Virgenes Municipal Water District headquarters at 4232 Las Virgenes Road in Calabasas, California. Josie Guzman, Clerk of the Board, conducted the roll call.

Present: Directors: Caspary, Lewitt, Orkney, Pan, Paule, Peterson, Polan, Renger, and Wall
Absent: None

2. PUBLIC COMMENTS

None.

3. TRAVEL BY BUS FOR A TOUR OF LAS VIRGENES RESERVOIR AND WESTLAKE FILTRATION PLANT, LOCATED AT 32501 TORCHWOOD PLACE, AND WESTLAKE PUMP STATION, LOCATED AT 2860 THREE SPRINGS DRIVE, WESTLAKE VILLAGE, CA 91361

The Board traveled by bus for a tour of Las Virgenes Reservoir, Westlake Filtration Plant, and Westlake Pump Station. Staff responded to questions posed by the Board. No action was taken.

4. ADJOURNMENT

Seeing no further business to come before the Board, the meeting was duly adjourned at **7:21 p.m**.

James Wall, Chair

ATTEST:

Glen Peterson, Vice Chair

POLICY PRINCIPLES FOR FUTURE USE OF 30800 AGOURA ROAD

JUNE 22, 2017

The Las Virgenes-Triunfo Joint Powers Authority (JPA) is currently considering the purchase of a vacant 7.1-acre parcel at 30800 Agoura Road for future facilities that may be required for the Pure Water Project Las Virgenes-Triunfo. The site is one of several to be considered for the construction of an advanced water treatment plant that would purify excess recycled water during the wintertime to supplement existing water supplies.

Because the design of the Pure Water Project Las Virgenes-Triunfo is several years away, the JPA proposes to outline policy principles for the future use of the property should it be selected for the construction of an advanced water treatment plant, as follows:

1. Involve the City and the community in the development and design of facilities.
2. Preserve the natural beauty of the site.
3. Reserve a portion of the property for public benefit in coordination with the City of Agoura Hills.
4. Minimize the impact to oak trees and other natural resources on the property.
5. Design the facilities with architecture compatible with the surrounding area.
6. Minimize the overall footprint of the facility.
7. Provide for the on-site treatment and/or capture of stormwater.
8. Keep the community and recreational users informed of any project-related activities that may affect them.

#####

July 10, 2017 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Rancho Las Virgenes Raw Sludge Wet Well Recirculation Modifications Project: Construction Award

SUMMARY:

On February 6, 2017, the JPA Board authorized a Call for Bids for the Rancho Las Virgenes Raw Sludge Wet Well Recirculation Modifications Project. The scope of the project consists of replacing the existing sludge recirculation pump and installing a grinder, meters, valves and associated controls at the Rancho Las Virgenes Composting Facility. Eight bids were submitted and publicly opened on March 16, 2017.

After evaluating the proposals, staff determined the bid documents did not sufficiently convey the scope of the project and recommended that the integration/programming portion of the work be removed from the project and performed under a separate contract. On April 4, 2017, the Board approved staff's recommendation to reject all bids and authorized revision of the bid documents. On June 8, 2017, five bids were received in response to a revised Call for Bids.

Staff evaluated the bids and determined that the lowest responsive bid was submitted by Pacific Hydrotech Corporation, in the amount of $355,900, which is approximately 29% higher than the Engineer's Estimate. Pacific Hydrotech has successfully completed a number of large projects for the JPA or LVMWD: construction of Digester No. 3, construction of the 5-Million-Gallon Torchwood Tank and upgrade of the Westlake Pump Station. Staff recommends award of the a construction contract to Pacific Hydrotech, in the amount of $355,900.

RECOMMENDATION(S):

Appropriate an additional $240,328; award a construction contract to Pacific Hydrotech Corporation, in the amount of $355,900; and reject all remaining bids upon receipt of duly executed contract documents for the Rancho Las Virgenes Raw Sludge Wet Well Recirculation Modifications Project.

FISCAL IMPACT:

Yes

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

Existing appropriations, through Fiscal Year 2017-18, provide funding in the amount of $344,614. An additional appropriation, in the amount of $240,328, is required to award the construction contract, allow for a 10% contingency to cover change orders during construction, provide funding for integration of the distributed control system (DCS) and cover the administrative costs of the project.

DISCUSSION:

The Rancho Las Virgenes Composting Facility was designed with a dedicated recirculation pump to suspend and recirculate solids within the sludge wet wells at the Dewatering Building. The pump was intended to suspend solids prior to pumping the sludge to the digesters. Without recirculation, the solids coagulate and settle out within the wet wells, requiring costly cleaning. However, since its installation in 1992, the recirculation pump has not performed as intended and was taken out of service due to pump failure. Currently, staff uses one of the two digester pumps to temporarily recirculate the wet wells. Although this work-around is maintaining the suspension of solids in the sludge, only one digester pump is left to feed sludge to the digesters, impacting the redundancy of the system. If one of the digester pumps fails, sludge pumping could be interrupted.

The project consists of a new positive displacement pump to replace the existing centrifugal pump, in-line grinder, flow meter and modulating plug valve for the discharge line into each well, piping/fittings at new grinder/isolation valve and associated electrical/instrumentation work. The new pump system will restore redundancy for the digester pump system. Also, the pump will assist in maintaining proper sludge solids suspension within the wet wells, as well as controlling the concentration of the sludge sent to the digesters.

The apparent low bid, during the first round of bids received on March 16, 2017, was $352,500 submitted by Pyramid Building & Engineering. The Engineer's Estimate at that time was $202,429, resulting in a 74% difference. At that time, staff recommended the following changes to the bid package: removing the integration/programming portion of the work from the scope as it would be performed under a different contract with Emerson/Ovation who possesses proprietary training required to complete the work; listing the grinder as an optional bid item to give the JPA the choice of procuring and installing it in-house; including material quotes received from the consultant for the Engineer's Estimate in hopes of receiving better pricing for materials; and revising the Engineer's Estimate to more accurately reflect the project's cost.

The Engineer's Estimate for construction was revised to be $276,150, compared to the lowest responsible bid, which was submitted by Pacific Hydrotech Corporation, in the amount of $355,900. While the bids were higher than the Engineer's Estimate, they are competitive and within the range of the first round of bids. Staff believes the bids were higher than the Engineer's Estimate due to the current state of the construction market (i.e. large number of projects out to bid).

Following is a summary of the bids:

Bidder	Bid Total	Percentage Above/Below Estimate
Pacific Hydrotech Corp.	$ 355,900.00	+29%
Integrated Water Services, Inc.	$ 387,068.00	+40%
Blois Construction, Inc.	$ 485,150.00	+76%
Spiess Construction Co, Inc.	$ 398,410.00	+44%
Tharsos, Inc.	$ 397,000.00	+44%

An additional appropriation, in the amount of $240,328, is recommended to provide sufficient funding for construction.

Following is a summary of the anticipated project costs and requested appropriation:

Description	**Cost**
Professional Services:	
Design & Construction Support	$64,564
Construction:	
Construction Award	$355,900
Integration Scope	$15,000
Construction Contingency (10%)	$35,590
Administrative	
District Labor (12%)	$42,708
G&A (20%)	$71,180
Total Project Cost	**$584,942**
Existing Appropriation	$344,614
Additional Appropriation (proposed)	$240,328

GOALS:

Construct, Manage and Maintain All Facilities and Provide Services to Assure System Reliability and Environmental Compatibility

Prepared by: Jared Q. Adams, P.E., Associate Engineer

July 10, 2017 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Rancho Las Virgenes Centrate Equalization Tank Project: Approval of Scope Changes for Design Services During Construction and Construction Management

SUMMARY:

Scope changes are required for the professional services agreements with Pacific Advanced Civil Engineering (PACE) and Kennedy/Jenks Consultants for completion of the Centrate Equalization Tank Project. PACE currently provides design services during construction, and Kennedy/Jenks provides construction management for the project. Due to delays in completing the project within the timeframe stipulated in the contract documents, additional services beyond those originally agreed upon have been required of both consultants. The proposed scope changes will allow for payment for the services rendered to-date and sufficient allowance for the remaining level-of-effort required for completion of the project.

RECOMMENDATION(S):

Authorize the General Manager to execute a Change in Scope to the professional services agreement with Pacific Advanced Civil Engineering (PACE), in the amount of $31,474, for additional design services during construction; and to the professional services agreement with Kennedy/Jenks Consultants, in the amount of $62,700, for additional construction management services for the Centrate Equalization Tank Project.

FISCAL IMPACT:

Yes

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

No additional appropriation is required for this action. The adopted Fiscal Year 2016-17 Budget for CIP Job No. 10564 provides funding in the amount of $2,139,198.

DISCUSSION:

Pacific Advanced Civil Engineering (PACE) is the engineer of record for the Centrate Equalization Tank Project and is currently providing design support during construction. Kennedy/Jenks Consultants is providing construction management and inspection services for the project. The fee for the professional services provided by the two consultants was based on an anticipated project completion date of March 21, 2017, as stipulated in the contract documents.

The current projected completion date for the project is August 1, 2017, which is approximately four months beyond the original schedule. The additional services required to complete the project are related to the delay. Staff proposes to reconcile the cost of the delay with the contractor in conjunction with change order negotiations prior to final acceptance.

The amounts of the scope changes required exceed 10% of the original contract amounts; therefore, Board approval is required for this action.

Following is a summary of the existing professional services and scope changes to-date:

	Amount	Description
PACE	**$121,641**	**Original Contract Amount**
Scope Change No. 1	$4,122	Electrical PLC design revisions due to limitations at farm building
Scope Change No. 2	$3,180	Revise bid documents to reflect sole source selection and bidding support services
Scope Change No. 3	$1,476	Plan revisions to add relocation of grit bin drain vault & piping
Scope Change No. 4	$2,907	Exceedance of estimated review of submittals, RFI's, clarification support to the contractor, meeting attendance and coordination with construction manager
Kennedy/Jenks	**$116,740**	**Original Contract Amount**

Prepared by: Eric Schlageter, P.E., Senior Engineer

ATTACHMENTS:

Scope Change Request: Design Services During Construction
Scope Change Request: Construction Management

PACE
Advanced Water Engineering

June 6, 2017

Mr. Eric Schlageter
Las Virgenes Municipal Water District Page 1 of 1
Triunfo Sanitation District Joint Powers Authority
4232 Las Virgenes Road
Calabasas, CA 91302
Phone (818) 251-2100

Re: Change Order No.5 – Additional Services for Construction Services # A694

Dear Mr. Schlageter,

Per our discussion, this change order is to assist the District with additional construction services for the construction of the Rancho Las Virgenes Centrate Storage Tank Project. Our original scope for Services during Construction consisted of only 40 hours for submittal reviews and RFIs. Thus far, we have exceeded our hours in both the original proposal as well as in Change Order 4. The reasons for the exceedance in hours are mainly due to the following:

- The project was anticipated to be completed in late March but the construction activities is still ongoing. The extension of the project requires PACE to be available for additional weekly meetings, email and phone correspondences, extended project management for billing and other administrative requirements.
- A large quantity of the contractor's submittals were rejected or required resubmittal, which requires additional time to review and respond to the submittals. There were approximately 20 rejected submittals and approximately 13 submittals that required revisions for resubmittal. This is approximately half of the approximately 60 submittals issued.
- A large quantity of field RFIs related to fixing construction errors. Some of these are listed below:
    - Contractor's misalignment of pipe to tank
    - Contractor's misalignment of pipe to existing process line
    - Incorrect installation of Mini Power Center, which required additional accessories to fix
    - Review of non-approved equipment (i.e., some equipment showed up on site that were different from approved equipment)
    - RFIs related to Contractor's request to not grout the tank per plan
    - Electrical RFIs related to conduit material, MCC buckets, penetration and supports, etc.

In addition to these additional services, we understand that our services will continue to be needed to assist in completing the project. We anticipate it will be another 2 months before the project will be at Final Completion. As a result, this change order also includes additional hours for PM, RFI responses, submittal reviews, and site visits. These are anticipated hours and will be billed appropriately as needed.

Attached is the fee estimate for this Change Order. Please contact me if you have any questions regarding the Change Order at (714) 514-8812 or by email at ddo@pacewater.com

Sincerely,

Duong Do, PE
Vice President – Environmental Water

PACE
Advanced Water Engineering

ENGINEERING FEE ESTIMATE
PROJECT WORKSHEET

Project Data
Project Name: Centrate Storage and Line
Client: LVMWD & TSD Joint Powers Authority
PACE Job Number: A694
Estimate Date: May 10, 2017

Item No.	Work Item Description	PACE									Man-Power Subtotal	Reimburs. Expenses	Total Task Costs
		Principal	Sr. Project Manager/Sr. Consulting Engr.	Project Engineer /Design Engr. II	Instru-mentation Specialist	Design Engineer	Sr. CAD Designer /Sr. GIS Analyst	CAD Designer /GIS Analyst	Graphic Designer	Proj. Coord/Admin Support			
		235	177	136	125	115	117	91	92	70			
1	**Change Order 5**	**41**	**31**	**112**	**0**	**0**	**0**	**0**	**0**	**16**	**$31,474**	**$0**	**$31,474**
1.1	Additional Construction Services	17	7	48						8	$12,322		
1.2	Projected Additional Construction Services	24	24	64						8	$19,152		
	TOTALS	41	31	112	0	0	0	0	0	16	$31,474	$0	$31,474

Additional Work Log

Job Number: A694

6/6/2017

RFI/SDR #	Subject/Title	Date Answered	Answered By	Time (Hours)	Notes	Unit Cost	
	Additional Meetings	3/15 - 5/10	DD	6.00	Addition Weekly Meetings	$ 235.00	$ 1,410.00
	Additional Meetings	3/15 - 5/10	TDM	8.00	Additional Weekly Meetings	$ 136.00	$ 1,088.00
	Admin Support and Meeting	3/15 - 5/10	NF	8.00		$ 70.00	$ 560.00
41	MCC Bucket	Ongoing	TM	8.00	Review and coordinating MCC Bucket	$ 136.00	$ 1,088.00
41	MCC Bucket	Ongoing	EB	3.00	Review and coordinating MCC Bucket	$ 177.00	$ 531.00
41	MCC Bucket	Ongoing	DD	3.00	Review and coordinating MCC Bucket	$ 235.00	$ 705.00
035	Mini Power Center Gutter	5/1-5/11	DD	2.00	RFI regarding Gutter	$ 235.00	$ 470.00
035	Mini Power Center Gutter	5/1-5/10	TDM	3.00	RFI regarding Gutter	$ 136.00	$ 408.00
035	Shop Drawing Review - Mini Power Center Gutter	4/28/2017	EB	1.00	Mini Power Center Gutter Resubmittal	$ 177.00	$ 177.00
035	Shop Drawing Review - Mini Power Center Gutter	4/28/2017	TDM	5.00	Mini Power Center Gutter Resubmittal	$ 136.00	$ 680.00
036	Shop Drawing Review - Stainless Steel Conduit Tags	5/1/2017	EB	1.00	Incorrect Conduit Tag submittal per plan and spec	$ 177.00	$ 177.00
036	Shop Drawing Review - Stainless Steel Conduit Tags	5/1/2017	TDM	1.00	Incorrect Conduit Tag submittal per plan and spec	$ 136.00	$ 136.00
034	RFI - 34 Terminal Board Material	4/26/2017	EB	1.00	Assisted the contractor in finding suitable material for the terminal board	$ 177.00	$ 177.00
034	RFI - 34 Terminal Board Material	4/26/2017	TDM	2.00	Assisted the contractor in finding suitable material for the terminal board	$ 136.00	$ 272.00
030	Shop Drawing Review - MCC Bucket & Resubmittal	4/7/2017	EB	1.00	Contractor submitted incorrect MCC Bucket	$ 177.00	$ 177.00
030	Shop Drawing Review - MCC Bucket & Resubmittal	4/7/2017	TDM	3.00	Contractor submitted incorrect MCC Bucket	$ 136.00	$ 408.00
03.0R	Shop Drawing Review - TSP cable Resubmittal	4/18/2017	TDM	0.50	Contractor installed incorrect cable	$ 136.00	$ 68.00
19.0R	Shop Drawing Review - OCAL Piping	4/18/2017	TDM	0.50	Contractor installed incorrect conduit fittings and connections	$ 136.00	$ 68.00
03.0R	Shop Drawing Review - Analog Cable Resubmittal	4/18/2017	TDM	0.50	Contractor installed incorrect analog cable	$ 136.00	$ 68.00
Tie-In 3	Tie-In Phase 3	4/11/2017	DD	2.00	Reviewing Contractor field issues with pipe tie-ins and alignments	$ 235.00	$ 470.00
Tie-In 3	Tie-In Phase 3	4/11/2017	TDM	2.00	Reviewing Contractor field issues with pipe tie-ins and alignments	$ 136.00	$ 272.00
Tie-In	Tie-In Phase 1	3/13/2017	DD	2.00	Reviewing Tie-in Plan	$ 235.00	$ 470.00
Tie-In	Tie-In Phase 1	3/13/2017	TDM	10.00	Reviewing Tie-in Plan	$ 136.00	$ 1,360.00
21	RFI - 21 Tie-in spool piece	1/31/2017	DD	2.00	Phase 1 Tie-in plan	$ 235.00	$ 470.00
21	RFI - 21 Tie-in spool piece	1/31/2017	TDM	4.00	Phase 1 Tie-in plan	$ 136.00	$ 544.00
				79.50			$12,254.00

Kennedy/Jenks Consultants
Engineers & Scientists
2775 North Ventura Road, Suite 100
Oxnard, California 93036
805-973-5700
FAX: 805-973-1440

22 June 2017

Mr. Eric Schlageter, P.E., ENV SP
Senior Engineer
Las Virgenes Municipal Water District
4232 Las Virgenes Road
Calabasas, CA 91302-1994

Subject: Budget Augmentation Request – Construction Management Services
Rancho Las Virgenes Centrate Equalization Tank Project
K/J 1698011*00 (2.01)

Dear Mr. Schlageter:

As discussed with you several times and in accordance with our Agreement for Professional Services for the Rancho Las Virgenes Centrate Equalization Tank Project, Kennedy/Jenks Consultants (Kennedy/Jenks) is submitting for your consideration this request for additional budget to cover the cost of extra work performed for Construction Management Services (CMS) to date and for extended CMS through completion of the project.

Through effective management of our time, Kennedy/Jenks was able to extend our services and original budget on the project approximately seven weeks beyond the as awarded completion date of March 8, 2017. However, as of approximately April 27, 2017 our budget for the project was exhausted and as of June 16, 2017 we were approximately $26,700 overbudget.

Our overbudget status is a result of the following additional services:

- Administrative tasks including 1) preparation of meeting agendas, 2) facilitating the progress meetings, 3) distributing meeting minutes, and 4) managing contractor correspondence, submittals, and RFI's.
- Technical services including input to assist the District and design engineer in the review of RFI's and submittals.
- Budgeting and time management tasks including review of contractor payment applications, change orders and schedules.
- Additional site observation.

- Coordination tasks including 1) coordinating with the District's project manager, operations staff, and inspectors, 2) coordinating with the design engineers (PACE and Wunderlich-Malec), and 3) coordinating with the materials testing firm (Oakridge).

Based on our analysis of the project status, we anticipate completion of all work by roughly August 1, 2017. This is roughly an additional six weeks beyond the June 16, 2017 date indicated above. Our anticipated costs for this six weeks is $36,000 as shown on the attached spread sheet.

As done throughout this project, the time and costs identified above will be efficiently managed to minimize additional cost to the District.

Based on the information provided, we respectfully request that you consider a budget adjustment of $62,700 ($26,700 plus $36,000) to our contract. This adjustment would increase the project budget from $116,740 to $179,440.

We look forward to discussing this request with you, as necessary. Should you have any questions, please do not hesitate to contact me.

Very truly yours,

KENNEDY/JENKS CONSULTANTS

William C. Yates, P.E.
Principal/Project Manager

cc: Jeff Savard, Kennedy/Jenks Consultants

Extra Work Fee Estimate

Kennedy/Jenks Consultants

PROJECT Description: LVMWD Rancho Las Virgenes Centrate Storage Tank

Proposal/Job Number: 1698011*00

Classification:	Jeff Savard (Principal-In-Charge)Technical Advisor)	Kim Sloat (Technical Advisor)	Bill Yates (PM/Construction Manager)	John Coffman (QA/QC)	Masis Acob (Document Control)	Project Admin.	Total	KJ Total Labor	Sub-Markup	KJ ODCs	Total Labor + Expenses
Hourly Rate:	**$210**	**$195**	**$195**	**$185**	**$110**	**$110**	**Hours**	**Fees**		**Fees**	**Fees**
Administrative, Technical Services, Budget & Time Mgmt											
Administrative, Technical Services, Budget & Time Mgmt					60		60	$6,600			$6,600
Subtotal	0	0	0		60	0	60	$6,600		$0	$6,600
Site Observation and Coordination											
Site Observation and Coordination			144				144	$28,080		$1,320	$29,400
Subtotal	0	0	144		0	0	144	$28,080		$1,320	$29,400
Total	0	0	144		60	0	204	$34,680		$1,320	**$36,000**

July 10, 2017 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Pure Water Project Las Virgenes-Triunfo: Draft Preliminary Design Report for Pure Water Demonstration Project

SUMMARY:

On December 5, 2016, the JPA Board accepted a proposal from CDM Smith to prepare a Preliminary Design Report (PDR) for a Pure Water Demonstration Project. The scope of work generally consists of the following items:

- Scoping the demonstration project, including recommendations for the capacity, size and layout of treatment modules considering: future regulatory compliance for surface water augmentation; current standards or regulations for demonstration projects; suitability for public outreach, public tours and education; operator exposure to the treatment processes; and potential pre-qualification of treatment processes.
- Preparing preliminary layouts and/or concepts for conversion of portions of Building No. 1 to house the demonstration project and serve as a learning center/assembly room.
- Providing a discussion of the options for procurement and construction of the facilities considering leasing, design-bid-build and design-build.
- Conducting the required CEQA/NEPA analyses and preparing the appropriate environmental document(s) for the proposed project.
- Developing a project schedule indicating major milestones and providing an Engineer's Estimate for the project.

CDM Smith completed the draft PDR in accordance with the scope of work. Staff seeks input from the Board on the vision and layout of the demonstration project before recommending approval of the PDR, adoption of an environmental finding CEQA and consideration of next steps. These actions are tentatively scheduled for the August JPA Board meeting.

RECOMMENDATION(S):

Provide input and feedback on the proposed vision, layout and scope of the Pure Water Demonstration Project.

FISCAL IMPACT:

No

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

There is no financial impact associated with providing input and feedback on the preliminary design of the Pure Water Demonstration Project.

DISCUSSION:

Most agencies that have undertaken indirect potable reuse projects have constructed and operated a pilot or demonstration project. These projects can vary in size and generally have three goals: (1) treatment technique validation and research, (2) public outreach and acceptance, and (3) operator training. On December 5, 2016, the JPA Board accepted a proposal from CDM Smith to prepare a PDR for a Demonstration Project for the Pure Water Project Las Virgenes-Triunfo. The following sections generally describe the contents of the PDR; however, additional details can be found in the report itself. Staff seeks Board input and feedback on the vision, layout and scope of the proposed project before proceeding with approval of the PDR, adopting an environmental finding and considering next steps. These actions are tentatively scheduled for the August Board meeting.

Scope and Layout:

The Pure Water Demonstration Project is proposed to be a nominal 100 gallon per minute (gpm) facility that will test the full advanced treatment processes of microfiltration (MF), reverse osmosis (RO), ultraviolet disinfection (UV) and advanced oxidation (AOP) on the JPA's tertiary-treated recycled water to produce purified water suitable for surface water augmentation. The JPA successfully received a WaterSMART Grant from the U.S. Bureau of Reclamation, in the amount of $300,000, to offset the cost of the project and conduct research on the effectiveness of the treatment processes. The research will focus on six primary areas:

1. Evaluation and quantification of the natural degradation of NDMA and other constituents of emerging concern in an open-air reservoir exposed to sunlight.

2. Direct testing of high recovery RO, achieving recovery rates above 93%.

3. Long-term demonstration of the benefits of operating RO membranes at elevated flux to improve contaminant rejection and produce water quality.

4. Evaluation of the benefits of RO membrane flushing to extend operating periods between chemical cleanings.

5. Characterization of the brine to determine its compatibility to discharge to CMWD's Salinity Management Pipeline.

6. Evaluation of treatment of tertiary-treated recycled water that includes low-flow urban runoff as part of its source water.

The facility is proposed to be housed in Building No. 1, the old administrative building on the Headquarters campus. Some refurbishment would be required to house the demonstration facility in Building No. 1, but no new significant construction would be needed. The PDR provides details on the sizes and locations of various treatment equipment, chemical systems and ancillary equipment needed for the demonstration project.

Public Outreach:

One of the primary goals of the demonstration project would be to provide opportunities for public outreach, education and acceptance of indirect potable reuse. Understanding the technology of water recycling, the supporting science, the safeguards against failure, and the environmental benefits are key drivers in transforming skepticism to acceptance and support for indirect potable reuse. The vision and key design and architectural considerations for achieving this end are as follows:

1. Create an environment that is clean, uncluttered, orderly and modern, leading to a sense of confidence in the processes and the people who operate it.

2. Provide ample space for a comfortable experience, both in the learning center (old Board Room) and throughout the tour.

3. Include exhibits and a presentation in the learning center prior to the tour to provide guests with a basic understanding of the process and science behind indirect potable reuse, as well as an area for questions and subsequent close-out of each tour.

4. Use colors and design palates that are simple, compatible with other JPA materials and adaptable to multiple media.

5. Create displays and exhibits that draw visitors' attention, build interest and provide background about the safety, benefits and worldwide use of indirect potable reuse.

6. Utilize clear, attractive signage throughout the facility (inside and out) that seamlessly guides people to the right spot and in the right direction.

Tours would start in the learning center, and after an introduction, wind their way through the facility, highlighting major processes while avoiding chemicals and other potentially hazardous areas. One of the last stops would be a water tasting station where the guest could taste the purified water. The tours would end in the learning center, allowing for additional questions and answers. The preliminary design includes two exhibits showing the vision and tour routes.

Procurement Options, Schedule and Costs:

Three procurement options were considered in the PDR: leasing, design-bid-build (DBB), and design-build (DB). Each option has advantages and disadvantages. Typically, a lease option is for no longer than 18 months. The currently proposed vision is to have the demonstration project operational until the ultimate commissioning of Pure Water Project Las Virgenes-Triunfo, so leasing may not be a viable option. DBB provides the highest level of control over

the design but creates a longer schedule and has the potential for conflicts between design, construction and operations contracts. DB allows for a faster schedule and has a single point of contact; however, there is less control during design. As a part of next steps, staff will provide a recommendation on a preferred procurement option.

DBB would take up to 15 months from design to start-up. DB would take 12 months from design to start-up. In either case, there would likely be an operations contract for at least a year until staff could develop the necessary skills to operate and maintain the facility.

Ancillary facilities that would include building renovations are estimated to be $965,000. Purchase and installation of treatment equipment, including contingencies and engineering, are estimated to be $3,564,000. The total project is estimated to be $4,529,000, based on the preliminary layout. Refinement to the estimate would be made during the design process.

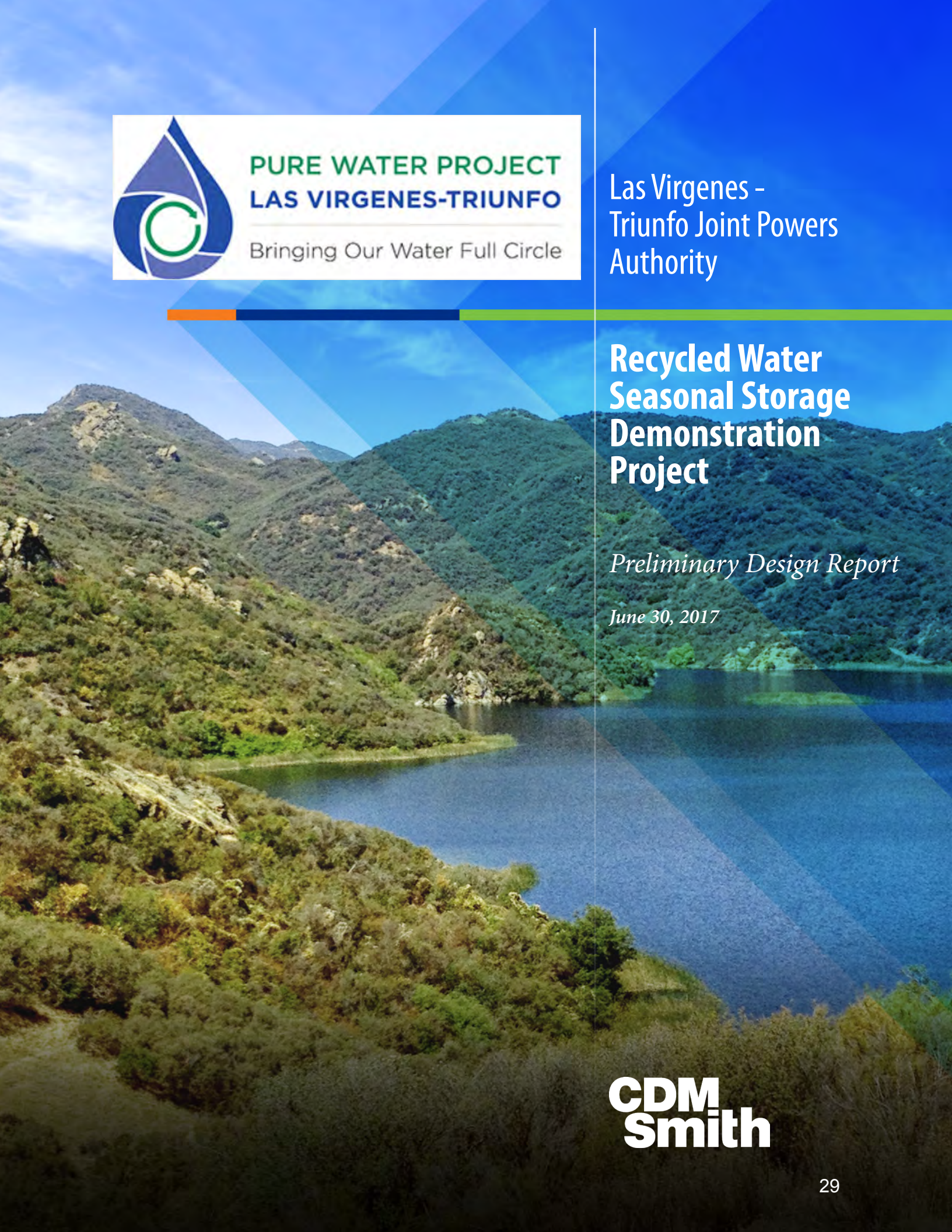
CEQA and other Permits:

The proposed project would be a minor alteration of an existing public utility structure/facility involving negligible use beyond its existing use. As a result, the work would qualify for a categorical exemption from CEQA. The JPA Board would adopt an environmental finding, and staff would file of a Notice of Exemption.

Prepared by: David R. Lippman, PE, Director of Facilities and Operations

ATTACHMENTS:

Draft PDR



PURE WATER PROJECT
LAS VIRGENES-TRIUNFO

Bringing Our Water Full Circle

Las Virgenes - Triunfo Joint Powers Authority

Recycled Water Seasonal Storage Demonstration Project

Preliminary Design Report

June 30, 2017

CDM Smith

Acknowledgements

Las Virgenes – Triunfo Joint Powers Authority

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Appendices

Acronyms

ADA	Americans with Disabilities Act
AFY	Acre-feet per year
AOP	advanced oxidation processes
CEQA	California Environmental Quality Act
CIP	clean-in-place
CMWD	Calleguas Municipal Water District
DB	Design/Build
DBB	Design/Bid/Build
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin River Delta
gfd	gallons/ft/day
gpm	gallons per minute
GRS	Galvanized rigid steel
IPR	Indirect potable reuse
JPA	Las Virgenes-Triunfo Joint Powers Authority
LVMWD	Las Virgenes Municipal Water District
MF	microfiltration
mg/L	milligrams per liter
MWD	Metropolitan Water District of Southern California
NDMA	N-Nitrosodimethylamine
ng/L	Nanograms per liter
PDR	Preliminary Design Report
RO	reverse osmosis
SWP	California State Water Project
TDS	total dissolved solids

TMDL	Total Maximum Daily Load
TSD	Triunfo Sanitation District
TSS	Total Suspended Solids
USBR	United States Bureau of Reclamation
US EPA	United States Environmental Protection Agency
UV	Ultraviolet disinfection
VFD	variable frequency drive
WRF	Water Reclamation Facility

Section 1
Project Description

Section 1 of the Preliminary Design Report (PDR) includes project background about work has been done to date for the Pure Water Project and highlights what information is included in the other Sections of the PDR.

1.1 Project Background

The Las Virgenes – Triunfo Joint Powers Authority (JPA) was formed in 1964 to construct, operate and maintain a joint sewer system and wastewater treatment facilities to serve the Malibu Creek Watershed. The Board of the JPA consists of the Boards of the Las Virgenes Municipal Water District (LVMWD) and the Triunfo Sanitation District (TSD). The General Manager of LVMWD acts as the Administering Agent/General Manager of the JPA. Under the direction of the Administering Agent/General Manager LVMWD staff administers, manages, operates and maintains JPA facilities.

Formed in 1958, LVMWD is a municipal water district organized and operating pursuant to California Water Code Sections 71000 et seq. A board of five directors, elected by district for four-year terms governs LVMWD. LVMWD provides potable water, wastewater treatment, recycled water and biosolids composting to more than 70,000 residents in the cities of Agoura Hills, Calabasas, Hidden Hills, Westlake Village, and unincorporated areas of western Los Angeles County.

Pursuant to California Health and Safety Code Division 5, Part 3, Chapter 3, Section 4700, TSD was formed in 1963 as a special district to provide sanitation services for the southeast portion of Ventura County. Covering approximately 50 square miles, TSD serves approximately 30,100 people and provides wastewater collection and treatment (via JPA facilities) and supplies recycled water. A board of five directors, elected at large for four-year terms, governs TSD. The Oak Park Water Company is a branch of TSD and provides potable water service to about 4,600 service connections in the 4.1 square mile community of Oak Park. Other public and private water purveyors serve the other areas within TSD's service area. The JPA's service area of approximately 100,000 people is shown in **Figure 1-1**. LVMWD serves as the JPA's Administering Agent.

Figure 1-1
Boundary of JPA Service Area (Recycled Water Seasonal Storage Basis of Design Report, MWH/Stantec, 2016)

The JPA has no natural water supplies within its watershed and boundaries. There is no groundwater of sufficient quantity or quality for municipal use. The JPA's member agencies are 100 percent dependent upon imported water from the California State Water Project (SWP) delivered by the Metropolitan Water District of Southern California (MWD). The JPA built an extensive recycled water distribution system beginning the 1970s and currently reuses 60 percent of its Title 22 recycled water from the Tapia Water Reclamation Facility (WRF) for irrigation use. However, recycled water demands drop significantly in the cooler winter months while wastewater flows remain relative constant. Lacking seasonal storage for the excess recycled water, the JPA releases the valuable resource to Malibu Creek, which drains to the Pacific Ocean after passing through Malibu Lagoon.

Discharge of the WRF's recycled water to Malibu Creek is not a sustainable practice. The JPA wishes to find a more beneficial use for this valuable, local resource and increasingly stringent regulatory standards for water body impairments, particularly for nutrients, are now requiring advanced treatment of recycled water. The "2013 US EPA Malibu Creek and Lagoon Total Maximum Daily Load (TMDL) for Sedimentation and Nutrients to Address Benthic Community Impairments" established new in-stream limits of 1.0 milligrams per liter (mg/L) total nitrogen and 0.1 mg/L total phosphorous for Malibu Creek. These nutrient standards cannot be met with conventional wastewater treatment, even when producing Title 22 tertiary-treated recycled water. Advanced treatment is required to meet the standards. As such, discharge of the excess

recycled water from the WRF to Malibu Creek is no longer a viable option absent treatment to drinking water standards. The JPA is investigating the Pure Water Project Las Virgenes – Triunfo to beneficially reuses the surplus recycled water and reduce discharges to Malibu Creek. See **Figure 1-2**.

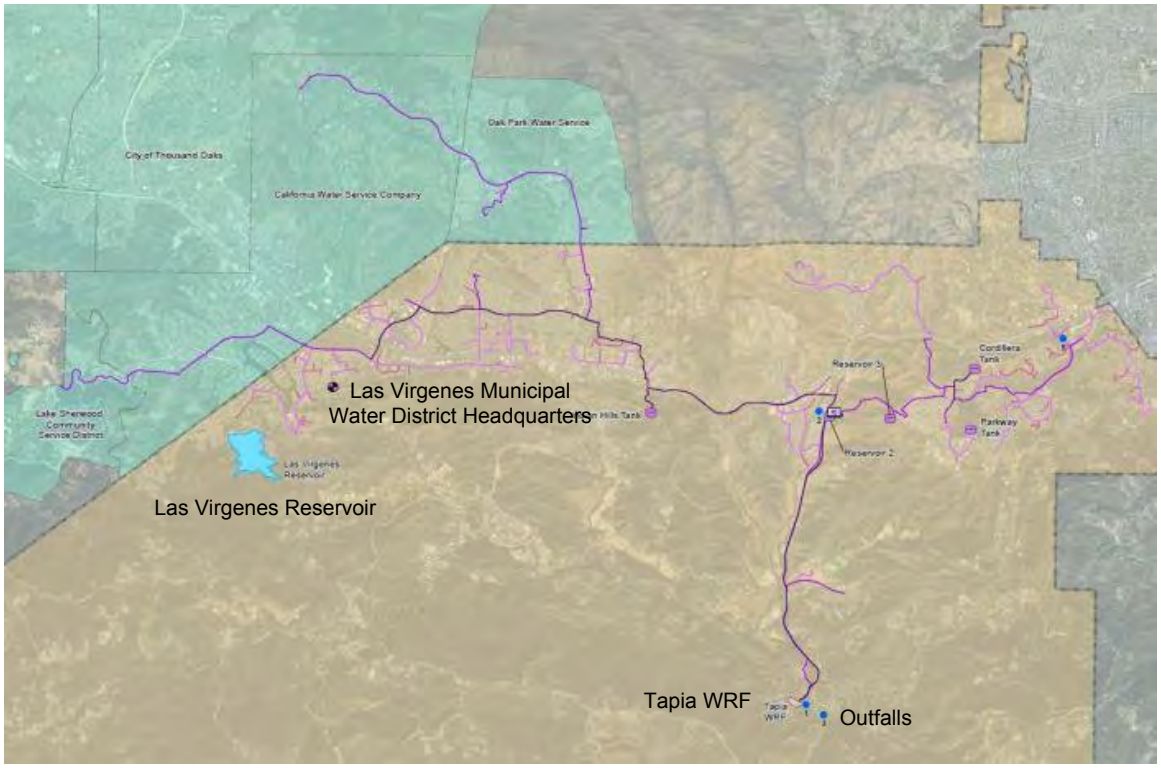

Figure 1-2
Existing Recycled Water Pipeline System (Recycled Water Seasonal Storage Basis of Design Report, MWH/Stantec, 2016)

Also, the state-wide drought has illustrated the challenges of relying on imported water, with uncertain long-term reliability associated with drought shortages, climate change, seismic events, environmental flow restrictions in the Sacramento-San Joaquin River Delta (Delta), which is the area of pumping origin for the SWP, and salinity of Colorado River supplies. Due to the significant investments being made by MWD to improve supply and system reliability, LVMWD's imported water costs are expected to increase significantly into the foreseeable future. Every acre-foot of recycled water that is beneficially used offsets an acre-foot of imported water from the SWP. Importing SWP water to the service area is very energy intensive, as compared to locally purified recycled water, and places additional strains on the sensitive Delta, which is also the pumping location for the Bureau of Reclamation's Central Valley Project (CVP).

1.2 Pure Water IPR Project

The JPA is studying the Pure Water Project Las Virgenes – Triunfo, an indirect potable reuse (IPR) surface water augmentation project that would ultimately produce up to 5,151 acre-feet per year (AFY) of new, local, drought-resilient water supply. The JPA produces recycled water at its Tapia

WRF by treating wastewater flows from its service area, with surplus recycled water discharged to Malibu Creek, which is an impaired water body that drains to Santa Monica Bay.

The Pure Water Project Las Virgenes – Triunfo would involve the seasonal advanced treatment of discharges from the Tapia Water WRF when existing recycled water demands are low. This advanced treated water would be conveyed to the 9,800 acre-foot Las Virgenes Reservoir where it would mix and be stored with imported supplies.

Figure 1-3 shows a photo of the Las Virgenes Reservoir. This project is unique in that it will be one of the first seasonally-operated IPR facilities as well as one of the first surface water augmentation projects in California.

Figure 1-3
Las Virgenes Reservoir

1.3 Demonstration Project Definition

The JPA has determined that a Demonstration Project is needed to:

1. provide opportunities for public education, acceptance, and public outreach to its customers;
2. test design criteria and operational procedures to inform and improve the full-scale design and provide experience to operators; and
3. provide technical documentation and support for permitting the project by the State of California's Division of Drinking Water (DDW) as a surface water augmentation project.

LVMWD has requested and has been approved for outside funding from the United States Bureau of Reclamation (USBR) for a Demonstration Project through the USBR's WaterSmart Grant Program. A copy of the WaterSmart Grant application is included in **Appendix A**. The Demonstration Project will provide information to decision makers to streamline the planning process and provide a basis for the design of the full-scale advanced treatment facility.

The Demonstration Project will be a nominal 100 gallons per minute (gpm) facility that tests full advanced treatment processes of microfiltration (MF), reverse osmosis (RO), ultraviolet disinfection (UV), and advanced oxidation processes (AOP) on the tertiary treated recycled water produced by the JPA's Tapia WRF and local dry weather flows. It is proposed that the treatment process equipment, chemicals, and testing laboratory will be housed in the former LVMWD administration building located adjacent to the current headquarters building. The outside of the former administration building is shown in **Figure 1-4**.

Initial thoughts are that no significant new construction should be necessary to convert the vacant building to be able to house the Demonstration Facility and only minor refurbishment of the building is expected to permit public use. The funding will support the procurement and installation of the Demonstration Facility's equipment, testing, and public education facilities, and

the associated laboratory testing and research.

Figure 1-4
The Future Demonstration Facility Building (former LVMWD Administration Building)

1.4 Preliminary Design Report Organization

This PDR provides a vision for the Demonstration Project, as well as a summary of the regulatory environment, process requirements, procurement alternatives, and project costs. An overview of the organization of this PDR is provided below:

- **Section 1 – Project Description** provides background on the Pure Water Project to be implemented by the Las Virgenes – Triunfo JPA and summarizes the information that is presented in the rest of the PDR.
- **Section 2 – Vision and Architectural Development** describes the overall vision and objectives for the Demonstration Project, provides an overview of the existing facilities and the modifications that are needed to implement the project, and an outline of the preliminary Architectural Programming.
- **Section 3 – Regulatory Environment and Process Selection** discusses the applicable regulations for potential reservoir augmentation projects and their impacts on the process selection.
- **Section 4 – Preliminary Design Criteria** presents the design criteria for each of the processes that will be tested at the Demonstration Project.
- **Section 5 – Procurement Options and Schedule** identifies the primary alternatives that could be utilized for the procurement of the Demonstration Project process systems.
- **Section 6 – Cost Estimate** provides the capital cost estimates for the Demonstration Project.
- **Section 7 – Environmental Documentation** summarizes the California Environmental Quality Act (CEQA) requirements.
- **Section 8 – Preliminary Drawings** presents the site, process, electrical and flow diagrams for the Demonstration Project.
- **Section 9 – Sources** identifies references used in report.
- **Appendices –** Appendices provide a copy of the 2017 WaterSmart Grant application and vendor information used to prepare the PDR.

Section 2
Vision and Architectural Development

The Demonstration Project will be installed inside the former LVMWD headquarters building and will incorporate testing facilities, supplemental research capabilities, public education and tour opportunities. The public education features will include explanations of the safety, benefits, and successful implementation of IPR across the globe, both implemented and anticipated like the JPA's Pure Water Project. The vision for the Demonstration Project will be discussed below, followed by a description of the condition of the existing building and the modifications required to facilitate the implementation of the Demonstration Project facilities.

2.1 Vision

The Demonstration Project is envisioned as an opportunity to test and prove processes for the IPR of effluent from the Tapia WRF. This is another step towards the District's goal of providing IPR through reservoir augmentation. Concurrently, and equally significant, the Demonstration Project will provide a focal point to develop public awareness of the entire Pure Water Program and build understanding and acceptance of IPR as a safe and desirable component of the local water supply portfolio.

Implementation of IPR provides significant benefits for the JPA (LVMWD and TSD), their customers, their communities, and the local environment, including:

- The ability to offset imported water supplies that currently comprise a high percentage of the local water portfolio and which are becoming less reliable and increasingly expensive.
- Local control and beneficial use of effluent from the Tapia WRF, that has gone through advanced water purification treatment.
- An alternative to avoid the capital and operating expense required to avoid discharges of nutrients in the tertiary treated effluent from the Tapia WRF to Malibu Creek, particularly during the shoulder spring and autumn months.

2.1.1 Purpose

Continuing their commitment to beneficial reuse, the JPA proposes to install a water purification demonstration facility in the currently unused former LVMWD headquarters building. Demonstration Project is envisioned to have a clean, industrial look that supports visitors' sense that the process is safe and technologically sound. The former headquarters previously used for cubicles by administrative staff has been cleared out and will provide ample space to install the treatment systems needed to purify water. The space also is sufficient for installation of interpretive tour components, to show and explain the multiple steps to consistently produce safe, pure water.

In keeping with the adage "seeing is believing", visitors should be able to walk through the operating demonstration facility, seeing and hearing the processes in operation. Other areas of

the former headquarters building should be configured and designed to extend the tour experience, with explanations of the process for water purification, why the project is needed, benefits within the context of the local water picture, and demonstration of water purification as a safe and reliable water supply alternative.

The Demonstration Project should have the capability to test several approaches to purification as well as providing engineering data to guide selection of the most effective protocols for purifying the effluent water from the Tapia WRF. The Demonstration Project must be able to provide the JPA staff an in-depth understanding of the process operation while developing skills related to the purification processes. The Demonstration Project will serve as a precursor to operating the future full-scale facility. The Demonstration Project should also provide data to secure regulatory approval, inform diverse audiences about the safety and benefits of IPR, and instill a sense of security in indirect potable reuse.

2.1.2 Public Outreach

One of the critical roles of the Demonstration Project will be to introduce people to the concept of water recycling, particularly for human consumption. Research findings and the experience of other water utilities indicate that understanding the technology of water recycling, the supporting science, the safeguards against failure, the environmental and social benefit of potable reuse, and being able to see the water purification process are key drivers in transforming disgust and skepticism to acceptance and even support for IPR. The Demonstration Project and information from successful water purification plants can prove that "seeing is believing".

Demonstration facility tours, messaging, design elements and other information-related features at the facility should be integrated with the many other forms of public outreach collateral and activities related to the Pure Water Project. Among the key design and architectural considerations are:

- Creating an environment that is clean, uncluttered, orderly, and modern, leading to a sense of confidence in the processes and the people who operate it
- Ample space for a comfortable experience, both in the Learning Center (former board room) and through the tour of the Demonstration Project
- Exhibits and presentations at a Learning Center prior to the tour, to provide a basic understanding of the process steps and science behind IPR, as well as an area for questions and close-out of each tour
- Color and design palates that are simple, compatible with the other JPA partners, and adaptable to multiple media.
- Displays and exhibits to draw visitors' attention, build interest, and provide background about the safety, benefits, and worldwide use of IPR
- Clear, attractive signage throughout the facility site (inside and out) that seamlessly guides people to the right spot or in the right direction.

2.1.3 Demonstration Project Location and Systems

The Demonstration Project is planned for installation inside the former LVMWD headquarters building, and is expected to operate until the full-scale plant is built. The facility is proximate to the current LVMWD headquarters and maintenance yard, with close access to outreach and maintenance staff. This provides convenience in opening and closing the facility, plant operation, restocking areas, performing minor maintenance, and other details of operation. The site is close to the Las Virgenes/Malibu Canyon exit of the 101 freeway, providing convenience and easy direction for visitors.

Interior installation of the Demonstration Project offers multiple advantages in terms of convenience and safety. Weather proof installations of pilot and Demonstration Projects are unusual. This Demonstration Project installation will operate in a clean and consistently dry environment allowing operation throughout the year, regardless of the weather or time of day. The indoor environment also simplifies development of interpretive tour components, enabling use of a broader range of materials without consideration of inclement weather and sun-proofing. On the other hand, interior installation will require attention to climate control systems, necessary to offset the impacts of the long hallway with floor to ceiling windows, heat emanating from process pumps, heat from compressors, and climate impacts of the raised ceiling areas along the tour route.

2.2 Existing Facilities and Required Improvements

The former LVMWD headquarters building is located on LVMWD property at 4232 Las Virgenes Road in Calabasas, California. The building was originally constructed to house the District's administrative offices. Constructed in 1967, the building was remodeled or expanded in 1978, 1986, and most recently in 1994. The building has been vacant since 2011 when the tenants vacated the building. The old headquarters building underwent asbestos abatement in 2012.

The layout and room sizes within the former LVMWD headquarters are well matched to demonstrating advanced water treatment. It provides dedicated space for the process systems as well as tours and other forms of public outreach. The existing portions of the building that will be used by the Demonstration Project and a summary of the required modifications are provided in **Table 2-1**. A plan of the building is shown below in **Figure 2-1**.

Table 2-1 Proposed Building Improvements

Original Use	Demo Plant Use	Required Upgrades and Improvements
Entrance	Entrance	General cleanup, addition of project signage, landscaping, minor building exterior updates
Board Room	Learning Center	Transition to a Learning Center. Repair and update ceilings, walls, floors, HVAC, lighting, audio visual system
Open Area	Process Area	Repair and update ceilings, walls, floors, HVAC, lighting, audio
Offices	Ancillary Process Facilities	Modify offices to provide a small laboratory and house demo plant process chemicals and blower equipment. Repair and update ceilings, walls, floors, HVAC, lighting, audio
Rest Rooms	Rest Rooms	Redo rest rooms to meet current building codes
North Patio	Optional Process Area	General cleanup, landscaping, minor building exterior updates
Utilities	Utilities	Utility connections for recycled water, sewer, potable water

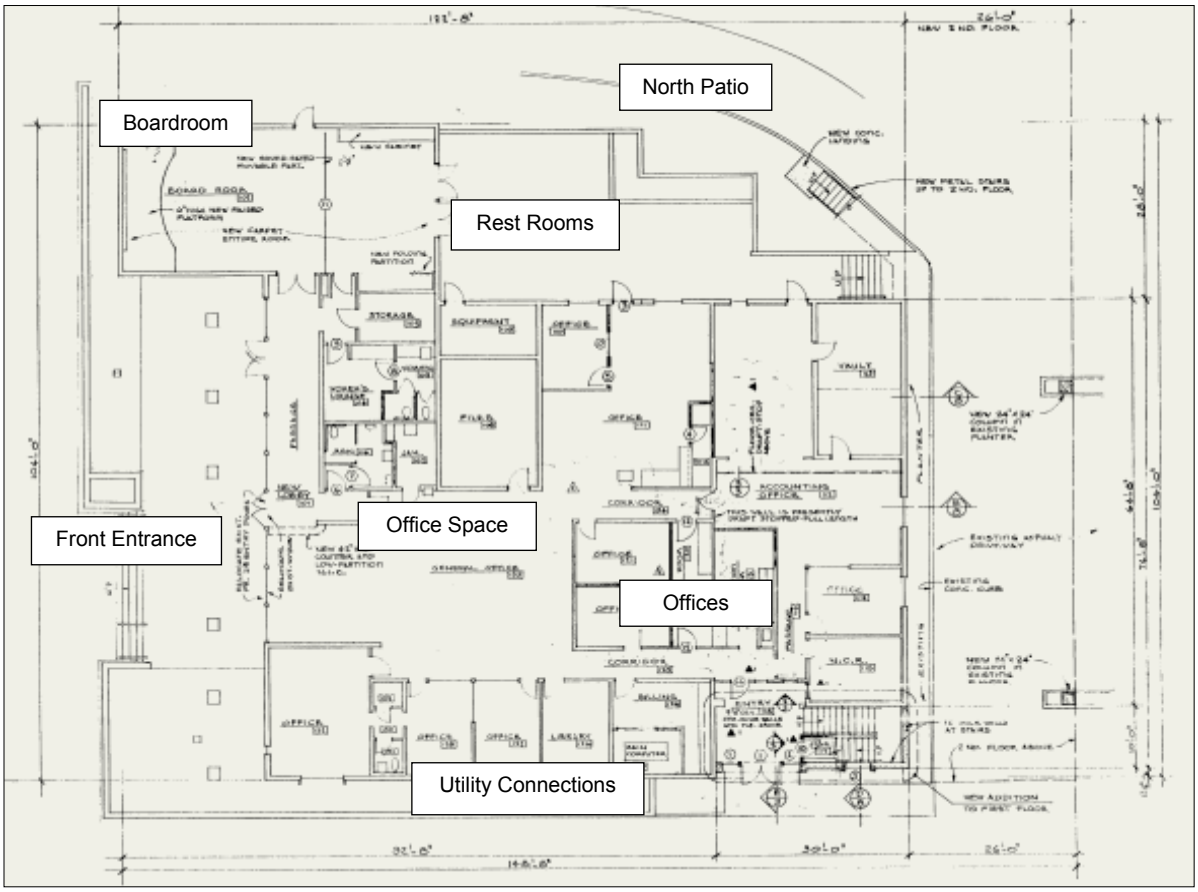

Figure 2-1
Existing Building Plan

The following provides a detailed vision of each Demonstration Project area as well as a list of the required upgrades and improvements.

2.2.1 Front Entrance

Vision for the Front Entrance

The tour should be designed so that the experience is launched with visitors' turn into the LVMWD headquarters complex. Signage reflecting the designated logo, color, and design template should direct people off Las Virgenes Road into the Demonstration Project parking lot, then to the Demonstration Project's front entrance. **Figure 2-2** shows the existing entrance to the former LVMWD administration building site and the front entrance to the building itself.

The facility name and logo should be clearly displayed on or near the low walls bordering the entry stairs, possibly etched brass or a similarly permanent material. Signage should clearly direct visitors to the entry door on the west side of the building. Careful consideration should be given to the high-visibility design and/or information posted on the hallway walls across from the entry doors. As noted above: "First Impressions Count!"

Figure 2-2
Existing Building Front Entrance (west side)

Figure 2-3 shows the hallway from the front entrance to the former Boardroom which will be modified to become a Learning Center. The existing sliding wood separator gate located just behind where the photo was taken would be closed prior to the start of a tour, preventing visitors from entering the process area. Signage on the gate and/or other nearby surfaces should clearly guide people down the hallway to the Learning Center. There is ample room to set up a sign-in station at the far end of the hallway, before people enter the board room. The storage room just outside the board room may warrant some reconfiguration to provide appropriate space to store tables, chairs, temporary signs, and other materials for tour activities.

Physical Modifications to the Front Entrance

The following summarizes the modifications needed to the front entrance to facilitate use for the Demonstration Project:

- Overall "sprucing up" of the building's front facade and entry area, including repairs and painting as required.
- Specific Demonstration Facility signage should be installed at the entrance and front of the building.
- Paved areas proximate to the entryway and landscaped areas should be cleaned or slurry sealed, with parking lines repainted.
- Landscaping should be refurbished or replaced with drought tolerant landscaping to match the rest of the site.
- Remove and replace front windows to facilitate installation of process equipment inside the building.
- New window coverings or blinds to help reduce the heat load on the HVAC.
- Consideration should be given to installing a fish tank or other water feature at the entry, similar to the one at the Tapia WRF entrance.
- See Section 2.2.4 for entrance hallway improvements.

Figure 2-3
Hallway from the Front Entrance to Board Room (looking north)

2.2.2 Learning Center (Board Room)

Vision for the Learning Center

The primary function of the Learning Center is to orient visitors to the tour experience, provide basic information about the processes of water reuse, introduce the science and safeguards of potable reuse, and other background information specific to the JPA's commitment to environmental sustainability. The current vision for the Learning Center anticipates diverse formats for displays, graphics, and interactive exhibits along the perimeter of the room. Visitors can constructively pass their time waiting for the tour to get underway. Their learning will build excitement for what they are about to experience.

The Learning Center is spacious and can be reconfigured to serve multiple purposes, including Demonstration Project tours as well as other potential community functions and meetings. **Figure 2-4** shows the Board Room as it exists today. The primary layout likely will be conference style, with chairs and tables.

Figure 2-4
Boardroom Converted to the Learning Center (looking west)

The audience would face a large, multi-screen video monitor that can be used for presentations orienting visitors to water treatment technologies and setting the stage for what they will see and experience during their facility tour. The presentation system also can be used to show animations of the treatment process, live microscope projections, and other visuals that help explain and build credibility for the treatment process.

Visitors would also congregate at the Learning Center at the close of their tour. This would be a chance to reflect on the experience, pose questions, and clarify understanding. The public outreach strategy for the Pure Water Project may recommend an interactive or closing activity using displays in the Learning Center. At minimum, visitors will have the chance to revisit some of the displays with new eyes, based on what they learned on the tour.

The walls of the hallway to the Learning Center as shown above in Figure 2-3 also provide prime area for messaging and graphics. Examples are photos that convey healthy people, diverse uses of water, environmental benefits, water conservation and water portfolio diversification are all contiguous with the Pure Water Project.

The actual Demonstration Project tour would start as visitors exit the Learning Center and walk through the hallway toward the treatment facility, as designated by the colored epoxy path on the floor. The floor of the Learning Center would be the same materials and format. This color will subsequently "dissolve" into the changing flow of colors (likely shades of blue) that will indicate the varied treatment processes.

Visuals toward the end of the hallway should help create a sense of discovery and excitement, that draws guest in to see more.

Physical Modifications for the Learning Center and Hallway

The following summarizes the modifications needed to the board room and adjacent hallway to facilitate use for the Demonstration Project:

- **Floors** – Colored epoxy application to the formerly carpeted floors, to give a sense of the facility being "so clean you could eat off the floor." A grey design is proposed for the Learning Center, outlined in blue which will be the predominant color on the floors throughout the building.
- **Walls** – Walls should be painted. The floor-to-ceiling wooden gate at the right of the entryway should be refurbished to close off the demonstration facility and guide people toward the Learning Center where the tour will start.
- **Ceilings** – Remove the tile drop ceiling in the process area and Learning Center. Paint the ceilings black. The drop ceiling tiles in the hallway between the Learning Center and the process area should be replaced with new tiles. All abandoned wires above the drop ceiling should be removed.
- **HVAC** – HVAC in the Learning Center and adjacent hallway should be checked and modified as required to make sure that all of the existing systems are working.
- **Lighting** – Provide simple lighting, to maintain focus on the tour features.
- **Audio Visual** – Install a new audio visual system consisting of a big screen TV panel and sound system.

2.2.3 Building Open Space Converted to Process Area

Vision for the Process Area

It is proposed that the demonstration process equipment be installed in the large open area formerly used to house cubicles for administrative staff. **Figure 2-5** shows the existing building open space that will be converted to the process area. The process systems should be positioned so that visitors walk the length of the skid for each process as they progress on the tour. The major process equipment (MF/RO/UV) should be positioned, painted and lighted so they stand out while the ancillary equipment pumps/tanks should be less prominent.

Figure 2-5
Existing Building Open Space (looking east from near the front entrance)

The process flow should also be designated by progressive changes in coloration in the pathway on the floor, coordinated with the same coloration on the skid, equipment or surrounding walls. Process names can be mounted in a manner that avoids direct contact on the equipment or flooring, to avoid their becoming dirty or detached over time.

Care should be taken to position wires and pipelines so they are concealed as much as possible, supporting the sense of this being an orderly, well maintained process. No pipes or conduits should cross the walking pathway to avoid damage and tripping hazards. Partitions and curtains can be used to visually set off the process equipment and maintain visitors' focus on the tour.

The suspended ceiling tiles over the Process Area should be removed, providing a more open atmosphere and a pleasant environment for visitors. See **Figure 2-6** for the typical condition of the existing ceiling. An open ceiling space enables installation of the taller process systems and provides more options for focused lighting along the tour route. The open ceiling space also will accommodate hanging banners proximate to each process step. These could include titles, graphics (as appropriate), and explanations of the process. Looking up to read the details helps visual learners and provides an alternative source of information being shared orally by the tour guide. Banners are particularly helpful for people with limited hearing or during large tours.

Figure 2-6
Typical Office Ceiling

Appropriately located wall displays, panels and curtains along the tour route can be used to reinforce messaging related to the treatment process and safe, reliable benefits of IPR. Along the tour route, visitors could have access to cutaways and samples of membranes, UV lamps, etc., for a "hands on" opportunity to build understanding and instill trust in the process. Similar opportunities should be "built in" to enable more technical visitors to "look under the hood" at process stages, view live testing, and handle filtration media.

The absence of the acoustical ceiling tiles will drive the need for the design to pay special attention to HVAC capabilities of the existing air conditioning system. Not having an acoustical ceiling will also impact the selection an audio system for tours because the sound will not be held close to the tour participants. Tour presentations will likely require more than a simple electronic megaphone or loud speaker to be effective.

The open space area will focus attention on exhibits and important components of the tour by spot-lighting these areas. Applying darker colors in unused areas that do not contribute to the overall message can enhance the effect.

Physical Modifications for the Open Space/Process Area

The following summarizes the modifications needed to the open space area to facilitate use as the process area for the Demonstration Project:

- **Floors** – Like the Learning Center, colored epoxy application should be installed on the formerly carpeted floors to give a sense of the facility being "so clean you could eat off the floor." A blue (or blue and grey) design is proposed for the process area, which will be the predominant color on the floors throughout the building and designate the tour route.
- **Walls** – Walls should be painted. Existing openings to areas not part of the visitor experience should be partitioned off to inhibit access and focus the visitors on the process equipment in front of them. Varied materials can be used, including curtains, portable barriers, and wall board.
- **Ceilings** – Remove the tile drop ceiling in the process area. Paint the ceilings black and provide simple lighting, to maintain focus on the tour features. All abandoned wires above the drop ceiling should be removed.
- **HVAC** – HVAC in the process area should be checked and modified as required to make sure that the existing systems are working. The existing insulation should be removed and replaced with an appropriate alternate material or covered up.
- **Lighting** – Provide simple lighting, to maintain focus on the tour features.
- **Drains** – Construct drains in the floors to provide a method for cleaning and removing potential water spills that may occur during operation.

2.2.4 Offices/Ancillary Facilities

Vision for the Offices/Ancillary Facilities

Three former offices along the windowed wall adjacent to the process area will be used to locate ancillary processes required by the Demonstration Project. These rooms should be inaccessible to the public and should only be used by the operators. These rooms will have some improvements, but will not have the same level of modifications as the public areas.

The vision for each of the rooms that will be used are as follows:

- A laboratory, with lab table, sink, beaker drying rack, and computer screens with visible "test results" displayed. The "lab" should be seen as a "working lab" even if no one is in

there, perhaps with some beakers on the table or scrolling test results on the computer screen.

- An air compressor room that likely will require soundproofing and improvements to the HVAC
- A chemical storage room that may require special containment features, HVAC modifications, and other accommodations for storing and delivering chemicals to the process systems.

Figure 2-7 shows the entrances to the offices while F**igure 2-8** shows the inside of one of the individual offices.

Figure 2-7
Existing Building Office Space

Figure 2-8
Existing Building Office

Physical Modifications for Offices/Ancillary Facilities

The following summarizes the modifications needed to the open space area to facilitate use as the process area for the Demonstration Project:

- **Floors** – Since the offices will not be part of the tours and not accessible to the public, no significant improvements to the floors are anticipated.
- **Walls** – Walls should be painted. Existing openings to areas not part of the visitor experience should be partitioned off to inhibit access and focus the visitors on the process equipment in front of them.
- **Ceilings** – Remove the tile drop ceiling in the offices. All abandoned wires above the drop ceiling should be removed.
- **HVAC** – HVAC in the offices should be checked and modified as required to make sure that the existing systems are working. The laboratory, compressor room, and chemical storage room will require additional enhancements to allow changes to the building occupancy to suit the new intended uses. The existing insulation should be removed and replaced with an appropriate alternate material or covered up.
- **Lighting** – Provide lighting to allow safe operation of the systems.
- **Plumbing** – Add plumbing to the laboratory for laboratory sinks and appurtenances. An Emergency Eyewash Shower will be required for the chemical area.

- **Drains** – Construct drains in the floors to provide a method for cleaning, removing potential spills that may occur during operation, and water from an emergency eyewash shower.

2.2.5 Restrooms

Vision for the Restrooms

See **Figure 2-9** for a photo of one of the existing restrooms. At a minimum, general "cleanup" of the Men's and Women's restrooms is required. The modifications to the building may require that the existing rest rooms be brought up to code, including meeting Americans with Disabilities Act (ADA) requirements. A worst-case scenario might require demolition and construction of all new rest room fixtures. Consideration could be given to providing one unisex restroom instead of separate woman's and man's restrooms.

In the event that LVMWD would like to avoid refurbishment of the existing rest rooms altogether, the rest rooms in the current LVMWD headquarters building could be used, as the distance from the Demonstration Project site to the administration building is less than 500 feet.

Figure 2-9
Existing Building Restrooms

Physical Modifications to the Rest Rooms

The following summarizes the modifications needed for the rest rooms to facilitate use as the process area for the Demonstration Project:

- **Floors** – Replace the floor tiles with new ceramic or vinyl tiles.
- **Walls** – Walls should be painted and tiled as required to meet code.

- **Ceilings** – The tile drop ceiling in the rest rooms should be replaced with new tiles. All abandoned wires above the drop ceiling should be removed.
- **Lighting** – Replace the existing lighting with new lighting.
- **HVAC** – HVAC in the rest rooms should be checked and modified as required to make sure that the existing systems are working.
- **Lighting** – Replace lighting as required.
- **Plumbing** – Replace fixtures, urinals, and toilets as required.

2.2.6 North Patio Area

Vision for the North Patio and Adjacent Areas

After the tour has progressed through the process area (see Section 2.2.3), LVMWD would like to give the visitors to the Demonstration Project the opportunity to taste product water from an IPR facility prior to leaving the building. Comments from other IPR facilities indicate that tasting the purified water is one of the most surprising and convincing elements of the tour experience. Experience of existing and anticipated IPR facilities indicates visitors are excited to do their own taste test.

At the end of the process area, just before the doors to exit the building into the north patio area, visitors would arrive at a "finished water tasting station" adjacent to the doorway. Design of the station should reflect common potable water uses, e.g. a bar sink or kitchen sink. The station would need to include storage and trash receptacles for small cups, towels, trash and other amenities. The tasting station also could be configured for visitors to take part in a "blind taste test" of tap water, bottled water and a "Pure Water", to see if they can tell the difference

In the north patio area itself (See **Figure 2-10**), facilities could be installed to introduce the possibility of using extended solar exposure as an alternative process step for NDMA removal, essentially demonstrating using the LVMWD Las Virgenes Reservoir as a "Process Component" of the IPR system.

From the North Patio, visitors would return to the Learning Center to bring closure to the experience. Closure can take many forms and should be discussed and a program developed as the JPA progresses with creating a comprehensive outreach strategy for introducing the Pure Water Project to the community's multiple audiences.

Visitors would exit the building by walking back through the long, windowed hallway to the same door that was used to enter the building. This exit will reinforce the impression of water's many uses and its role in our community, communicated through graphics that convey healthy people, environmental benefits, water conservation, water portfolio diversification, and other critical activities that will be advanced through the Pure Water Project.

Figure 2-10
Existing Building North Patio Area

Physical Modifications to the North Patio Area

The following summarizes the modifications needed for the water testing station and the north patio area for the Demonstration Project:

- **Floors** – Inside the building at the water testing station, the floors would be refurbished as outlined for the process area. Outside in the north patio area, no significant modifications to the existing concrete slabs is anticipated.
- **Walls** – Interior walls at the water tasting station should be painted to match the process area improvements.
- **Ceilings** – Drop ceiling modifications would be implemented with the process area improvements for the water tasting station area.
- **Lighting** – Provide lighting for the water tasting station. No additional lighting is anticipated for the north patio area.
- **HVAC** – HVAC modification for the water tasting station area would be implemented with the process area improvements.
- **Plumbing** – Plumbing and drains should be provided to construct the water tasting station.

2.2.7 Connections to Existing Utilities

Vision for the Connections to Existing Utilities

Connections will be made to existing utilities to obtain recycled water for the Demonstration Project, discharge of waste flows, and power for the process systems. Connections will be made to minimize pipe length and damage to existing facilities. **Figure 2-11** show the potential location for the connection to the non-potable reclaimed water line in the access road to the LVMWD administration building.

Figure 2-11
Existing Utility Connections South of Existing Building

Physical Modifications to Make Connections to Existing Utilities

The following summarizes the modifications needed for the connections to the existing utilities for the Demonstration Project:

- **Potable Water** – Potable water connections to the existing building water system will be required to provide water to the process area, laboratory, and water tasting area.
- **Recycled Water** – A connection is required to the existing non-potable recycled water pipe located in the access road to the LVMWD administration building.
- **Sewer** – The existing sewer connection will be used. All new floor drains and the discharge from the demonstration plant itself will be connected to the existing sewer.
- **Electrical** – The existing electrical panel on the north side of the building will be modified to power the new Demonstration Project loads.

2.3 Architectural Programming

As described above, the Demonstration Project will be designed to obtain engineering data as well as facilitate tours and learning at the site. The vision for the project is developed and defined by the architectural programming. This section provides ideas and suggestions from the Demonstration Project architect to show how the vision could be implemented as part of the final design. The architectural floor plan highlighting the modifications to the building floors is shown in **Figure 2-12**, while **Figure 2-13** shows the ceiling and exhibit plan.

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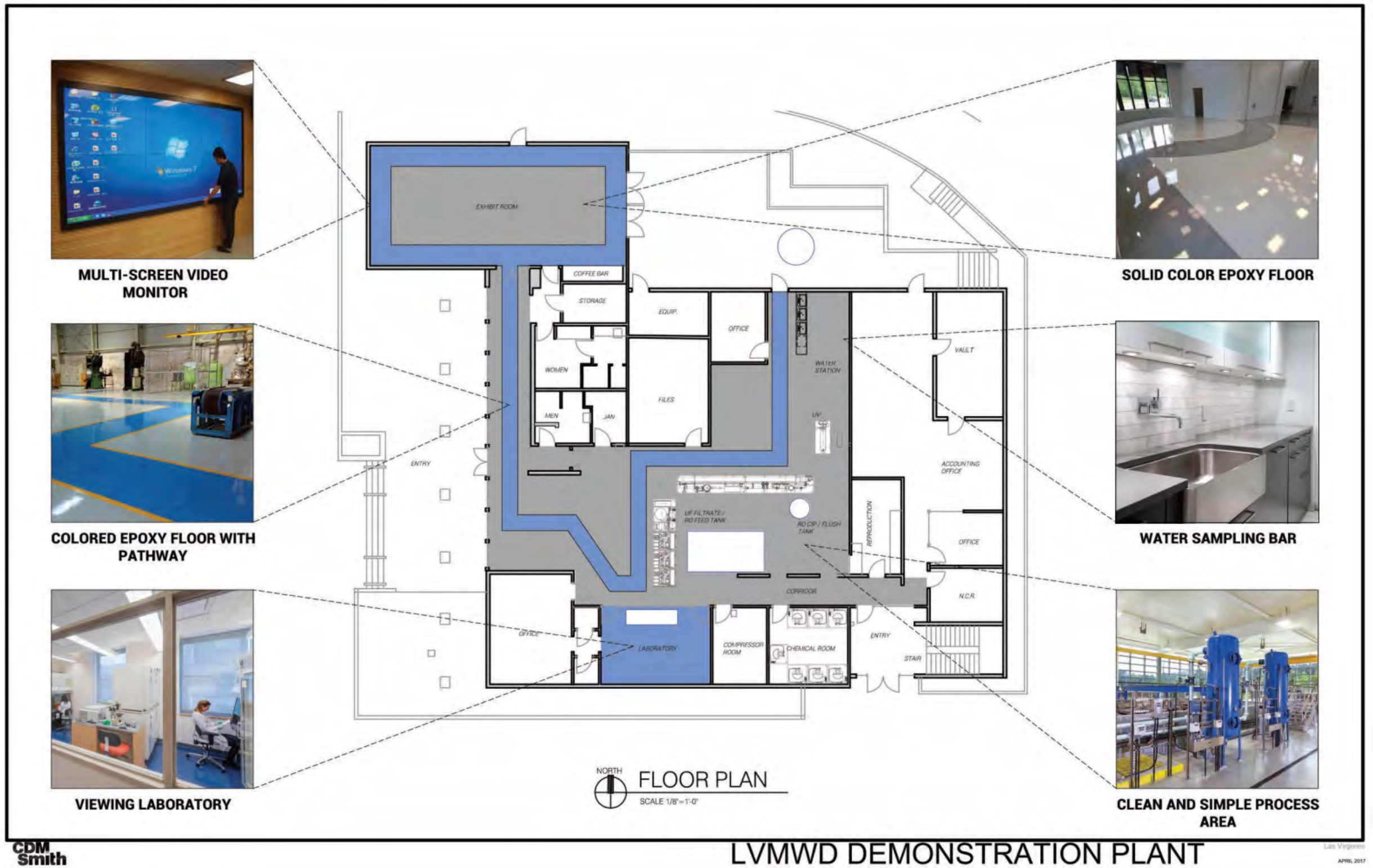

Figure 2-12
Architectural Floor Plan

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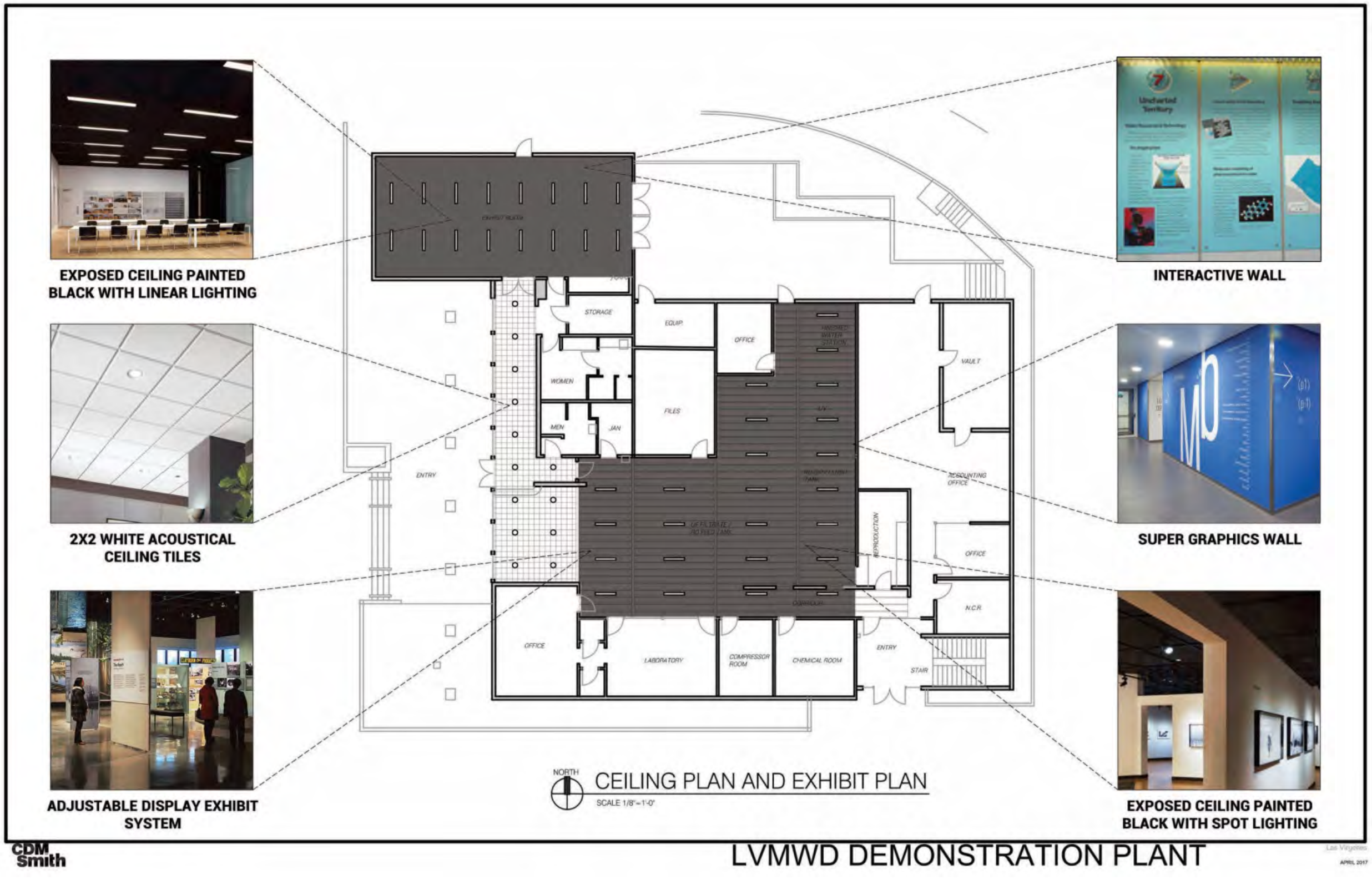

Figure 2-13
Architectural Ceiling and Exhibit Plan

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Public Outreach Demonstration Project Tours – The tour will wind through the facility to highlight major processes while avoiding chemical and other potentially hazardous areas. The tour will include a learning center, laboratory, major treatment processes, and a water tasting bar. The floor of the building will be coated with epoxy to smooth and flatten the current floor. The path of the tour, which begins and ends in the Learning Center, will be blue epoxy. Epoxy will prevent wear and/or peeling associated with other types of pathway markers. The shade of blue for the tour path will change during the tour to indicate a new process.

Learning Center – The Learning Center is designed to encourage interactive learning using exhibits, multi-screen video displays, and/or touchscreens. Interactive electronic walls, while engaging, can be costly and difficult to maintain. For this reason, a non-electronic interactive wall is recommended. Learning tools will focus on the source of the water and the treatment process and include both text and videos. The tour will then proceed down the hallway.

Laboratory – The laboratory will have a wall of windows looking out into the process area to allow for tours to look into the lab. The laboratory will contain hard-top countertops, cabinets, sinks and drains. Glassware and drying racks typical of water quality laboratory labs will be included to provide the viewer with an idea of common tools used in water treatment plant analysis. The laboratory will also have a work station with a computer monitor and chair.

Process Area – Each of the specific process systems will be discussed during the tour. Spotlights for each process will allow the tour guide to light up specific portions of the treatment system as they are being discussed. Banners will be hung from the ceiling to identify process areas. The wall behind the equipment will have a large super graphic wall that could contain text or a figure. Process area will be kept clean and simple.

Water Tasting Area – After the process area, tour participants will enter the water tasting bar. The bar can be done in a modern style or retro kitchen style. The bar will include a sink and drain and 3 taps: bottled water, purified water, and tap water. Taps will have a sloped slotted trough leading to the drain to prevent pooling of water while collecting samples. Samples will be provided in disposal cups and trash receptacle's will be provided.

Interior Walls – The interior walls of the building will be painted white. Anything at 9 feet in height and above in the process area and learning center will be painted black to allow the viewer to focus on the tour components. The ceiling in the process area and learning center will be exposed, with the drop ceiling removed as well as the phone and Ethernet cables. Duct work and lighting hangers will be painted black. Duct work with insulation will be wrapped in foil prior to painting to provide a cleaner surface. The exposed ceiling will also facilitate linear lighting and hangers for banners to aid in the identification of processes during the tour. The ceiling between the learning center and the process area will have white acoustical ceiling tiles. The building main entrance will have new white acoustical tiles. Black acoustical ceiling tiles may be used in place of a black exposed ceiling in the learning center if desired.

Chemical and Compressor Rooms – Chemicals and compressors will be kept away from the tour route for safety and to control noise during the tour. Chemical storage and pumps will be kept in the chemical room. Compressors will be installed in the compressor room. After sampling on the patio guests will return to the learning center for a debrief.

Other architectural programming ideas that should be implemented for the final design include:

- Use of darker colors in unused or immovable areas that do not contribute to the overall message, so as to focus their attention on the important components.
- Consider the use of colors (walls and process equipment) to convey the purification concept as water makes its way to the sampling area
- Establish logos explanations of process steps.
- Use of colors (walls and process equipment) to convey the purification concept as water makes its way to the sampling area.
- Use colors denoting progressive levels of treatment and purity.
- A sampling area that is inviting with integrated sinks or fountains, bottle fill station, cup dispensers, and integrated disposal receptacles.
- Install continuous online instruments that show improvement in water quality through the processes, like TDS (or provide sample taps so a tour guide can test, like we did for the watershed tour).
- Create visual aids (banners; cards) as if it was a self-guided tour.
- Consider sound transfer. Also consider an AV system linked to head sets or i-phones.
- Safety features include keeping chemicals and pumps away from the public tour route. Chemical delivery and storage away from tour and visitors
- Locate the compressor away from tour area, to reduce sound impacts.
- Consider the value of universal skids to a Demonstration Facility is the possibility of vetting different vendor's side-by-side and maintaining competitive pricing for future WTP membrane replacement
- Use banners to close off areas not in use. Banners can be black to diminish visibility. Also, can be designed to carry additional messaging.
- Use of monitor to view videos, show treatment up-close and personal, or project a series of static photos
- Provide maps of sites where IPR is in use
- Provide quotes from journal articles.

Section 3

Regulatory Environment and Process Selection

The regulatory environment has a significant impact on the Demonstration Project. This section highlights the current regulations and discusses how the treatment processes will be selected to meet the regulatory requirements.

3.1 Current Regulations

The California State Water Resource Control Board Division of Drinking water (DDW) is currently developing regulations for reservoir augmentation using recycled water. At this time, there are no formal regulations in place specific to surface water augmentation, thought the surface water augmentation regulations are currently under review. The development of these regulations has been an open and transparent process and preliminary information on the regulatory requirements has been provided by DDW at public presentations and through direct discussions with DDW staff. These new regulations are expected to build upon the existing Groundwater Replenishment Reuse Regulations, finalized in 2014.

While DDW has not yet released an expected date to promulgate the final regulations, the draft regulations are expected to be available in the second quarter of 2017. Internal drafts of the regulations were released within the 2016 Expert Panel Report on the Evaluation of the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse (September 2016). These early releases indicate that process requirements for RO and AOP and specified log reductions for pathogens will be similar to those contained in the 2014 Groundwater Recharge Reuse Regulations.

3.1.1 Pathogen Reduction

The draft regulations call for a total of 8-log reduction of *Giardia* and enteric viruses and 7-log reduction of *Cryptosporidium* prior to discharging to the reservoir. Additional pathogen credits would then be required by the surface water treatment plant pulling water from the reservoir, totaling 12-log virus, 10-log *Giardia*, and 10-log *Cryptosporidium*, between the wastewater treatment plant, advanced water treatment, and surface water treatment. Pathogen reduction provided by dilution and residence time are discussed below.

3.1.2 Dilution

Average theoretical hydraulic residence time within the reservoir must exceed 4 months and the reservoir must provide a 100 to 1 dilution to any single day flow into the reservoir. This dilution must be demonstrated through tracer testing. A smaller 10 to 1 dilution factor would also be allowed if an additional 1-log credit is provided for each pathogen. The Expert Panel also recommended that theoretical hydraulic residence times between 2 and 4 months be allowed if an additional log reduction credit is provided for each pathogen type. The maximum pathogen credit required before discharge to a reservoir would therefore be 10-log for *Giardia* and viruses and 9-log for *Cryptosporidium*, assuming no further changes to the draft regulations.

3.1.3 Residence Time

Another key component of the surface water augmentation regulations will be the residence time required in order to utilize a similar treatment train to the UF-RO-UV/AOP employed in groundwater replenishment projects.

At this point, DDW staff has indicated that a 4-month average residence time will be required, accounting for all influent into the reservoir, including both recycled water and natural and imported water supplies. Reservoirs with average residence time between 2 and 4 months will require an additional level of treatment for pathogen reduction, as is expected to be required for San Diego's Pure Water program. In addition, reservoirs with a daily dilution factor less than 1 to 100, but greater than 1 to 10 will require an additional 1-log reduction for each pathogen time.

Given the size of the Las Virgenes Reservoir (9,800 acre-feet), and the historic inflows, the residence time provided by this reservoir will likely be greater than the 2-month minimum and provide more than the 10 to 1 dilution, but it is not yet clear if they will exceed the 4-month residence time and 100 to 1 dilution needed to avoid additional pathogen removal. This question will need to be evaluated through the reservoir modeling that is being performed separately.

3.1.4 Pathogen Reduction Assumptions

It should therefore be assumed that the maximum removal requirements in the draft regulations will be required, specifically 10-log virus, 10-log *Giardia*, and 9-log *Cryptosporidium*. An additional 4-log virus, 2-log *Giardia*, and 3-log *Cryptosporidium* would be provided by the surface water treatment plant after storage in the reservoir.

3.2 Treatment Processes Selection

The high quality of the Tapia WRF effluent and the expected residence time in the Las Virgenes Reservoir (exceeding 4 months), could allow a high degree of flexibility in the treatment processes that are employed. The Demonstration Project should therefore focus on optimizing the primary treatment steps, MF/UF and RO, while evaluating alternative AOPs that are less costly than the standard UV/hydrogen peroxide used for most groundwater replenishment projects. **Figure 3-1** shows the proposed process stream for the Demonstration Project and future potable reuse approach.

Figure 3-1
Demonstration Project Process Flow Graphic

3.2.1 Core Treatment Processes

Beyond the core treatment processes of RO and AOP, MF or UF is generally provided as pretreatment for the RO and as an additional pathogen barrier. With technologies in advanced water treatment continuing to evolve, it is important that the full-scale facility design provide flexibility to take advantage of continuing developments in the industry. The use of a semi-universal membrane skid will provide an opportunity to directly test alternative MF/UF membranes side-by-side, facilitating pre-approval of acceptable membranes for use in the future full-scale facility

Part of the Demonstration Project's technical effort will focus on options for reducing brine quantity through higher RO recovery rates. Brine generation is an important consideration for the full-scale design due to the distance it would be conveyed to the disposal point and the potential requirements that will be imposed on the brine water quality by Calleguas Municipal Water District (CMWD), the discharge permittee. Since the cost of brine disposal is a significant cost, reducing the amount of brine produced by the Pure Water Project is essential to implement a cost-effective solution.

3.2.2 Disinfection/Advanced Oxidation

The low ammonia levels in the nitrified and denitrified source water provide an opportunity to use breakpoint chlorination for an additional level of virus inactivation and to trial UV/chlorine in place of UV/hydrogen peroxide. Utilizing a UV/chlorine approach at the Demonstration Project could allow for a reduction in UV unit sizing at a full-scale plant, reducing both the capital and operating cost of the facility. Disinfection using ozone is also a possibility as discussed below.

3.3 CEC Reduction

Preliminary bench testing or water quality testing to be performed during operation of the Demonstration Project will aid in the selection of a proposed process train for the full-scale Pure Water Project. Testing should include:

- NDMA and other nitrosamine formation potential benchtop testing;
- Spiking of 1,4-dioxane to assess and optimize AOP performance; and
- Simulated reservoir degradation of NDMA and other nitrosamines through natural sunlight.

3.3.1 Ozone

Ozone should also be evaluated as a means of reducing CECs, while serving as a barrier for viruses and *Giardia*. *Cryptosporidium* reduction can also be achieved with ozone, but requires extended contact times and higher ozone doses, which will add to the cost and could make UV treatment a more appealing alternative. Whether or not additional *Cryptosporidium* reduction is required, beyond what is achieved at Tapia WRF, MF, and RO, will depend on results of ongoing reservoir modeling and the final requirements of the reservoir augmentation regulations.

3.3.2 Nitrosodimethylamine (NDMA)

With source water potentially coming from the Tapia WRF downstream of existing storage tanks, there is a concern that elevated levels of N-Nitrosodimethylamine (NDMA), a disinfection by-product, will be present. NDMA has a notification level of 10 nanograms per liter (ng/L) and is often present at levels ranging from 30 to 1,000 ng/L in Southern California recycled water distribution systems. NDMA can be controlled by reducing the chloramine contact time, however, this alternative is generally not available to plants fed from an existing distribution network. When NDMA formation cannot be controlled, it must be removed using high doses of UV after the RO.

A unique opportunity for NDMA control at the JPA's full-scale facility is to consider the residence time of the water in the Las Virgenes Reservoir, where extended exposure to sunlight should be expected to naturally degrade residual NDMA in the water. While no existing facilities have been given credit for natural degradation of NDMA, testing was conducted by OCWD after startup of the Groundwater Replenishment System, storing treated water in open basins. The results demonstrated a relatively rapid breakdown of NDMA from sunlight (Plumee and Reinhard, 2007). Conducting similar testing at the Demonstration Project would be beneficial in providing baseline data for future regulatory approval of NDMA reduction credits within the Las Virgenes Reservoir. Such approval could allow for a reduced UV dose or the use of post-RO ozone, resulting in significant savings in both capital and operating costs for the future full-scale facility. Such an approach has not yet been approved by DDW, so it will be critical to include any novel means of NDMA reduction and any alternative AOP approach in the Demonstration Project testing.

3.4 Impacts from Seasonal Operation

The Demonstration Project will provide information for the full-scale Pure Water Project as well as research ways to make the Project more efficient and economical. If the Pure Water Project Las Virgenes-Triunfo were to use only tertiary treated recycled water from the Tapia WRF as the source water, its advanced treated water would only be available during the winter months (when the Tapia WRF has excess supply). The Demonstration Project should also investigate options for treating dry weather flows from the local stormwater municipal discharge (MS4) permittees.

The CMWD operates the Salinity Management Pipeline, which discharges saline water from groundwater desalination facilities and excess recycled water in the region to the Pacific Ocean. CMWD is concerned about exceeding the discharge permit water quality limits if the source of the brine includes urban runoff. If the Demonstration Project identified a feasible treatment method for the dry weather flows, the yield of potable water supply from the full-scale advanced water treatment plant could increase beyond 5,151 AFY. While it would likely not be feasible to collect and treat this water at the Demonstration Project, the project could include a study sampling and quantifying dry weather flows to evaluate their potential impact on the operations of the Advanced Treatment Facility.

In light of the above, the Demonstration Project's research efforts should focus on the following seven primary areas:

1. Evaluation and quantification of the natural degradation of NDMA and other constituents of emerging concern in an open-air reservoir subject to direct sunlight.
2. Direct testing of high recovery RO, achieving recoveries above 93 percent to reduce the brine flows requiring transmission and disposal.
3. Long-term demonstration of the benefits of operating RO membranes at elevated flux to improve contaminant rejection and product water quality.
4. Evaluation of the benefits of RO membrane flushing to extend operating periods between chemical cleanings, reducing chemical usage, energy consumption, and high salinity waste flows.
5. Characterization of the brine to determine its compatibility for discharge to CMWD's Salinity Management Pipeline.
6. Evaluation of post-RO ozonation as an alternative to UV/AOP.
7. Characterization of dry weather urban run-off and consideration as a supplemental source to the advanced treatment facility.

In addition, it is expected that full RO treatment will be required, along with AOP sufficient to achieve 0.5-log reduction of 1,4-dioxane, or other approved surrogate compounds. **Table 3-1** below presents a potential process train and level of pathogen credits to achieve the expected requirements of the Surface Water Augmentation Regulations. These credits are based on those granted in the permitting of similar IPR projects. It should be noted that this approach does not rely on any pathogen credits from travel time within the reservoir.

Table 3-1 Potential Pathogen Credits for AWT Process Train

Pathogen	WWTP	MF	RO	Free Cl2	UV	Total	Maximum Requirement
Cryptosporidium	1	4	2	0	6	13	9
Giardia	2	4	2	0	6	14	10
Virus	2	0	2	6	6	16	10

3.5 Building Codes and Permitting

The following building codes may be applicable to this project:

- Americans with Disabilities Act
- 2016 California Building Code
- 2016 California Mechanical Code
- 2016 California Energy Code
- 2016 California Plumbing Code

- 2016 California Green Building Standards Code
- 2013 California Fire Code
- 2016 California Environmental Quality Act
- National Electrical Safety Code
- National Fire Protection Agency
- Federal Occupational Safety and Health Administration
- Cal/OSHA General Industry Safety Orders
- California Health and Safety Code
- ANSI Z358.1: Emergency Eyewash and Shower Equipment, 1981

The following building permits may be required for the proposed modifications:

- Building Permit
  - City of Calabasas Building Permit(s)
  - County of Los Angeles Building Permit(s)

Section 4
Preliminary Design Criteria

The Demonstration Project will include multiple unit processes for treatment and testing of the water, including UF, RO, advanced oxidation with UV and free chlorine, an alternative advanced oxidation system using ozone, and product water stabilization using calcium chloride and caustic soda. The overall process flow diagram is shown in **Figure 4-1**. This section includes a description of the various systems that are part of the Demonstration Project. Vendor information used in the preparation of the preliminary design criteria and drawings (Section 8) is included in **Appendix B**.

Table 4-1 summarizes recoveries, waste flows, and treatment process capacities for primary treatment systems.

Table 4-1 Demonstration Project Process Design Capacities

Parameter	Unit	Criteria
UF recovery	%	90
RO recovery with Brine Reduction System	%	92.5
Influent to AWTF	gpm	107
UF filtrate water capacity	gpm	96.1
UF backwash waste	gpd	19,600
RO Feed Flow	gpm	96.1
RO Product Flow	gpm	88.9
RO brine	gpm	7.2

4.1 Ultrafiltration System

The membrane filtration system provides pretreatment for the RO system to reduce the particulate and biological fouling of the RO membranes. The membrane filtration system will effectively remove inert particulates, organic particulates, colloidal particulates, pathogenic organisms, bacteria and other particles by the size-exclusion sieve action of the membranes. **Table 4-2** presents design criteria for the membrane filtration system, with system components described briefly below.

Table 4-2 Preliminary Design Criteria (UF)

Parameter	Unit	Value
Max Feed Flow	gpm	107
Minimum Recovery	%	90
Element Area	ft^2	650 - 900
No. Membranes	-	6
Independently monitored systems		3
Flux	gallons/ft/day (gfd)	30-40
Backwash rate (each system)	gpm	50-75
Filtrate Storage	min	30
	gallons	2880

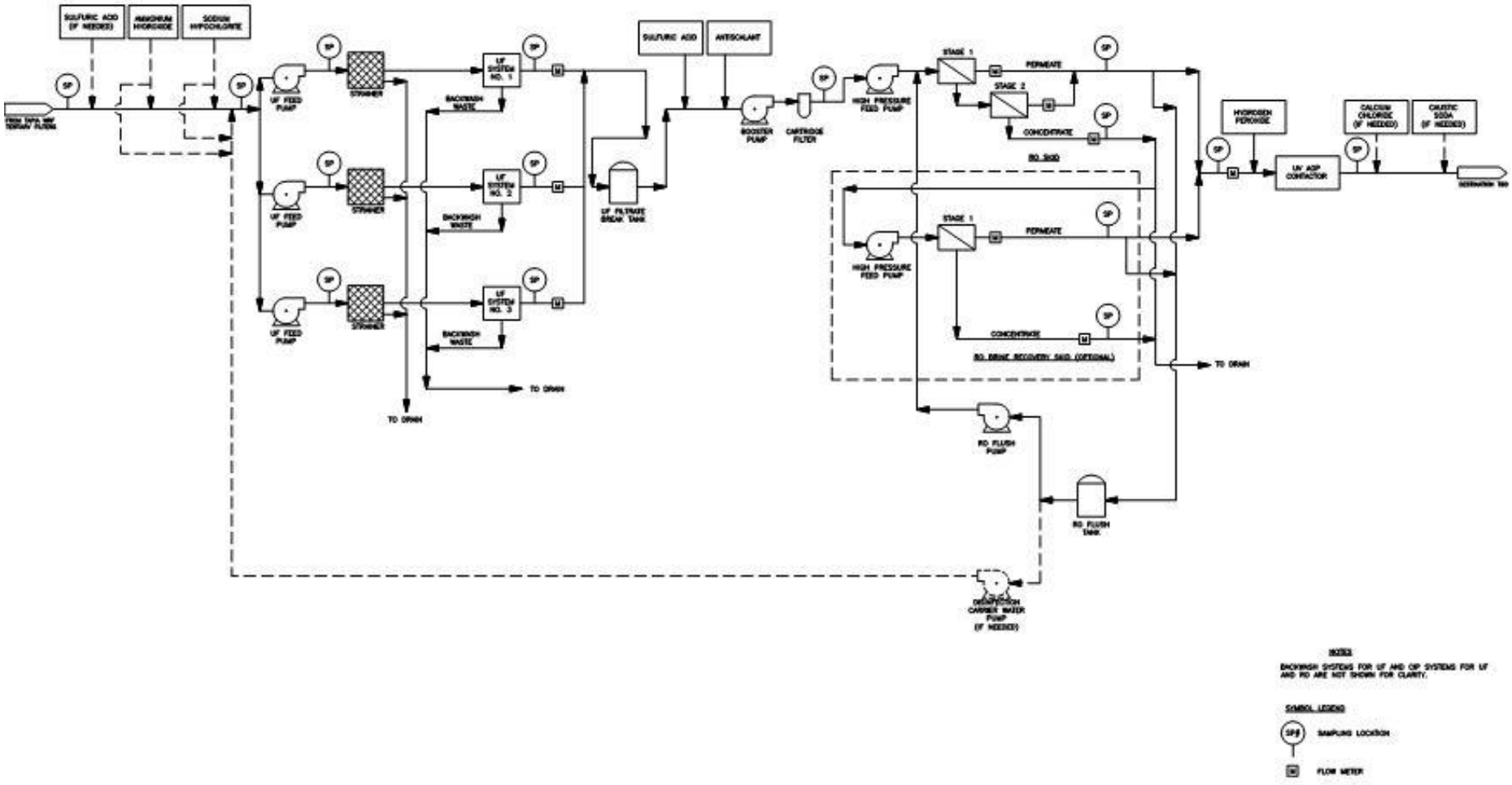

Figure 4-1
Demonstration Plant Process Flow Diagram

4.1.1 Pre-Treatment Chemical Addition

Ammonium hydroxide and sodium hypochlorite will be added downstream of the membrane feed pumps and upstream of the membrane filtration 200-micron inlet strainers for chloramination to control biological fouling of the UF membranes. The target combined chlorine concentration (chloramines) will be 3 to 5 mg/L.

4.1.2 Membrane Filtration Pre-Filters

The membrane filtration inlet strainers protect the membrane filtration membranes from damage and/or fouling due to larger particles. Automatic self-cleaning inlet strainers are typically provided by the membrane manufacturers as part of a complete membrane filtration system package and are required by the membrane filtration system warranty.

4.1.3 Membrane Filtration System

Since the membrane flux is a major element in determining how much membrane equipment is required for both the MF/UF and the RO systems, optimizing the flux rate across each is a critical outcome of the demonstration project. For the MF/UF, utilizing a universal skid design will allow multiple vendor's membranes to be tested at different flux rates side-by-side. The system should accommodate a minimum of three alternative membrane types, operating as independent systems with separate flow monitoring, integrity testing, backwashing, and membrane cleaning to allow a direct comparison of membrane performance between the three systems. Membrane integrity will be confirmed using online turbidimeters and by daily pressure decay tests. The system will be fully automated for flow control, backwashing, daily maintenance cleans, and periodic chemical cleans in place.

4.1.4 Membrane Filtration Break Tank

The membrane filtration break tank will serve as a flow equalization reservoir for the membrane filtration product prior to being pumped to the RO system. The membrane filtration filtrate will be conveyed to the membrane filtration break tank with residual pressure from the membrane filtration system. The membrane filtration break tank will mitigate the impact of the variations in the membrane filtration filtrate flow (resulting from backwashes, cleanings, and integrity tests) by providing equalization volume equivalent to approximately 30 minutes of the maximum RO feed flow between the membrane filtration and RO processes. The membrane filtration filtrate flow varies due to the membrane filtration backwashes, which will occur every 25 to 30 minutes. Overflow from the break tank will be directed to the sanitary sewer.

4.2 Reverse Osmosis System

While RO is used for purification and desalination in water treatment, it also has an extensive history of being effectively utilized in wastewater treatment processes for removal of a wide array of dissolved constituents, including trace organic compounds that are not removed through a tertiary filtration process. RO has proven to be effective at removing the refractory organics and volatile organic fractions of dissolved organic constituents. It can also remove complex organic constituents such as taste and odor causing compounds. RO is generally recognized as the best available treatment for reducing total dissolved solids (TDS) and many constituents of emerging concern in wastewater effluent intended for groundwater replenishment.

The RO facility will include the following processes:

- RO pre-treatment chemical addition (antiscalant and sulfuric acid for scale control)
- RO primary feed pump
- Two-Stage primary RO system
- Secondary RO feed pump
- One-stage secondary RO system
- RO flush tank and flush pump

4.2.1 Pre-Treatment Chemical Addition

Antiscalant will be added upstream of the RO membranes to control scaling. Sulfuric acid will also be added upstream of the RO membranes to lower the pH of the RO feed water to prevent calcium carbonate, calcium phosphate, barium and strontium from limiting the RO recovery.

4.2.2 Reverse Osmosis Feed Pump

The RO feed pump will pump membrane filtrate from the membrane filtration break tank to the RO system. he required RO feed pump pressure is a function of the headloss in the upstream associated piping, and the required feed pressure into the RO system. The required discharge pressure for the RO feed pump will vary as the RO operating pressure changes due to water quality changes and RO membrane fouling. Therefore, a variable frequency drive (VFD) will be used for the RO feed pump to adjust to varying pressure requirements. The rated design point for the pump will be selected from within this range such that the pump will operate near best efficiency for the most common operating conditions.

4.2.3 Reverse Osmosis System

A two-stage primary RO and single-stage secondary RO configuration will be provided to increase recovery and reduce brine flow. The RO trains will have 8-inch elements, which are the most common size in the IPR industry to date. One primary RO system will be used to treat the flow with a 2-stage design operating at approximately 85 percent recovery. The concentrate from the two primary RO systems will be combined and pumped through a single-stage secondary RO system which will increase overall RO recovery to approximately 92.5 percent. The two systems will share a common chemical cleaning system. Membrane integrity will be monitored continuously through conductivity and intermittently through weekly sampling for sulfate. Assessment of the RO flux rate requires longer term operation and cannot be as easily varied during a demonstration test. Based on experience with similar source waters, a primary RO flux rate of 14 gfd has been assumed for the RO skid design.

4.2.4 Reverse Osmosis Flush Tank and Pump

An RO flush tank and pump will be provided for membrane cleanings. The RO flush tank will be fed with RO permeate.

Design criteria for the RO system are summarized in **Table 4-3.**

Table 4-3 Preliminary Design Criteria (RO)

System		Parameter	Unit	Value
Primary RO	Membrane Diameter		in	8
	Membrane Area		ft^2	400
	No. Membranes/ Vessel		-	7
	No. Vessels		-	3
	Configuration		-	Two Stage
	Feed Flow		gpm	96.1
	Overall Recovery		%	85
	Permeate Flow		gpm	81.7
	1st Stage	No. Membranes	-	14
		No. Vessels	-	2
		Permeate Flow	gpm	54.4
		Recovery	%	57%
		Flux	gfd	14
	2nd Stage	No. Membranes	-	7
		No. Vessels	-	1
		Permeate Flow	gpm	27.2
		Recovery	%	65%
		Flux	gfd	14
Brine Recovery RO System		Configuration	-	One Stage
		Feed Flow	gpm	9.4
		Recovery	%	50
		Permeate Flow	gpm	4.7
		Membrane Diameter	in	4
		Membrane Area	ft^2	81
		No. Membranes	-	7
		No. Vessels	-	2 (1 duty, 1 standby)
		Flux	gfd	10 - 12
Primary RO + Brine Recovery		Overall Recovery	%	90
		Permeate Production	gpm	86.4

4.3 UV/Advanced Oxidation System

The final advanced water purification process is disinfection and advanced oxidation, which is required for projects to comply with the 2014 Groundwater Recharge Reuse Regulations. A disinfection process is needed to meet the pathogenic microorganism reduction requirements included in the regulations. Advanced oxidation is required for the full advanced treatment, achieving a minimum 0.5-log reduction of 1,4-dioxane.

The UV reactors serve two purposes: disinfection and, with addition of hydrogen peroxide or chlorine upstream, advanced oxidation. The UV disinfection process will provide 6-log enteric virus reduction (towards the overall requirement of 12-log removal), 6-log *Giardia cyst* reduction (towards the overall requirement of 10-log removal), and 6-log *Cryptosporidium oocyst* reduction (towards the overall requirement of 10-log removal).

Advanced oxidation is considered the best available technology to address the destruction of trace organic compounds that are not fully removed by the RO membranes, notably NDMA, flame retardants, and 1,4-dioxane. UV coupled with an oxidant, such as hydrogen peroxide, chlorine or ozone, destroys trace organic compounds through two simultaneous mechanisms:

- Through UV photolysis (exposure to UV light) where UV photons break the bonds of certain chemicals if the bond energy is less than the photon energy.
- Through UV light reacting with the oxidant to generate hydroxyl radicals. A typical hydrogen peroxide added to the RO permeate upstream of the UV process at a dose of approximately 3.0 mg/L.

Advanced oxidation with UV/hydrogen peroxide systems are the most common advanced oxidation technology for IPR, and have been used extensively for the removal of trace organic compounds found in treated water. However, recent studies have investigated the benefits of using other oxidants, such as chlorine or ozone, for AOP in IPR. Preliminary testing of UV/chlorine has shown that it has the potential to provide similar reductions in 1,4-Dioxane to UV/hydrogen peroxide. Use of chlorine for AOP has the benefits of sodium hypochlorite being is a relatively inexpensive chemical and it being commonly used in water and wastewater treatment. The system will be designed to allow for the injection of either hydrogen peroxide or chlorine upstream of the UV. Ozone is another AOP oxidant that may be tested during this study.

The UV/hydrogen peroxide system has been designed to meet the 2014 Groundwater Recharge Reuse Regulations, providing a minimum 0.5-log reduction of 1,4-dioxane, which serves as an indicator compound for other trace organic compounds. The UV system design criteria are listed in **Table 4-4**.

Table 4-4 Preliminary Design Criteria (UV)

Parameter	Unit	Value
Design Flow	gpm	90
UV Transmittance	%	>96
1,4-Dioxane Removal Target	-	0.5 log
NDMA Removal Target	-	<10 ng/L
Lamp Technology		LP-HO

4.4 Chemical Addition Systems

Chemicals will be added at various stages of the treatment process to improve water quality, prevent fouling of the membranes, and provide chemical cleaning for the membranes.

4.4.1 Membrane Filtration Pre-Treatment

Sodium hypochlorite and ammonium hydroxide will be added to the membrane filtration feed water. Sodium hypochlorite will be added before the membrane filtration system to prevent biogrowth on the membranes, reducing the risk of fouling. Ammonium hydroxide will be added before the membrane filtration system to combine with the sodium hypochlorite and create a chloramine residual, which will not damage the RO membranes. Without ammonia, free chlorine could cause severe damage to the oxidant sensitive membranes. A target chlorine to ammonia ratio of 4:1 will be used to provide excess ammonia and prevent the formation of dichloramine.

4.4.2 Reverse Osmosis Pre-Treatment

Sulfuric acid and antiscalant will be added the membrane filtration filtrate before entering the RO system. Sulfuric acid will be added before the RO system to prevent scaling in the RO membranes. System will target an RO feed water pH of 6.5. Antiscalant will be added before the RO system to prevent scaling in the RO membranes.

4.4.3 Reverse Osmosis Post-Treatment

The RO post-treatment strategy will include the addition of calcium chloride to increase hardness and the addition of caustic soda to increase pH. This strategy allows operators to control hardness and pH independently, producing stable product water that can be matched to any desired combination of pH, hardness, and alkalinity. Hydrogen peroxide or chlorine will be added before the UV system to promote advanced oxidation and removal of any trace organic compounds present in the RO permeate.

4.4.4 Clean-In-Place Systems

The membrane filtration and RO systems will include clean-in-place (CIP) systems that will utilize chemical cleaning to remove fouling from the membranes. Chemicals that will be used for MF/UF CIP include sodium hypochlorite, citric acid, and caustic soda. Chemicals that will be used for RO CIP include citric acid, caustic soda, and proprietary cleaning chemicals.

Table 4-5 presents the design criteria for the chemical addition systems.

4.5 Water Quality

Projections of water quality are based on the historic effluent quality from the Tapia WRF. **Table 4-6** presents a summary of these data.

Table 4-5 Preliminary Design Criteria (Chemicals)

Chemical	Dosing Location	Frequency of Use	Dose (mg/L)
Sodium Hypochlorite	UF Feed	Continuous	3 to 5[1]
	RO Permeate (alternative AOP testing)	Continuous	2 to 4
	UF MW/ CIP	Intermittent	To achieve free chlorine residual target
Ammonia	UF Feed	Continuous	1[1]
Sulfuric Acid	RO Feed	Continuous	80[2]
	Dosing Location (Alternative)	Brine Recovery Feed	150[2]
Antiscalant	RO Feed	Continuous	4
Hydrogen Peroxide	RO Permeate	Continuous	Up to 4
Calcium Chloride	RO Permeate	Continuous	15[3]
Caustic Soda	RO Permeate	Continuous	15[3]
	UF CIP	Intermittent	To achieve desired %wt concentration
	RO CIP	Intermittent	To achieve desired %wt concentration
Citric Acid	UF MW/ CIP	Intermittent	To achieve desired %wt concentration
	RO CIP	Intermittent	To achieve desired %wt concentration

Notes:
1. To be refined based on Title 22 feed water analysis
2. To be refined based on Title 22 feed water analysis and RO projections
3. To be refined based on RO projections and RTW modelling

Table 4-6 Anticipated Source Water Quality for the Demonstration Project

Parameter	Units	Taipa WRF Effluent[1]	
		Avg	Max
Ammonia – N	µg/L	97	440
BOD (5 day, 20° C)	mg/L	1.7	4.6
Boron	mg/L	0.39	0.48
Chloride	mg/L	160	182
Copper (Total Recoverable	µg/L	97	440
Cyanide	µg/L	1.82	10
Nickel (Total Recoverable)	µg/L	3.5	5
Nitrate + Nitrite – N	mg/L	7	9.9
Orthophosphate – P	mg/L	2.3	3.4
Sulfate	mg/L	192	281
Total Dissolved Solids (TDS)	mg/L	744	860
Total Suspended Solids (TSS)	mg/L	1.69	9.9
Turbidity	NTU	<1	7

Note:
1. Based on Joint Powers Authority LVMWD Triunfo Sanitation District Basis of Design Report (MWH, 2016). Data summarizes effluent water quality between November 2010 and December 2014.

4.6 Structural

A structural assessment was conducted for the equipment scheduled to be mounted to the existing Headquarters Building. The new equipment will be supported on the first-floor concrete slab on grade. The following structural design criteria were used:

- Building Code: 2016 California Building Code
- Building Risk Category II
- Dead Loads include weight of all materials of construction
- Earthquake Design Data:
  - Spectral Response Accelerations:
    - $S_S = 1.919\ g$
    - $S_1 = 0.681\ g$
- Site Class D (assumed)
- Earthquake Spectral Response Acceleration Parameters
  - S_{DS} = 1.279 g
  - S_{D1} = 0.681 g
- Long-Period Transition Period TL = 8 seconds
- Seismic Design Category D
- Seismic Importance Factor Ie = 1.00
- Component Importance Factor IP = 1.00

The existing concrete slab on grade is 4" thick with #4@24" each way. Therefore, the slab is a soil supported slab and not reinforced to allow it to act as a structural slab on grade.

Each major piece of equipment was assessed for the effect of its operating weight and operating weight plus earthquake effects on the concrete floor. When the structural analysis indicates that the equipment would overturn during a seismic event, then uplift, anchorage will be provided. Since the existing concrete floor can accommodate only a small amount of uplift, separate equipment pads will be provided to provide the needed structural support. The following are the key findings from this assessment.

- MF Process Skid – The MF Skid is skid mounted equipment with an operating weight of 7,500 lbs. This skid will need anchorage to resist sliding and uplift. The skid will be mounted on a concrete equipment pad to elevate the equipment to provide drainage away from the skid and adequate concrete thickness for the anchor bolts.

- MF Break Tank – The MF Break Tank is a 2,500-gal tank with an operating weight of 21,230 lbs. This tank will need anchorage to resist sliding. The existing slab should be adequate. The height of the tank and the per square foot loading could cause potential settlement.
- RO Skid – The RO skid is skid mounted equipment with an operating weight of 6,750 lbs. This skid will need anchorage to resist sliding and uplift. The skid will be mounted on a concrete equipment pad to elevate the equipment to provide drainage away from the skid and adequate concrete thickness for anchor bolts.
- Chemical Skid – The chemical storage tanks will consist of 55 gal. drums with an operating weight of approximately 500 lbs. will require anchorage for sliding. The existing slab should be adequate.
- Metering Pumps – The metering pumps with an operating weight of approximately 800 lbs. The standard rack system will need to be modified to allow the pumps to be mounted directly on the existing concrete floor. If the rack cannot be modified, an equipment pad will be provided.

4.7 Electrical

This section summarizes general electrical design criteria for the Demonstration Project. The applicable codes and standards for the electrical design of the facility include the following:

- NFPA 70 – National Electrical Code (NEC) 2017
- California Building Code
- California Fire Code
- American National Standards Institute (ANSI) Standards
- National Electrical Manufacturers Association (NEMA) Standards

4.7.1 Design Criteria

Table 4-7 through **Table 4-9** contain the general electrical design criteria for the system.

Table 4-7 General Electrical Design Criteria

Category	Design Criteria
Electrical Equipment Sizing	As a minimum, the electrical equipment will be sized in accordance with the NEC for the following: ▪ Protective devices, conductors, and conduits shall be sized in accordance with the NEC.
Overcurrent and Short Circuit Protection	All 120/240V power circuits will be protected by fuse or circuit breaker. Protective devices will be fully rated for the short circuit duty at the point of application. Bus and equipment short circuit ratings will exceed worst case fault current available at each location.
Identification	Identification plates will be provided for the conduits. Wire markers will be provided for all power conductors.

Table 4-8 Conductors Design Criteria

Category	Design Criteria
Minimum Size Conductors	Power circuits (240 Volts): #12 AWG
600 Volt cable/wiring	Copper conductors 120v power and lighting circuits and control wiring: THWN/THHN-2 insulation 480V power circuits: XHHW-2 insulation

Table 4-9 Conduit Design Criteria

Category	Design Criteria
Wiring	All wiring will be run in conduit. Minimum ¾-inch trade size conduit for exposed runs.
Conduit Usage	Exposed: ▪ Clean, dry unfinished, non-process areas: Galvanized rigid steel (GRS) and liquid-tight flexible metal conduit (unless otherwise noted below.) ▪ Process areas designated DAMP or WET: GRS and liquid-tight flexible metal conduit (unless otherwise noted below.) ▪ Corrosive areas: PVC coated rigid steel ▪ Exposed outdoor areas: PVC coated rigid steel ▪ Hazardous areas: GRS or PVC coated GRS depending on exposure Embedded in concrete walls, floors, or ceilings: Schedule 40 PVC Connections to all motors and transformers: Liquid tight flexible metal conduit.

4.7.2 Power Distribution System

The existing electrical distribution system consists of Switchboard P, which is fed from the utility. Switchboard P is currently not in use. The new power distribution system will utilize the existing Switchboard P with its current circuit breakers to feed the new loads. See Section 7 for the required electrical single-line diagram.

4.8 HVAC

The HVAC system for the existing building requires modifications for it to function with the with the Demonstration Project layout. The air handling unit and ductwork date from the original building construction in 1968. While the system might still function, it is approaching 50 years old and is at the end of its service life. It is recommended that a full evaluation of the existing HVAC unit be completed during the design phase by a reputable HVAC contractor to determine whether it should be replaced as part of this project, or if it can be reused.

The existing HVAC equipment also does not meet current energy codes. Any modifications will be required to meet the current energy code. This includes modifications to the windows, walls, roof, lighting as well as the HVAC and ductwork systems.

At a minimum, the HAVC system will require rebalancing because of the changed usage of the exhibit room, process area, laboratory, compressor room and chemical room. The existing ductwork, if it is reused will require sealing and re-insulating. A new HVAC control system is also required.

Specific requirements for each room are provided as follows:

4.8.1 Process Room

The heat gain from the process equipment is not yet known. It is anticipated that the existing HVAC system will have adequate capacity for the heat if it is still operational. Diffusers may need to be moved to provide the cooling where it is required.

4.8.2 Laboratory

The building code requires no ventilation air from laboratories be returned to the building air conditioning system. This would require an exhaust fan to purge the air from the building. A final determination on whether the air from this room needs to be exhausted can be made once the testing protocols and the chemicals involved have been established

4.8.3 Compressor Room

The heat generated by the new compressor may exceed the design capacity of the HVAC provided to this room. A supplemental air conditioning unit like a mini-split air conditioner can be added to this room to remove the additional heat from the compressor. Also, additional wall insulation and layers of wallboard may be required to keep the compressor noise from being objectionably loud in the public spaces.

4.8.4 Chemical Storage Room

Chemical storage for this facility could be indoors or outside, depending on chemicals and design considerations. Outdoor storage of chemicals, while less complex in terms of HVAC design, often requires longer chemical lines and places chemicals in areas that may be more prone to vandalism. Chemical storage indoors, while more complex for permitting and HVAC design, allows for the chemicals to be stored in a secure, temperature-controlled location. For these reasons, chemicals will be stored inside the building in a chemical storage room. The chemical storage room requires 1 cfm/sq. ft. of exhaust ventilation, approximately 125 cfm. The new exhaust fan can penetrate the roof. The existing air handling unit will need to be rebalanced to accommodate the increased building exhaust. Any penetrations through the walls will need to be fire rated.

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Section 5
Procurement Options & Schedule

Three primary alternatives could be utilized for the procurement of the equipment used in the Demonstration Testing. These include:

- Leasing
- Design/Bid/Build (DBB)
- Design/Build (DB)

These alternatives are discussed briefly below. A table summarizing advantages and drawbacks to each is included as **Table 5-1**. Regardless of the procurement method selected, a pre-qualification process is recommended, and is discussed further at the end of this section.

Table 5-1 Procurement Alternatives: Advantages/ Disadvantages

Procurement Type	Advantages	Disadvantages
Leasing	Potential for lower cost Vendors provide maintenance responsibility Simplified decommissioning	Limitations in available equipment May be higher cost if extending operations period Desired operation period of project (>3 years) is greater than typical length of leasing projects
Design-Bid-Build	Highest level of control over design conditions	Longer schedule Potential for conflicts between design, construction, and operations contract
Design-Build	Faster schedule Single point of responsibility Simpler to modify plant during operation	Less control during design

5.1 Leasing

For the leasing option, the process systems used would be rented or leased from specific vendors, whether proprietary or not. Leasing is advantageous for short pilot or demonstration programs. It allows equipment to be changed out during the testing, if needed, maintains equipment maintenance responsibility with the suppliers, and does not require effort to sell off equipment once it is no longer needed. Because the leasing relies on readily available equipment packages, the equipment options may limit the scope of what can be tested, and the potential for cost savings decrease substantially as the duration of the testing is extended. Assuming the demonstration plant trial will last 12 months, the difference between purchasing and leasing is estimated to be $403,000, however, if the rental period is extended to 18 months, the savings we be only $46,600. If the rental period extends beyond 18 months, it could become more costly than purchasing the equipment. A breakdown of costs for both options is presented in Section 6 Cost Estimates.

5.2 Design/Bid/Build

Using a DBB procurement method for the demonstration plant would require that the JPA retain a design firm to take the results of the demonstration plant preliminary design and complete the final design. The design firm would then assist the JPA with the procurement of a contractor to build the demonstration plant. The design firm and contractor work directly with the Owner, there is no contractual relation between the design firm and contractor. Operation could be by the design consultant, the contractor, or a separate operations consultant, depending on JPA preferences. **Table 5-2** presents an estimated schedule for a DBB contracting approach.

Advantages of DBB project delivery include:

- Owner has control with the design firm responsible for design and the contractor responsible for construction as per design.
- Owner has more input into the design compared with a DB contract.

Drawbacks of DBB project delivery include:

- Owner assumes significant risk for the overall project. Design risk is with the designer and construction and start-up risk is borne by the Contractor.
- Pursuing separate contracts for the engineering and construction services can lengthen the project schedule compared with a DB contract.
- Conflicts can arise between the design firm and contractor as a result of the separate contracts.

Table 5-2 Design-Bid-Build Schedule

Action/ Item	Duration (months)
30% Design Submittal	3
Bid for the Design Firm	
Award the Design Contract	
Complete Design Documents	3
Bid for the Construction Contract	3
Evaluation of Proposal Submissions	
Award the Construction Contract	
Materials and Equipment Procurement	2
Construction	3
Commissioning and Start-up	1
Handover to Operations	12
Project Duration	27

5.3 Design/Build

DB combines the design and construction into one contract. The DB team can be led by a design firm or contractor which may be separate firms or a single integrated firm. A 30 percent

procurement "bridging" document, possibly based on the preliminary design prepared for this project, would be used to define the DB contractor's responsibilities. The DB contractor would have the ability, as allowed by the bridging documents, to select which vendors to use for the demonstration project. The DB contracting approach has seen increasing use in municipal water treatment projects over the last 10 to 20 years, and it provides unique advantages for a demonstration project, where ideal operating conditions are not necessarily fixed and continued changes to design and construction may be desired during plant operation. For a DB project, the owner would contract with a single entity, avoiding the risks of conflicts between the designer and contractor scope, and this firm could remain under contract during plant operations, covering plant maintenance, facility modifications, and possibly operation of the plant, as desired. **Table 5-3** presents an estimated schedule for a DB contracting approach.

Advantages of the DB project delivery approach include:

- Compared with DBB schedules, DB project schedules are often shorter due to the elimination of separate procurement contracts for the design firm and constructor. This also tends to lead to reduced costs.
- Owner assumes less risk for the design compared with a DBB project.
- Unlike a DBB project, with DB there is a single point of responsibility for the owner to manage.
- Professional relationship exists between the design firm and contractor.
- Unified recommendations are presented to the owner.
- Constructability reviews during design promote innovation.

Disadvantages of DB project delivery include:

- DB contractor generally has to assume more risk depending on the prescriptive nature of the bidding documents.
- Owner generally has less control of design.

Table 5-3 Design-Build Schedule

Action/ Item	Duration (months)
30% Design Submittal	3
Develop Design-Build Documents	
Bid for the Design-Build Contractor	
Evaluation of Proposal Submissions	
Award Design-Build Contract	
Complete Design Documents	3
Materials and Equipment Procurement	2
Construction	3
Commissioning and Start-up	1
Operations	12
Project Duration	24

5.4 Vendor Prequalification and Selection Processes

While pre-qualification is recommended for both DBB and DB projects, it is only one part of the procurement process. Even after pre-qualifying vendors through the demonstration testing, there will still be differences between the qualified vendors that will impact the size, layout and ancillary facilities needed. Determining which proprietary membrane filtration systems to include in the full-scale design for example, requires specialized procurement methods to maintain competition between the qualified vendors and provide the necessary information to complete the design as discussed above.

The typical vendor selection processes are outlined in **Table 5-4**. Implemented successfully, all three options provide a means for project owners to obtain a firm price for the proprietary equipment and eliminate schedule delay.

Table 5-4 Vendor Selection Processes: Advantages/ Disadvantages

Procurement Type	Advantages	Disadvantages
Negotiated	Single system design Matches existing system	No competition to determine price
Owner Pre-purchase	Single system design Life-cycle cost	Owner has schedule/ operation risk
Pre-selection and Assignment	Maintains competition Single system design Life-cycle cost	Upfront contract to provide shop drawings

Section 6
Cost Estimate

This section provides the capital cost estimates for the Demonstration Project. LVMWD has the option of either purchasing or leasing the treatment process equipment. The Demonstration Plant is estimated to be operational until the full scale Pure Water Project comes is implemented. This period is estimated to be approximately 4-5 years after construction of the Demonstration Project. There would be some minor savings from leasing the equipment compared to purchasing; however, a leasing option would reduce the opportunity to continue utilizing the equipment for an extended period of time after the leasing agreement has ended. It is therefore recommended to purchase the equipment, providing greater flexibility for future plant operation.

6.1 Ancillary Facilities

The capital cost of the ancillary facilities for the Demonstration Project is summarized in **Table 6-1.** Ancillary costs are identical for both the purchase and lease options. Costs for the architectural/structural/HVAC items are estimates and the actual scope of work should be refined during the final design.

Table 6-1 Ancillary Facilities Breakdown

No.	Description	Burdened Actual Cost	Detail of Assumptions
1	Site Work	$35,000	Yard piping, dumpster, maintenance, utility connections
2	Demolition	$15,000	
3	Piping	$20,000	Interior piping, drains, supports, painting
4	Laboratory Furnishing	$10,000	
5	Miscellaneous Items	$135,000	Tools, signs, safety equip., materials, etc.
6	Architectural/Structural/HVAC[1]	$750,000	Allowance to: refurbish walls, ADA requirements, rest rooms, floor repairs, AC Units and Ducts, water testing station
	Subtotal	**$965,000**	

Notes:
1. Exhibits, banners and other public outreach specific items are not included in this item.

6.2 Purchase Option

The capital cost to purchase equipment for the Demonstration Project is summarized in **Table 6-2**.

Table 6-2 Purchase Option Cost Estimate Breakdown for Design-Build and Design-Bid-Build

No.	Description	Burdened Actual Cost
1	UF Skid (Equipment, shipping, startup)	$265,000
2	RO Skid (Equipment, shipping, startup)	$260,000
3	UV Skid (Equipment, shipping, startup)	$120,000
4	Chemical System (Chemicals, dosing pumps)	$30,000
5	Air Compressor	$2,000
6	Ancillary Facilities (See Table 6-1)	$965,000
7	Electrical and Instrumentation (Wiring, equipment)	$100,000
8	Labor and Equipment (Contractor labor and equipment installation)	$325,000
	Subtotal	**$2,067,000**
7	Contractor OH&P (10%)	$206,000
8	Permit Allowance (1%)	$20,000
9	Sales Tax (8%)	$165,000
	Subtotal	**$2,458,000**
10	General Liability Insurance (1%)	$25,000
11	Builder's Risk Insurance (0.4%)	$10,000
	Construction Subtotal	**$2,493,000**
12	Engineering (10%)	$249,000
	Project Subtotal	**$2,742,000**
13	Construction Contingency (30%)	$822,000
	Grand Total	**$3,564,000**

6.3 Lease Option

The capital cost to lease equipment for the Demonstration Project is summarized in **Table 6-3.** Leasing costs are based on 12-month and 18-month rentals of major process equipment, which is the longest period where leasing could be considered favorable over purchasing of equipment. Since this project will likely last more than 18-months (up to fiveyears), leasing is not considered a favorable option for implementation. Ancillary facilities costs are assumed to be the same as those presented in Table 6-1. Contractor markups, project development costs, and contingencies are based on the same percentages presented previously in Table 6-2.

Table 6-3 Cost Estimate Breakdown (Lease Option)

	Description	Cost for 12-month Rental Period [1]	Cost for 18-month Rental Period [1]
1	UF Skid (Equipment, shipping, startup)	$135,000	$203,000
2	RO Skid (Equipment, shipping, startup)	$230,000	$345,000
3	UV Skid (Equipment, shipping, startup)	$48,000	$72,000
4	Ancillary Facilities (See Table 6-1)	$965,000	$965,000
5	Electrical and Instrumentation (Wiring, equipment)	$100,000	$100,000
6	Labor and Equipment (Contractor labor and equipment installation)	$325,000	$325,000
	Subtotal	**$1,803,000**	**$2,010,000**
7	Contractor OH&P (10%)	$180,000	$201,000
8	Permit Allowance (1%)	$18,000	$20,000
9	Sales Tax (8%)	$144,000	$161,000
	Subtotal	**$2,145,000**	**$2,392,000**
10	General Liability Insurance (1%)	$21,000	$24,000
11	Builder's Risk Insurance (0.4%)	$9,000	$10,000
	Construction Subtotal	**$2,175,000**	**$2,426,000**
12	Engineering (10%)	$218,000	$243,000
	Project Subtotal	**$2,393,000**	**$2,669,000**
13	Construction Contingency (30%)	$718,000	$801,000
	Grand Total	**$3,111,000**	**$3,470,000**

Notes:

1. The lease option is for less time (12-18 months vs 4-5 years) than currently proposed for the purchase option.

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Section 7
Environmental Documentation

The CEQA was enacted in 1970 to provide decision-makers and the public with information regarding environmental effects of proposed projects; identifying means of avoiding environmental damage; and disclosing to the public the reasons behind a project's approval even if it leads to environmental damage. CEQA applies only to discretionary government activities, referred to as "projects." Under CEQA, a "project" is defined as the whole of an action, which has the potential for resulting in either direct physical change in the environment or a reasonable foreseeable indirect physical change in the environment. Once a determination has been made that a "project" exists, there are three basic levels of environmental documentation:

- Exemption;
- Negative Declaration (includes those with or without mitigation); and,
- Environmental Impact Report.

As the proposed Pure Water Las Virgenes-Triunfo Demonstration Project (proposed project) involves activities/actions which have the potential for resulting in either direct physical change in the environment or a reasonable foreseeable indirect physical change in the environment, the project is subject to CEQA.

LVWD as the Lead Agency under CEQA (the Lead Agency is the public agency which has the principal responsibility for carrying out or approving the project) has determined that the proposed project falls within categories of activities that are recognized under CEQA as generally having no significant effect on the environment pursuant to Article 19 of the State CEQA Guidelines (i.e., Categorical Exemptions).

As the proposed project would

1. be a nominal 100 gpm facility that tests full advanced treatment processes of MF, RO, UV, and AOP on the tertiary treated recycled water produced by JPA's Tapia WRF and local dry weather flows, and
2. the project's treatment process equipment, chemicals, and testing laboratory would be housed in the vacant former LVWD building (located at 4232 Las Virgenes Road, Calabasas, California, which is on the same site as the new/existing headquarters, reclaimed water reservoir and pump station), and
3. no significant new construction will be necessary, only minor refurbishment of the building (mostly within the interior of the building) and tie into existing systems is expected.

In accordance with the State CEQA Guidelines Section 15301 (a) and (b), the proposed project is the minor alteration of an existing public utility structure/facility involving negligible use beyond existing. The proposed project includes minor interior and exterior alterations of the existing structure/facility. A Notice of Exemption should be filed with the Los Angeles Registrar-Recorder/County Clerk.

As the proposed project is not anticipated to affect federal lands or require federal funding, no compliance under the National Environmental Policy Act is required.

Section 8

Preliminary Drawings

The following preliminary Demonstration Project drawings are provided:

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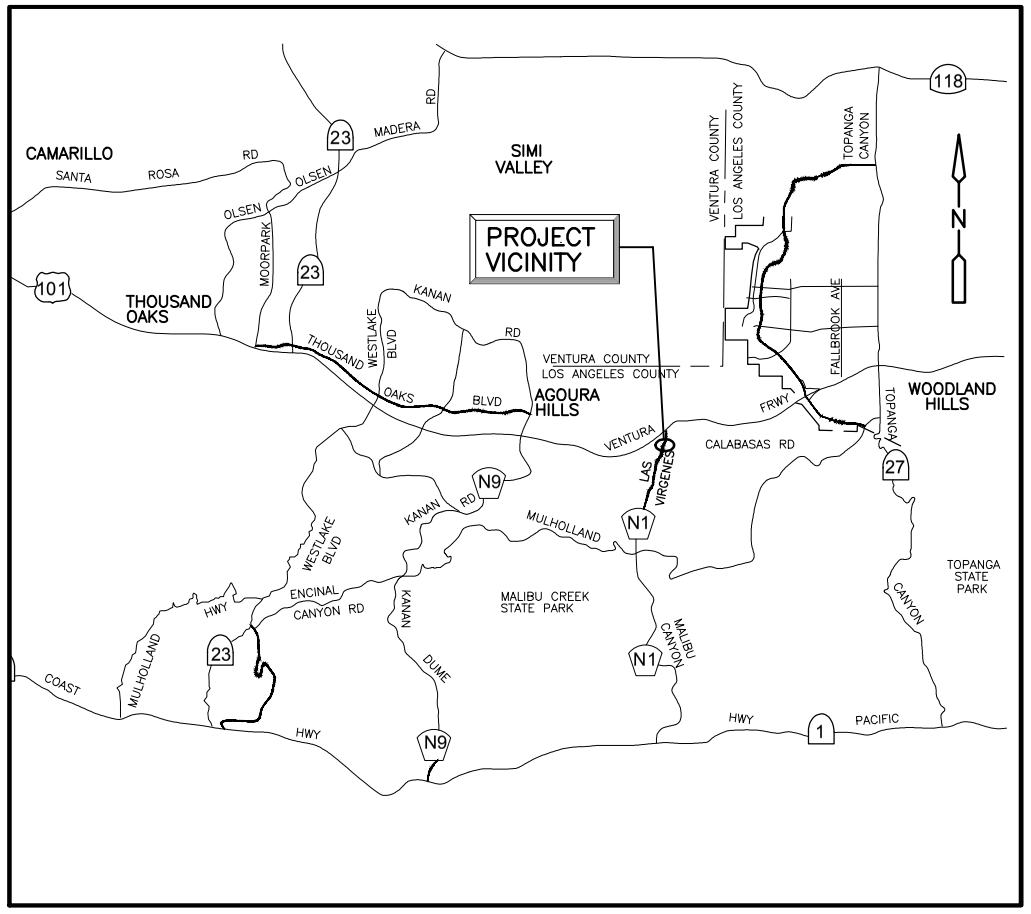
LAS VIRGENES – TRIUNFO JOINT POWERS AUTHORITY

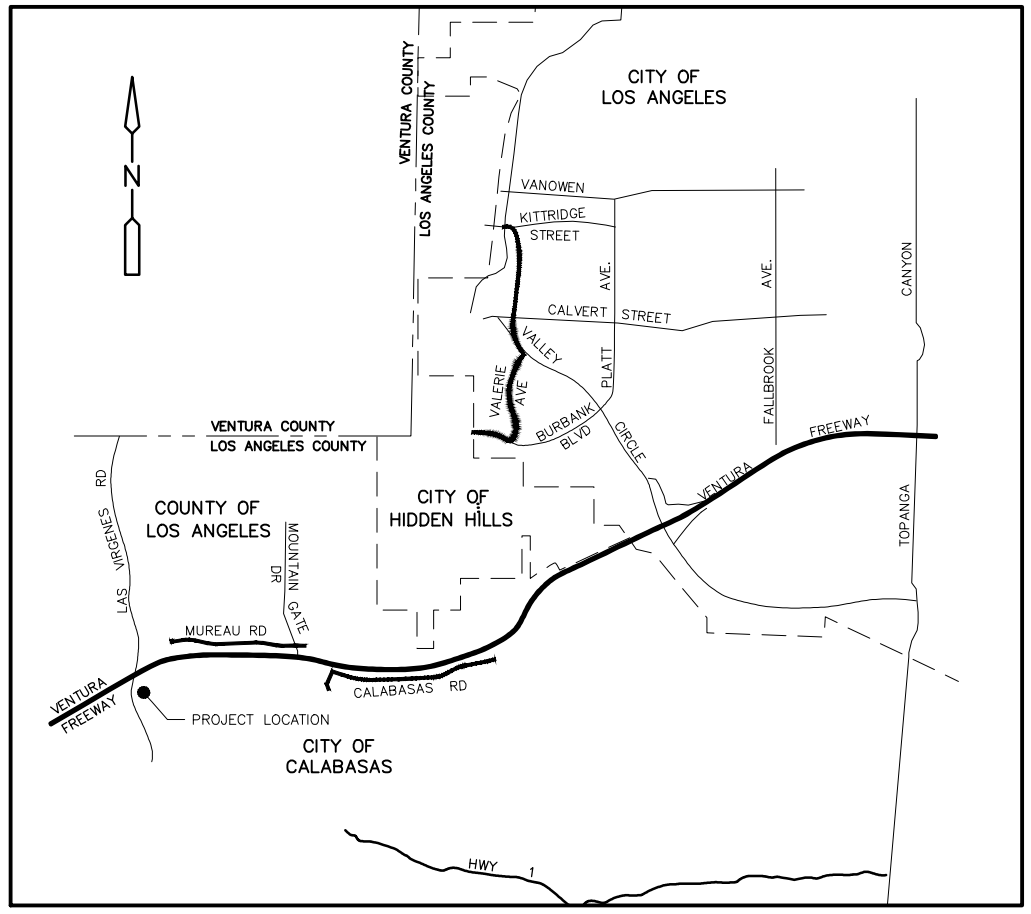
RECYCLED WATER SEASONAL STORAGE DEMONSTRATION PROJECT



VICINITY MAP

NTS

PURE WATER PROJECT
LAS VIRGENES-TRIUNFO
Bringing Our Water Full Circle



LOCATION MAP

NTS

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. YOSHIMURA
DRAWN BY: M. PEREZ
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: JUNE 2017

CDM Smith
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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

COVER SHEET

PROJECT NO. 10976-215736
FILE NAME: T001COVR.DWG
SHEET NO.
T-1

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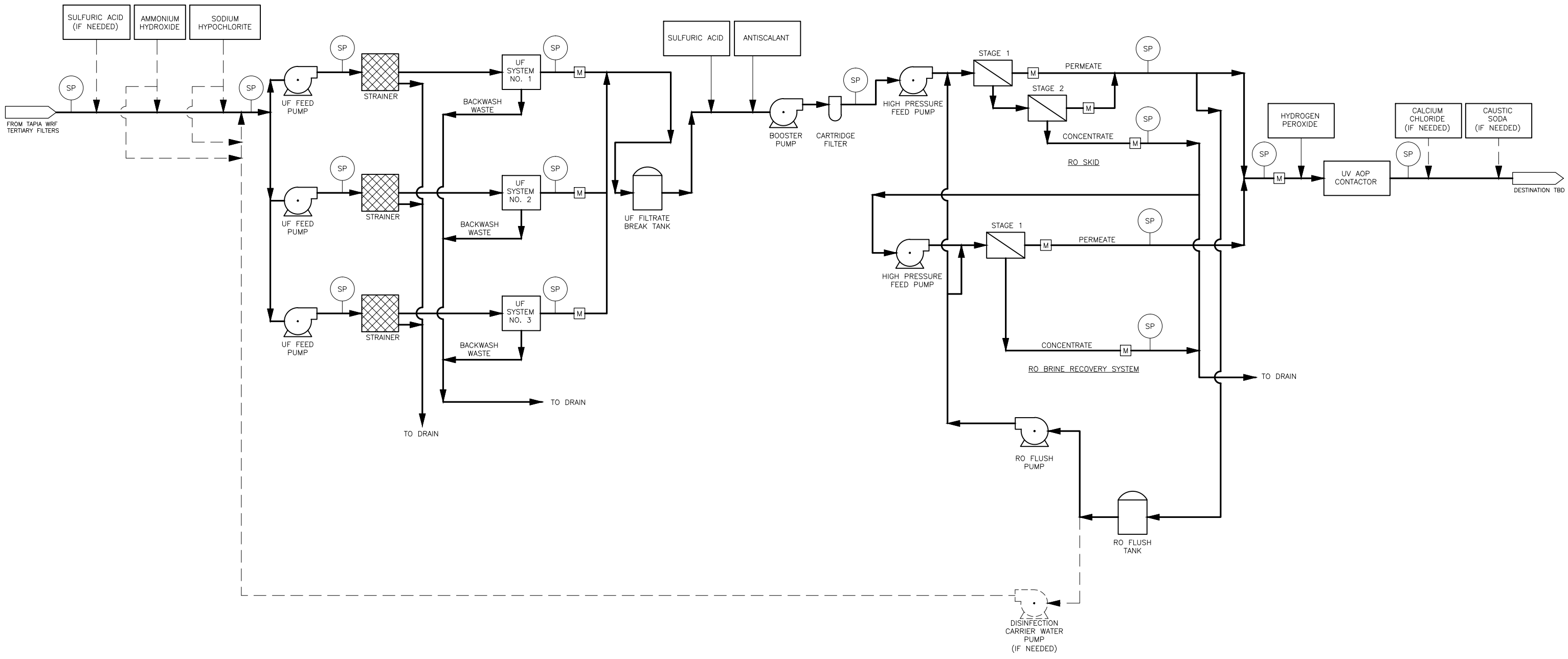

NOTES

BACKWASH SYSTEMS FOR UF AND CIP SYSTEMS FOR UF AND RO ARE NOT SHOWN FOR CLARITY.

SYMBOL LEGEND

SP# SAMPLING LOCATION

M FLOW METER

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: C. SANDERS
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SHEET CHK'D BY:
CROSS CHK'D BY:
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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE DEMONSTRATION PROJECT

PROCESS FLOW DIAGRAM

PROJECT NO. 10976-215736
FILE NAME: G001NFPF.DWG

SHEET NO.
G-1

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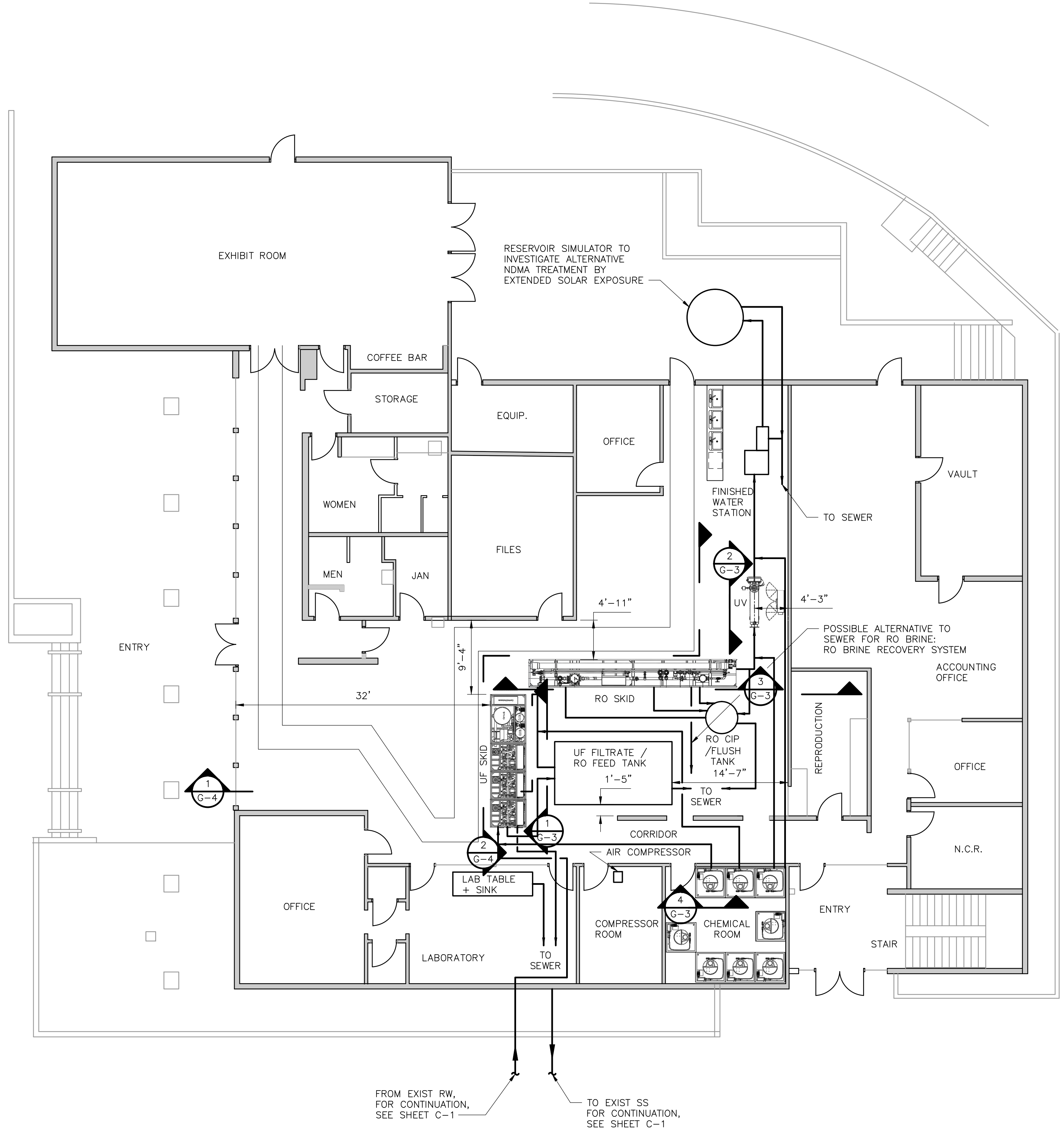
UNITS TABLE		
UNITS	LENGTH (FT–INCHES)	DEPTH (FT–INCHES)
RO SKID	26'–2"	3'–6"
MF SKID	4'–6"	4'–6"
UV REACTOR	2'–1"	2'–1"
UF FILTRATE/ RO FEED TANK	7'–11"	7'–11"
RO FLUSH TANK	4'–7"	4'–7"



PLAN
1/8" = 1'–0"

1/8" = 1'– 0"

DESIGNED BY:	C. SANDERS
DRAWN BY:	M. PEREZ
SHEET CHK'D BY:	
CROSS CHK'D BY:	
APPROVED BY:	
DATE:	JUNE 2017

REV. NO.	DATE	DRWN	CHKD	REMARKS

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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

DEMONSTRATION PLANT
PRELIMINARY LAYOUT

PROJECT NO. 10976–215736
FILE NAME: G002STPL.DWG
SHEET NO.
G-2

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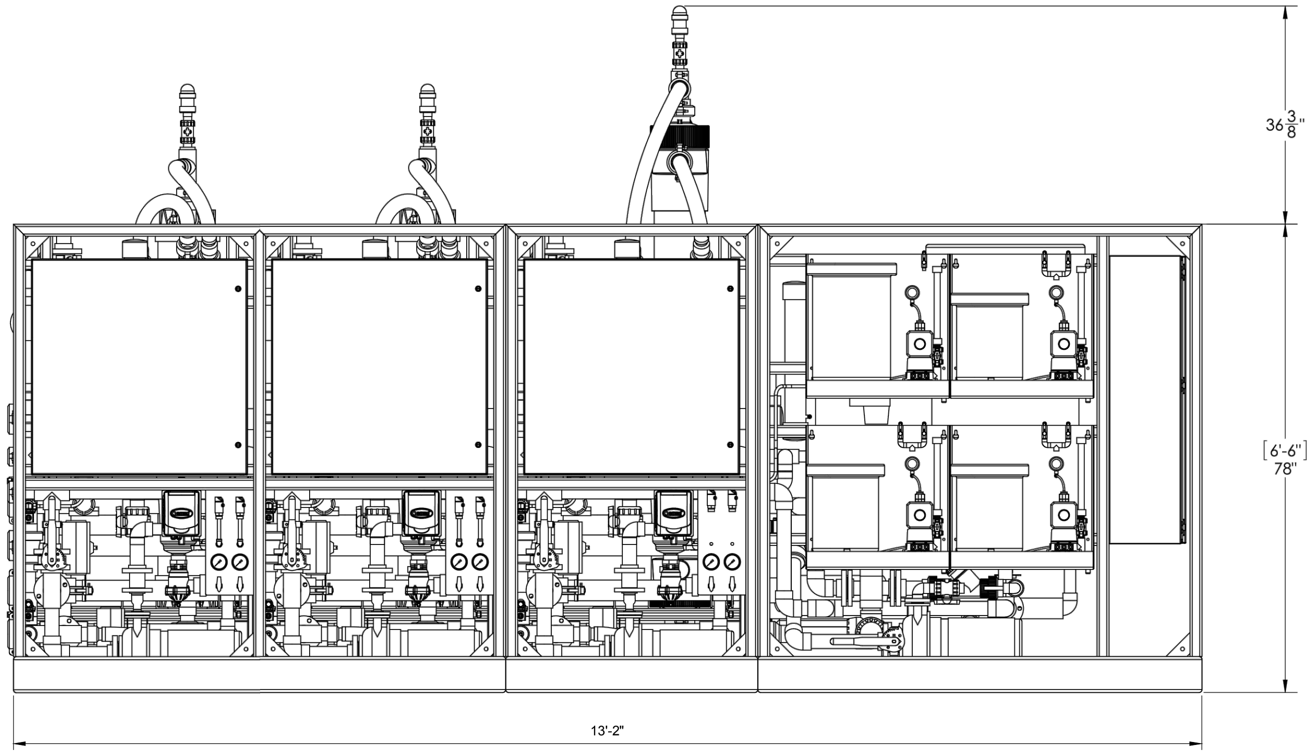
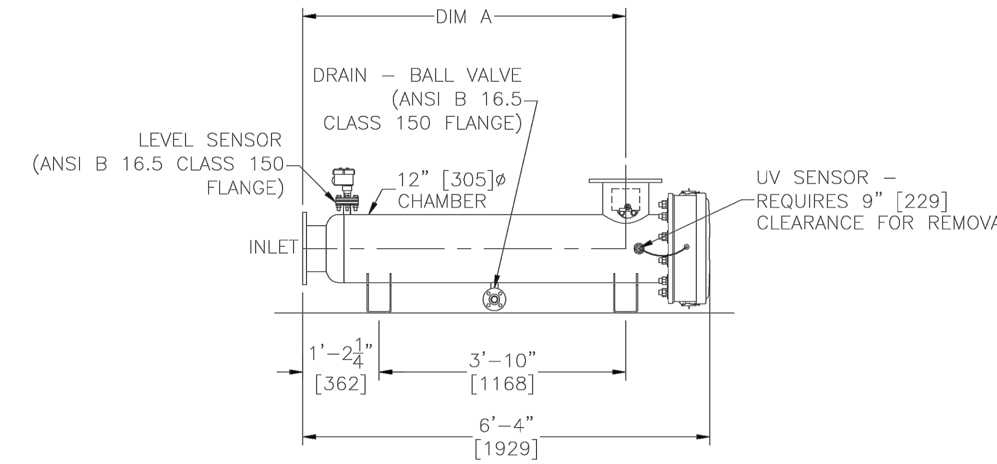
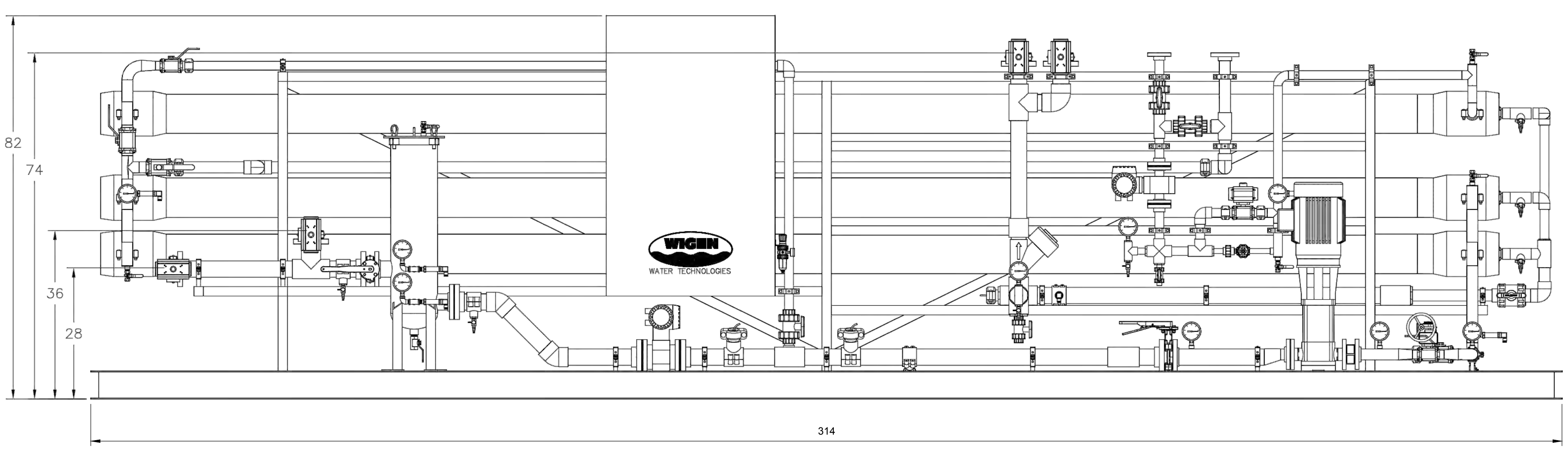


UF SKID
SECTION 1 G-2
NTS



UV REACTOR
SECTION 2 G-2
NTS



RO SKID
SECTION 3 G-2
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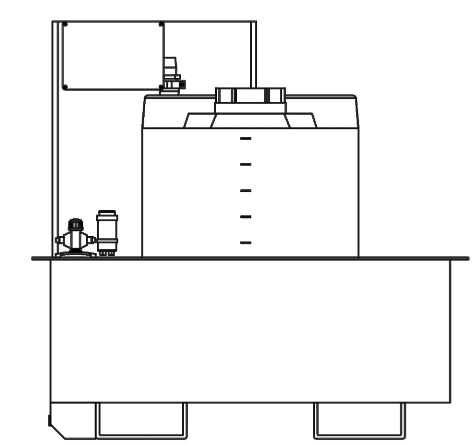

TYPICAL CHEMICAL FEED SKID
SECTION 4 G-2
NTS

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. YOSHIMURA
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CROSS CHK'D BY:
APPROVED BY:
DATE: JUNE 2017

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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

DEMONSTRATION PLANT
PRELIMINARY SECTIONS

PROJECT NO. 10976-215736
FILE NAME: G003STSC.DWG
SHEET NO.
G-3

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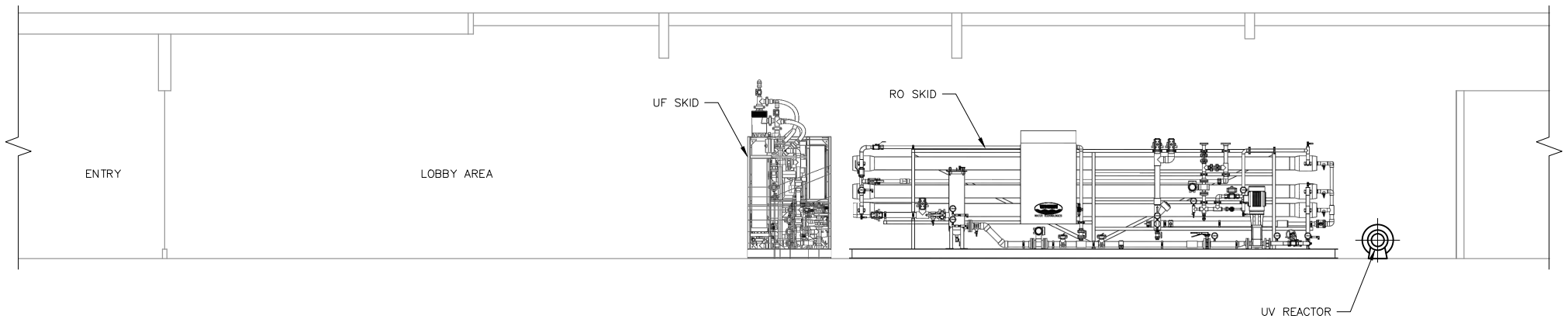
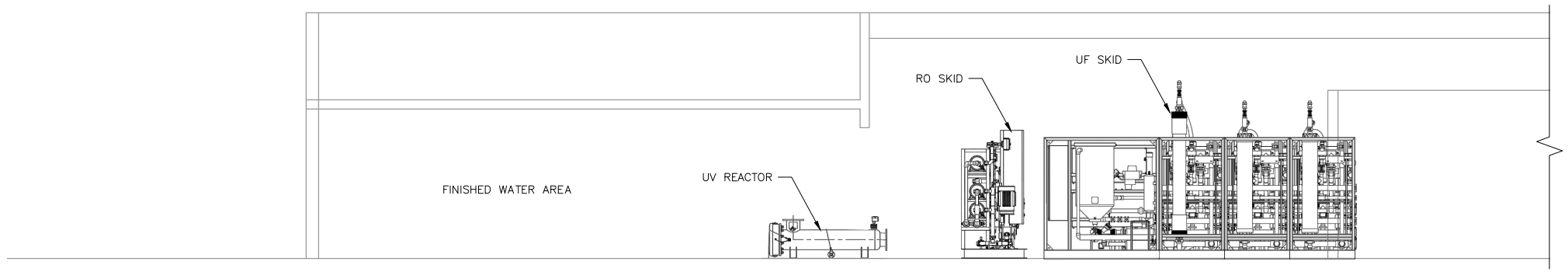


SECTION THROUGH PROCESS AREA LOOKING NORTH

SECTION 1 / G-2

1/4" = 1'-0"



SECTION THROUGH PROCESS AREA LOOKING EAST

SECTION 2 / G-2

1/4" = 1'-0"

1/4" = 1'- 0"

2 1 0 2 4

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: C. SANDERS
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CROSS CHK'D BY:
APPROVED BY:
DATE: JUNE 2017

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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

DEMONSTRATION PLANT
PRELIMINARY BUILDING SECTIONS

PROJECT NO. 10976-215736
FILE NAME: G004STSC.DWG

SHEET NO.
G-4

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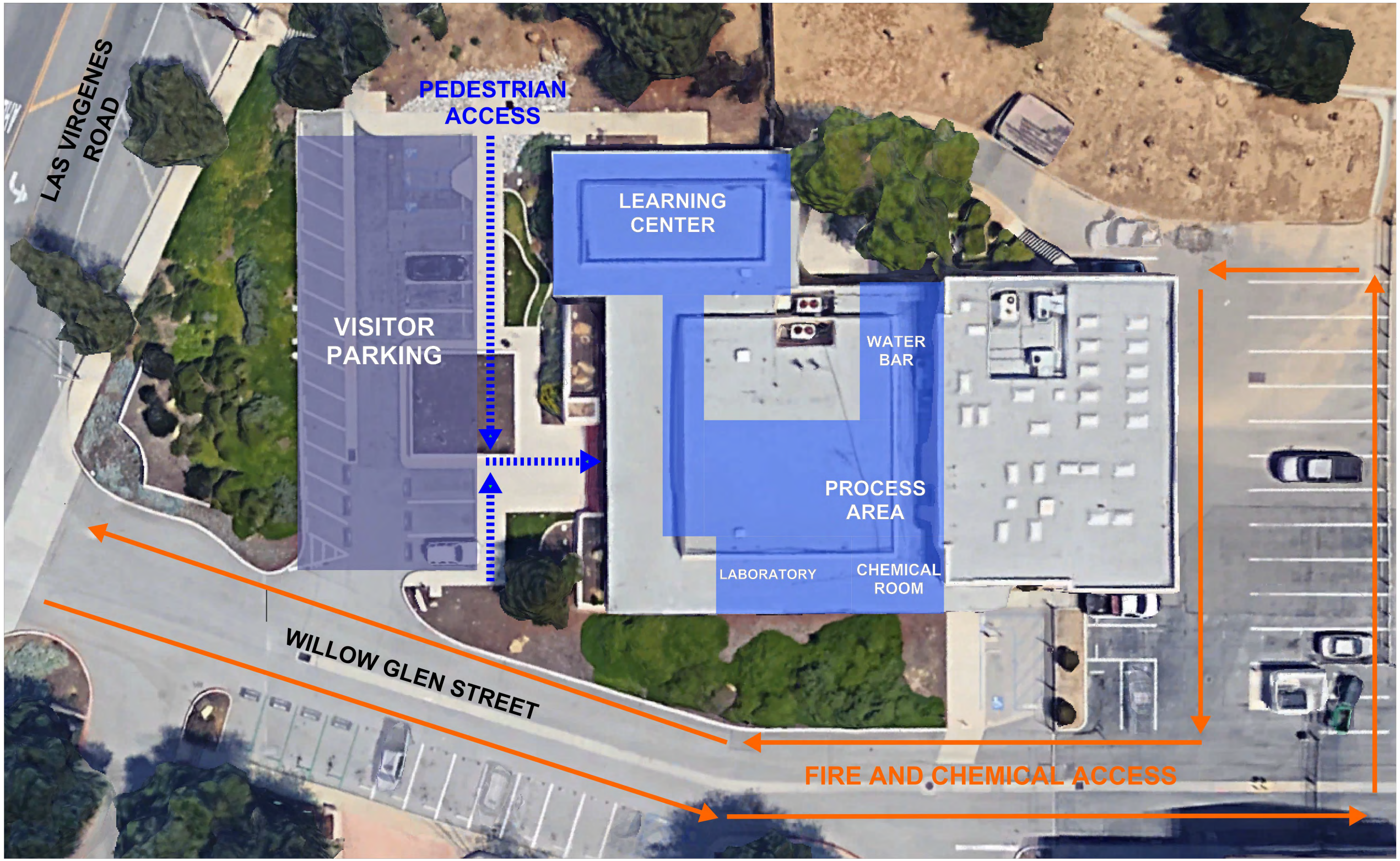

N

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. DOWDELL
DRAWN BY: M. PEREZ
SHEET CHK'D BY:
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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

PARKING AND ACCESS PLAN

PROJECT NO. 10976-215736
FILE NAME: G005STPL.DWG

SHEET NO.
G-5

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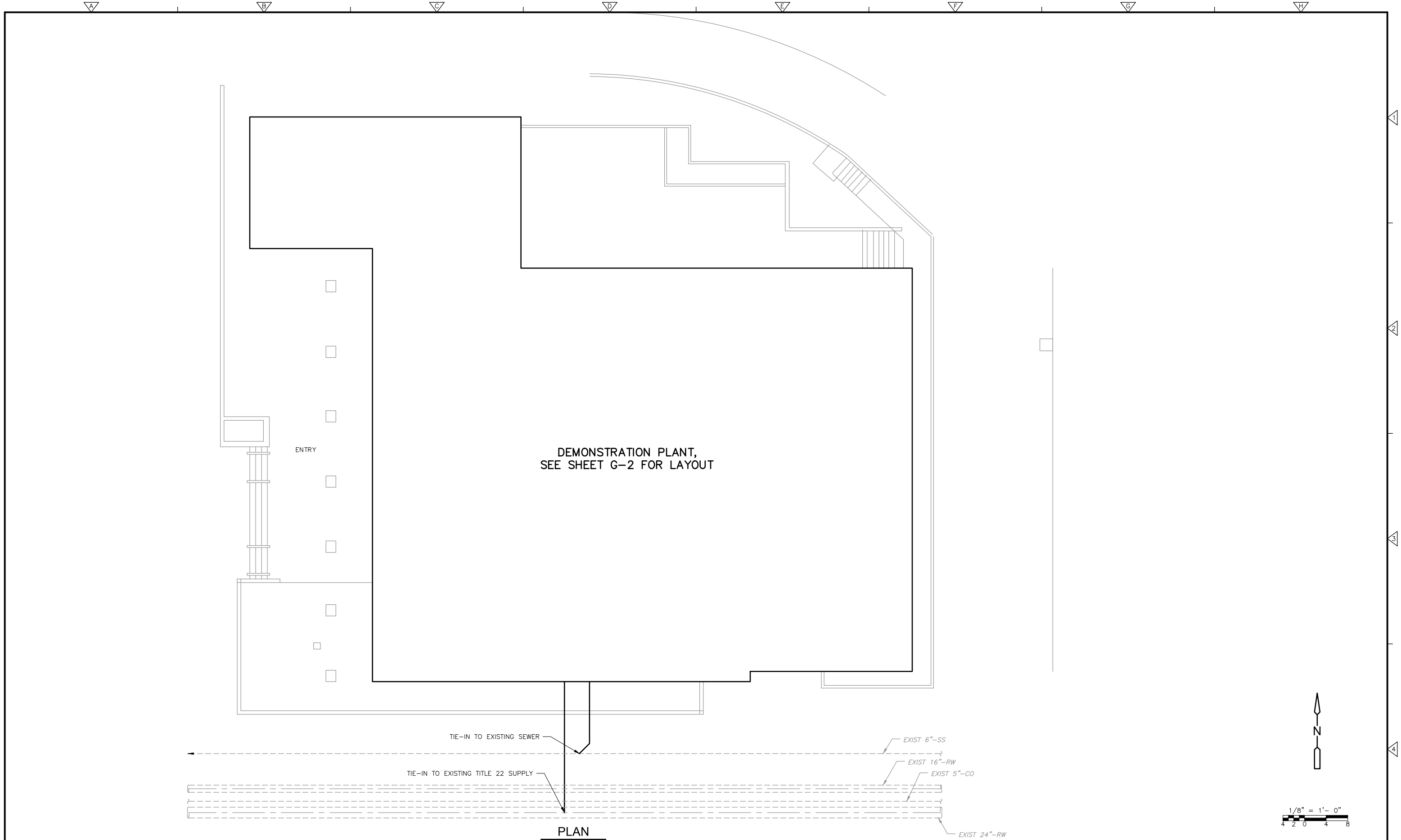

PLAN
1/8" = 1'-0"

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. YOSHIMURA
DRAWN BY: M. PEREZ
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: JUNE 2017

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LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

DEMONSTRATION PLANT
UTILITY CONNECTIONS

PROJECT NO. 10976-215736
FILE NAME: C001STPL.DWG
SHEET NO.
C-1

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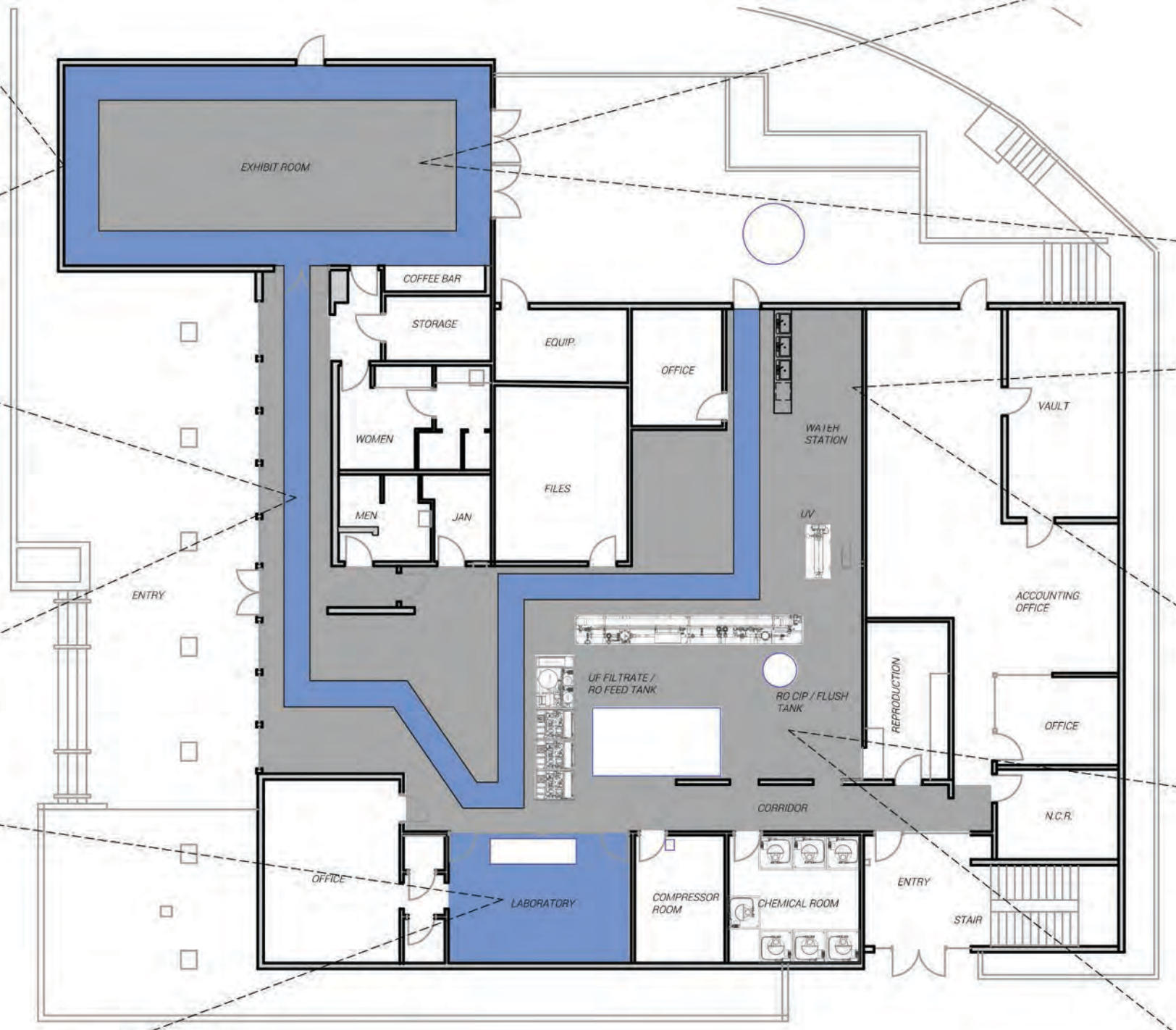
MULTI-SCREEN VIDEO MONITOR

COLORED EPOXY FLOOR WITH PATHWAY

VIEWING LABORATORY



NORTH

FLOOR PLAN

SCALE 1/8"=1'-0"

SOLID COLOR EPOXY FLOOR

WATER SAMPLING BAR

CLEAN AND SIMPLE PROCESS AREA

CDM Smith

LVMWD DEMONSTRATION PLANT

Las Virgenes

APRIL 2017

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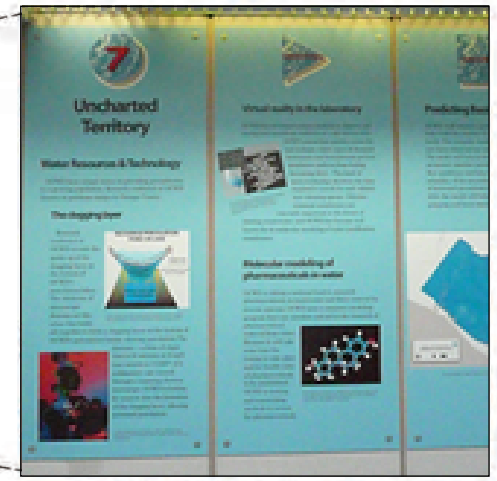
EXPOSED CEILING PAINTED BLACK WITH LINEAR LIGHTING

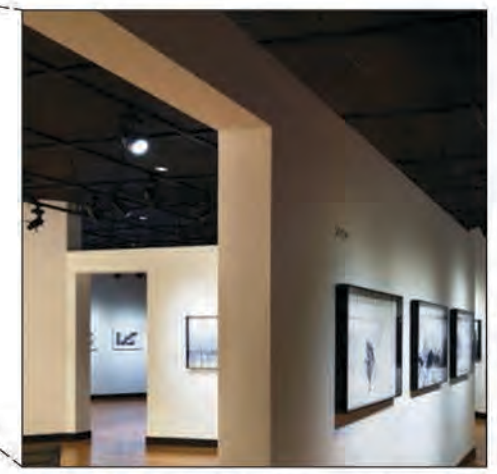
2X2 WHITE ACOUSTICAL CEILING TILES

ADJUSTABLE DISPLAY EXHIBIT SYSTEM

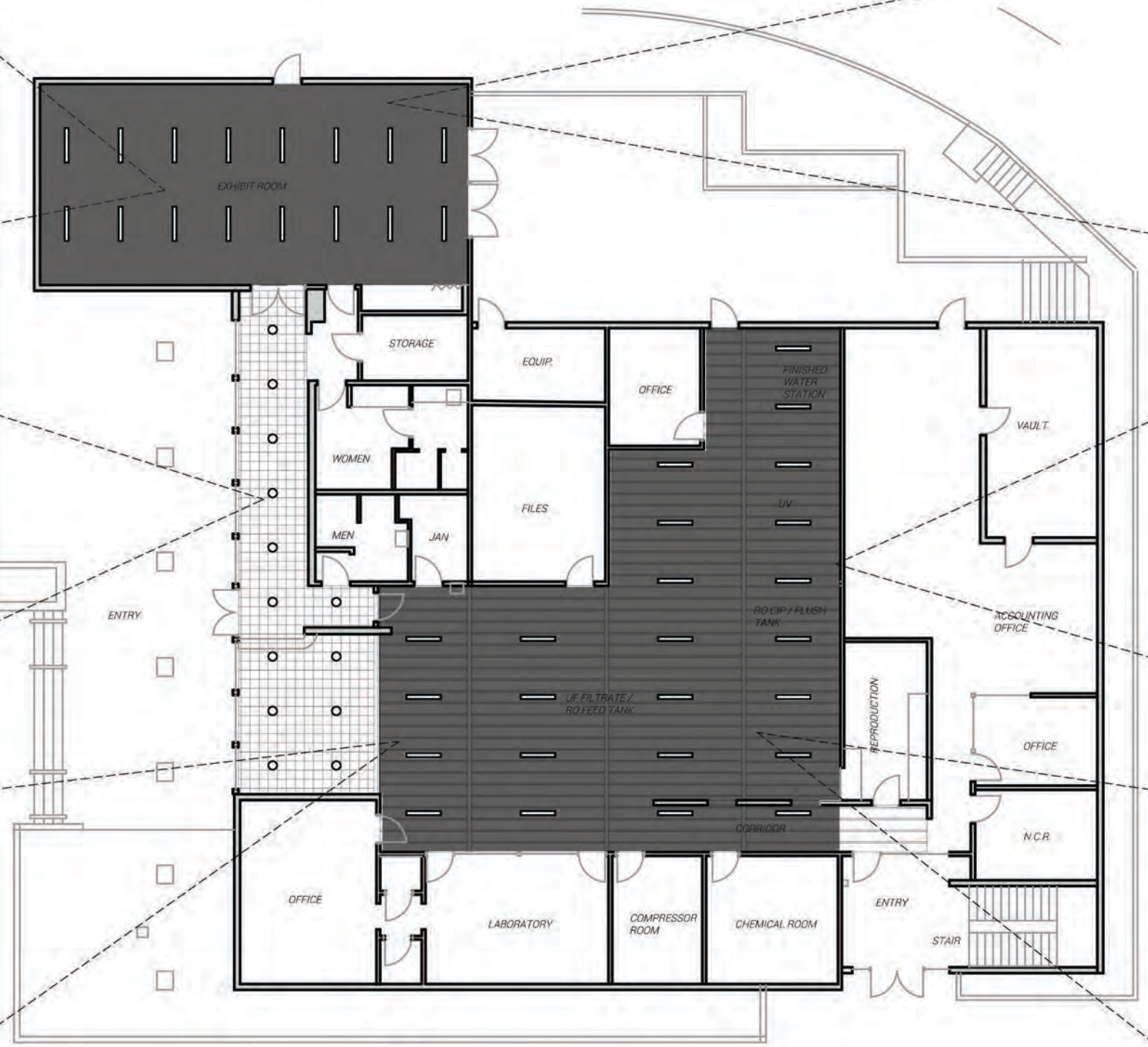


INTERACTIVE WALL

SUPER GRAPHICS WALL



EXPOSED CEILING PAINTED BLACK WITH SPOT LIGHTING



NORTH

CEILING PLAN AND EXHIBIT PLAN

SCALE 1/8"=1'-0"

CDM Smith

LVMWD DEMONSTRATION PLANT

Las Virgenes

APRIL 2017

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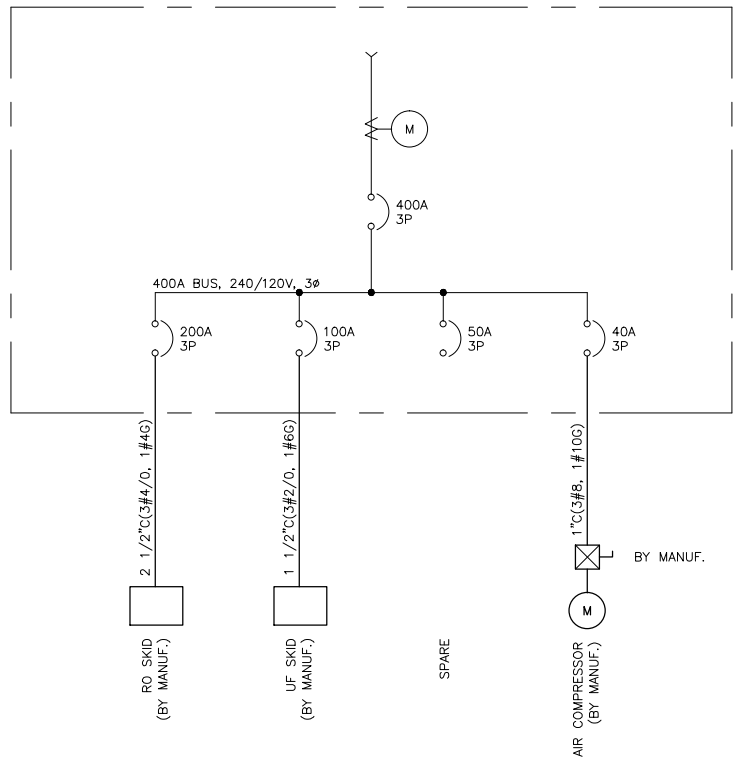

SWITCHBOARD 'P' SINGLE LINE
NO SCALE

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: F.Y
DRAWN BY: O.N
SHEET CHK'D BY: F.Y
CROSS CHK'D BY: –
APPROVED BY: –
DATE: JUNE 2017

CDM Smith
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Carlsbad, CA 92011
Tel: (760) 438-7755

LAS VIRGENES - TRIUNFO JOINT POWERS AUTHORITY
PURE WATER PROJECT
RECYCLED WATER SEASONAL STORAGE
DEMONSTRATION PROJECT

SINGLE LINE DIAGRAM

PROJECT NO. 10976-215736
FILE NAME: E01.dwg

SHEET NO.
E-1

DRAFT - NOT FOR CONSTRUCTION

FILE: C:\pw_pl1\perezs\d0703278\E01.dwg – DATE: 5/10/2017 9:57 PM BY: Perez, S. Moses

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Section 9
Sources

2016. *Expert Panel Report on the Evaluation of the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse*. September 2016.

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MWH/Stantec, 2016. *Recycled Water Seasonal Storage Basis of Design Report.*

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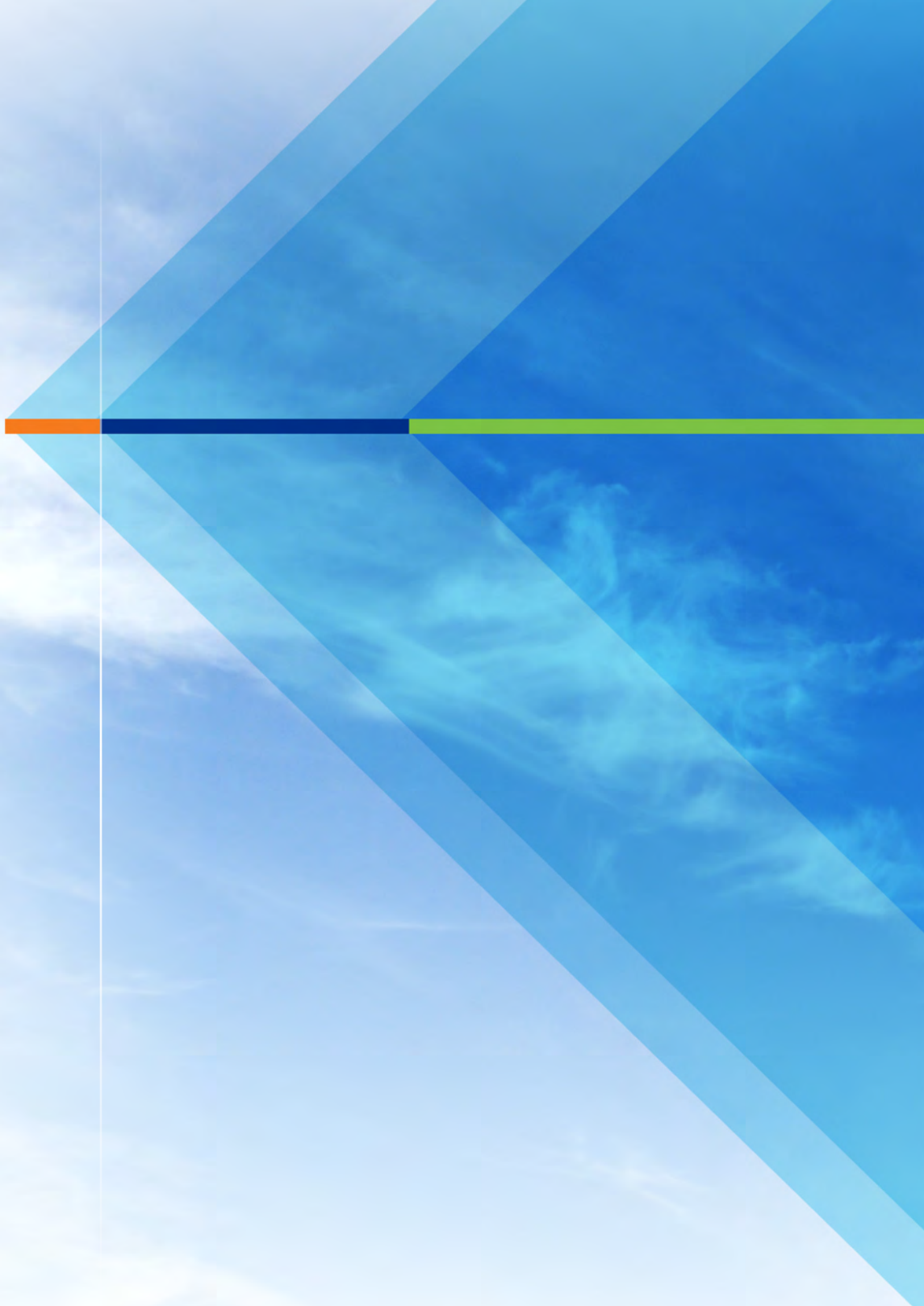

CDM Smith®

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ITEM 10A

INFORMATION ONLY

July 10, 2017 JPA Board Meeting

TO: JPA Board of Directors

FROM: Finance & Administration

Subject : Pure Water Project Las Virgenes-Triunfo: Preliminary Financial Feasibility Report

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SUMMARY:

In March 2016, the JPA entered into a professional services agreement with PFM Financial Advisors LLC to complete a study of the financial feasibility of the Pure Water Project Las Virgenes-Triunfo. Representatives of PFM presented the preliminary analysis to the JPA Board on May 1, 2017.

Since that time, staff has worked with PFM representatives to refine the analysis as it pertains to the potential retail rate impacts the project may have on the customers of the JPA's two member agencies. Of particular interest was to quantify the benefits of Metropolitan Water District of Southern California's Local Resources Program (LRP) funds, if successfully obtained by LVMWD on behalf of the JPA. Attached is the final report from PFM that will be presented at the Board meeting.

FISCAL IMPACT:

No

ITEM BUDGETED:

No

GOALS:

Ensure Effective Utilization of the Public's Assets and Money

Prepared by: Donald Patterson, Director of Finance and Administration

ATTACHMENTS:

Preliminary Financial Feasibility Report

PURE WATER PROJECT
LAS VIRGENES-TRIUNFO
Bringing Our Water Full Circle

Las Virgenes – Triunfo Joint Powers Authority

Preliminary Financial Feasibility Report

June 16, 2017

PFM FINANCIAL ADVISORS LLC

601 South Figueroa Street, Suite 4500
Los Angeles, CA 90017
(213) 489-4075

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TABLE OF CONTENTS

Executive Summary

The proposed Pure Water Project (the "Project") will create a new, local, sustainable and drought-proof drinking water supply through the purification of the Las Virgenes – Triunfo Joint Powers Authority's (the "JPA") surplus recycled water and process it through an advanced treatment facility; then store it at the Las Virgenes Reservoir for later use as drinking water. This process is known as indirect potable reuse ("IPR") and discussed in greater detail in Scenario 4 in the Basis of Design Report ("BODR") dated September 2016 prepared by MWH. The Project would reduce the need to discharge excess recycled water to Malibu Creek and is intended to diversify the region's water supply and reduce dependence on imported water by generating up to 6 million gallons per day ("mgd") of new drinking water. Total construction costs of the Project are estimated to be approximately $95,313,000 million (2016 Dollars) as detailed in the BODR and Section 1 of this Financial Feasibility Report ("Financial Report")

By creating a new source of locally controlled, uninterruptable drinking water, the Project results in reduced reliance on the Metropolitan Water District of Southern California ("MWD") for imported water. The avoided costs associated with reduced dependence on the MWD are the primary financial benefits of the Project and are discussed in detail in this Financial Report. Additional regional environmental benefits of the Project include ecosystem protection and reduced discharge into Malibu Creek.

This Financial Report is comprised of six sections. Section 1 details the estimated capital expenditures necessary for construction of the Project and the preliminary capital cost allocation framework between the JPA members. Section 2 follows with a discussion of potential funding sources available for the Project. Pre-construction costs are expected to be funded through a combination of cash contributions from Las Virgenes MWD ("LV") and Triunfo Sanitation District ("TSD") and grants to the extent they are available based on the cost allocation framework. Funding for the construction of the Project is expected to come from grants, State Revolving Fund ("SRF") and Water Infrastructure Finance and Innovation Act ("WIFIA") loans, and municipal bonds; however, the availability of grant funding and the SRF loan interest rates are unknown at this time. Section 3 analyzes a set of potential funding scenarios in order to establish a range of financing alternatives for the project. Section 4 analyzes the required revenue increase for LV and TSD and the total revenue increase required to support each of the funding scenarios identified in Section 3.

Section 5 of this Financial Report outlines the process for continuing to refine the financial analysis as it pertains to future financial plan updates. Section 6 presents a summary and conclusion. It should be noted that LV and TSD will be responsible for reducing discharge to Malibu Creek in the future due to regulatory requirements regardless of whether or not the added step of constructing the advanced treatment facility is undertaken. As such, the Pure Water Project represents only an incremental increase in costs compared to what will be necessary to meet regulatory requirements.

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1. Capital Expenditures

Capital Costs. The projected capital costs for the Project facilities are comprised of construction costs and soft costs. These costs were developed as part of the BODR, and detailed information on the development of these costs can be found in that study. A high level summary of how these costs were developed is provided below.

Construction costs were calculated for the Advanced Water Treatment ("AWT") facility, recycled water pipelines, brine discharge pipeline and the mixing system at the reservoir, and are presented in the table below. A lump sum was assumed for the land acquisition necessary for the AWT facility. The construction cost of the AWT facility is a sum of the costs needed for process equipment, equipment installation, pumping and storage and the plant building itself. A number of these fees were developed from vendor quotes specific to the requirements of the AWT facility, while equipment installation costs were determined as a percentage of equipment costs.

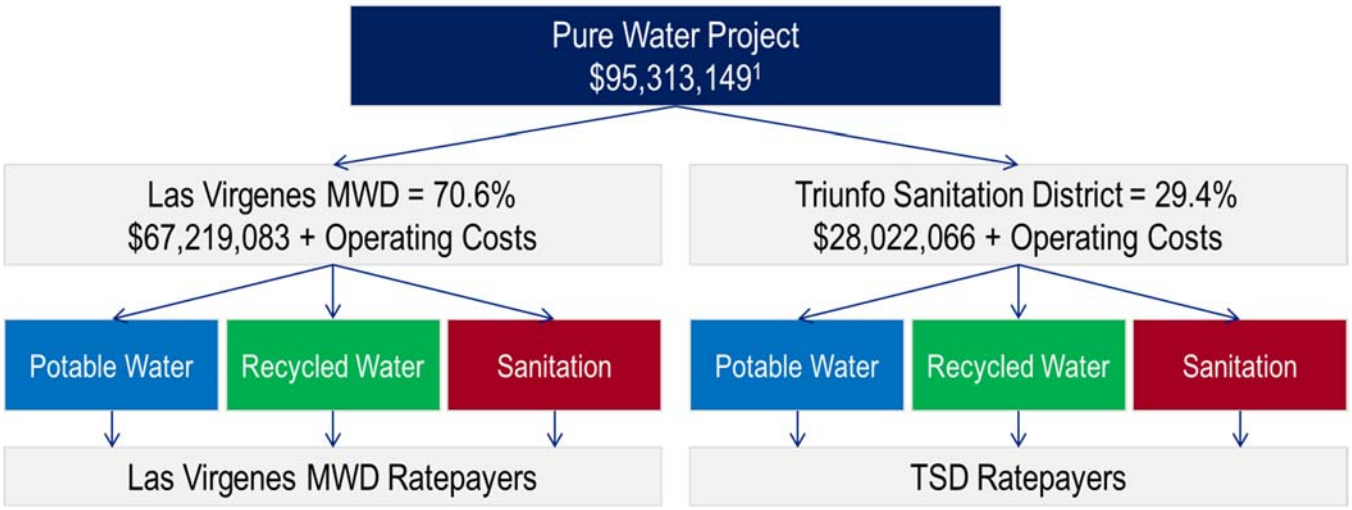
Additionally, contingencies were added for contractor overhead and profit, scope and estimating, and soft costs such as engineering and administrative fees. A breakout of the Project construction costs is detailed in the following table:

Pure Water Project Construction Costs (2016 Dollars)	
Description	Estimated Cost
Advance Water Treatment ("AWT") Facility	$46,721,000
Land Acquisition	$2,000,000
AWT Inlet Pipeline	$1,460,000
AWT Outlet Pipeline	$6,400,000
Brine Line	$10,500,000
Mixing System	$1,000,000
Subtotal	$68,081,000
Contingency (25%)	$17,020,250
Soft Costs (Engineering & Admin - 15%)	$10,212,150
Estimated Total Costs[1]	$95,313,149

[1]Totals may not add due to rounding

It is currently expected that the bulk of the Project's costs would occur during the construction phase which is expected to take place in 2025 through 2030.

Cost Allocation Framework. Capital costs are assumed to be allocated between LV and TSD based on a 70.6%/29.4% split with O&M costs following the same allocation.



At this point, a method for allocating costs among the applicable service types: potable water, recycled water, and sanitation has not been developed. Rather, this report focuses on the impact the Project will have on each member of the JPA at an aggregate level. As the Project moves forward, this allocation method will be developed in order to properly determine cost impacts on each respective customer class.

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2. Funding Sources

Funding for the Project is expected to come from a variety of sources, including but not limited to cash contributions from LV and TSD, grants, low-cost loans from the state revolving fund and if available, federally subsidized loan programs, and long-term debt. The Project is eligible for grants and subsidized loans and the objective of the financing plan is to secure the most favorable mix of funding that results in the lowest cost of capital for the Project. A discussion of potential funding sources is provided below. The availability of subsidized capital fluctuates based on a number of factors including demand from other borrowers, state and federal budget constraints, and evolving application processes. As such, there can be no assurance that the Project will be eligible for grants and subsidized loans at the time the JPA is seeking capital financing.

Grants. At times, grants from state and federal agencies are available to help fund capital intensive water supply and wastewater projects. Availability of these funds vary from year to year, however, it is expected that at least some funding for the Project would be available in the form of grants. Grants are the cheapest source of funding as they do not have to be repaid, however, they do bear administrative costs.

State Revolving Fund Loans ("SRF"). SRF Loans are loans with state subsidized interest payments made to assist agencies in funding water and wastewater related projects. If available, these types of loans provide a much less expensive means of funding capital intensive projects than other forms of debt, including publicly issued debt or bank loans. As of January 2017, funding from the State Water Resources Control Board SRF Loan program is available at a rate of approximately 1.67%.

Federally Subsidized Loan Programs. The Environmental Protection Agency ("EPA") has announced the implementation the Water Infrastructure Finance and Innovation Act ("WIFIA") program which is intended to accelerate investment in water and wastewater infrastructure by providing long-term, low cost, supplemental credit assistance for water and wastewater projects of national and regional significance. WIFIA will fund up to 49% of a project's eligible costs at interest rates equal to contemporary Treasury rates plus one basis point. The WIFIA program received initial budget authority in December 2016 and an additional $8 million for credit subsidy in the Consolidated Appropriations Act of 2017, which was signed by President Trump in May 2017. At this stage, the financing scenarios evaluated in this Financial Report do not assume WIFIA loans as a source of funding; however, WIFIA loans may be available in the future.

Metropolitan Water District of Southern California (MWD) Local Resources Program (LRP): The MWD's LRP provides funding for the development of water recycling, groundwater recovery and seawater desalination supplies that replace an existing demand or prevent a new demand on MWD's imported water deliveries. Under the current program, there are three LRP incentive payment structure options to choose from: (1) sliding scale incentives up to $340/AF over 25 years, (2) sliding scale incentives up to $475/AF over 15 years, or (3) fixed incentive up to $305/AF over 25 years. Applications are reviewed on a first come first served basis. While the Project would be eligible for LRP funding under the current program, the LRP has been updated several times since 1982 and continues to evolve based on the water supply conditions and economic landscape of MWD's service area. As a result, the base case financing analysis does not incorporate the receipt of LRP incentives given the length of time between now and operation; however, it is likely that the Project will qualify for the LRP incentive, thus a sensitivity analysis has been included to illustrate the impact of the LRP incentives at current program levels.

Tax-Exempt Bonds. LV and TSD (either on a standalone basis or through a pooled financing) have the option of accessing funding via tax-exempt debt in the public capital markets. Public market debt comes in a variety of different forms that can broadly be broken down into two categories: variable rate and fixed rate options, both of which would

be available to and can be used to complement financing obtained through grants or the state and federal loan programs.

Variable rate debt has interest rates that fluctuate, typically in direct correlation with a market index such as the London Interbank Offered Rate ("LIBOR") or the Securities Industry and Financial Markets Association ("SIFMA") index. Interest rates reset periodically on predetermined dates (typically daily, weekly or monthly), which accounts for the variable nature of the debt. Although variable rate debt opens the issuer to interest rate risk as interest rates can rise above planned levels, variable rates have historically resulted in a lower cost of debt than fixed rate alternatives.

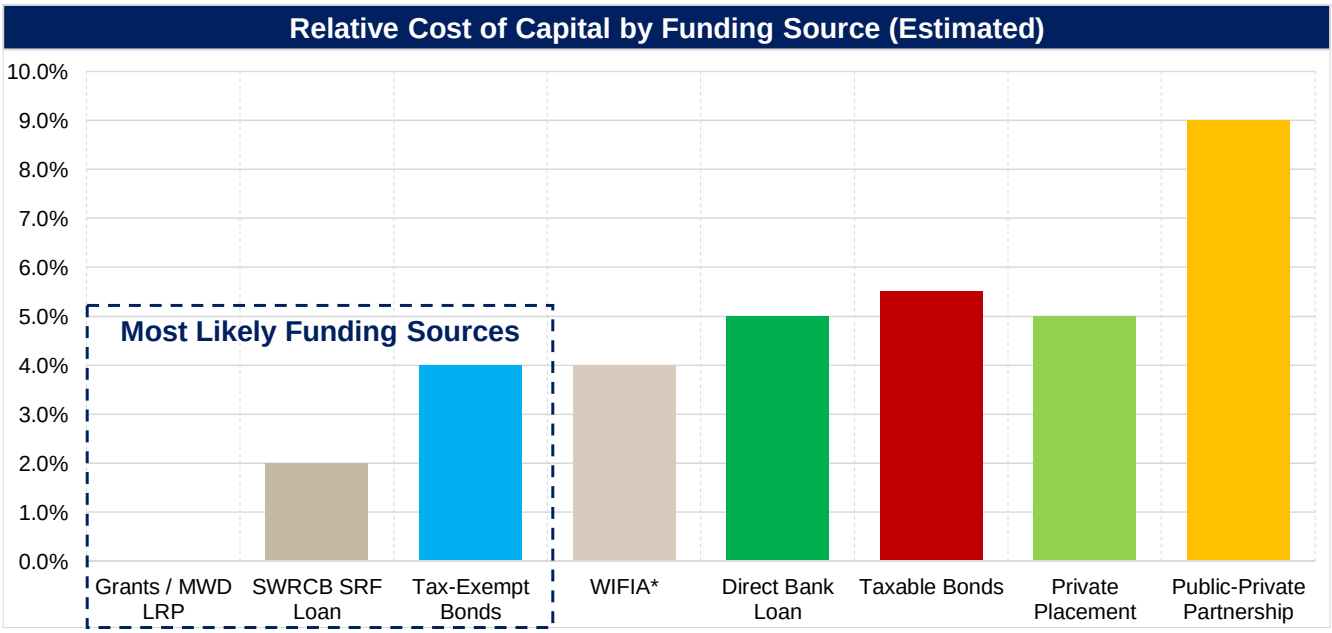
Fixed rate debt, which in the case of TSD and LV would most likely be in the form of tax-exempt revenue bonds, is debt that has interest rates that do not change over the life of the debt; hence they are "fixed". In today's market, interest rates on fixed rate debt are near historical lows making today an extremely attractive time to finance capital projects.

Taxable Bonds. Similar to tax-exempt bonds, LV and TSD have the option of accessing funding via the public capital markets through taxable bonds. Taxable debt, while more expensive than its tax-exempt counterpart, offers additional flexibility in terms of its allowable uses. For instance, if the Project was expected to directly benefit an entity in the private sector, the JPA would be unable to utilize tax-exempt debt as a source of funding. It is not expected that taxable debt will be needed as a funding source for the project as the Project provides public benefits.

Direct Bank Loans & Private Placements. In order to minimize disclosure and administrative burden on the JPA, LV, and TSD, Direct Bank Loans and Private Placements may be a worthwhile alternative to traditional publicly offered municipal bonds. Direct Bank Loans and Private Placements will have similar characteristics to publicly issued debt in terms of structure but will be purchased directly by a bank or privately placed with investor(s). Typically, these structures are slightly more expensive than tax-exempt municipal bonds, but the actual differential will be dependent on contemporary market dynamics. However, the increase in agencies utilizing these programs over the past five years has attracted the attention of the Municipal Securities Rulemaking Board ("MSRB") and the Securities and Exchange Commission ("SEC") which may result in increased reporting requirements in the future. PFM will monitor these dynamics as the need for additional funding arises leading up to the construction phase.

Public Private Partnership. The JPA may also be able to finance the Project through a public private partnership ("P3") in which case the Project would at least in part be funded through the infusion of funds from a private third party in the form of private equity. In general, private equity is significantly more expensive than municipal debt, whether tax-exempt or taxable. While the cost of capital may be higher in a public private partnership, other important issues, such as construction overruns and operating risks may be allocated to the private party in exchange for the higher expected returns. P3 arrangements are complicated and require careful negotiations on the part of public agencies to ensure performance and risks are allocated commensurate with funding. Depending on the project and the specific circumstances associated with a project, a P3 arrangement can result in lower life cycle risk adjusted costs – even with a higher cost of capital.

The chart below summarizes the estimated relative cost of capital by funding source.



* WIFIA = Water Infrastructure Finance and Innovation Act. Relationship between WIFIA and tax-exempt varies based on transaction structure and relative interest rates.

3. Funding Scenarios

As discussed in Section 2 there is a wide array of funding sources that may be utilized to finance the Project. In order to evaluate the potential costs associated with the available financing options, three scenarios were developed to illustrate the range of funding costs based on the mix of funding sources.

In each of the scenarios described below, it is assumed that outlay for Project needs commences in 2017 and ends in 2030 with operation beginning in 2031. It is also assumed the repayment period for any debt issued is 30 years.

Scenario 1. In this scenario, funding comes from pay-go contributions of $20.0 million, grants of $15.0 million, and an SRF loan of $60.3 million. The assumed interest rate on the SRF loan is 1.663%, consistent with today's available funding. While the rates available on SRF loans will fluctuate over time, this Financial Report assumes that interest rates available through the SRF loan program will be below the Project's cost of capital should it obtain financing in the public capital markets. During the State of California's fiscal crisis in 2009-10, the cost of borrowing through the SRF program was above the cost of capital for many A/AA rated entities within the state. Notwithstanding this dislocation, the Scenario 1 funding structure is reasonably likely for the Project (i.e. mix of pay-go, grants and SRF loans) and represents a structure that maximizes the use of low-cost, subsidized financing.

Scenario 2. In Scenario 2, funding comes from pay-go contributions of $15.0 million, grants totaling $10.0 million, a SRF Loan of $35.0 million, and $35.3 million from tax-exempt municipal bonds. The interest rate on municipal bonds is assumed to be the average AA rated 20-Year MMD spot rate, corresponding to the expected weighted average lifespan of any debt issued, since the inception of the MMD index, approximately 4.00%. Scenario 2 illustrates the incremental cost associated with a shift in the capital structure away from subsidized financing to the capital markets in the form of publicly issued bonds.

Scenario 3. Scenario 3 replaces the funding from SRF Loans and grants in Scenario 2 with tax-exempt municipal bonds issued in the public capital markets. Scenario 3 represents the highest cost of capital considered (assuming the Project is entirely eligible to be financed on a tax-exempt basis) and provides a likely book-end in terms of the maximum relative cost increase vis-à-vis a scenario that relies more heavily on pay-go, grant or SRF funding.

A summary of the three scenarios is provided in the table below.

Potential Funding Scenarios (2016 Dollars)			
Scenario	Scenario 1	Scenario 2	Scenario 3
Funding Sources	Grants / SRF	Grants / SRF/ T-E Bonds	T-E Bonds
Total Capital Cost	$95,313,149		
Pay-Go Contribution	$20,000,000	$15,000,000	$10,000,000
Grant Funding	$15,000,000	$10,000,000	$0
SRF Loan (1.66%)	$60,313,149	$35,000,000	$0
Municipal Bond (4.00%)	N/A	$35,313,149	$85,313,149
Repayment period	30 Years	30 Years	30 Years

Detailed tables showcasing each scenario's funding needs by funding source and project participant are shown below. As seen in the tables, borrowing (whether SRF Loans or tax-exempt debt) is not expected to be needed until 2025 when construction begins in earnest. Each scenario assumes costs are allocated 70.6% to LV and 29.4% to TSD as described in the Cost Allocation Framework section.

Las Virgenes MWD Funding Sources ($000s)															
Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Scenario 1															
Pay Go	$412	$412	$412	$412	$412	$687	$687	$687	$2,571	$2,571	$2,571	$1,536	$500	$250	$14,120
Grants	$309	$309	$309	$309	$309	$515	$515	$515	$1,929	$1,929	$1,929	$1,152	$375	$188	$10,590
SRF Loans	$0	$0	$0	$0	$0	$0	$0	$0	$10,949	$10,949	$10,949	$6,539	$2,129	$1,065	$42,581
Bonds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$721	$721	$721	$721	$721	$1,202	$1,202	$1,202	$15,449	$15,449	$15,449	$9,227	$3,004	$1,502	$67,291
Scenario 2															
Pay Go	$433	$433	$433	$433	$433	$721	$721	$721	$1,611	$1,611	$1,611	$962	$313	$157	$10,590
Grants	$288	$288	$288	$288	$288	$481	$481	$481	$1,074	$1,074	$1,074	$641	$209	$104	$7,060
SRF Loans	$0	$0	$0	$0	$0	$0	$0	$0	$6,354	$6,354	$6,354	$3,795	$1,236	$618	$24,710
Bonds	$0	$0	$0	$0	$0	$0	$0	$0	$6,411	$6,411	$6,411	$3,829	$1,247	$623	$24,931
Total	$721	$721	$721	$721	$721	$1,202	$1,202	$1,202	$15,449	$15,449	$15,449	$9,227	$3,004	$1,502	$67,291
Scenario 3															
Pay Go	$721	$721	$721	$721	$721	$1,202	$1,202	$1,052	$0	$0	$0	$0	$0	$0	$7,060
Grants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SRF Loans	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bonds	$0	$0	$0	$0	$0	$0	$0	$150	$15,449	$15,449	$15,449	$9,227	$3,004	$1,502	$60,231
Total	$721	$721	$721	$721	$721	$1,202	$1,202	$1,202	$15,449	$15,449	$15,449	$9,227	$3,004	$1,502	$67,291

TSD Funding Sources ($000s)															
Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Scenario 1															
Pay Go	$172	$172	$172	$172	$172	$286	$286	$286	$1,071	$1,071	$1,071	$640	$208	$104	$5,880
Grants	$129	$129	$129	$129	$129	$214	$214	$214	$803	$803	$803	$480	$156	$78	$4,410
SRF Loans	$0	$0	$0	$0	$0	$0	$0	$0	$4,560	$4,560	$4,560	$2,723	$887	$443	$17,732
Bonds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$300	$300	$300	$300	$300	$500	$500	$500	$6,434	$6,434	$6,434	$3,842	$1,251	$625	$28,022
Scenario 2															
Pay Go	$180	$180	$180	$180	$180	$300	$300	$300	$671	$671	$671	$401	$130	$65	$4,410
Grants	$120	$120	$120	$120	$120	$200	$200	$200	$447	$447	$447	$267	$87	$43	$2,940
SRF Loans	$0	$0	$0	$0	$0	$0	$0	$0	$2,646	$2,646	$2,646	$1,580	$515	$257	$10,290
Bonds	$0	$0	$0	$0	$0	$0	$0	$0	$2,670	$2,670	$2,670	$1,594	$519	$260	$10,382
Total	$300	$300	$300	$300	$300	$500	$500	$500	$6,434	$6,434	$6,434	$3,842	$1,251	$625	$28,022
Scenario 3															
Pay Go	$300	$300	$300	$300	$300	$500	$500	$438	$0	$0	$0	$0	$0	$0	$2,940
Grants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SRF Loans	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bonds	$0	$0	$0	$0	$0	$0	$0	$62	$6,434	$6,434	$6,434	$3,842	$1,251	$625	$25,082
Total	$300	$300	$300	$300	$300	$500	$500	$500	$6,434	$6,434	$6,434	$3,842	$1,251	$625	$28,022

4. Revenue Requirement Impact

This section analyzes the net change necessary in the respective revenue requirements for LV and TSD as a result of financing and constructing the Project. The key assumptions underpinning the revenue requirement impact are segmented into two categories: Project-specific internal assumptions and external avoided-cost (benefit) assumptions. Internal assumptions are those over which the Project has control and include capital costs and accompanying mix of funding sources, annual operations and maintenance expenses and production/capacity of the Project. As the primary benefit in terms of avoided cost associated with the Project stem from a reduction in the need for imported water from the MWD, assumptions need to be made regarding the level of avoided costs which are external to Project stakeholders.

Annual Operations and Maintenance. O&M costs were categorized into fixed and variable costs, as shown in the table below. Fixed costs are classified as costs that do not vary with production output. These include labor and maintenance costs at the AWT facility, along with the reservoir mixing system. Variable costs are directly impacted by growth changes in the quantity of water treated at the AWT facility. Variable costs include energy and chemical costs at the AWT facility and energy costs at the RWPS West. The brine discharge fee is directly dependent on the quantity of brine production. A brine discharge facility maintenance cost is also needed, as further discussed in the Seasonal Storage Project – Basis of Design Report. Additionally, an increase in reservoir fill from the AWT facility would result in greater use of the Westlake FP, thus increasing O&M costs. O&M costs for Year 1 of operation are based largely on current supply and demand values. Based on these assumptions, O&M costs for the first year of operation are estimated to be approximately $2,663,000 escalated at 2.0% per year.

Pure Water Project Construction Costs (2016 Dollars)			
Description	Quantity (Acre Feet)	Unit Price ($/AF)	Estimated Cost
Fixed Costs			
AWT (Fixed)	2,637	$365	$962,505
Mixing System	9,500	$25	$237,500
Brine Discharge Facility		Lump Sum	$45,000
Fixed Subtotal			$1,245,005
Contingency (10%)			$124,501
Estimated Total Fixed Costs			$1,369,506
Variable Costs			
RWPS West	3,102	$25	$77,550
AWT (Variable)	2,637	$300	$791,100
Westlake Filtration Plant	498	$150	$74,700
Brine Discharge Fee	465	$500	$232,500
Subtotal			$1,175,850
Contingency (10%)			$117,585
Estimated Total Variable Costs			$1,293,435
Estimated Total O&M			$2,662,941

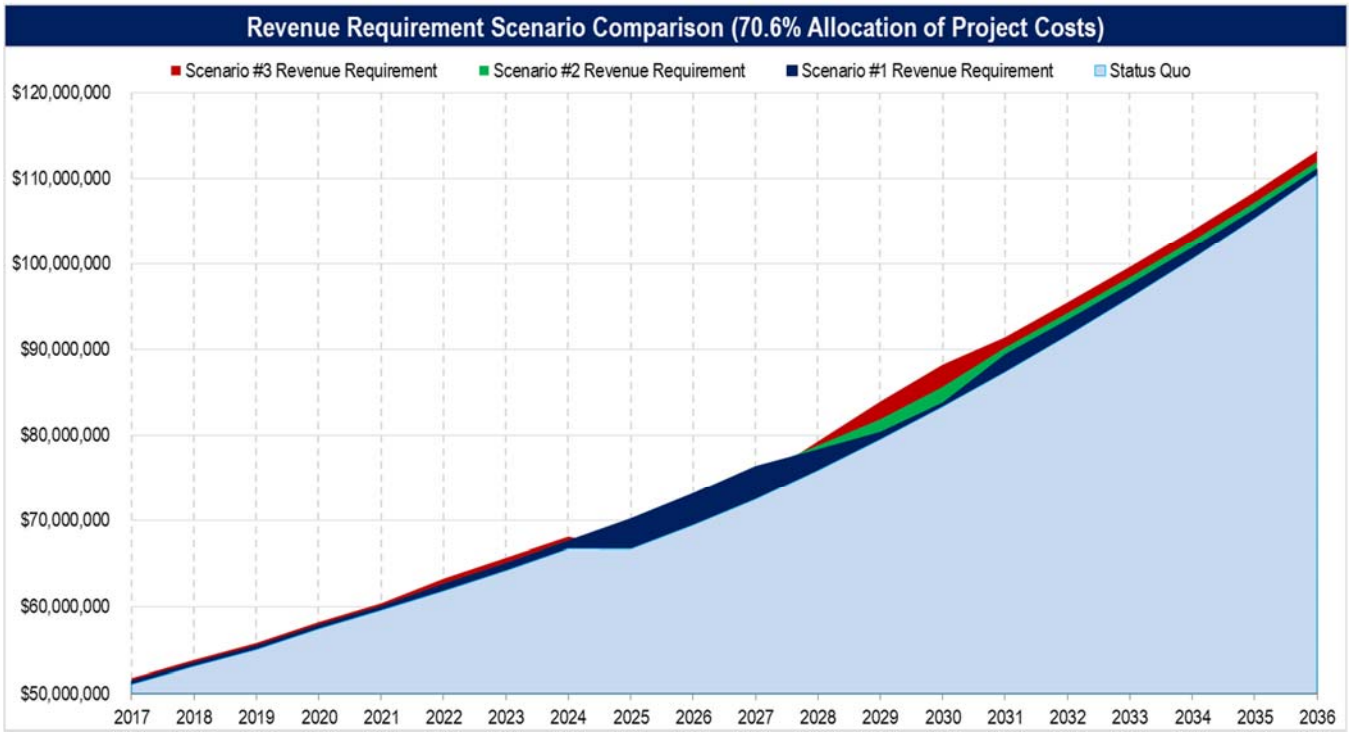
Avoided MWD Imported Water Costs. By creating a new source of locally controlled, uninterruptable drinking water, the Project results in reduced reliance on the MWD for imported water. The avoided costs associated with reduced dependence on the MWD is the primary financial benefit of the Project.

The avoided MWD costs were determined based on the expected production of purified water from the Pure Water Project offsetting imported water. The MWD avoided cost is calculated by taking the expected production of purified water (2,637 AF increasing by 70 AF per year through the projection horizon) and multiplying it by the projected

treated MWD rate. The projected MWD rate was assumed to increase at 5% over the existing Tier 1 Treated Water Rate. Further, no assumption regarding future charges in the MWD rate structure have been analyzed.

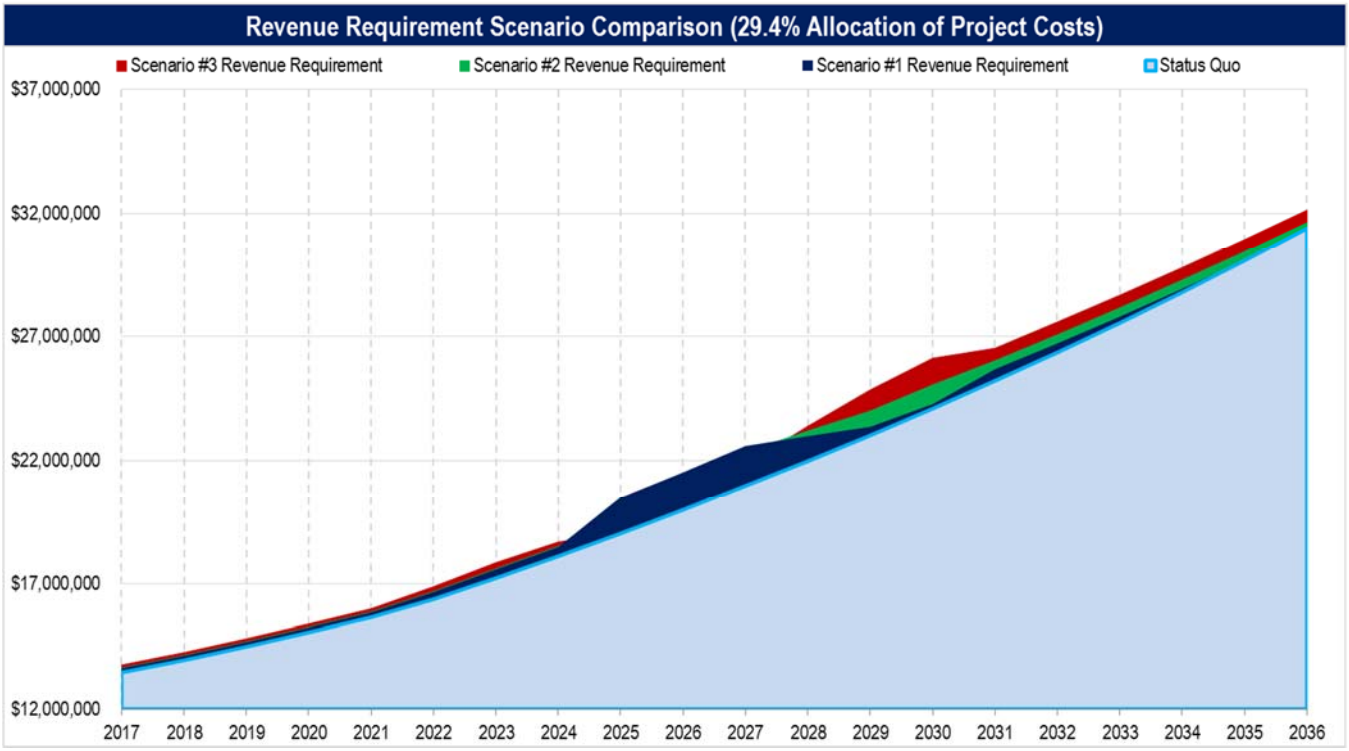
As noted in Section 2 of this report, the Project would qualify under MWD's current eligibility requirements for LRP incentive payments. The revenue impact of the LRP will depend on the LRP incentive options at the time an agreement is executed, the specific incentive option (i.e. fixed or sliding scale) chosen by the Project, and the amount by which the Project's unit cost exceeds MWD's prevailing water rate. As a result of the large number of variables that will affect the LRP, the base case revenue requirement model does not include receipt of LRP incentive payments. However, for purposes of quantifying the potential impact, assuming a fixed incentive payment of $305/AF over 25 years and a discount rate of 5%, the present value to the date of commercial operation of future incentive payments is approximately $14 million. The per-customer impact of the LRP will depend on the Project's performance, incentive structure and number of ERUs within each service area; however using $305/AF the per-customer benefit from receiving LRP funds would be approximately $1.70 per EDU per month for Las Virgenes MWD and $1.40 per EDU per month for TSD during the first year of production.

Las Virgenes MWD Revenue Requirement Impact. Compared to a status quo alternative, the Pure Water Project adds between $1.3 million to $2.6 million (2016 dollars) to Las Virgenes MWD's revenue requirement in 2031 which is when the Project is expected to become operational. Las Virgenes currently has 27,805 equivalent residential units in its system, therefore, assuming no change in the number of connections in the future, the estimated average impact over the 20-year forecast period is $3.00 to $4.53 per month in 2016 dollars per equivalent residential unit (excluding any benefit from the MWD LRP incentive, if available). A graph showing the impact each scenario has on Las Virgenes' revenue requirement through a 20-year projection horizon is shown below.



Triunfo Sanitation District Revenue Requirement Impact. Compared to a status quo alternative, the Pure Water Project adds between $0.3 million to $0.8 million (2016 dollars) to TSD's revenue requirement in 2031. TSD currently has 13,410 equivalent residential units in its system, this results in an average per-ERU impact of $2.19 to $3.44 per month in 2016 dollars over the 20-year forecast period (excluding any benefit from the MWD LRP incentive, if

available). A graph showing the impact each scenario has on TSD's revenue requirement through a 20-year projection horizon is shown below.



The impact the Project has on LV's and TSD's respective revenue requirements and the corresponding customer bill impacts vary over time based on the amount of annual pay-go and debt financing for each scenario. The analysis assumes that pay-go financing is funded out of revenues in the year in which the expenditure is incurred; in practice, it is likely that LV and TSD would anticipate the pay-go requirements in their respective CIPs and the impact would be smoothed over time. Similarly, debt financing is amortized beginning in 2025 (as shown in Section 3 of the report), thus Scenario 2 and Scenario 3, which incorporate larger bond issuance components have more material bill impacts in the years following the initial debt amortization. In order to smooth the revenue requirement impacts from timing differences between funding components, it is reasonable to evaluate a "levelized" bill impact over the 20-year projection period. The table below presents customer bill impacts based on the revenue requirement divided by the number of ERUs in 2016 dollars, as well as the average impact over the 20-year projection period and the potential offset should LRP subsidy be available at current subsidy levels.

Customer Bill Impacts										
Scenario	2021 Bill Impact		2031 Bill Impact (Commercial Operation)		2036 Bill Impact (Final Projection Year)		"Levelized" Average Impact (20yrs)		LRP Incentive Subsidy (Assumes $305/AF)	
	LVMWD	TSD	LVMWD	TSD	LVMWD	TSD	LVMWD	TSD	LVMWD	TSD
2016 Dollars										
1	$1.20	$1.04	$3.90	$1.87	$1.19	$0.96	$3.00	$2.19	($1.70)	($1.47)
2	$1.26	$1.09	$5.46	$3.22	$2.57	$1.80	$3.54	$2.60		
3	$2.10	$1.81	$7.78	$5.23	$4.63	$3.65	$4.53	$3.44		

As shown in the table above, the Project is projected to have a modestly larger impact on the customers in Las Virgenes' service area as compared to TSD, based on current ERUs. There are two primary variables driving this differential: (1) capital cost allocation compared to ERU count and (2) potable water supply costs. Based on information provided to PFM for this analysis, it is assumed that the capital costs and O&M are allocated 70.6% to

Las Virgenes and 29.4% to TSD, as shown in Section 1. The distribution of ERUs used to calculate the customer bill impact assumes 27,805 ERUs for Las Virgenes (67.5%) and 13,410 ERUs for TSD (32.5%). In other words, the percentage of capital costs allocated to Las Virgenes is larger than the percentage of total ERUs. TSD is allocated a smaller percentage of capital costs as compared to total ERUs. Conversely, the LRP incentive payments, if available, will have a modestly greater impact per-EDU for Las Virgenes, assuming the Project output is allocated based on the initial capital cost allocation. It is important to note that customer bill impacts will vary over time depending on the total number of ERUs, with service area expansion resulting in more moderate per-ERU impacts. Additionally, the net impact per ERU will be affected by the cost of potable water supply, as the primary economic benefit of the project is the avoided MWD supply costs. The costs of potable water supply differs between Las Virgenes and TSD. Las Virgenes is a MWD member agency and obtains potable water supply at the Tier 1 treated water rate. TSD purchases treated water from MWD via Calleguas Municipal Water District (CMWD) and reimburses CMWD for conveyance and O&M charges, thus the benefit of avoided imported water purchases has a larger impact on the revenue requirement of TSD vis-à-vis Las Virgenes, which has access to lower cost imported water.

As noted previously, the Project would qualify for the MWD LRP incentive under the current incentive guidelines and structure. The table below shows the "levelized" average impact on customer bills *including* the effect of the LRP incentive (assumed at a fixed $305/AF) over the 20-year forecast period.

Net Customer Bill Impacts With LRP		
Scenario	"Levelized" Average Impact (20yrs) Including LRP Incentive	
	LVMWD	TSD
1	$1.30	$0.72
2	$1.84	$1.13
3	$2.83	$1.97

It should be noted that the change in revenue requirements is based on the status quo or "no change" alternative. But, as previously noted, LV and TSD will be required to make additional investments in the future to meet regulatory requirements. As such, the change in per equivalent residential unit cost shown above would likely occur even without the benefits associated with the AWT.

5. Next Steps

Continued development of the Financing Plan and further refinement of this report will require increased certainty with respect to components of the Project governance structure as well as finalized cost allocation methods.

As noted previously, this Financing Report assumes that the Project will be funded entirely with cash contributions from Las Virgenes MWD and TSD until the construction phase is initiated. As the initial date of construction nears, a more robust Financing Plan will need to developed based on current market conditions and available funding sources.

6. Conclusion

The Pure Water Project will create a new, local, sustainable and drought-proof drinking water supply through the purification of the region's recycled water as well as meet regulatory requirements to reduce discharge into Malibu Creek. Based on current assumptions, as outlined in this Preliminary Financing Report, it is estimated the Project can be financed with a modest impact on LV and TSD customers in the range of $0.75 to $3.00 per customer per month in 2016 dollars, assuming receipt of the MWD LRP incentive subsidy.