



PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

BOARD OF DIRECTORS

W. SCOTT KELLERMAN
Division 1

DON WILSON
Division 2

GLORIA DIZMANG
Division 3

KATHY MAC LAREN-GOMEZ
Division 4

VINCENT DINO
Division 5

December 7, 2022

AGENDA FOR REGULAR MEETING OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT TO BE HELD AT 2029 EAST AVENUE Q, PALMDALE OR VIA TELECONFERENCE

FOR THE PUBLIC: VIA TELECONFERENCE ONLY

DIAL-IN NUMBER: 571-748-4021 ATTENDEE PIN: 425-317-417#

Submit Public Comments at: <https://www.gomeet.com/425-317-417>

MONDAY, DECEMBER 12, 2022

6:00 p.m.

DENNIS D. LaMOREAUX
General Manager

ALESHIRE & WYNDER LLP
Attorneys

NOTES: To comply with the Americans with Disabilities Act, to participate in any Board meeting please contact Dawn Deans at 661-947-4111 x1003 at least 48 hours prior to a Board meeting to inform us of your needs and to determine if accommodation is feasible.

Additionally, an interpreter will be made available to assist the public in making **comments** under Agenda Item No. 4 and any action items where public input is offered during the meeting if requested at least 48 hours before the meeting. Please call Dawn Deans at 661-947-4111 x1003 with your request. (PWD Rules and Regulations Section 4.03.1 (c))

Adicionalmente, un intérprete estará disponible para ayudar al público a hacer **comentarios** bajo la sección No. 4 en la agenda y cualquier elemento de acción donde se ofrece comentarios al público durante la reunión, siempre y cuando se solicite con 48 horas de anticipación de la junta directiva. Por favor de llamar Dawn Deans al 661-947-4111 x1003 con su solicitud. (PWD reglas y reglamentos sección 4.03.1 (c))

Agenda item materials, as well as materials related to agenda items submitted after distribution of the agenda packets, are available for public review at the District's office located at 2029 East Avenue Q, Palmdale (Government Code Section 54957.5). Please call Dawn Deans at 661-947-4111 x1003 for public review of materials.

PUBLIC COMMENT GUIDELINES: The prescribed time limit per speaker is three-minutes. Please refrain from public displays or outbursts such as unsolicited applause, comments, or cheering. Any disruptive activities that substantially interfere with the ability of the District to carry out its meeting will not be permitted, and offenders will be requested to leave the meeting. (PWD Rules and Regulations, Appendix DD, Sec. IV.A.)

Each item on the agenda shall be deemed to include any appropriate motion, resolution, or ordinance to take action on any item.

- 1) Pledge of Allegiance/Moment of Silence.
- 2) Administering of Oath of Office to Elected Directors. (General Counsel Trindle)



- 3) Roll Call.
- 4) Adoption of Agenda.
- 5) Public comments for non-agenda items.
- 6) Presentations:
 - 6.1) None at this time.
- 7) Action Items - Consent Calendar (The public shall have an opportunity to comment on any action item on the Consent Calendar as the Consent Calendar is considered collectively by the Board of Directors prior to action being taken.)
 - 7.1) Approval of minutes of Regular Board Meeting held November 28, 2022.
 - 7.2) Payment of bills for December 12, 2022.
 - 7.3) Approval of reappointment of Zakeya Anson to Palmdale Recycled Water Authority Board. (No Budget Impact – General Manager LaMoreaux)
 - 7.4) Approval of Resolution No. 22-32 being a Resolution of the Board of Directors of the Palmdale Water District Proclaiming a Local Emergency Persists, Ratifying the Proclamation of a State of Emergency by the Governor Issued March 4, 2020, and Re-Authorizing Remote Teleconference Meetings of the Legislative Bodies of the Palmdale Water District for the Period Beginning January 1, 2023 and Ending January 30, 2023 Pursuant to Brown Act Provisions. (No Budget Impact – Assistant General Manager Ly)
 - 7.5) Approval of Resolution No. 22-33 being a Tax Sharing Resolution with Los Angeles County Sanitation Districts. (No Budget Impact – General Manager LaMoreaux)
- 8) Action Items - Action Calendar (The public shall have an opportunity to comment on any action item as each item is considered by the Board of Directors prior to action being taken.)
 - 8.1) Public Hearing regarding the Draft Initial Study and Mitigated Negative Declaration for the Palmdale Water District Solar Energy Project. (No Budget Impact – Assistant General Manager Ly)
 - 8.2) Consideration and possible action on approving Resolution No. 22-34 being a Resolution of the Board of Directors of the Palmdale Water District Adopting the Notice of Intent for the Draft Initial Study and Mitigated Negative Declaration Study for the Palmdale Water District Solar Energy Project and authorizing staff to file the Notice of Determination with the California State Clearinghouse. (No Budgeted Impact – Assistant General Manager Ly)
 - 8.3) Public Hearing regarding findings required by Government Code section 4217.12 regarding anticipated energy cost savings and other benefits to the District for entering into Power Purchase Agreements and Easement Agreements for the installation of solar photovoltaic and battery energy storage systems. (No Budget Impact – Assistant General Manager Ly)

- 8.4) Consideration and possible action on approving Resolution No. 22-35 being a Resolution of the Board of Directors of the Palmdale Water District Making Findings, Authorizing the General Manager to Execute Power Purchase Agreements and Easement Agreements with East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC, to Build, Own and Operate a Solar Arrays System at the District Headquarters and 6MG Reservoir Site. (No Budget Impact – Assistant General Manager Ly)
- 8.5) Consideration and possible action on authorizing staff to negotiate and execute a Services Contract with Wigen Water Technologies for engineering submittals for a membrane filtration system for the Pure Water AV Demonstration Facility and agree to the purchasing terms for the present pricing of the equipment. (803,022.25 Not-to-Exceed – Budgeted – Engineering Manager Rogers)
- 8.6) Consideration and possible action on authorizing staff to negotiate and execute a Services Contract with Biwater, Inc. for engineering submittals for a reverse osmosis system for the Pure Water AV Demonstration Facility and agree to the purchasing terms for the present pricing of the equipment. (\$539,730.31 Not-to-Exceed – Budgeted – Engineering Manager Rogers)
- 8.7) Consideration and possible action on authorizing staff to negotiate and execute a Services Contract with Dupont (Desalitech, Inc.) for engineering submittals for a secondary reverse osmosis system for the Pure Water AV Demonstration Facility and agree to the pricing terms for the purchase of the equipment. (\$375,157.00 Not-to-Exceed – Budgeted – Engineering Manager Rogers)
- 8.8) Consideration and possible action on sending a letter supporting the Delta Conveyance Project and the certification of its Draft Environmental Impact Report. (No Budget Impact – Resource and Analytics Director Thompson)
- 8.9) Consideration and possible action on authorization of the following conferences, seminars, and training sessions for Board and staff attendance within budget amounts previously approved in the 2022 Budget:
 - a) AVEDGE Holiday Breakfast to be held December 13, 2022 in Lancaster.
- 9) Information Items:
 - 9.1) Reports of Directors:
 - a) Standing Committees; Organization Appointments; Agency Liaisons:
 - 1) Antelope Valley East Kern Water Agency (AVEK) – November 29. (Director Dino/Director Mac Laren-Gomez, Alt.)
 - 2) Antelope Valley State Water Contractors Association (AVSWCA)– December 8. (Director Mac Laren-Gomez/Director Wilson/President Dizmang, Alt.)
 - b) General Meetings Reports of Directors.
 - 9.2) Report of General Manager.
 - a) Department Presentations:
 - 1) Operations Department. (Operations Manager Masaya)

- 2) Human Resources Department. (Human Resources Director Barragan-Garcia)
 - 3) Public Affairs Department. (Public Affairs Director Shay)
- 9.3) Report of General Counsel.
- 10) Board members' requests for future agenda items.
 - 11) Adjournment.



DENNIS D. LaMOREAUX,
General Manager

DDL/dd

OATH OF OFFICE

For the office of Director of the Palmdale Water District:

I, VINCENT DINO, during such time as I hold the above office, do solemnly swear that I will support and defend the Constitution of the United States and the Constitution of the State of California against all enemies, foreign and domestic; that I will bear true faith and allegiance to the Constitution of the United States and the Constitution of the State of California; that I take this obligation freely, without any mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties upon which I am about to enter.

Vincent Dino

Subscribed and sworn to before me
this 12th day of December, 2022.

G. Ross Trindle, III, General Counsel

OATH OF OFFICE

For the office of Director of the Palmdale Water District:

I, SCOTT KELLERMAN, during such time as I hold the above office, do solemnly swear that I will support and defend the Constitution of the United States and the Constitution of the State of California against all enemies, foreign and domestic; that I will bear true faith and allegiance to the Constitution of the United States and the Constitution of the State of California; that I take this obligation freely, without any mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties upon which I am about to enter.

Scott Kellerman

Subscribed and sworn to before me
this 12th day of December, 2022.

G. Ross Trindle, III, General Counsel

OATH OF OFFICE

For the office of Director of the Palmdale Water District:

I, DON WILSON, during such time as I hold the above office, do solemnly swear that I will support and defend the Constitution of the United States and the Constitution of the State of California against all enemies, foreign and domestic; that I will bear true faith and allegiance to the Constitution of the United States and the Constitution of the State of California; that I take this obligation freely, without any mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties upon which I am about to enter.

Don Wilson

Subscribed and sworn to before me
this 12th day of December, 2022.

G. Ross Trindle, III, General Counsel

**PALMDALE WATER DISTRICT
BOARD MEMORANDUM**

DATE: December 6, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Dennis D. LaMoreaux, General Manager
RE: *AGENDA ITEM NO. 7.3 –APPROVAL OF REAPPOINTMENT OF PUBLIC MEMBER ZAKEYA ANSON TO THE PALMDALE RECYCLED WATER AUTHORITY BOARD. (NO BUDGET IMPACT – GENERAL MANAGER LaMOREAUX)*

Recommendation:

Staff recommends Public Member Zakeya Anson be reappointed to the Palmdale Recycled Water Authority (PRWA) Board.

Impact of Taking No Action:

No action would result in noncompliance with the Joint Powers Agreement signed by the Palmdale Water District (District) and the City of Palmdale (City).

Background:

The Palmdale Recycled Water Authority was formed by the District and the City via the "Joint Exercise of Powers Agreement Creating the Palmdale Recycled Water Authority" in September 2012. That Agreement provides for the joint appointment by the District and City of a fifth Director (Public Board Member) in addition to two Directors from each of their respective Boards. Both agencies must agree on the PRWA Public Board Member. All Board Members are appointed to serve one-year terms that may be renewed annually.

Zakeya Anson, the current Public Board Member, has expressed interest in remaining on the PRWA Board of Directors, and staff anticipates the City will consider the reappointment of Ms. Anson at a December or January meeting.

Strategic Plan Initiative/Mission Statement:

This work is part of Strategic Initiative No. 5 – Regional Leadership.
This item directly relates to the District’s Mission Statement.

Budget:

This item will not affect the budget.

**PALMDALE WATER DISTRICT
BOARD MEMORANDUM**

DATE: December 6, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Adam Ly, Assistant General Manager
VIA: Mr. Dennis D. LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 7.4 – APPROVAL OF RESOLUTION NO. 22-32 BEING A RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT PROCLAIMING A LOCAL EMERGENCY PERSISTS, RATIFYING THE PROCLAMATION OF A STATE OF EMERGENCY BY THE GOVERNOR ISSUED MARCH 4, 2020, AND RE-AUTHORIZING REMOTE TELECONFERENCE MEETINGS OF THE LEGISLATIVE BODIES OF THE PALMDALE WATER DISTRICT FOR THE PERIOD BEGINNING JANUARY 1, 2023 AND ENDING JANUARY 30, 2023 PURSUANT TO BROWN ACT PROVISIONS. (NO BUDGET IMPACT – ASSISTANT GENERAL MANAGER LY)***

Recommendation:

Staff recommends the Board approve Resolution No. 22-32 being a Resolution of the Board of Directors of the Palmdale Water District Proclaiming a Local Emergency Persists, Ratifying the Proclamation of a State of Emergency by the Governor Issued March 4, 2020, and Re-Authorizing Remote Teleconference Meetings of the Legislative Bodies of the Palmdale Water District for the Period Beginning January 1, 2023 and Ending January 30, 2023 Pursuant to Brown Act Provisions.

Alternative Options:

The Board can choose not to approve Resolution No. 22-32.

Impact of Taking No Action:

Teleconference options for the District’s publicly noticed meetings will end.

Background:

With the issuance of the Governor’s State of Emergency Executive Order due to the COVID-19 pandemic, the Brown Act was modified regarding agenda postings, Board member attendance from remote locations via teleconference, public attendance, and participation at publicly noticed meetings via teleconference. These modifications were rescinded by the Governor effective September 30, 2021; however, agencies and special districts have the option to continue remote teleconferencing options under the provisions of newly enacted AB 361. AB 361 provides agencies the ability to meet remotely during proclaimed state emergencies under modified Brown Act requirements beyond September 30, 2021.

December 6, 2022

The criteria to rely on the provisions of AB 361 are as follows:

- 1) The local agency is holding a meeting during a proclaimed state of emergency, and state or local officials have imposed or recommended measures to promote social distancing; or
- 2) The local agency is holding a meeting during a proclaimed state of emergency for the purpose of determining, by majority vote, whether as a result of the emergency, meeting in person would present imminent risks to the health or safety of attendees; or
- 3) The local agency is holding a meeting during a proclaimed state of emergency and has determined, by majority vote, that, as a result of the emergency, meeting in person would present imminent risks to the health or safety of attendees.

Resolution No. 22-32 addresses these criteria and will remain in effect for a period of 30 days. If the District wishes to continue meeting under modified Brown Act requirements under AB 361 after 30 days, the resolution must be renewed.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 5 – Regional Leadership.

This item directly relates to the District’s Mission Statement.

Budget:

There is no budget impact.

Supporting Documents:

- Resolution No. 22-32 being a Resolution of the Board of Directors of the Palmdale Water District Proclaiming A Local Emergency Persists, Ratifying the Proclamation of a State of Emergency by the Governor Issued March 4, 2020, and Re-Authorizing Remote Teleconference Meetings of the Legislative Bodies of the Palmdale Water District for the Period Beginning January 1, 2023 and Ending January 30, 2023 Pursuant to Brown Act Provisions

RESOLUTION NO. 22-32

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT PROCLAIMING A LOCAL EMERGENCY PERSISTS, RATIFYING THE PROCLAMATION OF A STATE OF EMERGENCY BY THE GOVERNOR ISSUED MARCH 4, 2020, AND RE-AUTHORIZING REMOTE TELECONFERENCE MEETINGS OF THE LEGISLATIVE BODIES OF THE PALMDALE WATER DISTRICT FOR THE PERIOD BEGINNING JANUARY 1, 2023 AND ENDING JANUARY 30, 2023 PURSUANT TO BROWN ACT PROVISIONS.

WHEREAS, the Palmdale Water District is committed to preserving and nurturing public access and participation in meetings of the Board of Directors; and

WHEREAS, all meetings of Palmdale Water District's ("District") legislative bodies are open and public, as required by the Ralph M. Brown Act (Cal. Gov. Code 54950 – 54963), so that any member of the public may attend, participate, and watch the District's legislative bodies conduct their business; and

WHEREAS, the Brown Act, Government Code section 54953(e), makes provisions for remote teleconferencing participation in meetings by members of a legislative body, without compliance with the requirements of Government Code section 54953(b)(3), subject to the existence of certain conditions; and

WHEREAS, a required condition is that a state of emergency is declared by the Governor pursuant to Government Code section 8625, proclaiming the existence of conditions of disaster or of extreme peril to the safety of persons and property within the state caused by conditions as described in Government Code section 8558; and

WHEREAS, a proclamation is made when there is an actual incident, threat of disaster, or extreme peril to the safety of persons and property within the jurisdictions that are within the District's boundaries, caused by natural, technological, or human-caused disasters; and

WHEREAS, it is further required that state or local officials have imposed or recommended measures to promote social distancing, or, the legislative body meeting in person would present imminent risks to the health and safety of attendees; and

WHEREAS, such conditions now exist in the District, specifically, a State of Emergency has been proclaimed by the Governor of the State of California on March 4, 2020 in response to the global outbreak of the novel Coronavirus disease ("COVID-19"); and

WHEREAS, meeting in person would present an imminent risk to the health and safety of attendees due to the continued impact of the COVID-19 pandemic; and

WHEREAS, the Board of Directors does hereby find that a State of Emergency has been proclaimed as a result of the threat of COVID-19 and the contagious nature of COVID-19 have caused, and will continue to cause, conditions of peril to the safety of persons within the District that are likely to be beyond the control of services, personnel, equipment, and facilities of the District, and desires to proclaim a local emergency and ratify the proclamation of state of emergency by the Governor of the State of California; and

WHEREAS, as a consequence of the local emergency, the Board of Directors does hereby find that the legislative bodies of the Palmdale Water District shall conduct their meetings without compliance with paragraph (3) of subdivision (b) of Government Code section 54953, as authorized by subdivision (e) of section 54953, and that such legislative bodies shall comply with the requirements to provide the public with access to the meetings as prescribed in paragraph (2) of subdivision (e) of section 54953; and

WHEREAS, the Palmdale Water District offers the option of teleconferencing to ensure access for the public to attend meetings.

NOW, THEREFORE, THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT DOES HEREBY RESOLVE AS FOLLOWS:

Section 1. Recitals. The Recitals set forth above are true and correct and are incorporated into this Resolution by this reference.

Section 2. Proclamation of Local Emergency. The Board hereby proclaims that a local emergency now exists throughout the District, and meeting in person would present imminent risks to the health and safety of attendees due to the serious and contagious nature of COVID-19.

Section 3. Ratification of Governor's Proclamation of a State of Emergency. The Board hereby ratifies the Governor of the State of California's Proclamation of a State of Emergency, effective as of its issuance date of March 4, 2020.

Section 4. Remote Teleconference Meetings. The staff, General Manager, and legislative bodies of the Palmdale Water District are hereby authorized and directed to take all actions necessary to carry out the intent and purpose of this Resolution including conducting open and public meetings in accordance with Government Code section 54953(e) and other applicable provisions of the Brown Act.

Section 5. Effective Date of Resolution. This Resolution shall take effect on January 1, 2023 and shall be effective until the earlier of (i) January 30, 2023, which is 30 days from the adoption of this Resolution, or (ii) such time the Board of Directors adopts a subsequent resolution in accordance with Government Code section 54953(e)(3) to extend the time during which the legislative bodies of the Palmdale Water District may continue to teleconference without compliance with paragraph (3) of subdivision (b) of section 54953.

PASSED AND ADOPTED by the Board of Directors of the Palmdale Water District this 12th day of December, 2022, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

President, Board of Directors

ATTEST:

Secretary, Board of Directors

APPROVED AS TO FORM:

Aleshire & Wynder, LLP, General Counsel

P A L M D A L E W A T E R D I S T R I C T
B O A R D M E M O R A N D U M

DATE: December 6, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Dennis D. LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 7.5 – APPROVAL OF RESOLUTION NO. 22-33
BEING A TAX SHARING RESOLUTION WITH LOS ANGELES
COUNTY SANITATION DISTRICTS. (NO BUDGET IMPACT –
GENERAL MANAGER LaMOREAUX)***

Recommendation:

Staff recommends approval of Resolution No. 22-33 being a Tax Sharing Resolution with Los Angeles County Sanitation Districts.

Alternative Options:

The alternative option is to not approve Resolution No. 22-33.

Impact of Taking No Action:

The Los Angeles County Sanitation Districts will approve Resolution No. 22-33 without the Palmdale Water District’s consent if no action is taken on this item.

Background:

Joint Tax Sharing Resolutions are presented for approval when an applicant requests annexation of their property into the Los Angeles County Sanitation Districts. The annexation process requires that a resolution for property tax revenue exchange be adopted by all affected local agencies before the annexation can be approved.

Joint Tax Sharing Resolutions have previously been approved by the Palmdale Water District and will continue to be presented to the Board for consideration as they are received.

Strategic Plan Initiative/Mission Statement:

This work is part of Strategic Initiative No. 3 – Systems Efficiency.
This item directly relates to the District’s Mission Statement.

Budget:

Approval of Resolution No. 22-33 will have no impact on the budget.

Supporting Documents:

- November 30, 2022 letter from Los Angeles County Sanitation Districts regarding Tax Sharing Resolution, worksheet, and location map
- Resolution No. 22-33



RECEIVED

DEC 05 2022

November 30, 2022

General Annexation File

Mr. Dennis La Moreaux, General Manager
Palmdale Water District - Westmont
2029 East Avenue Q
Palmdale, CA 93550

Dear Mr. La Moreaux:

Tax Sharing Resolutions

Thank you for signing and returning the last joint resolutions that were submitted to your office for tax sharing purposes.

Enclosed, in triplicate, is a Joint Tax Sharing Resolution (resolution) involving your agency and others. The applicant has requested, in writing, annexation of his property into the County Sanitation District No. 20 (District) in order to receive off-site disposal of sewage. Please see the table below for the annexation and its associated project. The annexation process requires that a resolution for property tax revenue exchange be adopted by all the affected local agencies before an annexation may be approved. For any jurisdictional change which will result in a special district providing new service not previously provided to an area, the law requires the governing bodies of all local agencies that receive an apportionment of the property tax from the area to determine by resolution the amount of the annual tax increment to be transferred to the special district (Revenue and Taxation Code Section 99.01). Please note that by sharing the property tax increment with the District resulting from this annexation, your agency will not lose any existing ad valorem tax revenue it currently receives from the affected territory. Your agency would only be giving up a portion of the revenues it would receive on increased assessed valuation.

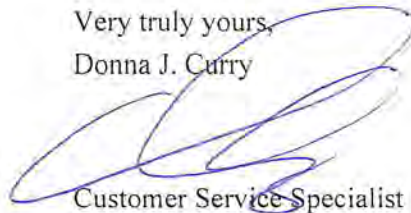
<u>Annexation No.</u>	<u>Type of Project</u>
20-101	one proposed shopping center

Also, attached for the annexation is a copy of the applicable worksheet and map showing the location of the annexation. The worksheet lists the annual tax increment to be exchanged between your agency, other affected taxing entities, and the District. The tax sharing ratios listed in the worksheet were calculated by the County Auditor Controller by specific Tax Rate Area (TRA). For example, if the annexing territory were to lie within two separate TRAs, there would be a worksheet for each TRA. The Los Angeles County Chief Executive Office (CEO) is requiring the District to implement the worksheet for all District annexations in order to increase efficiency for the calculation of property tax sharing ratios.

The resolution is being distributed to all parties for signature in counterpart. Therefore, you will only be receiving a signature page for your agency. Enclosed are three sets of the resolution. One set of the resolution is for your files and the other two sets of the resolution need to be returned to the District. Please execute the two sets of the resolution and return them to the undersigned within 60 days as required by the Government Code. In addition, the County CEO's legal counsel is also requesting that the signature pages be properly executed from all affected agencies. Therefore, please have the Attest line signed by the appropriate person. Upon completion of the annexation process, your office will receive a fully executed copy of the tax sharing resolution for your files.

Your continued cooperation in this matter is very much appreciated. If you have any questions, please do not hesitate to call me at (562) 908-4288, extension 2708.

Very truly yours,
Donna J. Curry



Customer Service Specialist
Facilities Planning Department

DC:dc

Enclosures: 20-101

PROPERTY TAX TRANSFER RESOLUTION WORKSHEET
FISCAL YEAR 2021-2022

AUDITOR ACAFAN03

ANNEXATION TO: CO.SANITATION DIST.NO 20 DEBT S.
ACCOUNT NUMBER: 066.75
TRA: 07424
EFFECTIVE DATE: 07/01/2022
ANNEXATION NUMBER: 101 PROJECT NAME: A-20-101
DISTRICT SHARE: 0.008487011

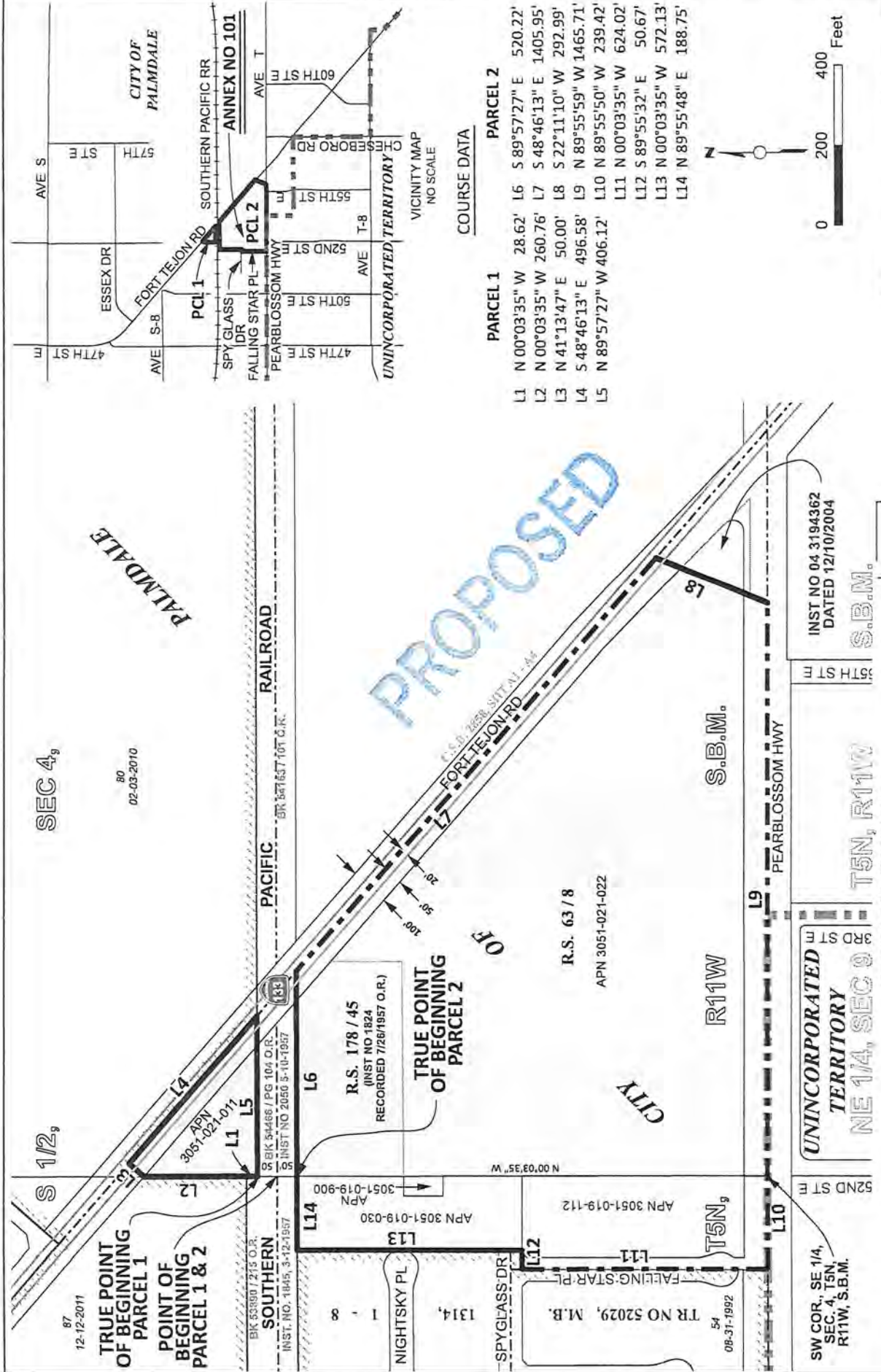
ACCOUNT #	TAXING AGENCY	CURRENT TAX SHARE	PERCENT	PROPOSED DIST SHARE	ALLOCATED SHARE	ADJUSTMENTS	NET SHARE
001.05	LOS ANGELES COUNTY GENERAL	0.203636704	20.3648 %	0.008487011	0.001728276	-0.001782349	0.201854355
001.20	L.A. COUNTY ACCUM CAP OUTLAY	0.000103020	0.0103 %	0.008487011	0.000000874	0.000000000	0.000103020
007.30	CONSOL. FIRE PRO.DIST.OF L.A.CO.	0.159672918	15.9672 %	0.008487011	0.001355145	-0.001355145	0.158317773
007.31	L A C FIRE-FFW	0.006268336	0.6268 %	0.008487011	0.000053199	0.000000000	0.006268336
030.10	L.A.CO.FL.CON.DR.IMP.DIST.MAINT.	0.001496883	0.1496 %	0.008487011	0.000012704	-0.000012704	0.001484179
030.70	LA CO FLOOD CONTROL MAINT	0.008461529	0.8461 %	0.008487011	0.000071813	-0.000071813	0.008389716
053.30	ANTELOPE VY CEMETERY DISTRICT	0.000375757	0.0375 %	0.008487011	0.000003189	-0.000003189	0.000372568
061.05	ANTELOPE VLY MOSQ & VECTOR CONTR	0.001530698	0.1530 %	0.008487011	0.000012991	-0.000012991	0.001517707
068.05	ANTELOPE VY RESOURCE CONSER DIST	0.000860118	0.0860 %	0.008487011	0.000007299	-0.000007299	0.000852819
225.01	CITY-PALMDALE TD #1	0.066247854	6.6247 %	0.008487011	0.000562246	-0.000562246	0.065685608
308.65	PALMDALE WATER DIST ZONE E	0.038866079	3.8866 %	0.008487011	0.000329856	-0.000329856	0.038536223
308.67	PALMDALE WATER-WESTMONT IMP DIST	0.051728623	5.1728 %	0.008487011	0.000439021	-0.000439021	0.051289602
400.00	EDUCATIONAL REV AUGMENTATION FD	0.112491222	11.2491 %	0.008487011	0.000954714	EXEMPT	0.112491222
400.01	EDUCATIONAL AUG FD IMPOUND	0.132210384	13.2210 %	0.008487011	0.001122070	EXEMPT	0.132210384
400.15	COUNTY SCHOOL SERVICES	0.001289414	0.1289 %	0.008487011	0.000010943	EXEMPT	0.001289414
400.21	CHILDREN'S INSTIL TUITION FUND	0.002558888	0.2558 %	0.008487011	0.000021717	EXEMPT	0.002558888
593.01	PALMDALE SCHOOL DISTRICT	0.045830675	4.5830 %	0.008487011	0.000388965	EXEMPT	0.045830675
593.06	CO.SCH.SERV.FD. - PALMDALE	0.008135269	0.8135 %	0.008487011	0.000069044	EXEMPT	0.008135269
593.07	DEV CTR HDCPD MINOR PALMDALE	0.000770990	0.0770 %	0.008487011	0.000006543	EXEMPT	0.000770990

TRA: 07424

PROJECT NAME: A-20-101

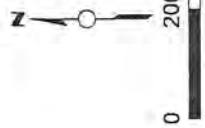
ANNEXATION NUMBER: 101

ACCOUNT #	TAXING AGENCY	CURRENT TAX SHARE	PERCENT	PROPOSED DIST SHARE	ALLOCATED SHARE	ADJUSTMENTS	NET SHARE
717.02	ANTELOPE VALLEY UNION HIGH SCH.	0.088946270	8.8946 %	0.008487011	0.000754887	EXEMPT	0.088946270
717.06	CO.SCH.SERV.FD.- ANTELOPE VALLEY	0.000325677	0.0325 %	0.008487011	0.000002764	EXEMPT	0.000325677
717.08	ANTELOPE VY,UN.HI.-K.P.S.-ELEM	0.043494444	4.3494 %	0.008487011	0.000369137	EXEMPT	0.043494444
792.04	ANTELOPE VY, JT. COMMUNITY COLL.	0.024698248	2.4698 %	0.008487011	0.000209614	EXEMPT	0.024698248
***066.75	CO.SANITATION DIST.NO 20 DEBT S.	0.000000000	0.0000 %	0.008487011	0.000000000	0.000000000	0.004576613
TOTAL:		1.000000000	100.0000 %		0.008487011	-0.004576613	1.000000000



COURSE DATA

- PARCEL 1**
- L1 N 00°03'35" W 28.62'
 - L2 N 00°03'35" W 260.76'
 - L3 N 41°13'47" E 50.00'
 - L4 S 48°46'13" E 496.58'
 - L5 N 89°57'27" W 406.12'
- PARCEL 2**
- L6 S 89°57'27" E 520.22'
 - L7 S 48°46'13" E 1405.95'
 - L8 S 22°11'10" W 292.99'
 - L9 N 89°55'59" W 1465.71'
 - L10 N 89°55'50" W 239.42'
 - L11 N 00°03'35" W 624.02'
 - L12 S 89°55'32" E 50.67'
 - L13 N 00°03'35" W 572.13'
 - L14 N 89°55'48" E 188.75'



COUNTY SANITATION DISTRICT NO. 20
 OF LOS ANGELES COUNTY, CA
 OFFICE OF CHIEF ENGINEER
 ROBERT C. FERRANTE
 CHIEF ENGINEER & GENERAL MANAGER

ANNEXATION NO. 101
 TO
 COUNTY SANITATION DISTRICT NO. 20

PROPOSED

INST NO 04 3194362
 DATED 12/10/2004
 S.B.M.

UNINCORPORATED
 TERRITORY
 NE 1/4, SEC 4, T5N, R11W

Annexation No. 101 shown thus
Boundary of County Sanitation District No. 20 prior to Annexation No. 101 shown thus
Prior Annexations shown thus
City Boundary
PARCEL 1	1.634 Acres
PARCEL 2	37.660 Acres
TOTAL	39.294 Acres

"FOR TAX ASSESSMENT PURPOSES ONLY"

LA County Assessor's Landbase,
 CAMS Centerline, Dr. City boundary
 LA County Sanitation District
 Annexation Layer and District Layer

RESOLUTION NO. 22-33

JOINT RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF LOS ANGELES
ACTING IN BEHALF OF

Los Angeles County General Fund

Los Angeles County Consolidated Fire Protection District

Los Angeles County Flood Control

THE BOARD OF DIRECTORS OF COUNTY SANITATION DISTRICT NO. 20 OF LOS ANGELES
COUNTY, AND THE GOVERNING BODIES OF

Antelope Valley Cemetery District

Antelope Valley Mosquito & Vector Control District

Antelope Valley Resource Conservation District

City of Palmdale

Palmdale Water District - Westmont

APPROVING AND ACCEPTING NEGOTIATED EXCHANGE OF PROPERTY TAX REVENUES
RESULTING FROM ANNEXATION TO COUNTY SANITATION DISTRICT NO. 20.

"ANNEXATION NO. 101"

WHEREAS, pursuant to Section 99 and 99.01 of the Revenue and Taxation Code, prior to the effective date of any jurisdictional change which will result in a special district providing a new service, the governing bodies of all local agencies that receive an apportionment of the property tax from the area must determine the amount of property tax revenues from the annual tax increment to be exchanged between the affected agencies and approve and accept the negotiated exchange of property tax revenues by resolution; and

WHEREAS, the governing bodies of the agencies signatory hereto have made determinations of the amount of property tax revenues from the annual tax increments to be exchanged as a result of the annexation to County Sanitation District No. 20 entitled *Annexation No. 101*;

NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS:

1. The negotiated exchange of property tax revenues resulting from the annexation of territory to County Sanitation District No. 20 in the annexation entitled *Annexation No. 101* is approved and accepted.

2. For each fiscal year commencing on and after July 1, 2022, or after the effective date of this jurisdictional change, whichever is later, the County Auditor shall transfer to County Sanitation District No. 20 a total of 0.0457661 percent of the annual tax increment attributable to the land area encompassed within *Annexation No. 101* as shown on the attached Worksheet.

3. No additional transfer of property tax revenues shall be made from any other tax agencies to County Sanitation District No. 20 as a result of annexation entitled *Annexation No. 101*.

4. No transfer of property tax increments from properties within a community redevelopment project, which are legally committed to a Community Redevelopment Agency, shall be made during the period that such tax increment is legally committed for repayment of the redevelopment project costs.

5. If at any time after the effective date of this resolution, the calculations used herein to determine initial property tax transfers or the data used to perform those calculations are found to be incorrect thus producing an improper or inaccurate property tax transfer, the property tax transfer shall be recalculated and the corrected transfer shall be implemented for the next fiscal year.

The foregoing resolution was adopted by the Board of Supervisors of the County of Los Angeles, the Board of Directors of County Sanitation District No. 20 of Los Angeles County, and the governing bodies of Antelope Valley Cemetery District, Antelope Valley Mosquito & Vector Control District, Antelope Valley Resource Conservation District, City of Palmdale, and Palmdale Water District - Westmont, signatory hereto.

PALMDALE WATER DISTRICT -
WESTMONT

SIGNATURE

Gloria Dizmang, President, Board of Dir.
PRINT NAME AND TITLE

December 12, 2022

Date

ATTEST:

Secretary

(SIGNED IN COUNTERPART)

P A L M D A L E W A T E R D I S T R I C T
B O A R D M E M O R A N D U M

DATE: December 6, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Adam Ly, Assistant General Manager
VIA: Mr. Dennis LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 8.1 – PUBLIC HEARING REGARDING DRAFT INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION FOR THE PALMDALE WATER DISTRICT SOLAR ENERGY PROJECT. (NO BUDGET IMPACT – ASSISTANT GENERAL MANAGER LY)***

Recommendation:

Staff recommends the Board open the public hearing on the Draft Initial Study and Mitigated Negative Declaration (ISMND) for the Palmdale Water District Solar Energy Project.

Alternative Options:

The Board can choose not to open up the hearing on the Project.

Impact of Taking No Action:

The District will not be able to approve the CEQA document and approve the Solar Energy Project.

Background:

The District previously approved TerraVerde Energy, LLC to evaluate the solar project for the Headquarters and 6MG Reservoir site. The District is the Lead Agency, and as our consultant, Woodard & Curran drafted the Initial Study and Mitigated Negative Declaration for the Solar Energy Project. The report was made ready for review and was posted to the California State Clearinghouse on November 7, 2022. The 30-day review period ended on December 6, 2022, at 5:00 PM.

District staff posted the Clearinghouse link onto our website on November 8, 2022. A copy of the notice was sent to Los Angeles County for posting on its website. In addition, staff advertised the availability of the report in the Antelope Valley Press on Saturday, November 19, 2022, and Saturday, November 26, 2022. This public meeting is another opportunity for the residents and public to comment on the ISMND.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 6- Customer Care, Advocacy and Outreach. This item directly relates to the District’s Mission Statement.

Budget:

There is no budget impact.

Supporting Documents:

- Initial Study and Mitigated Negative Declaration for Solar Energy Project



Draft Initial Study and Mitigated Negative Declaration

Palmdale Water District
Solar Energy Project

Prepared for:

Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550

Prepared by:

Woodard & Curran
801 T Street
Sacramento, CA 95811

woodardcurran.com

**Palmdale Water
District**
November 2022

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ACRONYM LIST

AB	Assembly Bill
AC	alternating current
AF	acre-feet
APCO	Air Pollution Control Officer
AVAQMD	Antelope Valley Air Quality Management District
BESS	battery energy storage system
BMP	best management practice
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CH ₄	methane
CNDDDB	California Natural Diversity Database
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalents
dc	direct current
District	Palmdale Water District
DTSC	(California) Department of Toxic Substances Control
EAP	Energy Action Plan
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
FTBMI	Fernandeño Tataviam Band of Mission Indians
GHG	greenhouse gas
HQ	headquarters
IPaC	Information for Planning and Consultation
IS/MND	Initial Study/Mitigated Negative Declaration

ITP	Incidental Take Permit
IUCN	International Union for Conservation of Nature
kWh	kilowatt hours
kWh/AF	kilowatt hours per acre-foot
MG	million gallons
MND	Mitigated Negative Declaration
MT	metric ton
MT/yr	metric tons per year
MWh	Megawatt hours
NAAQS	National Ambient Air Quality Standards
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
PCS	Power Conditioning System
PFYC	Potential Fossil Yield Classification
PM	particulate matter
PV	photovoltaic
PWD	Palmdale Water District
RWQCB	Regional Water Quality Control Board
SCADA	Supervisory Control or Data Acquisition
SCE	Southern California Edison
SIPs	State Implementation Plans
SMBMI	San Manuel Band of Mission Indians Cultural Resources Department
SO ₂	sulfur dioxide
SO _x	oxides of sulfur
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
VMT	Vehicle Miles Traveled
VOC	volatile organic compound
WEAP	Worker Environmental Awareness Program

1. INTRODUCTION

1.1 Purpose of this Document

The Palmdale Water District (PWD or District) has prepared this Initial Study/Mitigated Negative Declaration (IS/MND) to provide the public and Responsible and Trustee Agencies reviewing the proposed Project with information about the potential impacts on the environment. This IS/MND was prepared in compliance with Sections 15070 to 15075 of the California Environmental Quality Act (CEQA) Guidelines of 1970 (as amended), and California Administrative Code, Title 14, Division 6, Chapter 3. In accordance with Section 15070, a Mitigated Negative Declaration (MND) shall be prepared if the initial study shows that either:

- There is no substantial evidence, in light of the whole record before the agency, that the Project may have a significant effect on the environment; or
- If the initial study identifies potentially significant effects, but revisions to the Project would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur.

PWD as the CEQA lead agency has determined that an IS/MND should be prepared for the proposed Project.

1.2 CEQA Process

In accordance with Section 15073 of the CEQA Guidelines, this document is being circulated to local, state, and federal agencies and to interested organizations and individuals who may wish to review and comment on the report. PWD has circulated the IS/MND to the State Clearinghouse for distribution and a 30-day public review (November 7, 2022 to December 6, 2022). PWD will evaluate comments received on the draft IS/MND and will prepare responses to address any substantial evidence that the proposed Project could have a significant impact on the environment. If there is no such substantial evidence, FSSD as lead agency will adopt the MND in compliance with CEQA.

Written comments should be submitted to PWD by 5:00 PM, December 6 2022. Submit comments to:

Adam Ly
Assistant General Manager
Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550

This IS/MND and any comments received during the public review process will be considered by the PWD Board of Directors at a public hearing. Consistent with Assembly Bill (AB) 361 regarding public meetings during the COVID-19 Emergency, Directors may attend the meeting telephonically or by teleconference and the meeting may be accessible telephonically or otherwise electronically to members of the public.

Palmdale Water District
December 12, 2022
6:00 PM
2029 E Ave Q
Palmdale, CA 93550

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2. PROJECT DESCRIPTION

2.1 Project Overview

PWD is proposing to install solar facilities at the District’s Headquarters (HQ Site) located at 2029 East Avenue Q, Palmdale, CA and solar facilities and battery energy storage system at the 6 million gallon (MG) Tank Site (Tank Site) located at 641 E Avenue S, Palmdale, CA at the intersection of East Avenue S and Sierra Highway (herein referred to as the Project). The District is undertaking this Project to mitigate rising energy costs and provide an alternative energy source for District operations.

2.1.1 Existing Conditions

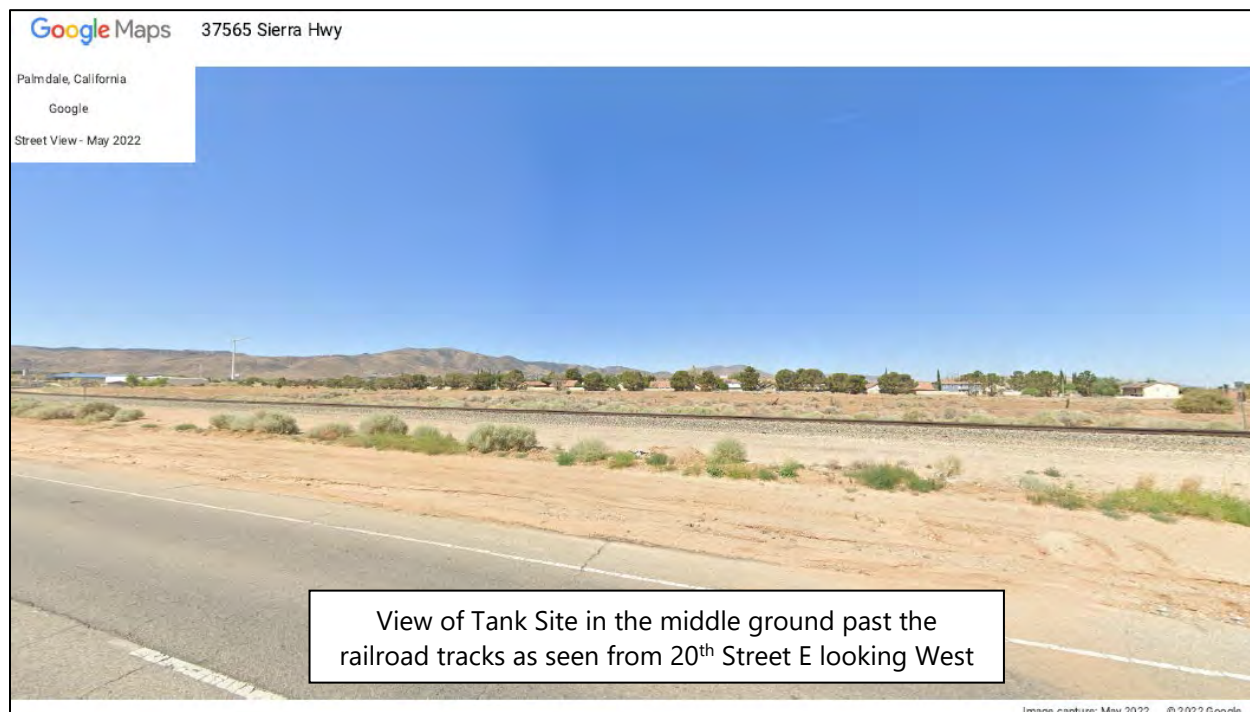
The HQ Site is located in an open, undeveloped field adjacent to, and north of, the District’s headquarters. The HQ Site is designated Public Facility, as shown on the City of Palmdale General Plan Land Use map (City of Palmdale, 2019a) and zoned Public Facility in the City of Palmdale Zoning map (City of Palmdale, 2019b). The HQ Site is currently undeveloped, disturbed, vacant land covered with sparse brush and other vegetation (see **Figure 2-1**).

Figure 2-1: HQ Site Existing Conditions



The Tank Site is located in an open, undeveloped field north of an existing District 6 MG reservoir tank. The Tank Site is designated Single Family Residential (SFR-3) in the City of Palmdale General Plan Land Use map (City of Palmdale, 2019a) and zoned Single Family Residential (R-1-7,000) in the City of Palmdale Zoning map (City of Palmdale, 2019b). The Tank Site is also currently undeveloped, disturbed, vacant land with sparse brush and other vegetation (see **Figure 2-2**).

Figure 2-2: Tank Site Existing Conditions



2.1.2 Project Objectives

Primary Objectives

The proposed Project would provide an alternative energy source for District operations to prevent, minimize, or mitigate damage resulting from emergencies or disasters like power outages, as well as mitigate rising energy costs, which are increasingly a burden on PWD's revenue. PWD uses energy for the extraction and diversion, conveyance, and treatment of water supplies. According to 2020 Urban Water Management Plan (UWMP) (PWD, 2021), the energy intensity for the PWD service area (i.e., total amount of energy expended by PWD to take water from the supply source to the point of delivery) is 381 kilowatt hours per acre-foot (kWh/AF). In 2020, PWD consumed a total of 8,404 megawatt hours (MWh) of electricity. PWD currently sources 100 percent of its electricity from Southern California Edison (SCE). In the event of a regional power outage, PWD's ability to deliver water supplies may be interrupted or reduced significantly. A sustained water supply outage could result in PWD's inability to meet potable water needs for critical functions. Energy costs are also expected to rise as urban water demands continue to increase within PWD's service area. The proposed Project would diversify PWD's energy portfolio, providing system redundancy while also increasing energy cost savings.

Secondary Objectives

PWD seeks to enhance its renewable energy portfolio to meet the District's sustainability goals and help mitigate climate change. Energy consumption from non-renewable sources (such as natural gas) results in greenhouse gas (GHG) emissions, which are the root cause of climate change. Prolonged, intense droughts

as a result of climate change are causing imported water to become an increasingly unreliable source of water for PWD. Project implementation would result in a net offset of non-renewable energy demands with solar energy produced by the solar facilities, resulting in a reduction of GHG emissions and helping to mitigate climate change. As a result, the proposed Project would help PWD achieve the following six District sustainability goals (Personal communication, 2022):

1. Ensure availability and sustainability of management of water.
2. Ensure access to affordable, reliable energy through beneficial use of water.
3. Build resilient water system and foster innovation.
4. Ensure sustainable consumption and production of water.
5. Tackle climate change.
6. Conserve water resources.

2.2 Purpose and Need of the Project

2.2.1 District Background

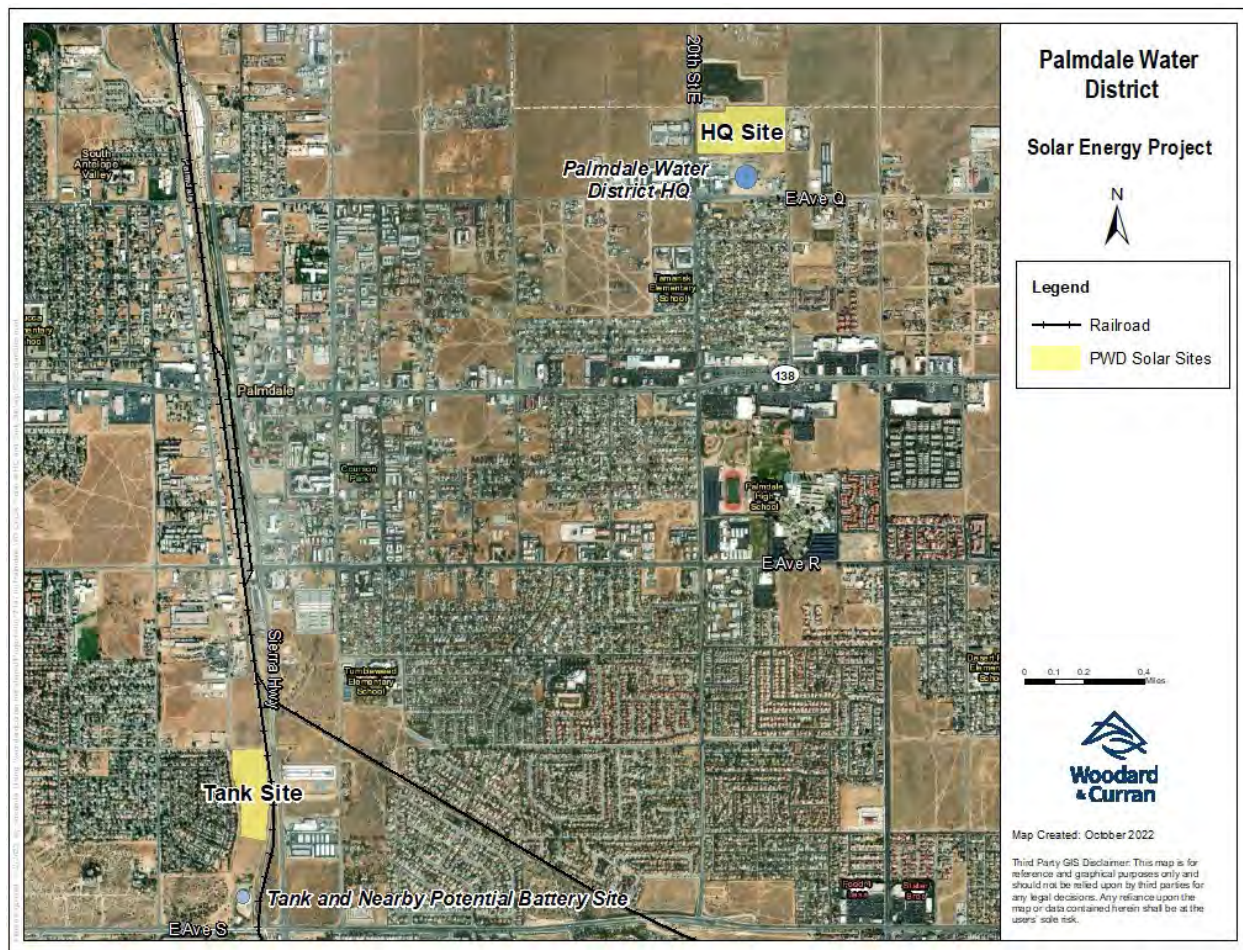
PWD is a municipal and industrial services water supplier located within the Antelope Valley in Los Angeles County, approximately 60 miles north of the City of Los Angeles and includes the central and southern portions of the City of Palmdale and adjacent unincorporated areas of Los Angeles County. Established in 1918, the primary function of the PWD is to provide retail water service within its service area. PWD meets the water demand of its almost 28,000 service connections through a combination of treated surface water from the State Water Project (SWP), local surface water, and groundwater pumped from water supply wells.

2.2.2 Project Location and Setting

The proposed Project locations, HQ Site and Tank Site, are both District-owned parcels adjacent to existing District's facilities, as shown in **Figure 2-3**. The HQ Site is about 20 acres and is located at 2029 East Avenue Q, Palmdale, CA, within Township 06 North Range 11 West. The HQ Site is located adjacent to District headquarters in an industrial/commercial area, surrounded by commercial/industrial uses to the east and the north, 20th Street E, a post office annex and several other businesses to the west, and District headquarters, other businesses, and E Avenue Q to the south.

The Tank Site is about 14 acres and is located west of Sierra Highway between E Avenue S and E Avenue R8, Palmdale, CA, within Township 06 North Range 12 West. Surrounding land uses include single family residential adjacent to the site to the west, and vacant and/or transportation/utilities to the north, south, and east. The Metrolink/Southern California Regional Rail Authority railroad tracks form the eastern border of the Tank Site. Other surrounding land uses include self-storage facilities and other commercial uses to the west of the site on the other side of Sierra Highway from the Tank Site, undeveloped lands to the north, and the Tank Site and undeveloped lands to the south.

Figure 2-3: Location of Proposed Solar Facilities at HQ Site and Tank Site



2.3 Project Characteristics

The proposed Project would construct and operate a 5,304 MWh alternative energy solar array at the HQ Site and a 2,914 MWh alternative energy solar array and battery storage facility at the Tank Site (see **Figure 2-3**). Both sites would include electrical connections from the solar arrays to the existing District facilities. Combined, the proposed solar Project and its related components would be constructed within the 20-acre HQ Site and the 14-acre Tank Site. The proposed solar energy Project would be connected to the existing SCE grid at the District Headquarters building and at the existing PWD 6 MG Tank located south of the Tank Site. The anticipated average maximum depth of ground disturbance is anticipated to be 3 to 5 feet.

2.3.1 Solar Fields

The proposed solar alternative energy project would be either based on a fixed tilt racking system or single-axis tracker system with a total system size of about 3950 kilowatt (kW). A fixed tilt angle solar racking system can be placed at a fixed tilt angle which is usually the optimum tilt to enable it can absorb the most sunlight whereas a single-axis tracker system allows the solar panels, otherwise known as photovoltaic (PV) panels, one axis of movement that is usually aligned north and south, allowing the panels to arc east to

west and track the sun as it rises and sets. The Project would require approximately 2,800 panels for Tank Site and 4,300 panels at HQ Site. Panel dimensions would be approximately 2 feet by 3 feet.

2.3.2 Battery Storage

Energy storage would include an on-the Tank Site intelligent battery energy storage system (BESS). The major electrical equipment includes battery modules and power conversion equipment. The BESS operations would be controlled and monitored remotely by the battery vendor via a Supervisory Control or Data Acquisition (SCADA) platform (described below). The BESS will be designed in accordance with the latest applicable codes and safety certifications (i.e., UL, NFPA, NEC, IEEE) for the design, construction, and operations of the facility.

The primary storage components would consist of self-contained lithium-ion battery systems that leverage the same conventional storage technologies (and vendors) as the batteries in a typical cell phone, laptop computer, or electric vehicle. The battery storage facility is designed such that the periodic maintenance and replacement of the underperforming battery components can be easily performed on an as-needed basis. The BESS and associated infrastructure (e.g., inverters, switches, etc.) would be serviced regularly via planned maintenance according to the manufacturer recommendations and on an as-needed basis by certified technicians.

The battery will be rechargeable and will be specifically selected and designed to perform the required operations within critical safety parameters beyond the planned operations for this facility.

Direct current (DC) electricity would be collected from the batteries and conveyed to the inverters. The typical battery modular energy storage solutions are approximately 8 to 10 feet in height. If the BESS option is included in the final design, the approximately 200-300 square foot of paved pad would be located within the existing Tank Site to the north of the existing tank.

2.3.3 Electrical Collection System

The solar panels would be organized into electrical groups referred to as “blocks” to allow adequate clearance for access roads and adequate access for maintenance. Each block would include an equipment pad containing one or more inverters and transformers. The inverter-transformer equipment pads would be prefabricated or assembled on site. Each inverter would be fully enclosed, be pad- or skid-mounted, and may range in height from approximately 5 to 9 feet. Inverters would be consolidated in areas to minimize cable routing, trenching, and minimal electrical losses. The alternating current (AC) output from the inverters would be routed through an AC collection system and consolidated within system switchgear. The final output from the Project would be processed through a transformer to match the interconnection voltage. The transformers would be pad-mounted and enclosed with a switchgear and a junction box. Electrical safety and protection systems would be provided to meet utility, California Independent System Operator (CAISO), and regulatory codes and standards.

2.3.4 Supervisory Control or Data Acquisition System

A data collection system would be designed to remotely monitor the facility operation and/or remotely control critical components. The fiber optic or other cabling would be installed throughout the solar field to a centrally located SCADA system. The SCADA system would also collect meteorological information for the Project site.

2.3.5 Associated Infrastructure

Associated infrastructure would include unpaved roads to allow access to the solar panels, a chain link perimeter security fence, tie-in to the existing/upgraded switchgear, and an underground distribution line to the point of interconnection with the SCE grid (see **Figure 2-4** and **Figure 2-5**). The distribution line would be buried in a trench.

2.3.5.1 Driveways and Access Roads

The Tank Site would be accessed on the west side of the site at the intersection of 6th St E, E Ave R, and E Ave R 8. The HQ Site would be accessed by one or more access points surround the site. Access may occur via the PWD Headquarters, E Ave P-8, and/or 20th St E. Gates would be installed at access points. The access would allow for emergency vehicles and maintenance and operation purposes. Unpaved access roads would be graded during construction and used for operation and maintenance throughout the Project sites.

2.3.5.2 Security Fencing

The Project site would be surrounded by an 8-foot-tall galvanized chain-link fence and as warranted topped with 1 foot of three- strand barbed wire, for a total fence height of 9 feet. "Warning High Voltage" signs would be placed along the fencing at regular intervals and at each gate pursuant to County and/or state requirements. The fencing would be secured with concrete footings and would have intermittent 12-inch openings along its foot for animal crossings. Fencing may include green visual barrier screening cloth.

2.3.5.3 Lighting

Lighting would be installed at each site entrance of the Project site for nighttime security purposes and at the switchgear area for maintenance purposes. Any lighting would consist of modern, low intensity, downward-shielded fixtures that are motion-activated, and would be directed onto the Project site. Motion detectors would be set at a sensitivity level that could not be triggered by small animal movement. The proposed Project would comply with the City of Palmdale Code Chapter 17.99.010.C, Renewable Energy – Development Standards.

Figure 2-4: HQ Site Layout

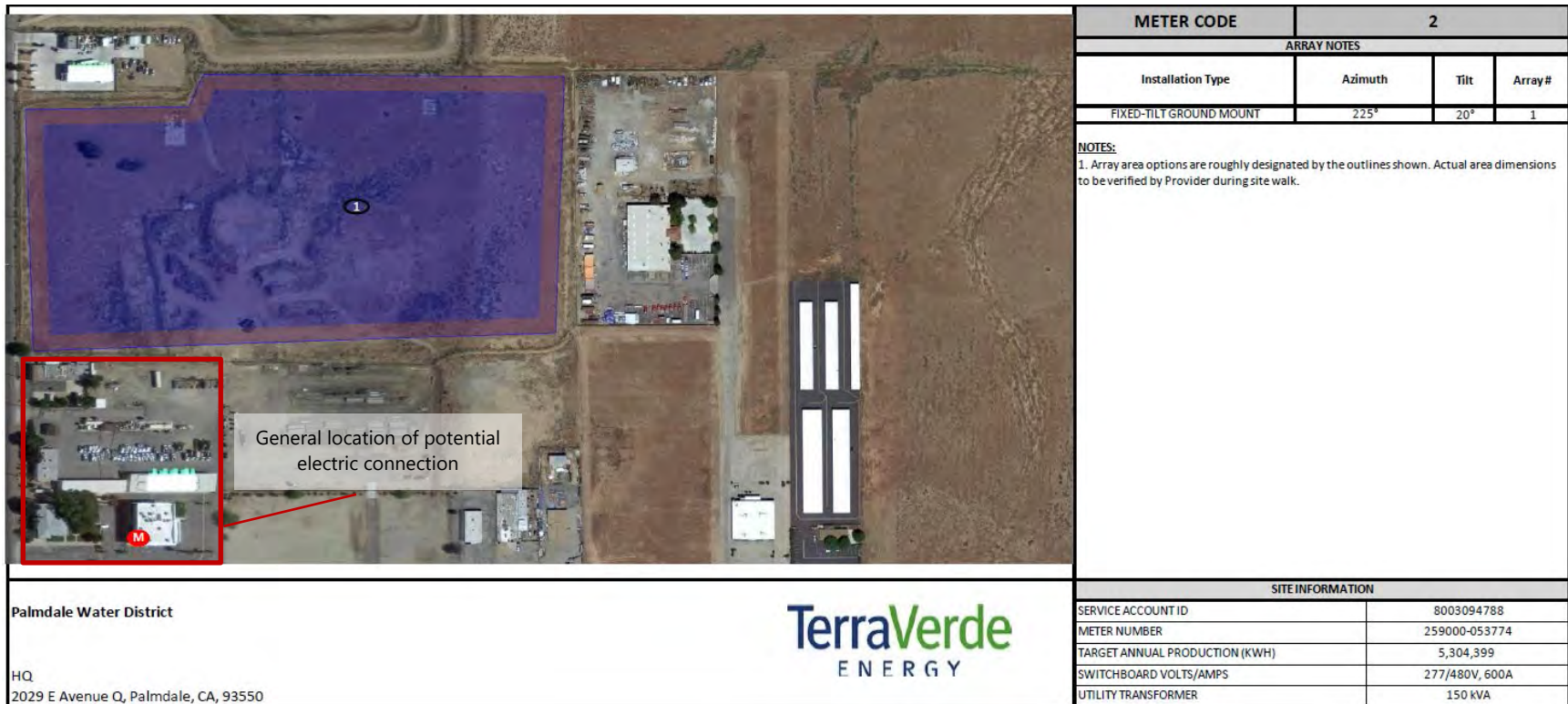
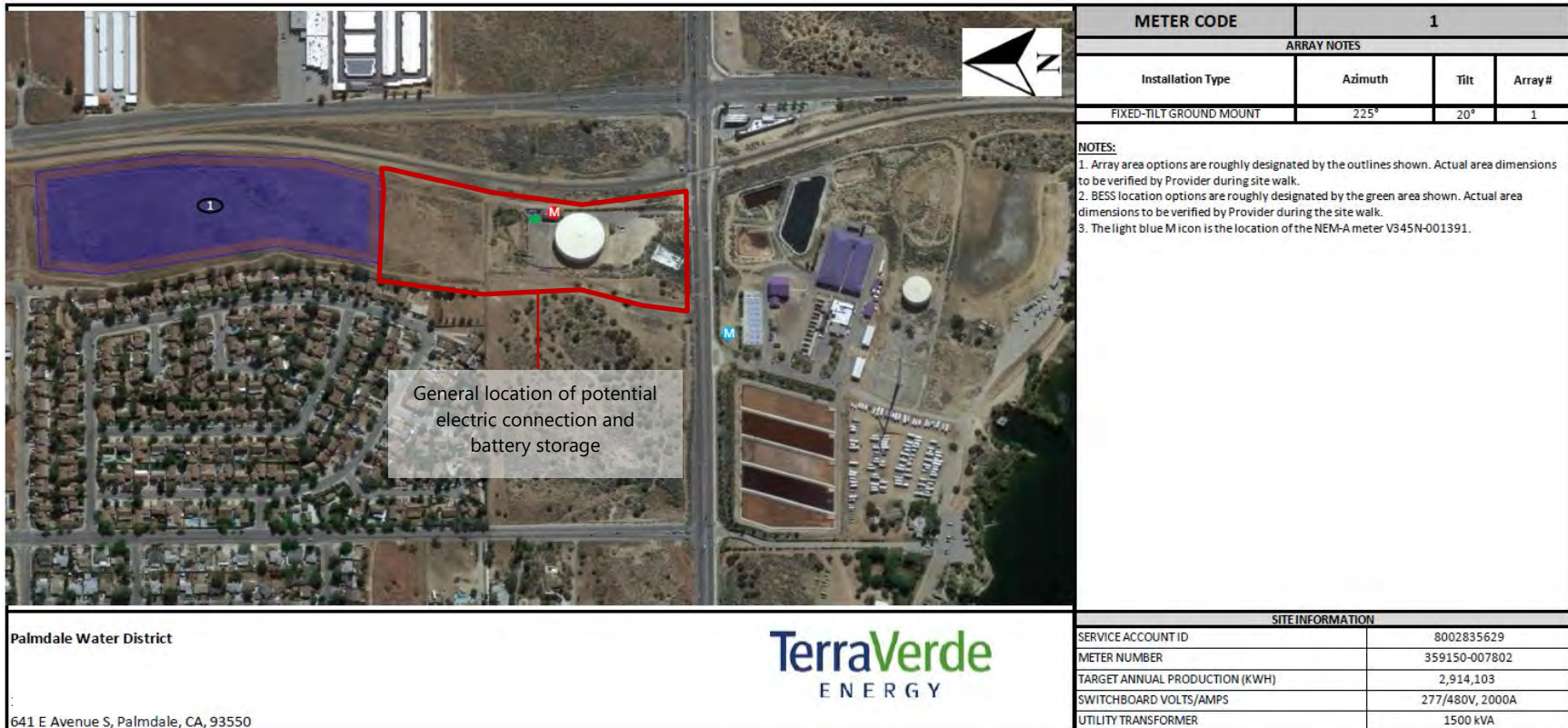


Figure 2-5: Tank Site Layout



2.4 Construction Activities

Project construction would consist of two major phases: (1) site preparation and grading, and (2) PV system/BESS installation. Construction of the Project is estimated to begin in or before the 4th Quarter 2023. **Table 2-1** provides a summary of construction activities for each site and their duration, as well as equipment and personnel that would be needed. Construction activities would be scheduled between 7:00 a.m. and 5:00 p.m., Monday through Friday.

Table 2-1: Summary of Construction Activities

Construction Activities	Duration (Days)	Equipment Type and Number	Number of Personnel
Site Grubbing and Preparation	50	Backhoe (1), Skid steer (1), Motor grader (1), Dump truck (1), Bulldozer (1), Roller (1)	10
Installation			
<i>Site Fences</i>	30	Forklift (1), Flatbed truck (1), Auger (1)	6
<i>Structures (PV arrays, BESS, etc.)</i>	75	Backhoe (1), Forklift (4), PD10 Pile driver (4)	25
<i>Electrical</i>	52	Trencher (1), Backhoe (2), Crane (1), Forklift (3)	60

2.4.1 Site Preparation and Grading

Construction of the Project would begin with initial clearing and grading of the onsite staging areas. Native soils would be used to level the site. Access to the Project site would be improved to for construction and on going maintenance access.

The onsite staging areas would typically include a construction trailer (as needed to support installation phase), a first aid station and other temporary structures (such as portable toilets), worker parking, truck loading and unloading facilities, and an area for assembly. Road corridors would be surveyed, cleared, and graded to bring equipment, materials, and workers to the areas under construction. Buried electrical lines, PV array locations, any necessary environmentally sensitive avoidance areas, and the locations of other facilities may be flagged and staked to guide construction activities. The Project site would be surrounded by a security fence. A secure controlled main access gate would be located at the entrance. A temporary landscape green fabric would be attached to the chain-link fence during construction. Best Management Practices (BMPs) such as straw wattles, use of hydroseeding, and wind screening for erosion control during site preparation would be employed. No import or export of soil from the proposed Project site would be required.

2.4.2 PV System Installation

PV system installation would include earthwork, grading, and landscaping, as well as erection of the PV modules, supports, and associated electrical equipment. The exact design would be finalized pending specific soil conditions. The pads for footings would be required and are estimated to have 3 to 4 foot depths and would be approximately 2 foot by 2 foot (or smaller) squares.

Wastes that would be generated during construction may include cardboard, wood pallets, copper wire, scrap steel, common trash, and wood wire spools. The contractor is not anticipated to generate hazardous waste during construction of the proposed Project. However, field equipment used during construction would contain various hazardous materials such as hydraulic oil, diesel fuel, grease, lubricants, solvents, adhesives, paints, and other petroleum-based products contained in construction vehicles.

2.4.3 Battery Storage Installation

The District anticipates that the battery storage containers would be constructed on concrete pads on the existing pavement at the Tank Site. The container would be bolted to meet or exceed the seismic requirements applicable to the District. The Power Conditioning System (PCS) and the medium voltage control system (i.e., inverters and transformers) would be mounted to the rack adjacent to the container.

2.4.4 Construction Water Use

Approximately 53 acre-feet (AF) of water would be required during construction, with actual consumption strongly dependent upon climatic conditions. Construction water needs would be limited to soil conditioning and dust suppression. Bottled water would be brought to the Project site for drinking and domestic needs. Required water needs would be met by water available on the existing District sites.

2.5 Operation and Maintenance

Table 2-2 provides an estimate of electricity output during the projected 25-year lifespan of the Project. The facilities would be constructed such that output could be monitored remotely. Normal preventative maintenance and routine inspections of the solar arrays, as well as periodic cleaning of the solar panels, would occur on a monthly or semi-monthly basis.

2.5.1.1 Permanent Site Access

Permanent site access to the Tank Site would use the access points established during construction. For the Tank Site access would be located at the intersection of 6th St E, E Ave R, and E Ave R 8. Access to the HQ Site would be determined during final design, but may be available via the PWD headquarters or from 20th St E.

The site access roads would be maintained on an as-needed basis and could involve re-grading of the unpaved access roads and drainage maintenance. Facilities at both sites would be inspected for signs of deterioration or repair needs on an annual basis. Emergency maintenance and repairs would occur immediately after a failure occurs.

Table 2-2: Summary of Energy Production During the Estimated Life Span of the Project

Year	Energy Production (MWh)
1	8,219
2	8,178
3	8,137
4	8,096
5	8,056
6	8,016
7	7,976
8	7,936
9	7,896
10	7,857
11	7,818
12	7,779
13	7,740
14	7,701
15	7,662
16	7,624
17	7,586
18	7,548
19	7,510
20	7,472
21	7,435
22	7,398
23	7,361
24	7,324
25	7,287

The estimated lifespan of the Project is 25 years.

2.5.2 Required Permits and Approvals

This IS/MND is intended to be used by the PWD Board of Directors when considering the Project. To support its decision on the Project, the Board must approve the MND and must also adopt a mitigation monitoring and reporting program to ensure compliance with mitigation measures during Project implementation. The IS/MND is also intended to be used by responsible agencies that have review and permit authority over the Project. Agencies with responsibility for permit approval of certain Project elements include:

- A Dust Control Plan to be reviewed and approved by the Antelope Valley Air Quality Management District (AVAQMD)
- State Water Resources Control Board Notice of Intent to obtain coverage under California General Construction Activity Stormwater National Pollutant Discharge Elimination System (NPDES) permit requiring preparation of a Stormwater Pollution Prevention Plan

3. ENVIRONMENTAL CHECKLIST FORM

1. **Project title:** Solar Energy Project
2. **Lead agency name and address:** Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550
3. **Contact person and phone number:** Adam Ly
Assistant General Manager
661-456-1062
4. **Project locations:**
 - 2029 East Avenue Q, Palmdale, CA
 - East Avenue S & Sierra Highway, Palmdale, CA
5. **Project sponsor's name and address:** Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550
6. **General plan designation:** Public Facility, Single Family Residential
7. **Zoning:** Public Facility Single Family Residential

8. Description of project: PWD is proposing to install solar facilities at the District's Headquarters (HQ Site) located at 2029 East Avenue Q, Palmdale, CA and solar facilities and battery energy storage system at the 6 MG Tank Site (Tank Site) located at East Avenue S & Sierra Highway, Palmdale, CA). The two combined sites of the Project are located on approximately 34 acres and will generate approximately 8,218 MWh. The District is undertaking this Project to mitigate rising energy costs and provide an alternative energy source for District operations.

9. Surrounding land uses and setting: According to the City of Palmdale General Plan Map, the HQ site is designated Public Facility, and the Tank Site is designated Single Family Residential. Surrounding land uses for the HQ Site include vacant and/or commercial/industrial. The Tank Site is located adjacent to a residential development to the west. Other surrounding land uses include transportation and commercial/industrial to the north, south, and east.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

- A Dust Control Plan to be reviewed and approved by the AVAQMD
- State Water Resources Control Board Notice of Intent to obtain coverage under the California General Construction Activity Stormwater NPDES permit requiring preparation of a Stormwater Pollution Prevention Plan

11. Have California Native American tribes traditionally and culturally affiliated with the Project area requested consultation pursuant to Public Resources Code section 2180.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

To date, no requests for consultation have been received pursuant to Public Resources Code section 2180.3.1.

Environmental Factors Potentially Affected

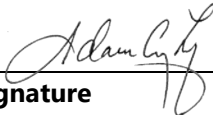
The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- | | | |
|---|--|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Public Services |
| <input type="checkbox"/> Agriculture and Forestry Resources | <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Air Quality | <input type="checkbox"/> Hydrology / Water Quality | <input type="checkbox"/> Transportation |
| <input checked="" type="checkbox"/> Biological Resources | <input type="checkbox"/> Land Use / Planning | <input checked="" type="checkbox"/> Tribal Cultural Resources |
| <input checked="" type="checkbox"/> Cultural Resources | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Utilities / Service Systems |
| <input type="checkbox"/> Energy | <input type="checkbox"/> Noise | <input type="checkbox"/> Wildfire |
| <input checked="" type="checkbox"/> Geology / Soils | <input type="checkbox"/> Population / Housing | <input type="checkbox"/> Mandatory Findings of Significance |

Determination:

On the basis of this initial evaluation:

- I find that the proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared
- I find that the proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- I find that the proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects
- I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.



Signature
 Adam Ly, Assistant General Manager

Printed Name

11/7/2022

Date
 Palmdale Water District

For

Environmental Analysis

The environmental impact analysis for each resource defines the criteria used to judge whether an impact is significant based on the CEQA Initial Study Checklist and regulatory agency standards. Impacts that exceed identified threshold levels are considered significant. In describing the significance of impacts, the following categories of significance are used and are based on the best professional judgment of the preparers of the Initial Study:

- **No Impact:** An effect that would have no impact, or would have a positive impact on the environment, such as reducing an existing environmental problem.
- **Less than Significant:** An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures.
- **Less than Significant with Mitigation:** An impact is potentially significant but can be reduced to below the threshold level (to less than significant) given reasonable and available mitigation measures.
- **Potentially Significant:** An impact that would cause substantial, or potentially substantial, impacts above the threshold level. Such an impact requires further evaluation and would trigger the preparation of an Environmental Impact Report (EIR) for the project.

3.1 Aesthetics

Except as provided in Public Resources Code Section 21099, would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

a) *Would the Project have a substantial adverse effect on a scenic vista?*

No scenic vistas are present on the Project sites. No impact would occur.

Mitigation Measures: None required or recommended.

b) *Would the Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*

The California Department of Transportation (Caltrans) administers the California Scenic Highway Program (Streets and Highways Code, Section 260 et seq) to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. There are no officially designated California scenic highways or roadways in the Project area (Caltrans 2019). The California State Route 14 and California State Route 138 that run near the Project site are not designated scenic highways (Caltrans 2019). There are no scenic highways in the vicinity of the Project site and thus there would be no impact.

Mitigation Measures: None required or recommended.

c) *Would the Project in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from*

publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?

The proposed Projects are located on public facility land near residential neighborhoods and commercial/industrial areas. The Projects would have some change to the aesthetic of the area; however, it would not conflict with applicable zoning and other regulations governing scenic quality. Therefore, the Project would have a less than significant impact.

Mitigation Measures: None required or recommended.

d) *Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?*

The Project would not require nighttime lighting. According to a glare analysis conducted by Burns and McDonnell Consultants Inc for the City of Palmdale solar projects of similar size and scale have the potential to generate glare and glint that may cause impacts to public and pilots. The City of Palmdale’s glare analysis identified these potential impacts, by including a series of observational points at nearby intersections, adjacent roads and the approach paths and airport traffic control for the adjacent U.S. Air Force (USAF) Plant 42 airport. Using a Solar Glare Hazard Analysis Tool developed by Sandia National Laboratories plus guidelines provided by the Federal Aviation Administration, the study concluded that no glare or glint hazards would occur from the proposed solar project (City of Palmdale, 2020). Given the proximity and similarity of the proposed Project to studied conditions, the proposed Project would not add a new source of substantial light or glare. Any potential impacts would be less than significant.

Mitigation Measures: None required or recommended.

3.2 Agriculture and Forestry Resources

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

Discussion

a-e) Would the Project a) convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use; b) conflict with existing zoning for agricultural use, or a Williamson Act contract?; c) conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)); d) result in the loss of forest land or conversion of forest land to non-forest use?; or, e) involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

The HQ Site is located on a site that is designated by the Farmland Mapping and Monitoring Program as Urban and Built Up Land. The Tank Site is designated by the Farmland Mapping and Monitoring Program as Other Land, which are areas that do not sustain farmland (California Department of Conservation, 2018). Additionally, there are no designated Williamson Act lands at either site. There is no farmland or forest land at the Project site, thus there would be no impact.

Mitigation Measures: None required or recommended.

3.3 Air Quality

Would the Project:	<u>Potentially Significant Impact</u>	<u>Less Than Significant with Mitigation Incorporated</u>	<u>Less Than Significant Impact</u>	<u>No Impact</u>
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non- attainment under an applicable federal or state ambient air quality standard?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Result in other emissions (such as those leading to odors or adversely affecting a substantial number of people)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

The Project site is within the portion of Los Angeles County that lies in the Mojave Desert Air Basin, under the jurisdiction of the AVAQMD. The AVAQMD regulates air quality through its permit authority over most

types of stationary emission sources and through its planning and review process. Applicable AVAQMD rules include, but are not limited to, those presented in **Table 3-1**.

Table 3-1: Applicable AVAQMD Rules

Rule/Regulation	Title
401	Visible Emissions
402	Nuisance
403	Fugitive Dust
404	Particulate Matter – Concentration

Rule 403 requires that a Dust Control Plan be prepared for review and approval by the AVAQMD Air Pollution Control Officer (APCO) prior to the start of construction activities. A Dust Control Plan would apply to the proposed Project because it would disturb more than five acres of surface area during construction. PWD will prepare the Dust Control Plan, which will detail how dust generated during construction will be controlled.

In addition, the proposed Project would comply with existing applicable state regulations, including the California Air Resources Board (CARB) In-Use Off-Road Diesel-Fueled Fleets Regulation (the Off-Road Regulation), which applies to all self-propelled off-road diesel vehicles 25 horsepower or greater used in California and most two-engine vehicles (except on-road two-engine sweepers). The Off-Road Regulation requires construction fleets to reduce their emissions by retiring older vehicles and replacing the retired vehicles with newer vehicles, repowering older engines, or installing verified diesel emission control strategies in older engines; and by restricting the addition of older vehicles to fleets (CARB, 2022).

a) Would the Project conflict with or obstruct implementation of the applicable air quality plan?

The federal Clean Air Act requires states to develop State Implementation Plans (SIPs) to state how they will attain or maintain the National Ambient Air Quality Standards (NAAQS). SIPs are a compilation of new and previously approved plans, programs, district rules, state regulations and federal controls. States and local air quality management agencies prepare SIPs for approval by the US Environmental Protection Agency (USEPA). SIPs are, in part, based on regional population, housing, and employment projections reflected in local general plans.

The Project sites are located in areas that are owned by PWD and zoned for public facilities, in the case of the HQ site, and single family residential, in the case of the Tank site. Small-scale solar is permitted on sites designated for public facilities and single family residential (City of Palmdale municipal code chapter 17.76.010 Land Use Matrix). Thus, the proposed Project would not conflict with the regional projections that form the basis of the SIP. In addition, the Project would comply with all applicable CARB and AVAQMD rules and regulations. Because the Project would be consistent with the growth forecast in the local land use planning documents, it is considered consistent with the State SIP. Therefore, the Project would not conflict with or obstruct implementation of the attainment plan.

Mitigation Measures: None required or recommended.

- b) *Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?*

Criteria air pollutants are the following six air pollutants for which the USEPA and the CARB have set ambient air standards: ozone (O₃), particle pollution (i.e., respirable particulate matter less than 10 microns in diameter [PM₁₀] and respirable particulate matter less than 2.5 microns in diameter [PM_{2.5}]), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and lead (Pb). The portion of Los Angeles County that is within the Mojave Desert Air Basin is designated attainment/ unclassified for all federal NAAQS except O₃ and is designated attainment/ unclassified for all California Ambient Air Quality Standards (CAAQS), except O₃ and PM₁₀ (CARB, 2017). This means that ambient concentrations of O₃ and PM₁₀ at the Project site exceed levels determined by the USEPA and CARB to be acceptable to protect public health. AVAQMD has established mass daily and annual significance thresholds to assist lead agencies in determining whether or not a project's activities would result in a cumulatively considerable net increase in any criteria pollutant (AVAQMD, 2016). Any project that would result in emissions that exceed the evaluation criteria is significant.

The proposed Project would generate temporary emissions of criteria pollutants O₃, PM₁₀, PM_{2.5}, CO, and SO₂ during its construction stage as a result of the use of internal combustion engines for heavy construction equipment, worker and vendor vehicle trips, and hauling trips. However, activities and emissions occurring during construction would stop once construction of the proposed Project is completed.

Operation emissions would be minimal and result from normal preventative maintenance and routine inspections. Preventative maintenance would consist of a vehicle trip and power washing occurring twice monthly. Routine inspections would occur twice a month.

This Project assumes air emissions would be similar to those calculated for the City of Palmdale's solar energy generating facility, a project of comparable size and scope. In 2020, Tetra Tech, Inc. completed an IS/MND for the City of Palmdale proposing to construct, operate, and eventually decommission a 25-megawatt (MW) solar project on a 140-acre site approximately 2.5 miles away from the proposed Project. Air emissions resulting from construction were calculated for the City of Palmdale's project based on a scenario where each equipment piece in each phase runs simultaneously. This approach assumed maximum daily operating time for all equipment assigned in each construction phase (e.g., Site Preparation, Grading, and Paving). Construction emissions were calculated using the California Emissions Estimator Model (CalEEMod). CalEEMod is designed to take information such as project size; construction length; vehicle and equipment types; number of vehicle trips and trip lengths; and equipment operating hours to calculate emissions of criteria air pollutants and GHGs. Emission calculations factored dust control measures such as those prescribed in AVAQMD Rule 403 and off-road vehicles using on average Tier 3 engines to comply with existing CARB regulations to phase out older, more polluting construction equipment engines (e.g., CARB Off-Road Regulation). Operational emissions are estimated based on two vendor trips per month for panel washing and or maintenance purposes and two inspection trips per month. Operational emissions were estimated using CalEEMod.

CalEEMod calculated air emission results for the City of Palmdale's solar energy generating facility are summarized in **Table 3-2** and compared to the AVAQMD significance thresholds.

Table 3-2: Project Construction Emissions of Criteria Pollutants for Representative Project

Project Phase	VOCs	NO_x	CO	SO_x	PM₁₀	PM_{2.5}
Construction 2020 Annual (tons)/Daily (lbs)	0.02/3.9	0.20/37.0	0.11/29.4	0.00/0.0	0.10/3.3	0.04/1.8
Construction 2021 Annual (tons)/Daily (lbs)	0.20/5.7	1.60/57.3	1.43/40.8	0.00/0.1	0.35/8.2	0.18/3.4
Operational Emissions Annual (tons)/Daily (lbs)	0.00/0.1	0.04/3.2	0.05/4.2	0.00/0.0	0.00/0.2	0.00/0.2
<i>Threshold of Significance</i> Annual (tons)/ Daily (lbs)	<i>25/137</i>	<i>25/137</i>	<i>100/548</i>	<i>25/137</i>	<i>15/82</i>	<i>12/65</i>
Significant?	No	No	No	No	No	No

Notes:

- lbs - pounds
- NO_x - oxides of nitrogen (nitric oxide and nitrogen dioxide)
- SO_x oxides of sulfur (sulfur dioxide and sulfur trioxide)
- VOC volatile organic compounds

Estimated construction emissions from the City of Palmdale’s project did not exceed the AVAQMD established thresholds. With the single vehicle trip to the facility that would occur once or twice a month, modeled emissions from operation of the facility did not exceed AVAQMD established daily thresholds. Given that the City of Palmdale’s project is representative of the District’s Solar Energy Project, the District’s proposed Project would also not exceed AVAQMD established daily thresholds.

Mitigation Measures: None required or recommended.

c) *Would the Project expose sensitive receptors to substantial pollutant concentrations?*

The proposed Project is not expected to expose sensitive receptors to substantial pollutant concentration during its construction or operation phases. At the HQ Site, the closest sensitive receptor is Tamarisk Elementary School located at 1843 E Ave Q-5, Palmdale, CA 93550, approximately 0.31 miles south of the site. At the Tank Site, the closest sensitive receptor is Tumbleweed Elementary School located at 1100 E Ave R-4, Palmdale, CA 93550, approximately 0.78 miles northeast from the site. During construction, emissions from off-road vehicles would be generated but would be temporary and are not anticipated to impact workers in nearby buildings. Criteria air pollutant emissions from construction equipment would not exceed threshold limits (**Table 3-2**) that are designed to protect public health. Operation of the proposed Project would generate minimal emissions resulting from normal preventative maintenance and routine inspections. Two preventative maintenance trips and two inspection related trips would occur monthly. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

d) *Would the Project result in other emissions (such as those leading to odors or adversely affecting a substantial number of people?)*

The proposed Project would generate odors resulting from diesel combustion by on-road and off-road vehicles during the construction phase. Odors from construction sources would be significant if they were to become a nuisance pursuant to Rule 402. To become a nuisance, odors resulting from the Project would need to generate multiple valid odor complaints. Construction equipment would emit sulfur compounds, which can have a rotten-egg odor. However, construction emissions would be temporary and would dissipate quickly with distance from the equipment. Furthermore, emissions of SO_x would be well below regional significance thresholds (**Table 3-2**). Therefore, perception of construction related odors are anticipated to be less than significant.

Mitigation Measures: None required or recommended.

3.4 Biological Resources

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

To begin assessing the potential impact on special-status species, a list of special-status species previously documented within a 0.25-mile radius of the proposed Project sites was compiled from the California Natural Diversity Database (CNDDDB) (CDFW, 2022). Seven records were included in the CNDDDB results: two mammals, San Joaquin Pocket mouse (*Perognathus inornatus*, listed by the International Union for Conservation of Nature (IUCN) as being of "least concern", and Mohave ground squirrel (*Xerospermophilus mohavensis*, threatened under the California Endangered Species Act (CESA)); two birds, Le Conte's thrasher (*Toxostoma lecontei*, California Department of Fish and Wildlife (CDFW) species of special concern), and Swainson's hawk (*Buteo swainsoni*, threatened under CESA); an insect, Crotch bumble bee (*Bombus crotchii*, IUCN Endangered, NatureServe S1S2); a dicot plant, Horn's milk-vetch (*Astragalus hornii* var. *hornii*, NatureServe T1); and a mollusk, Soledad shoulderband (*Helminthoglypta fontiphila*, NatureServe G1,S1).

In addition to the CNDDDB, a search of the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database was compiled for the two project sites (UWFWS, 2022). The IPaC search results found that two birds, California condor (*Gymnogyps californianus*, IUCN Critically Endangered), and least Bell's vireo (*Vireo bellii pusillus*); one reptile, desert tortoise (*Gopherus agassizii*, IUCN Critically Endangered); and one insect, Monarch butterfly (*Danaus plexippus*, IUCN Endangered).

The Project site, which consists of vacant, disturbed land, does not contain optimal suitable habitat for special-status wildlife species, due to the existing development in the surrounding area, lack of native vegetation, and regular disturbance. However, a lack of quality habitat does not preclude species presence. It is assumed that the marginal habitat on the Project sites may support San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly and **Mitigation Measure BIO-1** would be required to confirm species presence or absence of these species. Mitigation Measure BIO-1 would also identify Project avoidance areas where feasible if species are found. If species are identified during reconnaissance surveys **Mitigation Measure BIO-2** would require a pre-construction clearance survey and implementation of a Worker Environmental Awareness Program (WEAP) prior to construction to address potential impacts. The pre-construction survey and WEAP required by **Mitigation Measure BIO-2** would mitigate potential impacts to the sensitive insect, reptile and mammal species that have the potential to occur at the Project sites.

Additionally, birds have the potential to nest near the Project site in or on trees, other ornamental vegetation, and buildings. Nesting bird species are protected by California Fish and Game Code (CFGC) sections 3503 and 3503.5, and the Migratory Bird Treaty Act. According to the IPaC search results (USFWS 2022), six birds of conservation concern have the potential to be affected by activities at the Project sites: California thrasher (*Toxostoma redivivum*), Clark's grebe (*Aechmophorus clarkia*), Costa's hummingbird (*Calypte costae*), Lawrence's goldfinch (*Carduelis lawrencei*), tricolored blackbird (*Agelaius tricolor*), and western grebe (*aechmophorus occidentalis*).

If initial ground disturbance and vegetation/tree trimming or removal is required during the nesting bird season (typically January 16 to September 30), the Project may impact nesting birds through injury, mortality, or disruption of normal adult behaviors resulting in the abandonment or harm to eggs and nestlings. Construction occurring within the vicinity of nesting birds may also indirectly impact individuals

with construction noise, dust, and vibration from equipment. PWD would implement **Mitigation Measure BIO-3** to comply with CFGC 3503, CFGC 3503.5, and the Migratory Bird Treaty Act. These measures include a pre-construction survey for nesting birds and measures to avoid and monitor bird nests, if found, until construction is complete.

The Project would adhere to mitigation measures in order to avoid disturbance to nesting birds and other sensitive species, and the Project's impact on special-status species during construction would be less than significant. After construction is complete, Project operations at the site would involve regular visits to the site by PWD staff, but species habitat would be able to persist within the Project boundaries and there would be no new long-term operational activities that would directly impact on special status species. Therefore, Impacts to special status species are less than significant with mitigation incorporated.

Mitigation Measures: None required or recommended.

Mitigation Measure BIO-1: Reconnaissance Biological Survey and Identifying Avoidance Areas

Reconnaissance level surveys and habitat assessment shall be conducted during Project design prior to construction to assess and minimize impacts on potential for sensitive status species. The survey shall be conducted by a biological professional. The survey shall denote where species are present and adequate habitat exists. The survey shall evaluate the marginal habitat on the Project sites for the presence or absence of Joshua tree, California juniper, nesting birds, burrowing owl, San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly. If present, the Project design shall avoid the species to the maximum extent feasible.

Mitigation Measure BIO-2: San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly WEAP Training and Pre-construction Survey

Because there is marginal habitat present within the Project area to support the presence of San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly, a pre-construction survey prior to ground disturbance activity shall be carried out by a qualified biologist. WEAP training shall also be conducted prior to any ground disturbance activities, to address the potential for these species to occur within the Project area. The training will address BMPs prior to, during, and after construction, including appropriate protocol to follow if any special-status species are identified. All participants in construction activities will be required to attend this training prior to ground disturbance, and a signature from each participant will be required at the conclusion of the training. If species are identified during the pre-construction surveys, the qualified biological professional shall implement CDFW guidance for avoiding, protecting, and mitigating impacts.

Mitigation Measure BIO-3: Nesting and Migratory Birds Avoidance

If Project grading/construction activities are scheduled to occur during the nesting season for breeding birds (typically January 15th through September 30th), the following measures shall be implemented:

- An Avoidance Plan for nesting birds will be prepared by a qualified biologist that would include measures that are effective, enforceable and feasible to avoid impacts to nesting birds. The Avoidance Plan would be fully developed prior to implementing Project-related ground disturbance activities that includes site preparation, equipment staging and mobilization.

- Within seven days prior to commencement of grading/construction activities, a qualified biologist shall perform a pre-construction survey of all proposed work limits and within 500 feet of the proposed work limits.
- If active avian nest(s) of non-special status species are discovered within or 500 feet from the work limits, a buffer shall be delineated around the active nest(s) measuring 300 feet for passerines and 500 feet for raptors. A qualified biologist shall monitor the nest(s) weekly after commencement of construction mobilization to ensure that nesting behavior is not adversely affected by such activities.
- If the qualified biologist determines that nesting behavior of non-special-status species is adversely affected by grading/construction activities, then a noise mitigation program shall be implemented in consultation with CDFW, to allow such activities to proceed. The noise mitigation program will include the following elements: within 10 calendar days prior to the start of construction activities (including removal of vegetation), a qualified biologist conducts a preconstruction survey to determine the presence or absence of nesting birds on the proposed area of disturbance; if nesting birds are detected, the biologist prepares a letter report and mitigation plan in conformance with applicable federal and State laws (e.g., appropriate follow-up surveys, monitoring schedules, construction and noise barriers/buffers) to ensure that take of birds or eggs or disturbance of breeding activities is avoided; the report/mitigation plan is submitted to the City for review/approval and implemented to the satisfaction of the City; and the biologist verifies in a report to the City that all measures identified in the mitigation plan are in place prior to and/or during construction. Once the young have fledged and left the nest(s), then grading/construction activities may proceed within 300 feet (500 feet for raptor species) of the fledged nest(s).

b) Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

According to the IPaC database (USFWS 2022), no federal critical habitats were returned in the IPaC results for the proposed Project sites. According to the California Office of Planning and Research SiteCheck tool (which identifies habitat and natural communities protected by CDFW), no sensitive plant communities or special habitats are present at the Project site or adjacent areas within 0.25 mile (OPR 2022). There is no riparian habitat present within the Project area, and no sensitive plant communities occur within the Project site. Therefore, there would be no impact on sensitive vegetation communities.

c) Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

According to the IPaC database (USFWS 2022), the Project locations do not intersect any mapped wetlands. The Project site does not contain seasonal wetlands and other areas that may be considered to be under the jurisdiction of the U.S. Army Corps of Engineers. Therefore, potential for impacts to federally or state protected wetlands would be less than significant.

d) *Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?*

The Project site could be used by nesting migratory birds. Furthermore, although it was not present in the CNDDDB or IPaC records results, the vacant land at the Project sites could provide suitable nesting habitat for burrowing owl (*Athene cunicularia*), a listed CDFW Species of Special Concern. As a result, disturbance of the sites during the nesting season may cause a significant impact. If construction activities were to occur during the typical nesting bird season, a nesting bird survey should be conducted. Avoidance plans for nesting birds through implementation of **Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, and BIO-5** would reduce impacts to migratory wildlife species to a less than significant.

Mitigation Measures:

See Mitigation Measure BIO-1 through 3, above

Mitigation Measure BIO-4: Burrowing Owl Avoidance Plan

An Avoidance Plan for burrowing owl will be prepared by a biological professional that will include measures that are effective, enforceable and feasible to avoid impacts to burrowing owl. The Avoidance Plan will be fully developed prior to implementing Project-related ground disturbance activities (e.g., site preparation, equipment staging and mobilization). A pre-construction presence/ absence survey for burrowing owl shall be conducted within 30 days prior to any on-site ground disturbing activity. The survey shall be conducted pursuant to the recommendations and guidelines established by the CDFW. In the event these species are not identified within the Project disturbance limits, no further mitigation is required. If, during the pre-construction survey, the burrowing owl is found to occupy the site, Mitigation Measure BIO-2 shall be required.

Mitigation Measure BIO-5: Burrowing Owl Relocation

If burrowing owls are identified during the survey period, PWD shall take the following actions to offset impacts prior to ground disturbance. Active nests within the areas scheduled for disturbance or degradation shall be avoided from February 1 through September 15, and a minimum 250-foot buffer shall be provided until fledging has occurred. Following fledging, owls may be passively relocated by a qualified biologist. If impacts on occupied burrows in the non-nesting period are unavoidable, on-site passive relocation techniques may be used if approved by the CDFW, to encourage owls to move to alternate burrows outside of the impact areas.

If relocation of the owls is approved for the site by the CDFW, PWD shall hire a qualified biologist to prepare a plan for relocating the owls to a suitable site. The relocation plan shall include all of the following:

- The location of the nest and owls proposed for relocation;
- The number of owls involved and the time of the year when the relocation is proposed to take place;
- The name and credentials of the biologist who will be retained to supervise the relocation;

- The proposed method of capture and transport for the owls to the new site.
- A description of the site preparation at the relocation site (e.g. enhancement of existing burrows, creation of artificial burrow, one-time or long-term vegetation control); and
- A description of efforts and funding support proposed to monitor the relocation.

e) *Would the Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

The Project sites may contain creosote bush scrub with some areas of undisturbed creosote scrub with scattered Joshua trees (Tetra Tech 2020). The Project may require the removal of Joshua trees, which requires compliance with CESA for western Joshua tree and City of Palmdale Development Code Chapter 14.04 for Joshua trees and native vegetation preservation. Implementation of **Mitigation Measures BIO-6, BIO-7, and BIO-8** would reduce impacts to a less than significant level.

Mitigation Measures:

Mitigation Measure BIO-6: Western Joshua Tree Avoidance

If “take” or adverse impacts to western Joshua tree cannot be avoided during Project implementation, consultation with the CDFW will be undertaken and a CESA Incidental Take Permit (ITP) (pursuant to Fish & Game Code, § 2080 et seq.) will be sought. During the consultation process, if take of western Joshua tree is necessary for the Project to be constructed, compensatory mitigation will be required in the ITP and may include in-kind and/or in-lieu mitigations as per Fish and Game Code 2081 to offset impacts. The ITP will also specify minimization and avoidance measures and fully mitigate any impacts to western Joshua tree. No take of western Joshua tree will occur until the ITP has been issued to and accepted by the applicant. In addition, PWD will not approve the Project until the ITP has been issued and required mitigation completed.

Mitigation Measure BIO-7: Native Desert Vegetation Plan

PWD shall have a native desert vegetation plan prepared by a desert native plant specialist. The plan shall, at minimum, include the following:

- A written report and a site plan which depicts the location of each Joshua tree and California juniper, discusses their age and health, identifies and locates all trees and shrubs which can be saved in place or relocated.
- A site landscaping plan showing the proposed location of those Joshua trees, California junipers, and any other native desert vegetation that will remain on-site.
- A long-term maintenance program for any desert vegetation preserved on the site. The minimum term of any maintenance program shall be two growing seasons, unless a shorter length of time is approved by CDFW.

Mitigation Measure BIO-8: Joshua Tree Transplanting

Two years following Joshua tree transplanting, a written report shall be submitted to PWD. This report shall indicate the number of Joshua trees transplanted, the date(s) of transplanting, the method of transplanting, dates Joshua trees are watered, and the number of Joshua trees surviving.

f) *Would the Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?*

The Project area is not located within or near lands that are governed by a Habitat Conservation Plan, a natural community conservation plan or other approved, local, regional or state habitat conservation plan. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.5 Cultural Resources

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

a) *Would the Project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?*

The Palmdale area was largely undeveloped prior to the completion of the Southern Pacific Railroad through the Antelope Valley in 1876. In 1886, farming families predominantly from the Midwest settled in the Antelope Valley. When drought in the valley's desert climate rendered many agricultural homesteads unviable, many settlers relocated closer to the Southern Pacific Railroad Station in the present-day location of Palmdale's civic center. The completion of the Los Angeles Aqueduct in 1914 brought irrigation to the Antelope Valley, allowing for the cultivation of pears, apples, and alfalfa. Palmdale remained primarily an agricultural community until the growth of the aerospace industry during World War II. Palmdale became a center of the U.S. aerospace industry due to its proximity to Edwards Airforce Base, and the establishment of U.S. Air Force Plant 42 in 1953 (Rincon Consultants, 2022).

Per the City of Palmdale General Plan EIR, there is a possibility that during Project activities such as grubbing and grading or setting foundations, buried historical resources may be discovered (Rincon Consultants, 2022).

In the event of an inadvertent discovery of historical resources during construction, Mitigation Measures **CUL-1, CUL-2, and CUL-3** would be implemented to provide steps for mitigating impacts to a previously undiscovered resource. These measures would reduce the potential impacts to less than significant.

Mitigation Measures:

Mitigation Measure CUL-1: Confirm and Monitor for Cultural Resources

Prior to final design, PWD shall conduct a record search and field survey to confirm assumed site sensitivity and identify any resources to be avoided. If resources are identified on site, they shall be avoided or treated following Secretary of the Interior standards. If the qualified archaeologist determines the site to be highly sensitive with a high likelihood of discovering buried or previously unidentified objects, a qualified archaeological monitor shall be present during ground disturbing activities in that area such as grading, trenching, or excavation. Archeological monitoring shall be performed during initial ground disturbance only (not entire construction timeframe) under the direction of an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archeology. Archeological monitoring may be reduced or halted at the discretion of the monitors, in consultation with PWD.

In the event that cultural resources are discovered during Project construction activities, all work shall cease and a qualified archaeologist meeting Secretary of Interior standards shall assess the find. A qualified archaeologist will make recommendation if work can continue or if a buffer can be established for work to continue. If the tribal cultural resources are encountered, the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI) and the Fernandeano Tataviam Band of Mission Indians (FTBMI) shall be contacted, as detailed within Mitigation Measures TCR-1, regarding any precontact and/or post-contact finds and be provided information after the archaeologist makes his/her initial assessment of the nature of the find, so as to provide Tribal input with regards to significance and treatment.

Mitigation Measure CUL-2: Develop a Monitoring and Treatment Plan

If significant pre-contact and/or post-contact cultural resources, as defined by CEQA (as amended, 2015), are discovered and avoidance cannot be ensured, the archaeologist shall develop a Monitoring and Treatment Plan, the drafts of which shall be provided to SMBMI and FTBMI for review and comment, as detailed within **Mitigation Measure TCR-1**. The archaeologist shall monitor the remainder of the Project and implement the Plan accordingly.

Mitigation Measure CUL-3: Unintended Discovery of Human Remains

If human remains or funerary objects are encountered during any activities associated with the Project, work in the immediate vicinity (within a 100- foot buffer of the find) shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5 and that code enforced for the duration of the Project.

b) *Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?*

There is a possibility that during Project activities, buried cultural resources may be discovered. If this occurs, PWD is required to comply with City of Palmdale regulations and California Public Resources Code Section

21083.2. In the event that cultural resources are encountered during the course of construction activities, all work must cease until a qualified archaeologist determines the proper disposition of the resource.

In the event of an inadvertent discovery of cultural resources during construction, **Mitigation Measures CUL-1, CUL-2, and CUL-3** would be implemented to provide steps for mitigating impacts to a previously undiscovered resource. These measures would reduce the potential for impacts to less than significant.

Mitigation Measures:

See Mitigation Measures CUL-1, CUL-2, and CUL-3, above

c) *Would the Project disturb any human remains, including those interred outside of formal cemeteries?*

The discovery of human remains is always a possibility during ground-disturbing activities.. In the event that previously unknown human remains are discovered during construction of the Project, implementation of **Mitigation Measure TCR-2**, would reduce impacts to less than significant.

Mitigation Measures:

See Mitigation Measure TCR-2, in Section 3.18, below

3.6 Energy

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?*

Energy consumption during construction would have a nominal effect on the local and regional energy supplies. There are no unusual Project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in the region or State. Construction would be temporary and in compliance with AVAQMD regulations, and equipment would be maintained to optimal performance to reduce use of fuels. Once operational, the Project would be generating clean electricity, thereby reducing the use of fossil fuels for electricity in the area. Therefore, the Project would have a less than significant impact.

Mitigation Measures: None required or recommended.

b) *Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*

The proposed Project is an alternative energy project that is consistent with the City of Palmdale’s Energy Action Plan (EAP). The proposed alternative energy Project would assist the City of Palmdale in meeting its green energy goals. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.7 Geology and Soils

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineate on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) *Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:*
- i) *Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.*

The San Andreas fault is located less than a mile southwest of the Tank Site, and less than three miles southwest of the HQ Site. Rupture of the San Andreas within the City of Palmdale area would cause impacts to some degree to the region including the Project. According to the California Department of Conservation's Earthquake Zones of Required Investigation interactive map (2022) that incorporates the Alquist-Priolo Earthquake Fault Zoning data, the Project sites are not within known earthquake fault zones. Therefore, the Project would have no impact.

Mitigation Measures: None required or recommended.

- ii) *Strong seismic ground shaking?*

The Project area is located in a region that is subject to seismic events. The nearest fault is a portion of the San Andreas Fault located approximately one mile southwest of the Tank Site, and less than three miles southwest of the HQ Site. The solar facility would be unmanned and, therefore, a rupture of the San Andreas fault in the City of Palmdale planning area would not likely expose people to seismic rupture hazards as a result of the Project. A less than significant impact would occur.

Mitigation Measures: None required or recommended.

- iii) *Seismic-related ground failure, including liquefaction?*

The highest potential for liquefaction occurs in saturated, loosely consolidated sands and silts below the water table when the water table is within approximately 50 feet of the surface. The HQ site and the Tank Site parcel where the solar panels are proposed are not within liquefaction zones (Department of Conservation 2022). However, the parcel with the existing tank site is partially in a liquefaction zone. All new structures and facilities built on this parcel, such as the battery storage, would be built in accordance with the California Building Code and current design standards that prevent substantial adverse effects in the event of seismic-related ground failure. Additionally, the nature of the Project presents a low risk of loss, injury, or death if seismic-related ground failure were to occur. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

- iv) *Landslides?*

The topographic relief at the site is relatively flat. Site preparation for the Project will create a flat surface for the solar panels. There will be no slopes that may fail in a seismic event and cause adverse effects from a landslide. The potential for an earthquake-induced landslide at the Project area is very low. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

b) *Would the Project result in substantial soil erosion or the loss of topsoil?*

Site preparation would require grubbing and clearing of all vegetation present at the site. This would expose soils to erosion from wind and rain events. As more than one acre will be graded, the Project would be required to comply with the State of California NPDES General Permit for Discharges of Storm Water Associated with Construction Activity. A site-specific Storm Water Pollution Prevention Plan (SWPPP) would also need to be developed and implemented. The SWPPP will identify BMPs that would control on-site and off-site erosion from storm events and wind. The SWPPP will also identify BMPs for accidental spills of hazardous materials. Oversight by PWD will ensure compliance with any permit-related measures to control erosion generated by the Project. Therefore, a less than significant impact would occur.

Mitigation Measures: None required or recommended.

c) *Would the Project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?*

Lateral spreading occurs when large blocks of intact, nonliquefied soil move down slope on a liquefied soil layer. Lateral spreading is often a regional event. For lateral spreading to occur, the liquefiable soil zone must be unconstrained laterally and free to move along sloping ground. As stated earlier, the sites do not have the potential for liquefaction resulting in a low potential for lateral spreading at the Project area. The potential for subsidence, liquefaction and collapse are also unlikely. Therefore, a less than significant impact would occur.

Mitigation Measures: None required or recommended.

d) *Would the Project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?*

The Tank site is located on Ramona coarse sandy loam soils with 2 to 5 percent slopes. The HQ Site is located on Hanford coarse sandy loam with 0 to 2 percent slopes, Hesperia fine sandy loam with 0 to 2 percent slopes, and Greenfield sandy loam with 0 to 2 percent slopes. All these soil types are well drained and non expansive. Construction of the unmanned solar project will not create a substantial direct or indirect risk to life or property from expansive soils. No impact would occur.

Mitigation Measures: None required or recommended.

e) *Would the Project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?*

During construction, portable toilet/wash station facilities would be used by on-site workers. During routine or emergency repairs, portable toilet/wash station facilities would be mobilized to the site, if necessary. No septic system would be included as part of Project construction. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

f) *Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

Paleontological resource evaluations require analysis of geologic maps, existing literature, and an institutional record search. Geologic mapping indicated that the City of Palmdale’s project is entirely underlain by Holocene-age younger alluvium (Qa). While not mapped at the surface, Pleistocene-age older alluvium often occurs beneath Holocene-age younger alluvium at various depths (Paleo Solutions, Inc. 2019).

The Potential Fossil Yield Classification (PFYC) system was applied to the results of the analysis of existing data. Pleistocene-age older alluvium has a moderate paleontological potential (PFYC 3). Holocene-age younger alluvium (Qa) is estimated to be less than 11,000 years old and has a low paleontological potential (PFYC 2), because these deposits are too young to contain in-situ fossils. However, these younger deposits often overlie older geologic units with higher paleontological potential, which may be impacted at depth.

Based on the ground disturbance necessary to complete the Project, there is potential for adverse impacts to scientifically significant paleontological resources within Pleistocene-age older alluvium if encountered in the subsurface beneath the Holocene-age younger alluvium (Qa). With implementation of **Mitigation Measure GEO-1**, impacts would be less than significant.

Mitigation Measures:

Mitigation Measure GEO-1: Previously Undiscovered Paleontological Resources

If paleontological resources are discovered during earthmoving activities, the construction crew would immediately cease work at the discovery. In accordance with Society of Vertebrate Paleontology guidelines (Society of Vertebrate Paleontology 2010), a qualified paleontologist would assess the nature and importance of the find and recommend appropriate salvage, treatment, and future monitoring and mitigation.

3.8 Greenhouse Gas Emissions

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

GHG emissions are reported as metric tons per year (MT/year) measured as carbon dioxide equivalents (CO₂e). Because every GHG has a different global warming potential, CO₂ is used as the “reference gas” for climate change, and emissions of other GHGs are reported as CO₂e. For example, methane (CH₄) has a global warming potential 21 times greater than CO₂, so emissions of CH₄ are converted into CO₂e for purposes of calculating GHG emissions.

The AVAQMD (AVAQMD, 2016) has established thresholds of GHG emissions (**Table 3-2**) which if exceeded would render a Project as having a significant adverse impact. The proposed Project would create local GHGs during construction and operation activities but not in significant quantities. It would generate small amounts of GHG emissions from vendor vehicle trips associated with periodic cleaning of the solar panels and inspections. However, the proposed solar energy Project would create clean and renewable electricity, displacing GHGs that are produced in the process of generating electricity from fossil fuels and/or coal.

Tetra Tech, Inc. (Tetra Tech, 2020) evaluated the GHG emissions associated with the construction and operation of the City of Palmdale’s solar energy project, a representative project located approximately 2.5 miles away and that is similar in scope and size to the proposed Project. GHG emissions were calculated using CalEEMod and are summarized in **Table 3-3**. Operation emissions were estimated based on two vendor trips per month for the purpose of cleaning and maintaining the panels and two inspection-related trips per month.

Table 3-3: Project Construction and Operation Emissions of GHGs for Representative Project

Project Phase	CO ₂ e Annual (MT)/Daily (lbs)
Project Construction 2020	17/ 4,831
Project Construction 2021	230/ 7,622
Project Operation	8/ 710
<i>Threshold of Significance</i>	<i>100,000/ 548,000</i>
Significant?	No

Notes: • lbs pounds
• MT metric tons

Additionally, the proposed Project would displace GHG emissions that would otherwise be emitted in the process of generating electricity using traditional measures such as burning of fossil fuels at the power plant level. The construction and operation emissions would be significantly lower than the thresholds, and the Project would displace future GHG emissions, thus the proposed Project would have a less than significant impact and no mitigation would be required.

Mitigation Measures: None required or recommended.

b) *Would the Project Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?*

The proposed Project would develop renewable energy on land designated for public facilities and single family residential and would not result in an increase of either population or emissions sources inconsistent with what has been planned for in the City of Palmdale’s General Plan (City of Palmdale, 2021). The proposed Project is also consistent with the City of Palmdale’s EAP, which promotes the establishment of large-scale solar facilities to supply regional energy needs. The EAP is consistent with the State of California GHG reduction goals prescribed under Executive Order S-3-05 and AB 32 (City of Palmdale, 2011).

The proposed Project would be consistent with the General Plan, the City of Palmdale’s EAP, and State GHG reduction goals, therefore it would have less than significant impact and no impacts would occur.

Mitigation Measures: None required or recommended.

3.9 Hazards and Hazardous Materials

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

a-b) Would the Project a) create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or b) create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

During construction, equipment would require small amounts of potentially hazardous materials such as fuels and lubricants on a regular basis. Some of these materials would be transported to the site by permitted vendors who would be required to obtain permits and are subject to inspection to ensure compliance with all relevant state and federal regulations governing the transportation of hazardous materials. Standard BMPs for storage and minor spills or leaks would be used to ensure any accidental hazardous materials releases will be cleaned up and disposed of as appropriate. When not in use, equipment will be parked in identified parking areas to prevent accidental leaks from entering the drainages. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

c) Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

The Project area is not within a quarter mile of an existing school and the proposed Project would not be a source of toxic air emissions. The nearest school to the HQ Site is Tamarisk Elementary School which is approximately 0.31 miles south, and the nearest school to the Tank Site is Tumbleweed Elementary School which is approximately 0.78 miles northeast from the site. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

d) Would the Project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

A search of the EnviroStor database maintained by the California Department of Toxic Substances Control (DTSC) and the GeoTracker database maintained by the Regional Water Quality Control Board (RWQCB) for the HQ Site (2029 E. Avenue Q, Palmdale, CA 93550) and Tank Site (641 E. Avenue S, Palmdale, CA 93550) was completed. Neither database has records for the proposed Project area. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?

There are no public or private airports located in the vicinity of the Project sites. The sites are not located within an airport land use plan or within two miles of a public or private airport. There would no impact.

Mitigation Measures: None required or recommended.

f) *Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

During construction, the proposed Project would generate additional traffic associated with workers mobilizing daily to the Project site. Equipment would be transported to the Project site. Traffic generated during construction is not expected to block the roadways. Once constructed, with the exception of workers traveling to the Project site to conduct routine and/or emergency repairs, no traffic to the site would occur. The proposed Project would be an unmanned solar facility and would not interfere with any adopted emergency response plan or emergency evacuation plan. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

g) *Would the Project Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?*

The Project area is not associated with a wildland area. Once constructed, the solar facility would be maintained weed free to reduce risks from a wildfire. In the event of a wildfire, there would be a low risk for injury, or death to workers because it would be an unmanned facility. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

3.10 Hydrology and Water Quality

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) result in substantial erosion or siltation on- or off-site;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iv) impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- | | | | | |
|---|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

- a) *Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*

During construction, BMPs identified in a Project-specific SWPPP would be used to control any stormwater flow generated on site. During site clearance and grading, water would be used for dust suppression. To prevent violations of water quality standards, the site would be graded to ensure no impacts to the existing drainage. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- b) *Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?*

Water would be used during site grubbing and grading for dust suppression. PWD is the water purveyor for the Project site. PWD utilizes groundwater from the Antelope Valley Groundwater Basin and surface water from either the SWP or the Littlerock Reservoir (Palmdale Water District, 2020). This use would be temporary and would not deplete groundwater supplies or interfere substantially with groundwater recharge that would cause a net deficit in aquifer volume or lowering of the local groundwater table. Once the Project is developed, the site would remain substantially permeable to rain. PWD would comply with City of Palmdale ordinances and regulations related to the construction water use. Once the Project is built, no water would be required. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

- c i-iv) *Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) impede or redirect flood flows?*

The Project would not result in a change in the local drainage patterns of the Project area. Stormwater flows would remain similar to existing conditions and would follow existing drainage patterns but may be directed to an on-site retention pond for initial storage before being fed into the existing stormwater drainage system. Changes to impervious surface area at the site would be minor and would occur as a result of new equipment at the Project site. All construction activities would be conducted in accordance with BMPs specified in the construction SWPPP to prevent erosion, siltation, and other construction-related pollutants (such as potential leaks from construction equipment). The Project site is not located within a Special Flood Hazard Area as designated by the Federal Emergency Management Agency (FEMA 2021) and would not

create major changes to drainage or impervious surface area at the site; therefore, the Project would not have the potential to impede or redirect flood flows and impacts would be less than significant.

Mitigation Measures: None required or recommended.

d) *Would the Project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation?*

The Project sites are not located within a Special Flood Hazard Area as designated by FEMA (FEMA 2022). The Project site is located inland, more than 43 miles northeast of the Pacific Ocean, and is thus not expected to be affected by tsunamis. Based on a review of the City of Palmdale General Plan Exhibit S-6, the Tank Site is located within an inundation area if break occurs in northern 20% of Lake Palmdale. However, in the event of inundation, the Project would not risk release of pollutants. There are no other nearby large water bodies that could subject the site to seiche or mudflows. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

e) *Would the Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*

Water would be used as a dust suppressant during site grubbing and grading. This would be a temporary impact. Once the Project is built, no water would be required. Therefore, the proposed Project would not obstruct implementation of a water quality control plan or a sustainable groundwater management plan. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.11 Land Use and Planning

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project physically divide an established community?*

The Project would be constructed entirely within vacant lots and would thus not divide an established community. There would be no impact.

Mitigation Measures: None required or recommended.

b) *Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?*

The City of Palmdale would need to issue a Conditional Use Permit for the Project finding that the Project is consistent with existing land use and zoning and would not conflict with any land use plan, policy or regulation. Therefore, there would be no impact.

Mitigation Measures: None required or recommended.

3.12 Mineral Resources

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a, b) *Would the Project a) result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or, b) result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?*

The proposed Project area does not contain any mineral resources nor are there any mining activities occurring at the site or in the general vicinity of the site. Review of the City of Palmdale General Plan Exhibits ER-1B and ER-1C shows that the proposed Project area is not within an area containing mineral resources of value to the region or within the Quarry and Reclamation Zone as identified by the City of Palmdale. The proposed Project would not result in a loss of availability of locally important mineral resources. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

3.13 Noise

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- b) Generation of excessive groundborne vibration or groundborne noise levels?
- c) For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

Discussion

a-b) Would the Project a) result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies, or b) result in the generation of excessive groundborne vibration or groundborne noise levels?

Grubbing and grading of the sites has the potential for temporarily generating construction equipment noise, as does the trenching required to install the distribution line from the solar facility to the SCE electrical grid. In addition, during construction, groundborne vibrations and groundborne noise may be perceived by residents and workers in the area. However, the Tank Site is mostly surrounded by vacant and/ or transportation/ utilities, and the HQ Site is surrounded by industrial/commercial rural areas. There are residences along the west side of the Tank Site that may be exposed to this temporary construction noise; however, there is a wall separating the residences from any noisy activities that would limit the level of noise heard at the residences. The City of Palmdale’s Noise Ordinance prohibits construction noise near residences on Sundays, or any other day after 8:00 p.m. or before 6:30 a.m. The Project is anticipated to be constructed during the daytime on weekdays, however, if weekend or nighttime work is required the Project would obtain an exception from the City Engineer pursuant to Noise Ordinance section 8.28.040. Any groundborne vibration would attenuate prior to reaching sensitive receptors. Although residences are located near the Tank Site, construction would occur during daytime hours, consistent with local noise ordinances, and therefore, would not interrupt sleep. Therefore, no impacts to sensitive receptors from noise or groundborne vibration/ groundborne noise during construction of the Project are likely as, due to the distance and timing, construction ambient noise is not likely to be perceived. Operation of the Project would not generate any appreciable noise. Therefore, impacts would be less than significant

Mitigation Measures: None required or recommended.

c) For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

The Project sites are not in the vicinity of a public or private airstrip; the nearest airport is the Palmdale Regional Airport, located approximately 3 miles northeast of the HQ Site and 5 miles northeast of the Tank Site. There would be no impacts.

Mitigation Measures: None required or recommended.

3.14 Population and Housing

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a-b) *Would the Project a) induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure), or b) displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*

The proposed Project is an unmanned solar facility. There would be a temporary influx of workers during the construction of the Project that may use hotels for temporary housing. No new homes or business to support the proposed Project would be required. The site is undeveloped and there are no existing people or housing that may be impacted by the Project. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

3.15 Public Services

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a) Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- e) Other public facilities?

Discussion

- a) *Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection?*

The City of Palmdale is supported by the Los Angeles County Fire Department for fire, rescue, and emergency medical (paramedic) services, as well as fire prevention function. Los Angeles County Fire Station No. 37, located at 38318 9th Street East, is 1.9 miles to the southwest of the HQ Site and 1.5 miles north of the Tank Site, and would serve as the first responder in the event of an emergency. The proposed Project is not likely to cause a fire and increase demand for Fire Department. As a result, the proposed Project would not necessitate the provision of new or physically altered governmental facilities, and the overall need for fire protection services is not expected to substantially increase. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- b-e) *Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: police protection, schools, parks, and other public facilities?*

The proposed Project is an unmanned solar facility that would not require an increase in police, schools, parks or other facilities. No additional governmental facilities will be required as a result of Project implementation. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.16 Recreation

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?*

The Project would not increase the use of existing parks or recreational facilities and thus would not result in substantial physical deterioration of facilities. There would be no impact.

Mitigation Measures: None required or recommended.

b) *Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?*

The Project would not increase the use of existing parks or recreational facilities and would not require construction or expansion of new recreational facilities and thus no adverse physical effect on the environment would occur. There would be no impact.

Mitigation Measures: None required or recommended.

3.17 Transportation

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the Project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Would the Project result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?*

During construction of the Project, there would be a temporary increase in traffic from workers traveling to the site plus equipment and materials being delivered to the site. This minor, temporary increase in traffic to an area that is largely undeveloped would not conflict with the City of Palmdale ordinances that address transportation with the city limits. Therefore, the Project's long-term potential to conflict with circulation planning would be less than significant.

Mitigation Measures: None required or recommended.

b) *Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?*

Senate Bill 32 requires California to reduce GHG emissions below 1990 levels by 2030 and Executive Order B-16-12 provides a target rate of 80 percent below 1990 emissions levels for the transportation sector by 2050. The transportation sector has three means of reducing GHG emissions: increasing vehicle efficiency, reducing fuel carbon content, and reducing the amount of vehicle miles (Office of Planning and Research 2018). CARB has provided a path forward for achieving these emissions reductions from the transportation sector in its 2016 Mobile Source Strategy. CARB determined that it will not be possible to achieve the State’s 2030 and post-2030 emissions goals without reducing Vehicle Miles Traveled (VMT) growth. It has been concluded that to achieve the State’s long-term climate goals, California needs to reduce per capita VMT (Office of Planning and Research 2018). This can occur under CEQA through VMT mitigation. Many agencies use “screening thresholds” to quickly identify when a project should be expected to cause a less-than-significant impact without conducting a detailed study. PWD has determined to use the Los Angeles County Public Works thresholds of significance for determining if a project specific Transportation Impact Analysis is required (Los Angeles County Public Works 2020). Screening criteria for non-retail project trip generation provides that if the development project does not generate a net increase of 110 or more daily vehicle trips, then further analysis is not required.

According to the IS/MND prepared by Tetra Tech, Inc. for the City of Palmdale for a similar solar energy project approximately 2.5 miles away, construction and operation of the proposed Project of similar scope was expected to generate less than 110 trips per day. The City of Palmdale anticipated a daily average of 42 trips during construction with a maximum number of 92 trips on any given day.

There will be a total of two preventative maintenance and two inspection trips per month during operation of the solar facility for a total of four trips per month during operation. Operational trips associated with the Project would be negligible and limited to occasional maintenance and servicing of the solar system. The estimated daily construction trips are summarized in **Table 3-3**.

Table 3-4: Estimated Daily Trips during Construction for Representative Project

	Daily Average Trips	Maximum Trip Event
Construction Personnel	40	80
Deliveries	2	12
Total	42	92

Mitigation Measures: None required or recommended.

c) *Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?*

The proposed Project is a solar energy facility. Other than access roads for routine and emergency repairs, roads for the traveling project are not part of this project. There would be no impact.

Mitigation Measures: None required or recommended.

d) *Would the Project result in inadequate emergency access?*

The proposed Project would not result in inadequate emergency access. Permanent site access to the Tank Site is planned to use the temporary access routes located at the intersection of 6th St E / E Ave R/ E Ave R 8. Permanent site access to the HQ Site would be determined during final design, but may be available via the PWD headquarters or from 20th St E. These access roads will be included as part of the Project design and can be used by first responders in case of an emergency. These access roads have been designed to accommodate first responders and fire trucks. These roads are rated for the weight of a fire truck. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

3.18 Tribal Cultural Resources

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

a) *Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is*

geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

- i) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or
- ii) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

There are two Native American tribes in the region, the SMBMI and the FTBMI. **Mitigation Measures TRC-1** and **TRC-2** will be implemented to reduce impacts to potential pre-historic resources located within the Project area to a less than significant impact. With implementation of **Mitigation Measures TRC-1** and **TRC-2**, impacts would be less than significant.

Mitigation Measures:

Mitigation Measure TCR -1: Previously Undiscovered Cultural Resources and Monitoring and Treatment Plan

The SMBMI and the FTBMI shall be contacted, as detailed in Mitigation Measure CUL-1, of any pre-contact and/or post-contact cultural resources discovered during Project implementation, and be provided information regarding the nature of the find, so as to provide Tribal input with regards to significance and treatment. Should the find be deemed significant, as defined by CEQA (as amended, 2015), a cultural resources Monitoring and Treatment Plan shall be created by the archaeologist, in coordination with SMBMI and FTBMI, and all subsequent finds shall be subject to this Plan. This Plan shall allow for a monitor to be present that represents SMBMI for the remainder of the Project, should SMBMI elect to place a monitor on-site.

Mitigation Measure TCR -2: Archaeological and Cultural Documentation

Any and all archaeological/cultural documents created as a part of the Project (isolate records, site records, survey reports, testing reports, etc.) shall be supplied to the applicant and Lead Agency for dissemination to SMBMI and FTBMI. The Lead Agency and/or applicant shall, in good faith, consult with SMBMI and FTBMI throughout the life of the Project.

3.19 Utilities and Service Systems

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

construction or relocation of which could cause significant environmental effects?

- | | | | | |
|---|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| b) Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| c) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Discussion

a-b) Would the Project a) require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects, and b) have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?

The proposed Project is an alternative energy project and would not require the relocation or expansion of utilities such as water, wastewater treatment, electrical or natural gas. Stormwater generated on site would be directed nearby stormdrains. Water would be used as dust suppression during construction of the Project and in minor amounts during solar panel cleaning but expansion of water services to the Project will not be required. Other than metered water used for dust suppression, the Project will not require permanent water provisions. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

c) Would the Project result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?

During construction and routine or emergency services at the Project, portable toilets would be brought to the site for the workers and serviced by the portable toilet vendor. The Project does not include a sanitary system so there would be no Project-related impacts to the Palmdale Water Reclamation Plant. No impact would occur.

Mitigation Measures: None required or recommended.

d-e) Would the Project d) generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals; or, e)

comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

During site grubbing and clearance, green waste would be generated and disposed of in the local Class III landfill. Antelope Valley Landfill located at 1200 City Ranch Road, Palmdale, California, is the closest landfill to the Project site. Trash and debris generated during construction of the Project that would also be disposed of at a Class III landfill. Fees for disposing of green waste and non-hazardous waste would be paid by the Project proponent. Once the Project has been constructed, negligible amounts of trash may be generated when maintenance occurs. Any broken solar panels or those that need to be replaced would be either recycled or disposed of as manifested hazardous waste in a Class II or Class I landfill. This would be an infrequent occurrence. The proposed Project would not generate waste that would exceed the capacity of the local trash conveyors or the local landfill. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

3.20 Wildfire

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a-d) Would the Project a) substantially impair an adopted emergency response plan or emergency evacuation plan; b) due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire; c) require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or, d) expose people or structures to significant risks,

including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The Project is located within a Local Responsibility Area and is not designated as a Very High Fire Hazard Severity Zone (Calfire, n.d.). Therefore, the Project would have no impact.

Mitigation Measures: None required or recommended.

3.21 Mandatory Findings of Significance

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Does the Project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a Project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?*

As described in Section 3.4 Biological Resources, Section 3.5 Cultural Resources, Section 3.7 Geology and Soils, and Section 3.28 Tribal Cultural Resources, once proposed mitigation measures are implemented, the proposed Project does not have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major period of California history or prehistory. Additionally, the Project would not cause substantial degradation of habitat cause a fish or wildlife population to drop below self-sustaining levels nor a plant or animal community to be eliminated. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- b) *Does the Project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a Project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?*

The proposed Project has the potential to have cumulative impacts to air quality and GHGs. However, as discussed in Section III: Air Quality and Section VIII: Greenhouse Gas Emissions, these impacts would be temporary during construction and would not be significant.

Mitigation Measures: None required or recommended.

- c) *Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*

The proposed Project may have indirect minor short-term effects on human beings during construction. However, in the long term, the Project would have a beneficial impact because the Project would generate clean energy. No substantial adverse effects on human beings would occur. No impacts would occur.

Mitigation Measures: None required or recommended.

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**Woodard
& Curran**

woodardcurran.com

BOARD OF DIRECTORS
PALMDALE WATER DISTRICT

VIA: Mr. Dennis D. LaMoreaux, General Manager

December 6, 2022

The District developed a short scope of work and requested a proposal from ESA and Woodard & Curran. Woodard & Curran was selected to prepare the CEQA document. We received the Draft Initial Study and Mitigated Negative Declaration report (ISMND) and prepared the Notice of Intent (NOI) filing with the California State Clearinghouse on November 7, 2022. In addition, we posted the NOI and ISMND with Los Angeles County and referenced the posting on our websites. A copy of the study is also available at the District's Customer Care counter for review.

The report reviews air quality, biological resources, tribal resources, cultural resources, aesthetics, and other required parameters. It did not find any significant impacts that cannot be mitigated. The report also has plans for the contractor to follow if it encounters any of the issues listed.

Staff has reviewed all the comments and is asking the Board to adopt Resolution 22-34 Adopting the Notice of Intent for the Draft Initial Study and Mitigated Negative Declaration Study for the Solar Energy Project and to authorize staff to file the Notice of Determination (NOD) with the California State Clearinghouse.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 3 – System Efficiency and Strategic Initiative No. 6 – Customer Care, Advocacy & Outreach.

This item directly relates to the District's Mission Statement.

Budget:

There is no budget impact.

Supporting Documents:

- Resolution 22-34 being a Resolution of the Board of Directors of the Palmdale Water District Adopting the Notice of Intent for the Draft Initial Study and Mitigated Negative Declaration Study for the Palmdale Water District Solar Energy Project and Authorizing Staff to File the Notice of Determination with the California State Clearinghouse

RESOLUTION NO. 22-34

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT ADOPTING THE NOTICE OF INTENT FOR THE DRAFT INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION STUDY FOR THE PALMDALE WATER DISTRICT SOLAR ENERGY PROJECT AND AUTHORIZING STAFF TO FILE THE NOTICE OF DETERMINATION WITH THE CALIFORNIA STATE CLEARINGHOUSE

WHEREAS, Palmdale Water District (“District”) desires to reduce the steadily rising costs of meeting the energy needs at its facilities; and

WHEREAS, TerraVerde Energy, LLC (“TerraVerde”), has provided the District with analysis showing the benefits of implementing certain energy conservation measures through the installation of certain solar photovoltaic and battery energy storage facilities; and

WHEREAS, the District proposes to enter into a power purchase agreements and related contract documents with East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC, (“Providers”), pursuant to which Providers will design, construct, install, maintain, operate, and own on District property certain energy saving improvements consisting of solar photovoltaic facilities and battery storage systems and arrange with the local utility for interconnection of the facilities, which will generate energy for the sites on which such facilities are located (“Project”); and

WHEREAS, Providers are wholly-owned subsidiaries of Distributed Solar Development, LLC (“DSD”); and

WHEREAS, the District’s proposed approval of the Power Purchase Agreements and Easement Agreements whereby Providers are required to perform the Project is a “project” for purposes of the California Environmental Quality Act (“CEQA”); and

WHEREAS, pursuant to the authority and criteria contained in the CEQA, the District, as the Lead Agency, has analyzed the proposed project and has prepared a Mitigated Negative Declaration (SCH No. 2022110120) for the Project; and

WHEREAS, the Mitigative Negative Declaration was circulated for public review for the required 30 days from November 7, 2022 through December 6, 2022. A copy of the Mitigated Negative Declaration was circulated through the State Clearinghouse, posted on the District’s website, and was available at the District’s Customer Care counter.

WHEREAS, a public meeting to consider the Board’s adoption of the Mitigated Negative Declaration was duly noticed and held on December 12, 2022, at which time it received input from District Staff, public comment portion was opened, and public testimony and evidence, both written and oral, was considered by the Board, after which public testimony was closed; and

WHEREAS, the Board now desires to adopt a Mitigated Negative Declaration for the Project.

THEREFORE, THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT DOES HEREBY RESOLVE AS FOLLOWS:

1. The above recitals are true and correct and incorporated herein.

2. Pursuant to the California Environmental Quality Act (“CEQA”) and the District’s Local CEQA Guidelines, District prepared an Initial Study for the Project. It was determined that there was no substantial evidence that the Project would have a significant effect on the environment after the implementation of Mitigation Measures. Based on that determination, a Mitigated Negative Declaration was prepared. Thereafter, the District staff provided public notice of the public comment period and of the intent to adopt the Mitigated Negative Declaration.
3. The Board’s additional findings regarding the Project are set forth in the Initial Study/Mitigated Negative Declaration attached hereto as Exhibit 1, which findings the Board incorporates herein by this reference.
4. The Board of Directors hereby approves and adopts the Mitigated Negative Declaration for the Project in the form attached hereto as Exhibit 1.
5. The General Manager and District staff are hereby authorized and directed to take such further actions as may be necessary and appropriate to implement this Resolution, including filing the Notice of Determination with the appropriate county or other governmental authorities pursuant to CEQA and taking such other and further action as may be necessary or appropriate to carry out the purposes of this Resolution.

PASSED AND ADOPTED by the Board of Directors of the Palmdale Water District this 12^h day of December, 2022, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

President, Board of Directors

ATTEST:

Secretary, Board of Directors

APPROVED AS TO FORM:

Aleshire & Wynder, LLP, General Counsel

Exhibit 1

Mitigated Negative Declaration for the Project



Draft Initial Study and Mitigated Negative Declaration

Palmdale Water District
Solar Energy Project

Prepared for:

Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550

Prepared by:

Woodard & Curran
801 T Street
Sacramento, CA 95811

woodardcurran.com

**Palmdale Water
District**
November 2022

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ACRONYM LIST

AB	Assembly Bill
AC	alternating current
AF	acre-feet
APCO	Air Pollution Control Officer
AVAQMD	Antelope Valley Air Quality Management District
BESS	battery energy storage system
BMP	best management practice
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CH ₄	methane
CNDDDB	California Natural Diversity Database
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalents
dc	direct current
District	Palmdale Water District
DTSC	(California) Department of Toxic Substances Control
EAP	Energy Action Plan
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
FTBMI	Fernandeño Tataviam Band of Mission Indians
GHG	greenhouse gas
HQ	headquarters
IPaC	Information for Planning and Consultation
IS/MND	Initial Study/Mitigated Negative Declaration

ITP	Incidental Take Permit
IUCN	International Union for Conservation of Nature
kWh	kilowatt hours
kWh/AF	kilowatt hours per acre-foot
MG	million gallons
MND	Mitigated Negative Declaration
MT	metric ton
MT/yr	metric tons per year
MWh	Megawatt hours
NAAQS	National Ambient Air Quality Standards
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
PCS	Power Conditioning System
PFYC	Potential Fossil Yield Classification
PM	particulate matter
PV	photovoltaic
PWD	Palmdale Water District
RWQCB	Regional Water Quality Control Board
SCADA	Supervisory Control or Data Acquisition
SCE	Southern California Edison
SIPs	State Implementation Plans
SMBMI	San Manuel Band of Mission Indians Cultural Resources Department
SO ₂	sulfur dioxide
SO _x	oxides of sulfur
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
VMT	Vehicle Miles Traveled
VOC	volatile organic compound
WEAP	Worker Environmental Awareness Program

1. INTRODUCTION

1.1 Purpose of this Document

The Palmdale Water District (PWD or District) has prepared this Initial Study/Mitigated Negative Declaration (IS/MND) to provide the public and Responsible and Trustee Agencies reviewing the proposed Project with information about the potential impacts on the environment. This IS/MND was prepared in compliance with Sections 15070 to 15075 of the California Environmental Quality Act (CEQA) Guidelines of 1970 (as amended), and California Administrative Code, Title 14, Division 6, Chapter 3. In accordance with Section 15070, a Mitigated Negative Declaration (MND) shall be prepared if the initial study shows that either:

- There is no substantial evidence, in light of the whole record before the agency, that the Project may have a significant effect on the environment; or
- If the initial study identifies potentially significant effects, but revisions to the Project would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur.

PWD as the CEQA lead agency has determined that an IS/MND should be prepared for the proposed Project.

1.2 CEQA Process

In accordance with Section 15073 of the CEQA Guidelines, this document is being circulated to local, state, and federal agencies and to interested organizations and individuals who may wish to review and comment on the report. PWD has circulated the IS/MND to the State Clearinghouse for distribution and a 30-day public review (November 7, 2022 to December 6, 2022). PWD will evaluate comments received on the draft IS/MND and will prepare responses to address any substantial evidence that the proposed Project could have a significant impact on the environment. If there is no such substantial evidence, FSSD as lead agency will adopt the MND in compliance with CEQA.

Written comments should be submitted to PWD by 5:00 PM, December 6 2022. Submit comments to:

Adam Ly
Assistant General Manager
Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550

This IS/MND and any comments received during the public review process will be considered by the PWD Board of Directors at a public hearing. Consistent with Assembly Bill (AB) 361 regarding public meetings during the COVID-19 Emergency, Directors may attend the meeting telephonically or by teleconference and the meeting may be accessible telephonically or otherwise electronically to members of the public.

Palmdale Water District
December 12, 2022
6:00 PM
2029 E Ave Q
Palmdale, CA 93550

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2. PROJECT DESCRIPTION

2.1 Project Overview

PWD is proposing to install solar facilities at the District’s Headquarters (HQ Site) located at 2029 East Avenue Q, Palmdale, CA and solar facilities and battery energy storage system at the 6 million gallon (MG) Tank Site (Tank Site) located at 641 E Avenue S, Palmdale, CA at the intersection of East Avenue S and Sierra Highway (herein referred to as the Project). The District is undertaking this Project to mitigate rising energy costs and provide an alternative energy source for District operations.

2.1.1 Existing Conditions

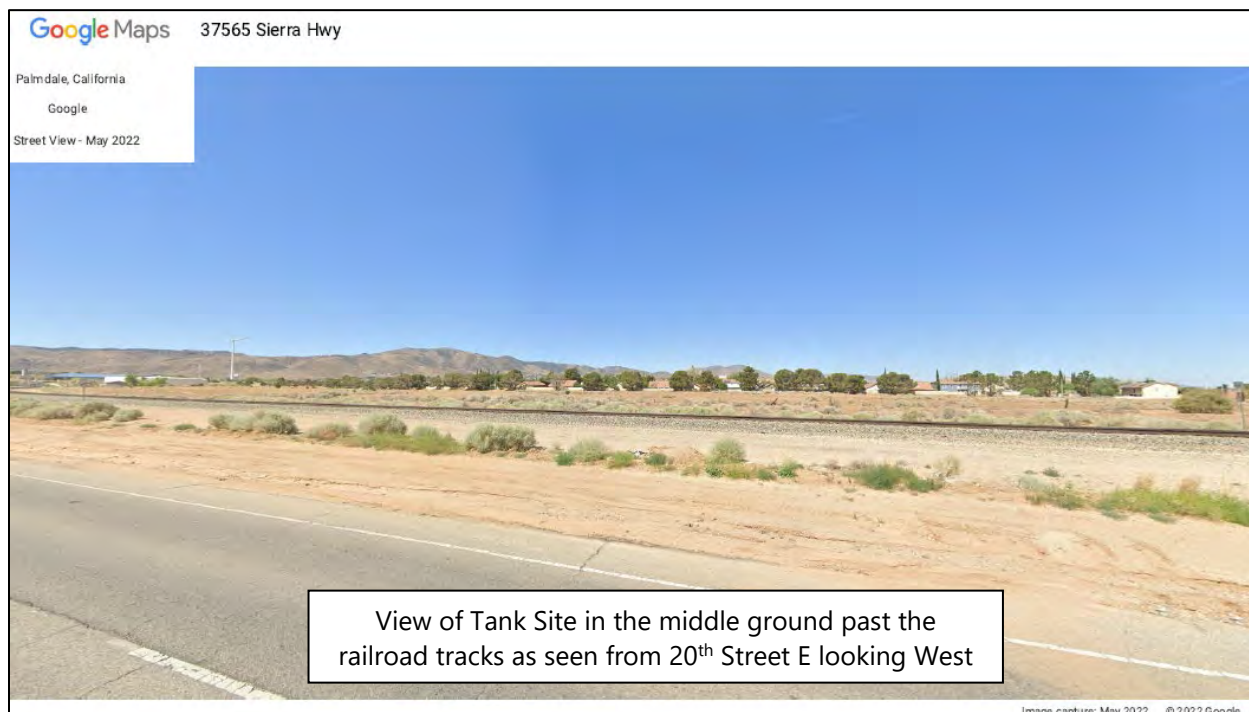
The HQ Site is located in an open, undeveloped field adjacent to, and north of, the District’s headquarters. The HQ Site is designated Public Facility, as shown on the City of Palmdale General Plan Land Use map (City of Palmdale, 2019a) and zoned Public Facility in the City of Palmdale Zoning map (City of Palmdale, 2019b). The HQ Site is currently undeveloped, disturbed, vacant land covered with sparse brush and other vegetation (see **Figure 2-1**).

Figure 2-1: HQ Site Existing Conditions



The Tank Site is located in an open, undeveloped field north of an existing District 6 MG reservoir tank. The Tank Site is designated Single Family Residential (SFR-3) in the City of Palmdale General Plan Land Use map (City of Palmdale, 2019a) and zoned Single Family Residential (R-1-7,000) in the City of Palmdale Zoning map (City of Palmdale, 2019b). The Tank Site is also currently undeveloped, disturbed, vacant land with sparse brush and other vegetation (see **Figure 2-2**).

Figure 2-2: Tank Site Existing Conditions



2.1.2 Project Objectives

Primary Objectives

The proposed Project would provide an alternative energy source for District operations to prevent, minimize, or mitigate damage resulting from emergencies or disasters like power outages, as well as mitigate rising energy costs, which are increasingly a burden on PWD's revenue. PWD uses energy for the extraction and diversion, conveyance, and treatment of water supplies. According to 2020 Urban Water Management Plan (UWMP) (PWD, 2021), the energy intensity for the PWD service area (i.e., total amount of energy expended by PWD to take water from the supply source to the point of delivery) is 381 kilowatt hours per acre-foot (kWh/AF). In 2020, PWD consumed a total of 8,404 megawatt hours (MWh) of electricity. PWD currently sources 100 percent of its electricity from Southern California Edison (SCE). In the event of a regional power outage, PWD's ability to deliver water supplies may be interrupted or reduced significantly. A sustained water supply outage could result in PWD's inability to meet potable water needs for critical functions. Energy costs are also expected to rise as urban water demands continue to increase within PWD's service area. The proposed Project would diversify PWD's energy portfolio, providing system redundancy while also increasing energy cost savings.

Secondary Objectives

PWD seeks to enhance its renewable energy portfolio to meet the District's sustainability goals and help mitigate climate change. Energy consumption from non-renewable sources (such as natural gas) results in greenhouse gas (GHG) emissions, which are the root cause of climate change. Prolonged, intense droughts

as a result of climate change are causing imported water to become an increasingly unreliable source of water for PWD. Project implementation would result in a net offset of non-renewable energy demands with solar energy produced by the solar facilities, resulting in a reduction of GHG emissions and helping to mitigate climate change. As a result, the proposed Project would help PWD achieve the following six District sustainability goals (Personal communication, 2022):

1. Ensure availability and sustainability of management of water.
2. Ensure access to affordable, reliable energy through beneficial use of water.
3. Build resilient water system and foster innovation.
4. Ensure sustainable consumption and production of water.
5. Tackle climate change.
6. Conserve water resources.

2.2 Purpose and Need of the Project

2.2.1 District Background

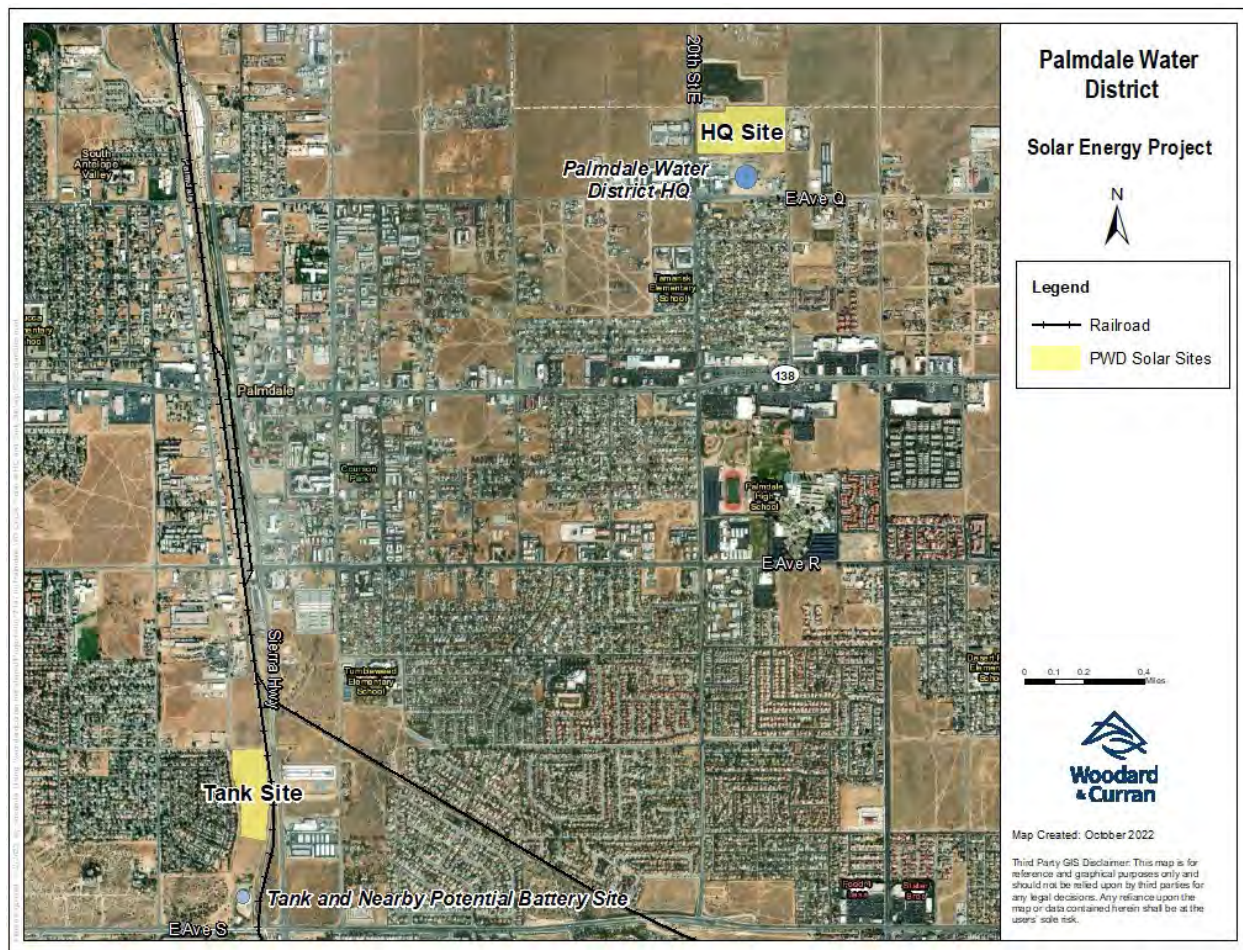
PWD is a municipal and industrial services water supplier located within the Antelope Valley in Los Angeles County, approximately 60 miles north of the City of Los Angeles and includes the central and southern portions of the City of Palmdale and adjacent unincorporated areas of Los Angeles County. Established in 1918, the primary function of the PWD is to provide retail water service within its service area. PWD meets the water demand of its almost 28,000 service connections through a combination of treated surface water from the State Water Project (SWP), local surface water, and groundwater pumped from water supply wells.

2.2.2 Project Location and Setting

The proposed Project locations, HQ Site and Tank Site, are both District-owned parcels adjacent to existing District's facilities, as shown in **Figure 2-3**. The HQ Site is about 20 acres and is located at 2029 East Avenue Q, Palmdale, CA, within Township 06 North Range 11 West. The HQ Site is located adjacent to District headquarters in an industrial/commercial area, surrounded by commercial/industrial uses to the east and the north, 20th Street E, a post office annex and several other businesses to the west, and District headquarters, other businesses, and E Avenue Q to the south.

The Tank Site is about 14 acres and is located west of Sierra Highway between E Avenue S and E Avenue R8, Palmdale, CA, within Township 06 North Range 12 West. Surrounding land uses include single family residential adjacent to the site to the west, and vacant and/or transportation/utilities to the north, south, and east. The Metrolink/Southern California Regional Rail Authority railroad tracks form the eastern border of the Tank Site. Other surrounding land uses include self-storage facilities and other commercial uses to the west of the site on the other side of Sierra Highway from the Tank Site, undeveloped lands to the north, and the Tank Site and undeveloped lands to the south.

Figure 2-3: Location of Proposed Solar Facilities at HQ Site and Tank Site



2.3 Project Characteristics

The proposed Project would construct and operate a 5,304 MWh alternative energy solar array at the HQ Site and a 2,914 MWh alternative energy solar array and battery storage facility at the Tank Site (see **Figure 2-3**). Both sites would include electrical connections from the solar arrays to the existing District facilities. Combined, the proposed solar Project and its related components would be constructed within the 20-acre HQ Site and the 14-acre Tank Site. The proposed solar energy Project would be connected to the existing SCE grid at the District Headquarters building and at the existing PWD 6 MG Tank located south of the Tank Site. The anticipated average maximum depth of ground disturbance is anticipated to be 3 to 5 feet.

2.3.1 Solar Fields

The proposed solar alternative energy project would be either based on a fixed tilt racking system or single-axis tracker system with a total system size of about 3950 kilowatt (kW). A fixed tilt angle solar racking system can be placed at a fixed tilt angle which is usually the optimum tilt to enable it can absorb the most sunlight whereas a single-axis tracker system allows the solar panels, otherwise known as photovoltaic (PV) panels, one axis of movement that is usually aligned north and south, allowing the panels to arc east to

west and track the sun as it rises and sets. The Project would require approximately 2,800 panels for Tank Site and 4,300 panels at HQ Site. Panel dimensions would be approximately 2 feet by 3 feet.

2.3.2 Battery Storage

Energy storage would include an on-the Tank Site intelligent battery energy storage system (BESS). The major electrical equipment includes battery modules and power conversion equipment. The BESS operations would be controlled and monitored remotely by the battery vendor via a Supervisory Control or Data Acquisition (SCADA) platform (described below). The BESS will be designed in accordance with the latest applicable codes and safety certifications (i.e., UL, NFPA, NEC, IEEE) for the design, construction, and operations of the facility.

The primary storage components would consist of self-contained lithium-ion battery systems that leverage the same conventional storage technologies (and vendors) as the batteries in a typical cell phone, laptop computer, or electric vehicle. The battery storage facility is designed such that the periodic maintenance and replacement of the underperforming battery components can be easily performed on an as-needed basis. The BESS and associated infrastructure (e.g., inverters, switches, etc.) would be serviced regularly via planned maintenance according to the manufacturer recommendations and on an as-needed basis by certified technicians.

The battery will be rechargeable and will be specifically selected and designed to perform the required operations within critical safety parameters beyond the planned operations for this facility.

Direct current (DC) electricity would be collected from the batteries and conveyed to the inverters. The typical battery modular energy storage solutions are approximately 8 to 10 feet in height. If the BESS option is included in the final design, the approximately 200-300 square foot of paved pad would be located within the existing Tank Site to the north of the existing tank.

2.3.3 Electrical Collection System

The solar panels would be organized into electrical groups referred to as “blocks” to allow adequate clearance for access roads and adequate access for maintenance. Each block would include an equipment pad containing one or more inverters and transformers. The inverter-transformer equipment pads would be prefabricated or assembled on site. Each inverter would be fully enclosed, be pad- or skid-mounted, and may range in height from approximately 5 to 9 feet. Inverters would be consolidated in areas to minimize cable routing, trenching, and minimal electrical losses. The alternating current (AC) output from the inverters would be routed through an AC collection system and consolidated within system switchgear. The final output from the Project would be processed through a transformer to match the interconnection voltage. The transformers would be pad-mounted and enclosed with a switchgear and a junction box. Electrical safety and protection systems would be provided to meet utility, California Independent System Operator (CAISO), and regulatory codes and standards.

2.3.4 Supervisory Control or Data Acquisition System

A data collection system would be designed to remotely monitor the facility operation and/or remotely control critical components. The fiber optic or other cabling would be installed throughout the solar field to a centrally located SCADA system. The SCADA system would also collect meteorological information for the Project site.

2.3.5 Associated Infrastructure

Associated infrastructure would include unpaved roads to allow access to the solar panels, a chain link perimeter security fence, tie-in to the existing/upgraded switchgear, and an underground distribution line to the point of interconnection with the SCE grid (see **Figure 2-4** and **Figure 2-5**). The distribution line would be buried in a trench.

2.3.5.1 Driveways and Access Roads

The Tank Site would be accessed on the west side of the site at the intersection of 6th St E, E Ave R, and E Ave R 8. The HQ Site would be accessed by one or more access points surround the site. Access may occur via the PWD Headquarters, E Ave P-8, and/or 20th St E. Gates would be installed at access points. The access would allow for emergency vehicles and maintenance and operation purposes. Unpaved access roads would be graded during construction and used for operation and maintenance throughout the Project sites.

2.3.5.2 Security Fencing

The Project site would be surrounded by an 8-foot-tall galvanized chain-link fence and as warranted topped with 1 foot of three- strand barbed wire, for a total fence height of 9 feet. "Warning High Voltage" signs would be placed along the fencing at regular intervals and at each gate pursuant to County and/or state requirements. The fencing would be secured with concrete footings and would have intermittent 12-inch openings along its foot for animal crossings. Fencing may include green visual barrier screening cloth.

2.3.5.3 Lighting

Lighting would be installed at each site entrance of the Project site for nighttime security purposes and at the switchgear area for maintenance purposes. Any lighting would consist of modern, low intensity, downward-shielded fixtures that are motion-activated, and would be directed onto the Project site. Motion detectors would be set at a sensitivity level that could not be triggered by small animal movement. The proposed Project would comply with the City of Palmdale Code Chapter 17.99.010.C, Renewable Energy – Development Standards.

Figure 2-4: HQ Site Layout

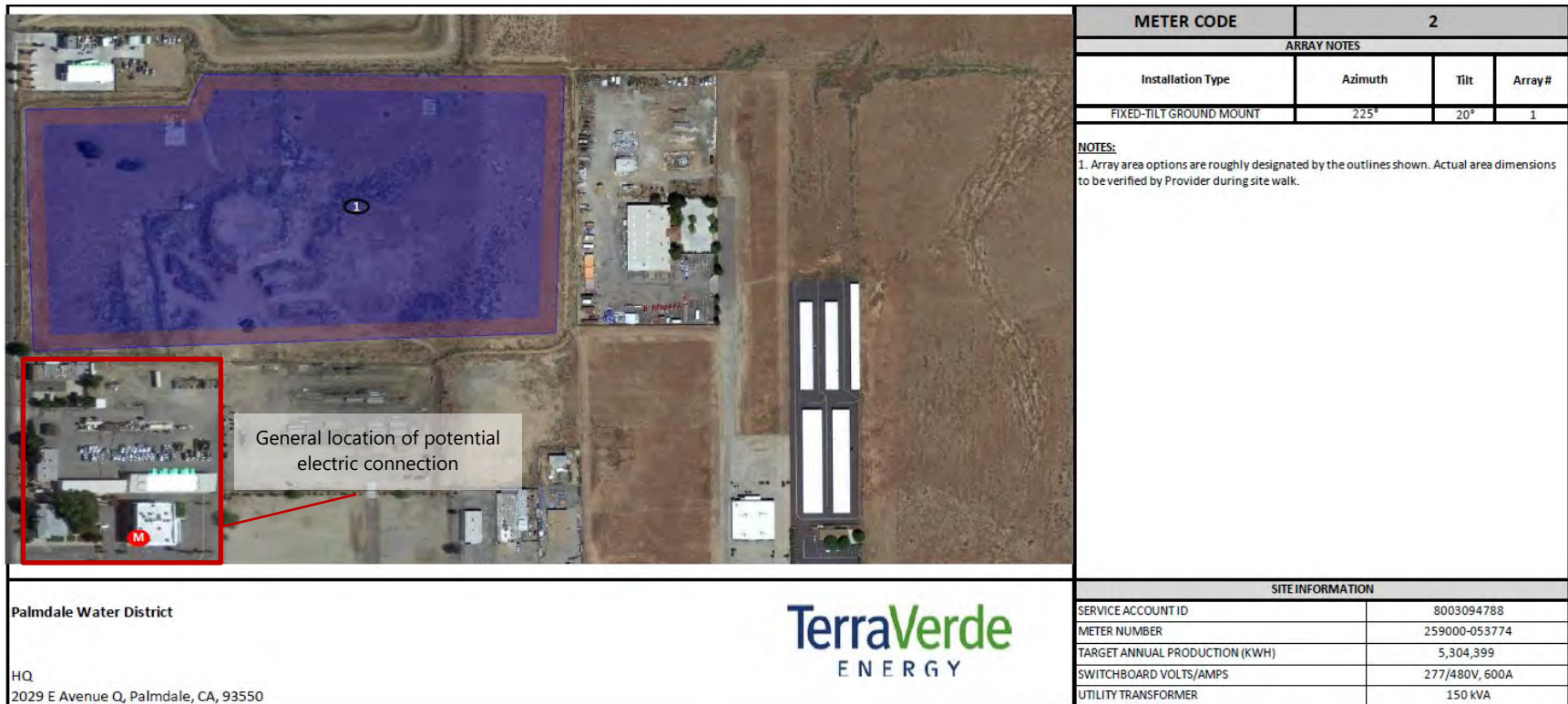
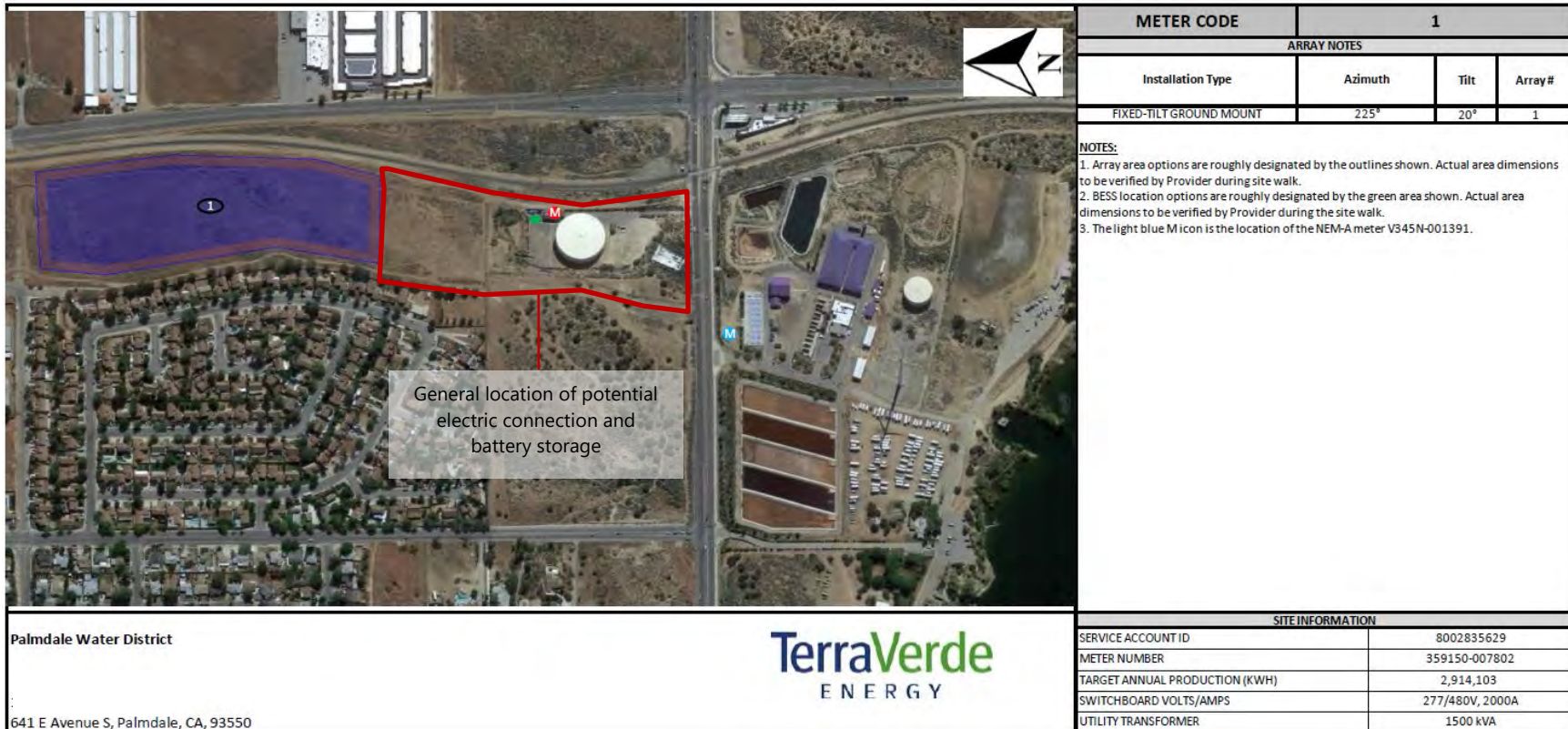


Figure 2-5: Tank Site Layout



2.4 Construction Activities

Project construction would consist of two major phases: (1) site preparation and grading, and (2) PV system/BESS installation. Construction of the Project is estimated to begin in or before the 4th Quarter 2023. **Table 2-1** provides a summary of construction activities for each site and their duration, as well as equipment and personnel that would be needed. Construction activities would be scheduled between 7:00 a.m. and 5:00 p.m., Monday through Friday.

Table 2-1: Summary of Construction Activities

Construction Activities	Duration (Days)	Equipment Type and Number	Number of Personnel
Site Grubbing and Preparation	50	Backhoe (1), Skid steer (1), Motor grader (1), Dump truck (1), Bulldozer (1), Roller (1)	10
Installation			
<i>Site Fences</i>	30	Forklift (1), Flatbed truck (1), Auger (1)	6
<i>Structures (PV arrays, BESS, etc.)</i>	75	Backhoe (1), Forklift (4), PD10 Pile driver (4)	25
<i>Electrical</i>	52	Trencher (1), Backhoe (2), Crane (1), Forklift (3)	60

2.4.1 Site Preparation and Grading

Construction of the Project would begin with initial clearing and grading of the onsite staging areas. Native soils would be used to level the site. Access to the Project site would be improved to for construction and on going maintenance access.

The onsite staging areas would typically include a construction trailer (as needed to support installation phase), a first aid station and other temporary structures (such as portable toilets), worker parking, truck loading and unloading facilities, and an area for assembly. Road corridors would be surveyed, cleared, and graded to bring equipment, materials, and workers to the areas under construction. Buried electrical lines, PV array locations, any necessary environmentally sensitive avoidance areas, and the locations of other facilities may be flagged and staked to guide construction activities. The Project site would be surrounded by a security fence. A secure controlled main access gate would be located at the entrance. A temporary landscape green fabric would be attached to the chain-link fence during construction. Best Management Practices (BMPs) such as straw wattles, use of hydroseeding, and wind screening for erosion control during site preparation would be employed. No import or export of soil from the proposed Project site would be required.

2.4.2 PV System Installation

PV system installation would include earthwork, grading, and landscaping, as well as erection of the PV modules, supports, and associated electrical equipment. The exact design would be finalized pending specific soil conditions. The pads for footings would be required and are estimated to have 3 to 4 foot depths and would be approximately 2 foot by 2 foot (or smaller) squares.

Wastes that would be generated during construction may include cardboard, wood pallets, copper wire, scrap steel, common trash, and wood wire spools. The contractor is not anticipated to generate hazardous waste during construction of the proposed Project. However, field equipment used during construction would contain various hazardous materials such as hydraulic oil, diesel fuel, grease, lubricants, solvents, adhesives, paints, and other petroleum-based products contained in construction vehicles.

2.4.3 Battery Storage Installation

The District anticipates that the battery storage containers would be constructed on concrete pads on the existing pavement at the Tank Site. The container would be bolted to meet or exceed the seismic requirements applicable to the District. The Power Conditioning System (PCS) and the medium voltage control system (i.e., inverters and transformers) would be mounted to the rack adjacent to the container.

2.4.4 Construction Water Use

Approximately 53 acre-feet (AF) of water would be required during construction, with actual consumption strongly dependent upon climatic conditions. Construction water needs would be limited to soil conditioning and dust suppression. Bottled water would be brought to the Project site for drinking and domestic needs. Required water needs would be met by water available on the existing District sites.

2.5 Operation and Maintenance

Table 2-2 provides an estimate of electricity output during the projected 25-year lifespan of the Project. The facilities would be constructed such that output could be monitored remotely. Normal preventative maintenance and routine inspections of the solar arrays, as well as periodic cleaning of the solar panels, would occur on a monthly or semi-monthly basis.

2.5.1.1 Permanent Site Access

Permanent site access to the Tank Site would use the access points established during construction. For the Tank Site access would be located at the intersection of 6th St E, E Ave R, and E Ave R 8. Access to the HQ Site would be determined during final design, but may be available via the PWD headquarters or from 20th St E.

The site access roads would be maintained on an as-needed basis and could involve re-grading of the unpaved access roads and drainage maintenance. Facilities at both sites would be inspected for signs of deterioration or repair needs on an annual basis. Emergency maintenance and repairs would occur immediately after a failure occurs.

Table 2-2: Summary of Energy Production During the Estimated Life Span of the Project

Year	Energy Production (MWh)
1	8,219
2	8,178
3	8,137
4	8,096
5	8,056
6	8,016
7	7,976
8	7,936
9	7,896
10	7,857
11	7,818
12	7,779
13	7,740
14	7,701
15	7,662
16	7,624
17	7,586
18	7,548
19	7,510
20	7,472
21	7,435
22	7,398
23	7,361
24	7,324
25	7,287

The estimated lifespan of the Project is 25 years.

2.5.2 Required Permits and Approvals

This IS/MND is intended to be used by the PWD Board of Directors when considering the Project. To support its decision on the Project, the Board must approve the MND and must also adopt a mitigation monitoring and reporting program to ensure compliance with mitigation measures during Project implementation. The IS/MND is also intended to be used by responsible agencies that have review and permit authority over the Project. Agencies with responsibility for permit approval of certain Project elements include:

- A Dust Control Plan to be reviewed and approved by the Antelope Valley Air Quality Management District (AVAQMD)
- State Water Resources Control Board Notice of Intent to obtain coverage under California General Construction Activity Stormwater National Pollutant Discharge Elimination System (NPDES) permit requiring preparation of a Stormwater Pollution Prevention Plan

3. ENVIRONMENTAL CHECKLIST FORM

1. **Project title:** Solar Energy Project
2. **Lead agency name and address:** Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550
3. **Contact person and phone number:** Adam Ly
Assistant General Manager
661-456-1062
4. **Project locations:**
 - 2029 East Avenue Q, Palmdale, CA
 - East Avenue S & Sierra Highway, Palmdale, CA
5. **Project sponsor's name and address:** Palmdale Water District
2029 E Ave Q
Palmdale, CA 93550
6. **General plan designation:** Public Facility, Single Family Residential
7. **Zoning:** Public Facility Single Family Residential

8. Description of project: PWD is proposing to install solar facilities at the District's Headquarters (HQ Site) located at 2029 East Avenue Q, Palmdale, CA and solar facilities and battery energy storage system at the 6 MG Tank Site (Tank Site) located at East Avenue S & Sierra Highway, Palmdale, CA). The two combined sites of the Project are located on approximately 34 acres and will generate approximately 8,218 MWh. The District is undertaking this Project to mitigate rising energy costs and provide an alternative energy source for District operations.

9. Surrounding land uses and setting: According to the City of Palmdale General Plan Map, the HQ site is designated Public Facility, and the Tank Site is designated Single Family Residential. Surrounding land uses for the HQ Site include vacant and/or commercial/industrial. The Tank Site is located adjacent to a residential development to the west. Other surrounding land uses include transportation and commercial/industrial to the north, south, and east.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

- A Dust Control Plan to be reviewed and approved by the AVAQMD
- State Water Resources Control Board Notice of Intent to obtain coverage under the California General Construction Activity Stormwater NPDES permit requiring preparation of a Stormwater Pollution Prevention Plan

11. Have California Native American tribes traditionally and culturally affiliated with the Project area requested consultation pursuant to Public Resources Code section 2180.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

To date, no requests for consultation have been received pursuant to Public Resources Code section 2180.3.1.

Environmental Factors Potentially Affected


The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- | | | |
|---|--|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Public Services |
| <input type="checkbox"/> Agriculture and Forestry Resources | <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Air Quality | <input type="checkbox"/> Hydrology / Water Quality | <input type="checkbox"/> Transportation |
| <input checked="" type="checkbox"/> Biological Resources | <input type="checkbox"/> Land Use / Planning | <input checked="" type="checkbox"/> Tribal Cultural Resources |
| <input checked="" type="checkbox"/> Cultural Resources | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Utilities / Service Systems |
| <input type="checkbox"/> Energy | <input type="checkbox"/> Noise | <input type="checkbox"/> Wildfire |
| <input checked="" type="checkbox"/> Geology / Soils | <input type="checkbox"/> Population / Housing | <input type="checkbox"/> Mandatory Findings of Significance |

Determination:

On the basis of this initial evaluation:

- I find that the proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared
- I find that the proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- I find that the proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects
- I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.



Signature
 Adam Ly, Assistant General Manager

Printed Name

11/7/2022

Date
 Palmdale Water District

For

Environmental Analysis

The environmental impact analysis for each resource defines the criteria used to judge whether an impact is significant based on the CEQA Initial Study Checklist and regulatory agency standards. Impacts that exceed identified threshold levels are considered significant. In describing the significance of impacts, the following categories of significance are used and are based on the best professional judgment of the preparers of the Initial Study:

- **No Impact:** An effect that would have no impact, or would have a positive impact on the environment, such as reducing an existing environmental problem.
- **Less than Significant:** An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures.
- **Less than Significant with Mitigation:** An impact is potentially significant but can be reduced to below the threshold level (to less than significant) given reasonable and available mitigation measures.
- **Potentially Significant:** An impact that would cause substantial, or potentially substantial, impacts above the threshold level. Such an impact requires further evaluation and would trigger the preparation of an Environmental Impact Report (EIR) for the project.

3.1 Aesthetics

Except as provided in Public Resources Code Section 21099, would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

a) *Would the Project have a substantial adverse effect on a scenic vista?*

No scenic vistas are present on the Project sites. No impact would occur.

Mitigation Measures: None required or recommended.

b) *Would the Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*

The California Department of Transportation (Caltrans) administers the California Scenic Highway Program (Streets and Highways Code, Section 260 et seq) to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. There are no officially designated California scenic highways or roadways in the Project area (Caltrans 2019). The California State Route 14 and California State Route 138 that run near the Project site are not designated scenic highways (Caltrans 2019). There are no scenic highways in the vicinity of the Project site and thus there would be no impact.

Mitigation Measures: None required or recommended.

c) *Would the Project in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from*

publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?

The proposed Projects are located on public facility land near residential neighborhoods and commercial/industrial areas. The Projects would have some change to the aesthetic of the area; however, it would not conflict with applicable zoning and other regulations governing scenic quality. Therefore, the Project would have a less than significant impact.

Mitigation Measures: None required or recommended.

d) *Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?*

The Project would not require nighttime lighting. According to a glare analysis conducted by Burns and McDonnell Consultants Inc for the City of Palmdale solar projects of similar size and scale have the potential to generate glare and glint that may cause impacts to public and pilots. The City of Palmdale’s glare analysis identified these potential impacts, by including a series of observational points at nearby intersections, adjacent roads and the approach paths and airport traffic control for the adjacent U.S. Air Force (USAF) Plant 42 airport. Using a Solar Glare Hazard Analysis Tool developed by Sandia National Laboratories plus guidelines provided by the Federal Aviation Administration, the study concluded that no glare or glint hazards would occur from the proposed solar project (City of Palmdale, 2020). Given the proximity and similarity of the proposed Project to studied conditions, the proposed Project would not add a new source of substantial light or glare. Any potential impacts would be less than significant.

Mitigation Measures: None required or recommended.

3.2 Agriculture and Forestry Resources

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

Discussion

a-e) Would the Project a) convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use; b) conflict with existing zoning for agricultural use, or a Williamson Act contract?; c) conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)); d) result in the loss of forest land or conversion of forest land to non-forest use?; or, e) involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

The HQ Site is located on a site that is designated by the Farmland Mapping and Monitoring Program as Urban and Built Up Land. The Tank Site is designated by the Farmland Mapping and Monitoring Program as Other Land, which are areas that do not sustain farmland (California Department of Conservation, 2018). Additionally, there are no designated Williamson Act lands at either site. There is no farmland or forest land at the Project site, thus there would be no impact.

Mitigation Measures: None required or recommended.

3.3 Air Quality

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non- attainment under an applicable federal or state ambient air quality standard?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Result in other emissions (such as those leading to odors or adversely affecting a substantial number of people)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

The Project site is within the portion of Los Angeles County that lies in the Mojave Desert Air Basin, under the jurisdiction of the AVAQMD. The AVAQMD regulates air quality through its permit authority over most

types of stationary emission sources and through its planning and review process. Applicable AVAQMD rules include, but are not limited to, those presented in **Table 3-1**.

Table 3-1: Applicable AVAQMD Rules

Rule/Regulation	Title
401	Visible Emissions
402	Nuisance
403	Fugitive Dust
404	Particulate Matter – Concentration

Rule 403 requires that a Dust Control Plan be prepared for review and approval by the AVAQMD Air Pollution Control Officer (APCO) prior to the start of construction activities. A Dust Control Plan would apply to the proposed Project because it would disturb more than five acres of surface area during construction. PWD will prepare the Dust Control Plan, which will detail how dust generated during construction will be controlled.

In addition, the proposed Project would comply with existing applicable state regulations, including the California Air Resources Board (CARB) In-Use Off-Road Diesel-Fueled Fleets Regulation (the Off-Road Regulation), which applies to all self-propelled off-road diesel vehicles 25 horsepower or greater used in California and most two-engine vehicles (except on-road two-engine sweepers). The Off-Road Regulation requires construction fleets to reduce their emissions by retiring older vehicles and replacing the retired vehicles with newer vehicles, repowering older engines, or installing verified diesel emission control strategies in older engines; and by restricting the addition of older vehicles to fleets (CARB, 2022).

a) Would the Project conflict with or obstruct implementation of the applicable air quality plan?

The federal Clean Air Act requires states to develop State Implementation Plans (SIPs) to state how they will attain or maintain the National Ambient Air Quality Standards (NAAQS). SIPs are a compilation of new and previously approved plans, programs, district rules, state regulations and federal controls. States and local air quality management agencies prepare SIPs for approval by the US Environmental Protection Agency (USEPA). SIPs are, in part, based on regional population, housing, and employment projections reflected in local general plans.

The Project sites are located in areas that are owned by PWD and zoned for public facilities, in the case of the HQ site, and single family residential, in the case of the Tank site. Small-scale solar is permitted on sites designated for public facilities and single family residential (City of Palmdale municipal code chapter 17.76.010 Land Use Matrix). Thus, the proposed Project would not conflict with the regional projections that form the basis of the SIP. In addition, the Project would comply with all applicable CARB and AVAQMD rules and regulations. Because the Project would be consistent with the growth forecast in the local land use planning documents, it is considered consistent with the State SIP. Therefore, the Project would not conflict with or obstruct implementation of the attainment plan.

Mitigation Measures: None required or recommended.

- b) *Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?*

Criteria air pollutants are the following six air pollutants for which the USEPA and the CARB have set ambient air standards: ozone (O₃), particle pollution (i.e., respirable particulate matter less than 10 microns in diameter [PM₁₀] and respirable particulate matter less than 2.5 microns in diameter [PM_{2.5}]), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and lead (Pb). The portion of Los Angeles County that is within the Mojave Desert Air Basin is designated attainment/ unclassified for all federal NAAQS except O₃ and is designated attainment/ unclassified for all California Ambient Air Quality Standards (CAAQS), except O₃ and PM₁₀ (CARB, 2017). This means that ambient concentrations of O₃ and PM₁₀ at the Project site exceed levels determined by the USEPA and CARB to be acceptable to protect public health. AVAQMD has established mass daily and annual significance thresholds to assist lead agencies in determining whether or not a project's activities would result in a cumulatively considerable net increase in any criteria pollutant (AVAQMD, 2016). Any project that would result in emissions that exceed the evaluation criteria is significant.

The proposed Project would generate temporary emissions of criteria pollutants O₃, PM₁₀, PM_{2.5}, CO, and SO₂ during its construction stage as a result of the use of internal combustion engines for heavy construction equipment, worker and vendor vehicle trips, and hauling trips. However, activities and emissions occurring during construction would stop once construction of the proposed Project is completed.

Operation emissions would be minimal and result from normal preventative maintenance and routine inspections. Preventative maintenance would consist of a vehicle trip and power washing occurring twice monthly. Routine inspections would occur twice a month.

This Project assumes air emissions would be similar to those calculated for the City of Palmdale's solar energy generating facility, a project of comparable size and scope. In 2020, Tetra Tech, Inc. completed an IS/MND for the City of Palmdale proposing to construct, operate, and eventually decommission a 25-megawatt (MW) solar project on a 140-acre site approximately 2.5 miles away from the proposed Project. Air emissions resulting from construction were calculated for the City of Palmdale's project based on a scenario where each equipment piece in each phase runs simultaneously. This approach assumed maximum daily operating time for all equipment assigned in each construction phase (e.g., Site Preparation, Grading, and Paving). Construction emissions were calculated using the California Emissions Estimator Model (CalEEMod). CalEEMod is designed to take information such as project size; construction length; vehicle and equipment types; number of vehicle trips and trip lengths; and equipment operating hours to calculate emissions of criteria air pollutants and GHGs. Emission calculations factored dust control measures such as those prescribed in AVAQMD Rule 403 and off-road vehicles using on average Tier 3 engines to comply with existing CARB regulations to phase out older, more polluting construction equipment engines (e.g., CARB Off-Road Regulation). Operational emissions are estimated based on two vendor trips per month for panel washing and or maintenance purposes and two inspection trips per month. Operational emissions were estimated using CalEEMod.

CalEEMod calculated air emission results for the City of Palmdale's solar energy generating facility are summarized in **Table 3-2** and compared to the AVAQMD significance thresholds.

Table 3-2: Project Construction Emissions of Criteria Pollutants for Representative Project

Project Phase	VOCs	NO_x	CO	SO_x	PM₁₀	PM_{2.5}
Construction 2020 Annual (tons)/Daily (lbs)	0.02/3.9	0.20/37.0	0.11/29.4	0.00/0.0	0.10/3.3	0.04/1.8
Construction 2021 Annual (tons)/Daily (lbs)	0.20/5.7	1.60/57.3	1.43/40.8	0.00/0.1	0.35/8.2	0.18/3.4
Operational Emissions Annual (tons)/Daily (lbs)	0.00/0.1	0.04/3.2	0.05/4.2	0.00/0.0	0.00/0.2	0.00/0.2
<i>Threshold of Significance</i> Annual (tons)/ Daily (lbs)	<i>25/137</i>	<i>25/137</i>	<i>100/548</i>	<i>25/137</i>	<i>15/82</i>	<i>12/65</i>
Significant?	No	No	No	No	No	No

- Notes:
- lbs - pounds
 - NO_x - oxides of nitrogen (nitric oxide and nitrogen dioxide)
 - SO_x oxides of sulfur (sulfur dioxide and sulfur trioxide)
 - VOC volatile organic compounds

Estimated construction emissions from the City of Palmdale’s project did not exceed the AVAQMD established thresholds. With the single vehicle trip to the facility that would occur once or twice a month, modeled emissions from operation of the facility did not exceed AVAQMD established daily thresholds. Given that the City of Palmdale’s project is representative of the District’s Solar Energy Project, the District’s proposed Project would also not exceed AVAQMD established daily thresholds.

Mitigation Measures: None required or recommended.

c) Would the Project expose sensitive receptors to substantial pollutant concentrations?

The proposed Project is not expected to expose sensitive receptors to substantial pollutant concentration during its construction or operation phases. At the HQ Site, the closest sensitive receptor is Tamarisk Elementary School located at 1843 E Ave Q-5, Palmdale, CA 93550, approximately 0.31 miles south of the site. At the Tank Site, the closest sensitive receptor is Tumbleweed Elementary School located at 1100 E Ave R-4, Palmdale, CA 93550, approximately 0.78 miles northeast from the site. During construction, emissions from off-road vehicles would be generated but would be temporary and are not anticipated to impact workers in nearby buildings. Criteria air pollutant emissions from construction equipment would not exceed threshold limits (**Table 3-2**) that are designed to protect public health. Operation of the proposed Project would generate minimal emissions resulting from normal preventative maintenance and routine inspections. Two preventative maintenance trips and two inspection related trips would occur monthly. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

d) *Would the Project result in other emissions (such as those leading to odors or adversely affecting a substantial number of people?)*

The proposed Project would generate odors resulting from diesel combustion by on-road and off-road vehicles during the construction phase. Odors from construction sources would be significant if they were to become a nuisance pursuant to Rule 402. To become a nuisance, odors resulting from the Project would need to generate multiple valid odor complaints. Construction equipment would emit sulfur compounds, which can have a rotten-egg odor. However, construction emissions would be temporary and would dissipate quickly with distance from the equipment. Furthermore, emissions of SO_x would be well below regional significance thresholds (**Table 3-2**). Therefore, perception of construction related odors are anticipated to be less than significant.

Mitigation Measures: None required or recommended.

3.4 Biological Resources

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

To begin assessing the potential impact on special-status species, a list of special-status species previously documented within a 0.25-mile radius of the proposed Project sites was compiled from the California Natural Diversity Database (CNDDDB) (CDFW, 2022). Seven records were included in the CNDDDB results: two mammals, San Joaquin Pocket mouse (*Perognathus inornatus*, listed by the International Union for Conservation of Nature (IUCN) as being of "least concern", and Mohave ground squirrel (*Xerospermophilus mohavensis*, threatened under the California Endangered Species Act (CESA)); two birds, Le Conte's thrasher (*Toxostoma lecontei*, California Department of Fish and Wildlife (CDFW) species of special concern), and Swainson's hawk (*Buteo swainsoni*, threatened under CESA); an insect, Crotch bumble bee (*Bombus crotchii*, IUCN Endangered, NatureServe S1S2); a dicot plant, Horn's milk-vetch (*Astragalus hornii* var. *hornii*, NatureServe T1); and a mollusk, Soledad shoulderband (*Helminthoglypta fontiphila*, NatureServe G1,S1).

In addition to the CNDDDB, a search of the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database was compiled for the two project sites (UWFWS, 2022). The IPaC search results found that two birds, California condor (*Gymnogyps californianus*, IUCN Critically Endangered), and least Bell's vireo (*Vireo bellii pusillus*); one reptile, desert tortoise (*Gopherus agassizii*, IUCN Critically Endangered); and one insect, Monarch butterfly (*Danaus plexippus*, IUCN Endangered).

The Project site, which consists of vacant, disturbed land, does not contain optimal suitable habitat for special-status wildlife species, due to the existing development in the surrounding area, lack of native vegetation, and regular disturbance. However, a lack of quality habitat does not preclude species presence. It is assumed that the marginal habitat on the Project sites may support San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly and **Mitigation Measure BIO-1** would be required to confirm species presence or absence of these species. Mitigation Measure BIO-1 would also identify Project avoidance areas where feasible if species are found. If species are identified during reconnaissance surveys **Mitigation Measure BIO-2** would require a pre-construction clearance survey and implementation of a Worker Environmental Awareness Program (WEAP) prior to construction to address potential impacts. The pre-construction survey and WEAP required by **Mitigation Measure BIO-2** would mitigate potential impacts to the sensitive insect, reptile and mammal species that have the potential to occur at the Project sites.

Additionally, birds have the potential to nest near the Project site in or on trees, other ornamental vegetation, and buildings. Nesting bird species are protected by California Fish and Game Code (CFGC) sections 3503 and 3503.5, and the Migratory Bird Treaty Act. According to the IPaC search results (USFWS 2022), six birds of conservation concern have the potential to be affected by activities at the Project sites: California thrasher (*Toxostoma redivivum*), Clark's grebe (*Aechmophorus clarkia*), Costa's hummingbird (*Calypte costae*), Lawrence's goldfinch (*Carduelis lawrencei*), tricolored blackbird (*Agelaius tricolor*), and western grebe (*aechmophorus occidentalis*).

If initial ground disturbance and vegetation/tree trimming or removal is required during the nesting bird season (typically January 16 to September 30), the Project may impact nesting birds through injury, mortality, or disruption of normal adult behaviors resulting in the abandonment or harm to eggs and nestlings. Construction occurring within the vicinity of nesting birds may also indirectly impact individuals

with construction noise, dust, and vibration from equipment. PWD would implement **Mitigation Measure BIO-3** to comply with CFGC 3503, CFGC 3503.5, and the Migratory Bird Treaty Act. These measures include a pre-construction survey for nesting birds and measures to avoid and monitor bird nests, if found, until construction is complete.

The Project would adhere to mitigation measures in order to avoid disturbance to nesting birds and other sensitive species, and the Project's impact on special-status species during construction would be less than significant. After construction is complete, Project operations at the site would involve regular visits to the site by PWD staff, but species habitat would be able to persist within the Project boundaries and there would be no new long-term operational activities that would directly impact on special status species. Therefore, Impacts to special status species are less than significant with mitigation incorporated.

Mitigation Measures: None required or recommended.

Mitigation Measure BIO-1: Reconnaissance Biological Survey and Identifying Avoidance Areas

Reconnaissance level surveys and habitat assessment shall be conducted during Project design prior to construction to assess and minimize impacts on potential for sensitive status species. The survey shall be conducted by a biological professional. The survey shall denote where species are present and adequate habitat exists. The survey shall evaluate the marginal habitat on the Project sites for the presence or absence of Joshua tree, California juniper, nesting birds, burrowing owl, San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly. If present, the Project design shall avoid the species to the maximum extent feasible.

Mitigation Measure BIO-2: San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly WEAP Training and Pre-construction Survey

Because there is marginal habitat present within the Project area to support the presence of San Joaquin Pocket mouse, Mohave ground squirrel, Crotch bumble bee, and Monarch butterfly, a pre-construction survey prior to ground disturbance activity shall be carried out by a qualified biologist. WEAP training shall also be conducted prior to any ground disturbance activities, to address the potential for these species to occur within the Project area. The training will address BMPs prior to, during, and after construction, including appropriate protocol to follow if any special-status species are identified. All participants in construction activities will be required to attend this training prior to ground disturbance, and a signature from each participant will be required at the conclusion of the training. If species are identified during the pre-construction surveys, the qualified biological professional shall implement CDFW guidance for avoiding, protecting, and mitigating impacts.

Mitigation Measure BIO-3: Nesting and Migratory Birds Avoidance

If Project grading/construction activities are scheduled to occur during the nesting season for breeding birds (typically January 15th through September 30th), the following measures shall be implemented:

- An Avoidance Plan for nesting birds will be prepared by a qualified biologist that would include measures that are effective, enforceable and feasible to avoid impacts to nesting birds. The Avoidance Plan would be fully developed prior to implementing Project-related ground disturbance activities that includes site preparation, equipment staging and mobilization.

- Within seven days prior to commencement of grading/construction activities, a qualified biologist shall perform a pre-construction survey of all proposed work limits and within 500 feet of the proposed work limits.
- If active avian nest(s) of non-special status species are discovered within or 500 feet from the work limits, a buffer shall be delineated around the active nest(s) measuring 300 feet for passerines and 500 feet for raptors. A qualified biologist shall monitor the nest(s) weekly after commencement of construction mobilization to ensure that nesting behavior is not adversely affected by such activities.
- If the qualified biologist determines that nesting behavior of non-special-status species is adversely affected by grading/construction activities, then a noise mitigation program shall be implemented in consultation with CDFW, to allow such activities to proceed. The noise mitigation program will include the following elements: within 10 calendar days prior to the start of construction activities (including removal of vegetation), a qualified biologist conducts a preconstruction survey to determine the presence or absence of nesting birds on the proposed area of disturbance; if nesting birds are detected, the biologist prepares a letter report and mitigation plan in conformance with applicable federal and State laws (e.g., appropriate follow-up surveys, monitoring schedules, construction and noise barriers/buffers) to ensure that take of birds or eggs or disturbance of breeding activities is avoided; the report/mitigation plan is submitted to the City for review/approval and implemented to the satisfaction of the City; and the biologist verifies in a report to the City that all measures identified in the mitigation plan are in place prior to and/or during construction. Once the young have fledged and left the nest(s), then grading/construction activities may proceed within 300 feet (500 feet for raptor species) of the fledged nest(s).

b) Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

According to the IPaC database (USFWS 2022), no federal critical habitats were returned in the IPaC results for the proposed Project sites. According to the California Office of Planning and Research SiteCheck tool (which identifies habitat and natural communities protected by CDFW), no sensitive plant communities or special habitats are present at the Project site or adjacent areas within 0.25 mile (OPR 2022). There is no riparian habitat present within the Project area, and no sensitive plant communities occur within the Project site. Therefore, there would be no impact on sensitive vegetation communities.

c) Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

According to the IPaC database (USFWS 2022), the Project locations do not intersect any mapped wetlands. The Project site does not contain seasonal wetlands and other areas that may be considered to be under the jurisdiction of the U.S. Army Corps of Engineers. Therefore, potential for impacts to federally or state protected wetlands would be less than significant.

d) *Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?*

The Project site could be used by nesting migratory birds. Furthermore, although it was not present in the CNDDDB or IPaC records results, the vacant land at the Project sites could provide suitable nesting habitat for burrowing owl (*Athene cunicularia*), a listed CDFW Species of Special Concern. As a result, disturbance of the sites during the nesting season may cause a significant impact. If construction activities were to occur during the typical nesting bird season, a nesting bird survey should be conducted. Avoidance plans for nesting birds through implementation of **Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, and BIO-5** would reduce impacts to migratory wildlife species to a less than significant.

Mitigation Measures:

See Mitigation Measure BIO-1 through 3, above

Mitigation Measure BIO-4: Burrowing Owl Avoidance Plan

An Avoidance Plan for burrowing owl will be prepared by a biological professional that will include measures that are effective, enforceable and feasible to avoid impacts to burrowing owl. The Avoidance Plan will be fully developed prior to implementing Project-related ground disturbance activities (e.g., site preparation, equipment staging and mobilization). A pre-construction presence/ absence survey for burrowing owl shall be conducted within 30 days prior to any on-site ground disturbing activity. The survey shall be conducted pursuant to the recommendations and guidelines established by the CDFW. In the event these species are not identified within the Project disturbance limits, no further mitigation is required. If, during the pre-construction survey, the burrowing owl is found to occupy the site, Mitigation Measure BIO-2 shall be required.

Mitigation Measure BIO-5: Burrowing Owl Relocation

If burrowing owls are identified during the survey period, PWD shall take the following actions to offset impacts prior to ground disturbance. Active nests within the areas scheduled for disturbance or degradation shall be avoided from February 1 through September 15, and a minimum 250-foot buffer shall be provided until fledging has occurred. Following fledging, owls may be passively relocated by a qualified biologist. If impacts on occupied burrows in the non-nesting period are unavoidable, on-site passive relocation techniques may be used if approved by the CDFW, to encourage owls to move to alternate burrows outside of the impact areas.

If relocation of the owls is approved for the site by the CDFW, PWD shall hire a qualified biologist to prepare a plan for relocating the owls to a suitable site. The relocation plan shall include all of the following:

- The location of the nest and owls proposed for relocation;
- The number of owls involved and the time of the year when the relocation is proposed to take place;
- The name and credentials of the biologist who will be retained to supervise the relocation;

- The proposed method of capture and transport for the owls to the new site.
- A description of the site preparation at the relocation site (e.g. enhancement of existing burrows, creation of artificial burrow, one-time or long-term vegetation control); and
- A description of efforts and funding support proposed to monitor the relocation.

e) *Would the Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

The Project sites may contain creosote bush scrub with some areas of undisturbed creosote scrub with scattered Joshua trees (Tetra Tech 2020). The Project may require the removal of Joshua trees, which requires compliance with CESA for western Joshua tree and City of Palmdale Development Code Chapter 14.04 for Joshua trees and native vegetation preservation. Implementation of **Mitigation Measures BIO-6, BIO-7, and BIO-8** would reduce impacts to a less than significant level.

Mitigation Measures:

Mitigation Measure BIO-6: Western Joshua Tree Avoidance

If “take” or adverse impacts to western Joshua tree cannot be avoided during Project implementation, consultation with the CDFW will be undertaken and a CESA Incidental Take Permit (ITP) (pursuant to Fish & Game Code, § 2080 et seq.) will be sought. During the consultation process, if take of western Joshua tree is necessary for the Project to be constructed, compensatory mitigation will be required in the ITP and may include in-kind and/or in-lieu mitigations as per Fish and Game Code 2081 to offset impacts. The ITP will also specify minimization and avoidance measures and fully mitigate any impacts to western Joshua tree. No take of western Joshua tree will occur until the ITP has been issued to and accepted by the applicant. In addition, PWD will not approve the Project until the ITP has been issued and required mitigation completed.

Mitigation Measure BIO-7: Native Desert Vegetation Plan

PWD shall have a native desert vegetation plan prepared by a desert native plant specialist. The plan shall, at minimum, include the following:

- A written report and a site plan which depicts the location of each Joshua tree and California juniper, discusses their age and health, identifies and locates all trees and shrubs which can be saved in place or relocated.
- A site landscaping plan showing the proposed location of those Joshua trees, California junipers, and any other native desert vegetation that will remain on-site.
- A long-term maintenance program for any desert vegetation preserved on the site. The minimum term of any maintenance program shall be two growing seasons, unless a shorter length of time is approved by CDFW.

Mitigation Measure BIO-8: Joshua Tree Transplanting

Two years following Joshua tree transplanting, a written report shall be submitted to PWD. This report shall indicate the number of Joshua trees transplanted, the date(s) of transplanting, the method of transplanting, dates Joshua trees are watered, and the number of Joshua trees surviving.

f) *Would the Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?*

The Project area is not located within or near lands that are governed by a Habitat Conservation Plan, a natural community conservation plan or other approved, local, regional or state habitat conservation plan. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.5 Cultural Resources

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

a) *Would the Project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?*

The Palmdale area was largely undeveloped prior to the completion of the Southern Pacific Railroad through the Antelope Valley in 1876. In 1886, farming families predominantly from the Midwest settled in the Antelope Valley. When drought in the valley's desert climate rendered many agricultural homesteads unviable, many settlers relocated closer to the Southern Pacific Railroad Station in the present-day location of Palmdale's civic center. The completion of the Los Angeles Aqueduct in 1914 brought irrigation to the Antelope Valley, allowing for the cultivation of pears, apples, and alfalfa. Palmdale remained primarily an agricultural community until the growth of the aerospace industry during World War II. Palmdale became a center of the U.S. aerospace industry due to its proximity to Edwards Airforce Base, and the establishment of U.S. Air Force Plant 42 in 1953 (Rincon Consultants, 2022).

Per the City of Palmdale General Plan EIR, there is a possibility that during Project activities such as grubbing and grading or setting foundations, buried historical resources may be discovered (Rincon Consultants, 2022).

In the event of an inadvertent discovery of historical resources during construction, Mitigation Measures **CUL-1, CUL-2, and CUL-3** would be implemented to provide steps for mitigating impacts to a previously undiscovered resource. These measures would reduce the potential impacts to less than significant.

Mitigation Measures:

Mitigation Measure CUL-1: Confirm and Monitor for Cultural Resources

Prior to final design, PWD shall conduct a record search and field survey to confirm assumed site sensitivity and identify any resources to be avoided. If resources are identified on site, they shall be avoided or treated following Secretary of the Interior standards. If the qualified archaeologist determines the site to be highly sensitive with a high likelihood of discovering buried or previously unidentified objects, a qualified archaeological monitor shall be present during ground disturbing activities in that area such as grading, trenching, or excavation. Archeological monitoring shall be performed during initial ground disturbance only (not entire construction timeframe) under the direction of an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archeology. Archeological monitoring may be reduced or halted at the discretion of the monitors, in consultation with PWD.

In the event that cultural resources are discovered during Project construction activities, all work shall cease and a qualified archaeologist meeting Secretary of Interior standards shall assess the find. A qualified archaeologist will make recommendation if work can continue or if a buffer can be established for work to continue. If the tribal cultural resources are encountered, the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI) and the Fernandeño Tataviam Band of Mission Indians (FTBMI) shall be contacted, as detailed within Mitigation Measures TCR-1, regarding any precontact and/or post-contact finds and be provided information after the archaeologist makes his/her initial assessment of the nature of the find, so as to provide Tribal input with regards to significance and treatment.

Mitigation Measure CUL-2: Develop a Monitoring and Treatment Plan

If significant pre-contact and/or post-contact cultural resources, as defined by CEQA (as amended, 2015), are discovered and avoidance cannot be ensured, the archaeologist shall develop a Monitoring and Treatment Plan, the drafts of which shall be provided to SMBMI and FTBMI for review and comment, as detailed within **Mitigation Measure TCR-1**. The archaeologist shall monitor the remainder of the Project and implement the Plan accordingly.

Mitigation Measure CUL-3: Unintended Discovery of Human Remains

If human remains or funerary objects are encountered during any activities associated with the Project, work in the immediate vicinity (within a 100- foot buffer of the find) shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5 and that code enforced for the duration of the Project.

b) *Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?*

There is a possibility that during Project activities, buried cultural resources may be discovered. If this occurs, PWD is required to comply with City of Palmdale regulations and California Public Resources Code Section

21083.2. In the event that cultural resources are encountered during the course of construction activities, all work must cease until a qualified archaeologist determines the proper disposition of the resource.

In the event of an inadvertent discovery of cultural resources during construction, **Mitigation Measures CUL-1, CUL-2, and CUL-3** would be implemented to provide steps for mitigating impacts to a previously undiscovered resource. These measures would reduce the potential for impacts to less than significant.

Mitigation Measures:

See Mitigation Measures CUL-1, CUL-2, and CUL-3, above

c) *Would the Project disturb any human remains, including those interred outside of formal cemeteries?*

The discovery of human remains is always a possibility during ground-disturbing activities.. In the event that previously unknown human remains are discovered during construction of the Project, implementation of **Mitigation Measure TCR-2**, would reduce impacts to less than significant.

Mitigation Measures:

See Mitigation Measure TCR-2, in Section 3.18, below

3.6 Energy

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?*

Energy consumption during construction would have a nominal effect on the local and regional energy supplies. There are no unusual Project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in the region or State. Construction would be temporary and in compliance with AVAQMD regulations, and equipment would be maintained to optimal performance to reduce use of fuels. Once operational, the Project would be generating clean electricity, thereby reducing the use of fossil fuels for electricity in the area. Therefore, the Project would have a less than significant impact.

Mitigation Measures: None required or recommended.

b) *Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*

The proposed Project is an alternative energy project that is consistent with the City of Palmdale’s Energy Action Plan (EAP). The proposed alternative energy Project would assist the City of Palmdale in meeting its green energy goals. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.7 Geology and Soils

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineate on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) *Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:*
- i) *Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.*

The San Andreas fault is located less than a mile southwest of the Tank Site, and less than three miles southwest of the HQ Site. Rupture of the San Andreas within the City of Palmdale area would cause impacts to some degree to the region including the Project. According to the California Department of Conservation's Earthquake Zones of Required Investigation interactive map (2022) that incorporates the Alquist-Priolo Earthquake Fault Zoning data, the Project sites are not within known earthquake fault zones. Therefore, the Project would have no impact.

Mitigation Measures: None required or recommended.

- ii) *Strong seismic ground shaking?*

The Project area is located in a region that is subject to seismic events. The nearest fault is a portion of the San Andreas Fault located approximately one mile southwest of the Tank Site, and less than three miles southwest of the HQ Site. The solar facility would be unmanned and, therefore, a rupture of the San Andreas fault in the City of Palmdale planning area would not likely expose people to seismic rupture hazards as a result of the Project. A less than significant impact would occur.

Mitigation Measures: None required or recommended.

- iii) *Seismic-related ground failure, including liquefaction?*

The highest potential for liquefaction occurs in saturated, loosely consolidated sands and silts below the water table when the water table is within approximately 50 feet of the surface. The HQ site and the Tank Site parcel where the solar panels are proposed are not within liquefaction zones (Department of Conservation 2022). However, the parcel with the existing tank site is partially in a liquefaction zone. All new structures and facilities built on this parcel, such as the battery storage, would be built in accordance with the California Building Code and current design standards that prevent substantial adverse effects in the event of seismic-related ground failure. Additionally, the nature of the Project presents a low risk of loss, injury, or death if seismic-related ground failure were to occur. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

- iv) *Landslides?*

The topographic relief at the site is relatively flat. Site preparation for the Project will create a flat surface for the solar panels. There will be no slopes that may fail in a seismic event and cause adverse effects from a landslide. The potential for an earthquake-induced landslide at the Project area is very low. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

b) *Would the Project result in substantial soil erosion or the loss of topsoil?*

Site preparation would require grubbing and clearing of all vegetation present at the site. This would expose soils to erosion from wind and rain events. As more than one acre will be graded, the Project would be required to comply with the State of California NPDES General Permit for Discharges of Storm Water Associated with Construction Activity. A site-specific Storm Water Pollution Prevention Plan (SWPPP) would also need to be developed and implemented. The SWPPP will identify BMPs that would control on-site and off-site erosion from storm events and wind. The SWPPP will also identify BMPs for accidental spills of hazardous materials. Oversight by PWD will ensure compliance with any permit-related measures to control erosion generated by the Project. Therefore, a less than significant impact would occur.

Mitigation Measures: None required or recommended.

c) *Would the Project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?*

Lateral spreading occurs when large blocks of intact, nonliquefied soil move down slope on a liquefied soil layer. Lateral spreading is often a regional event. For lateral spreading to occur, the liquefiable soil zone must be unconstrained laterally and free to move along sloping ground. As stated earlier, the sites do not have the potential for liquefaction resulting in a low potential for lateral spreading at the Project area. The potential for subsidence, liquefaction and collapse are also unlikely. Therefore, a less than significant impact would occur.

Mitigation Measures: None required or recommended.

d) *Would the Project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?*

The Tank site is located on Ramona coarse sandy loam soils with 2 to 5 percent slopes. The HQ Site is located on Hanford coarse sandy loam with 0 to 2 percent slopes, Hesperia fine sandy loam with 0 to 2 percent slopes, and Greenfield sandy loam with 0 to 2 percent slopes. All these soil types are well drained and non expansive. Construction of the unmanned solar project will not create a substantial direct or indirect risk to life or property from expansive soils. No impact would occur.

Mitigation Measures: None required or recommended.

e) *Would the Project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?*

During construction, portable toilet/wash station facilities would be used by on-site workers. During routine or emergency repairs, portable toilet/wash station facilities would be mobilized to the site, if necessary. No septic system would be included as part of Project construction. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

f) *Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

Paleontological resource evaluations require analysis of geologic maps, existing literature, and an institutional record search. Geologic mapping indicated that the City of Palmdale’s project is entirely underlain by Holocene-age younger alluvium (Qa). While not mapped at the surface, Pleistocene-age older alluvium often occurs beneath Holocene-age younger alluvium at various depths (Paleo Solutions, Inc. 2019).

The Potential Fossil Yield Classification (PFYC) system was applied to the results of the analysis of existing data. Pleistocene-age older alluvium has a moderate paleontological potential (PFYC 3). Holocene-age younger alluvium (Qa) is estimated to be less than 11,000 years old and has a low paleontological potential (PFYC 2), because these deposits are too young to contain in-situ fossils. However, these younger deposits often overlie older geologic units with higher paleontological potential, which may be impacted at depth.

Based on the ground disturbance necessary to complete the Project, there is potential for adverse impacts to scientifically significant paleontological resources within Pleistocene-age older alluvium if encountered in the subsurface beneath the Holocene-age younger alluvium (Qa). With implementation of **Mitigation Measure GEO-1**, impacts would be less than significant.

Mitigation Measures:

Mitigation Measure GEO-1: Previously Undiscovered Paleontological Resources

If paleontological resources are discovered during earthmoving activities, the construction crew would immediately cease work at the discovery. In accordance with Society of Vertebrate Paleontology guidelines (Society of Vertebrate Paleontology 2010), a qualified paleontologist would assess the nature and importance of the find and recommend appropriate salvage, treatment, and future monitoring and mitigation.

3.8 Greenhouse Gas Emissions

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

GHG emissions are reported as metric tons per year (MT/year) measured as carbon dioxide equivalents (CO₂e). Because every GHG has a different global warming potential, CO₂ is used as the “reference gas” for climate change, and emissions of other GHGs are reported as CO₂e. For example, methane (CH₄) has a global warming potential 21 times greater than CO₂, so emissions of CH₄ are converted into CO₂e for purposes of calculating GHG emissions.

The AVAQMD (AVAQMD, 2016) has established thresholds of GHG emissions (**Table 3-2**) which if exceeded would render a Project as having a significant adverse impact. The proposed Project would create local GHGs during construction and operation activities but not in significant quantities. It would generate small amounts of GHG emissions from vendor vehicle trips associated with periodic cleaning of the solar panels and inspections. However, the proposed solar energy Project would create clean and renewable electricity, displacing GHGs that are produced in the process of generating electricity from fossil fuels and/or coal.

Tetra Tech, Inc. (Tetra Tech, 2020) evaluated the GHG emissions associated with the construction and operation of the City of Palmdale’s solar energy project, a representative project located approximately 2.5 miles away and that is similar in scope and size to the proposed Project. GHG emissions were calculated using CalEEMod and are summarized in **Table 3-3**. Operation emissions were estimated based on two vendor trips per month for the purpose of cleaning and maintaining the panels and two inspection-related trips per month.

Table 3-3: Project Construction and Operation Emissions of GHGs for Representative Project

Project Phase	CO ₂ e Annual (MT)/Daily (lbs)
Project Construction 2020	17/ 4,831
Project Construction 2021	230/ 7,622
Project Operation	8/ 710
<i>Threshold of Significance</i>	<i>100,000/ 548,000</i>
Significant?	No

Notes: • lbs pounds
 • MT metric tons

Additionally, the proposed Project would displace GHG emissions that would otherwise be emitted in the process of generating electricity using traditional measures such as burning of fossil fuels at the power plant level. The construction and operation emissions would be significantly lower than the thresholds, and the Project would displace future GHG emissions, thus the proposed Project would have a less than significant impact and no mitigation would be required.

Mitigation Measures: None required or recommended.

b) *Would the Project Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?*

The proposed Project would develop renewable energy on land designated for public facilities and single family residential and would not result in an increase of either population or emissions sources inconsistent with what has been planned for in the City of Palmdale’s General Plan (City of Palmdale, 2021). The proposed Project is also consistent with the City of Palmdale’s EAP, which promotes the establishment of large-scale solar facilities to supply regional energy needs. The EAP is consistent with the State of California GHG reduction goals prescribed under Executive Order S-3-05 and AB 32 (City of Palmdale, 2011).

The proposed Project would be consistent with the General Plan, the City of Palmdale’s EAP, and State GHG reduction goals, therefore it would have less than significant impact and no impacts would occur.

Mitigation Measures: None required or recommended.

3.9 Hazards and Hazardous Materials

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a-b) *Would the Project a) create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or b) create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?*

During construction, equipment would require small amounts of potentially hazardous materials such as fuels and lubricants on a regular basis. Some of these materials would be transported to the site by permitted vendors who would be required to obtain permits and are subject to inspection to ensure compliance with all relevant state and federal regulations governing the transportation of hazardous materials. Standard BMPs for storage and minor spills or leaks would be used to ensure any accidental hazardous materials releases will be cleaned up and disposed of as appropriate. When not in use, equipment will be parked in identified parking areas to prevent accidental leaks from entering the drainages. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- c) *Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?*

The Project area is not within a quarter mile of an existing school and the proposed Project would not be a source of toxic air emissions. The nearest school to the HQ Site is Tamarisk Elementary School which is approximately 0.31 miles south, and the nearest school to the Tank Site is Tumbleweed Elementary School which is approximately 0.78 miles northeast from the site. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

- d) *Would the Project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*

A search of the EnviroStor database maintained by the California Department of Toxic Substances Control (DTSC) and the GeoTracker database maintained by the Regional Water Quality Control Board (RWQCB) for the HQ Site (2029 E. Avenue Q, Palmdale, CA 93550) and Tank Site (641 E. Avenue S, Palmdale, CA 93550) was completed. Neither database has records for the proposed Project area. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- e) *For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?*

There are no public or private airports located in the vicinity of the Project sites. The sites are not located within an airport land use plan or within two miles of a public or private airport. There would no impact.

Mitigation Measures: None required or recommended.

f) *Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

During construction, the proposed Project would generate additional traffic associated with workers mobilizing daily to the Project site. Equipment would be transported to the Project site. Traffic generated during construction is not expected to block the roadways. Once constructed, with the exception of workers traveling to the Project site to conduct routine and/or emergency repairs, no traffic to the site would occur. The proposed Project would be an unmanned solar facility and would not interfere with any adopted emergency response plan or emergency evacuation plan. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

g) *Would the Project Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?*

The Project area is not associated with a wildland area. Once constructed, the solar facility would be maintained weed free to reduce risks from a wildfire. In the event of a wildfire, there would be a low risk for injury, or death to workers because it would be an unmanned facility. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

3.10 Hydrology and Water Quality

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) result in substantial erosion or siltation on- or off-site;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iv) impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation?
- e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Discussion

- a) *Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*

During construction, BMPs identified in a Project-specific SWPPP would be used to control any stormwater flow generated on site. During site clearance and grading, water would be used for dust suppression. To prevent violations of water quality standards, the site would be graded to ensure no impacts to the existing drainage. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- b) *Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?*

Water would be used during site grubbing and grading for dust suppression. PWD is the water purveyor for the Project site. PWD utilizes groundwater from the Antelope Valley Groundwater Basin and surface water from either the SWP or the Littlerock Reservoir (Palmdale Water District, 2020). This use would be temporary and would not deplete groundwater supplies or interfere substantially with groundwater recharge that would cause a net deficit in aquifer volume or lowering of the local groundwater table. Once the Project is developed, the site would remain substantially permeable to rain. PWD would comply with City of Palmdale ordinances and regulations related to the construction water use. Once the Project is built, no water would be required. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

- c i-iv) *Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) impede or redirect flood flows?*

The Project would not result in a change in the local drainage patterns of the Project area. Stormwater flows would remain similar to existing conditions and would follow existing drainage patterns but may be directed to an on-site retention pond for initial storage before being fed into the existing stormwater drainage system. Changes to impervious surface area at the site would be minor and would occur as a result of new equipment at the Project site. All construction activities would be conducted in accordance with BMPs specified in the construction SWPPP to prevent erosion, siltation, and other construction-related pollutants (such as potential leaks from construction equipment). The Project site is not located within a Special Flood Hazard Area as designated by the Federal Emergency Management Agency (FEMA 2021) and would not

create major changes to drainage or impervious surface area at the site; therefore, the Project would not have the potential to impede or redirect flood flows and impacts would be less than significant.

Mitigation Measures: None required or recommended.

d) *Would the Project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation?*

The Project sites are not located within a Special Flood Hazard Area as designated by FEMA (FEMA 2022). The Project site is located inland, more than 43 miles northeast of the Pacific Ocean, and is thus not expected to be affected by tsunamis. Based on a review of the City of Palmdale General Plan Exhibit S-6, the Tank Site is located within an inundation area if break occurs in northern 20% of Lake Palmdale. However, in the event of inundation, the Project would not risk release of pollutants. There are no other nearby large water bodies that could subject the site to seiche or mudflows. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

e) *Would the Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*

Water would be used as a dust suppressant during site grubbing and grading. This would be a temporary impact. Once the Project is built, no water would be required. Therefore, the proposed Project would not obstruct implementation of a water quality control plan or a sustainable groundwater management plan. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.11 Land Use and Planning

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project physically divide an established community?*

The Project would be constructed entirely within vacant lots and would thus not divide an established community. There would be no impact.

Mitigation Measures: None required or recommended.

b) *Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?*

The City of Palmdale would need to issue a Conditional Use Permit for the Project finding that the Project is consistent with existing land use and zoning and would not conflict with any land use plan, policy or regulation. Therefore, there would be no impact.

Mitigation Measures: None required or recommended.

3.12 Mineral Resources

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a, b) *Would the Project a) result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or, b) result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?*

The proposed Project area does not contain any mineral resources nor are there any mining activities occurring at the site or in the general vicinity of the site. Review of the City of Palmdale General Plan Exhibits ER-1B and ER-1C shows that the proposed Project area is not within an area containing mineral resources of value to the region or within the Quarry and Reclamation Zone as identified by the City of Palmdale. The proposed Project would not result in a loss of availability of locally important mineral resources. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

3.13 Noise

Would the Project:	Potentially Significant <u>Impact</u>	Less Than Significant with Mitigation <u>Incorporated</u>	Less Than Significant <u>Impact</u>	<u>No Impact</u>
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- b) Generation of excessive groundborne vibration or groundborne noise levels?
- c) For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

Discussion

a-b) Would the Project a) result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies, or b) result in the generation of excessive groundborne vibration or groundborne noise levels?

Grubbing and grading of the sites has the potential for temporarily generating construction equipment noise, as does the trenching required to install the distribution line from the solar facility to the SCE electrical grid. In addition, during construction, groundborne vibrations and groundborne noise may be perceived by residents and workers in the area. However, the Tank Site is mostly surrounded by vacant and/ or transportation/ utilities, and the HQ Site is surrounded by industrial/commercial rural areas. There are residences along the west side of the Tank Site that may be exposed to this temporary construction noise; however, there is a wall separating the residences from any noisy activities that would limit the level of noise heard at the residences. The City of Palmdale’s Noise Ordinance prohibits construction noise near residences on Sundays, or any other day after 8:00 p.m. or before 6:30 a.m. The Project is anticipated to be constructed during the daytime on weekdays, however, if weekend or nighttime work is required the Project would obtain an exception from the City Engineer pursuant to Noise Ordinance section 8.28.040. Any groundborne vibration would attenuate prior to reaching sensitive receptors. Although residences are located near the Tank Site, construction would occur during daytime hours, consistent with local noise ordinances, and therefore, would not interrupt sleep. Therefore, no impacts to sensitive receptors from noise or groundborne vibration/ groundborne noise during construction of the Project are likely as, due to the distance and timing, construction ambient noise is not likely to be perceived. Operation of the Project would not generate any appreciable noise. Therefore, impacts would be less than significant

Mitigation Measures: None required or recommended.

c) For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

The Project sites are not in the vicinity of a public or private airstrip; the nearest airport is the Palmdale Regional Airport, located approximately 3 miles northeast of the HQ Site and 5 miles northeast of the Tank Site. There would be no impacts.

Mitigation Measures: None required or recommended.

3.14 Population and Housing

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a-b) *Would the Project a) induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure), or b) displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*

The proposed Project is an unmanned solar facility. There would be a temporary influx of workers during the construction of the Project that may use hotels for temporary housing. No new homes or business to support the proposed Project would be required. The site is undeveloped and there are no existing people or housing that may be impacted by the Project. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

3.15 Public Services

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a) Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- e) Other public facilities?

Discussion

- a) *Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection?*

The City of Palmdale is supported by the Los Angeles County Fire Department for fire, rescue, and emergency medical (paramedic) services, as well as fire prevention function. Los Angeles County Fire Station No. 37, located at 38318 9th Street East, is 1.9 miles to the southwest of the HQ Site and 1.5 miles north of the Tank Site, and would serve as the first responder in the event of an emergency. The proposed Project is not likely to cause a fire and increase demand for Fire Department. As a result, the proposed Project would not necessitate the provision of new or physically altered governmental facilities, and the overall need for fire protection services is not expected to substantially increase. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- b-e) *Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: police protection, schools, parks, and other public facilities?*

The proposed Project is an unmanned solar facility that would not require an increase in police, schools, parks or other facilities. No additional governmental facilities will be required as a result of Project implementation. Therefore, no impacts would occur.

Mitigation Measures: None required or recommended.

3.16 Recreation

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?*

The Project would not increase the use of existing parks or recreational facilities and thus would not result in substantial physical deterioration of facilities. There would be no impact.

Mitigation Measures: None required or recommended.

b) *Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?*

The Project would not increase the use of existing parks or recreational facilities and would not require construction or expansion of new recreational facilities and thus no adverse physical effect on the environment would occur. There would be no impact.

Mitigation Measures: None required or recommended.

3.17 Transportation

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the Project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Would the Project result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Would the Project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?*

During construction of the Project, there would be a temporary increase in traffic from workers traveling to the site plus equipment and materials being delivered to the site. This minor, temporary increase in traffic to an area that is largely undeveloped would not conflict with the City of Palmdale ordinances that address transportation with the city limits. Therefore, the Project's long-term potential to conflict with circulation planning would be less than significant.

Mitigation Measures: None required or recommended.

b) *Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?*

Senate Bill 32 requires California to reduce GHG emissions below 1990 levels by 2030 and Executive Order B-16-12 provides a target rate of 80 percent below 1990 emissions levels for the transportation sector by 2050. The transportation sector has three means of reducing GHG emissions: increasing vehicle efficiency, reducing fuel carbon content, and reducing the amount of vehicle miles (Office of Planning and Research 2018). CARB has provided a path forward for achieving these emissions reductions from the transportation sector in its 2016 Mobile Source Strategy. CARB determined that it will not be possible to achieve the State’s 2030 and post-2030 emissions goals without reducing Vehicle Miles Traveled (VMT) growth. It has been concluded that to achieve the State’s long-term climate goals, California needs to reduce per capita VMT (Office of Planning and Research 2018). This can occur under CEQA through VMT mitigation. Many agencies use “screening thresholds” to quickly identify when a project should be expected to cause a less-than-significant impact without conducting a detailed study. PWD has determined to use the Los Angeles County Public Works thresholds of significance for determining if a project specific Transportation Impact Analysis is required (Los Angeles County Public Works 2020). Screening criteria for non-retail project trip generation provides that if the development project does not generate a net increase of 110 or more daily vehicle trips, then further analysis is not required.

According to the IS/MND prepared by Tetra Tech, Inc. for the City of Palmdale for a similar solar energy project approximately 2.5 miles away, construction and operation of the proposed Project of similar scope was expected to generate less than 110 trips per day. The City of Palmdale anticipated a daily average of 42 trips during construction with a maximum number of 92 trips on any given day.

There will be a total of two preventative maintenance and two inspection trips per month during operation of the solar facility for a total of four trips per month during operation. Operational trips associated with the Project would be negligible and limited to occasional maintenance and servicing of the solar system. The estimated daily construction trips are summarized in **Table 3-3**.

Table 3-4: Estimated Daily Trips during Construction for Representative Project

	Daily Average Trips	Maximum Trip Event
Construction Personnel	40	80
Deliveries	2	12
Total	42	92

Mitigation Measures: None required or recommended.

c) *Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?*

The proposed Project is a solar energy facility. Other than access roads for routine and emergency repairs, roads for the traveling project are not part of this project. There would be no impact.

Mitigation Measures: None required or recommended.

d) *Would the Project result in inadequate emergency access?*

The proposed Project would not result in inadequate emergency access. Permanent site access to the Tank Site is planned to use the temporary access routes located at the intersection of 6th St E / E Ave R/ E Ave R 8. Permanent site access to the HQ Site would be determined during final design, but may be available via the PWD headquarters or from 20th St E. These access roads will be included as part of the Project design and can be used by first responders in case of an emergency. These access roads have been designed to accommodate first responders and fire trucks. These roads are rated for the weight of a fire truck. Therefore, no impact would occur.

Mitigation Measures: None required or recommended.

3.18 Tribal Cultural Resources

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

a) *Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is*

geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

- i) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or
- ii) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

There are two Native American tribes in the region, the SMBMI and the FTBMI. **Mitigation Measures TRC-1** and **TRC-2** will be implemented to reduce impacts to potential pre-historic resources located within the Project area to a less than significant impact. With implementation of **Mitigation Measures TRC-1** and **TRC-2**, impacts would be less than significant.

Mitigation Measures:

Mitigation Measure TCR -1: Previously Undiscovered Cultural Resources and Monitoring and Treatment Plan

The SMBMI and the FTBMI shall be contacted, as detailed in Mitigation Measure CUL-1, of any pre-contact and/or post-contact cultural resources discovered during Project implementation, and be provided information regarding the nature of the find, so as to provide Tribal input with regards to significance and treatment. Should the find be deemed significant, as defined by CEQA (as amended, 2015), a cultural resources Monitoring and Treatment Plan shall be created by the archaeologist, in coordination with SMBMI and FTBMI, and all subsequent finds shall be subject to this Plan. This Plan shall allow for a monitor to be present that represents SMBMI for the remainder of the Project, should SMBMI elect to place a monitor on-site.

Mitigation Measure TCR -2: Archaeological and Cultural Documentation

Any and all archaeological/cultural documents created as a part of the Project (isolate records, site records, survey reports, testing reports, etc.) shall be supplied to the applicant and Lead Agency for dissemination to SMBMI and FTBMI. The Lead Agency and/or applicant shall, in good faith, consult with SMBMI and FTBMI throughout the life of the Project.

3.19 Utilities and Service Systems

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

construction or relocation of which could cause significant environmental effects?

- | | | | | |
|---|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| b) Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| c) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Discussion

a-b) Would the Project a) require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects, and b) have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?

The proposed Project is an alternative energy project and would not require the relocation or expansion of utilities such as water, wastewater treatment, electrical or natural gas. Stormwater generated on site would be directed nearby stormdrains. Water would be used as dust suppression during construction of the Project and in minor amounts during solar panel cleaning but expansion of water services to the Project will not be required. Other than metered water used for dust suppression, the Project will not require permanent water provisions. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

c) Would the Project result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?

During construction and routine or emergency services at the Project, portable toilets would be brought to the site for the workers and serviced by the portable toilet vendor. The Project does not include a sanitary system so there would be no Project-related impacts to the Palmdale Water Reclamation Plant. No impact would occur.

Mitigation Measures: None required or recommended.

d-e) Would the Project d) generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals; or, e)

comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

During site grubbing and clearance, green waste would be generated and disposed of in the local Class III landfill. Antelope Valley Landfill located at 1200 City Ranch Road, Palmdale, California, is the closest landfill to the Project site. Trash and debris generated during construction of the Project that would also be disposed of at a Class III landfill. Fees for disposing of green waste and non-hazardous waste would be paid by the Project proponent. Once the Project has been constructed, negligible amounts of trash may be generated when maintenance occurs. Any broken solar panels or those that need to be replaced would be either recycled or disposed of as manifested hazardous waste in a Class II or Class I landfill. This would be an infrequent occurrence. The proposed Project would not generate waste that would exceed the capacity of the local trash conveyors or the local landfill. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

3.20 Wildfire

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a-d) Would the Project a) substantially impair an adopted emergency response plan or emergency evacuation plan; b) due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire; c) require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or, d) expose people or structures to significant risks,

including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The Project is located within a Local Responsibility Area and is not designated as a Very High Fire Hazard Severity Zone (Calfire, n.d.). Therefore, the Project would have no impact.

Mitigation Measures: None required or recommended.

3.21 Mandatory Findings of Significance

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Does the Project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a Project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a) *Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?*

As described in Section 3.4 Biological Resources, Section 3.5 Cultural Resources, Section 3.7 Geology and Soils, and Section 3.28 Tribal Cultural Resources, once proposed mitigation measures are implemented, the proposed Project does not have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major period of California history or prehistory. Additionally, the Project would not cause substantial degradation of habitat cause a fish or wildlife population to drop below self-sustaining levels nor a plant or animal community to be eliminated. Therefore, impacts would be less than significant.

Mitigation Measures: None required or recommended.

- b) *Does the Project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a Project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?*

The proposed Project has the potential to have cumulative impacts to air quality and GHGs. However, as discussed in Section III: Air Quality and Section VIII: Greenhouse Gas Emissions, these impacts would be temporary during construction and would not be significant.

Mitigation Measures: None required or recommended.

- c) *Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*

The proposed Project may have indirect minor short-term effects on human beings during construction. However, in the long term, the Project would have a beneficial impact because the Project would generate clean energy. No substantial adverse effects on human beings would occur. No impacts would occur.

Mitigation Measures: None required or recommended.

4. REFERENCES

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BOARD OF DIRECTORS
PALMDALE WATER DISTRICT

VIA: Mr. Dennis D. LaMoreaux, General Manager

December 6, 2022

2) Find that the anticipated cost to Palmdale Water District of thermal or electrical energy or conservation services provided by the Project under the Power Purchase Agreements will be less than the anticipated marginal cost to Palmdale Water District of thermal, electrical, or other energy that would have been consumed by Palmdale Water District in the absence of those purchases.

Staff asks the Board to first fulfill Step No. 1 of this process and hold a public hearing for commenting on the project.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 6- Customer Care, Advocacy and Outreach

This item directly relates to the District's Mission Statement.

Budget:

There is no budget impact.

Supporting Documents:

None.

**PALMDALE WATER DISTRICT
BOARD MEMORANDUM**

DATE: December 7, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Adam Ly, Assistant General Manager
VIA: Mr. Dennis LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 8.4 – CONSIDERATION AND POSSIBLE ACTION ON APPROVING RESOLUTION 22-35 BEING A RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT AUTHORIZING THE GENERAL MANAGER TO EXECUTE POWER PURCHASE AGREEMENTS AND EASEMENT AGREEMENTS WITH EAST AVENUE Q SOLAR PROJECT 2022, LLC, AND EAST AVENUE SOUTH SOLAR PROJECT 2022, LLC, TO BUILD, OWN AND OPERATE A SOLAR ARRAYS SYSTEM AT THE DISTRICT HEADQUARTERS AND 6MG RESERVOIR SITE. (NO BUDGET IMPACT – ASSISTANT GENERAL MANAGER LY)***

Recommendation:

Staff recommends the Board approve Resolution No. 22-35 being a Resolution of the Board of Directors of the Palmdale Water District Authorizing the General Manager to Execute Power Purchase Agreements and Easement Agreements with East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC, to Build, Own and Operate a Solar Arrays System at the District Headquarter (HQ) and 6MG Reservoir Site (Tank).

Alternative Options:

The Board can choose not to approve Resolution No. 22-35.

Impact of Taking No Action:

The District will continue to rely on Southern California Edison (SCE) to supply its energy.

Background:

The Board approved a no-risk agreement with TerraVerde Energy, LLC in April 2022 to evaluate and develop a Request for Proposal (RFP) for an aggregated solar project. TerraVerde did an initial assessment using 2020 – 2022 SCE’s 15-minutes interval data. The assessment showed potential energy savings, and the District has the land to build a solar array for energy offset.

The RFP was posted on July 13, 2022 with a mandatory job walk scheduled for July 27, 2022. Twenty-five (25) potential vendors attended the job walk, and this resulted in six (6) proposals submitted on August 31, 2022. TerraVerde Energy and staff evaluated the proposals, and three were short-listed for an in-person interview. The three vendors were invited to present their proposal and participate in a question and answer session.

BOARD OF DIRECTORS
 PALMDALE WATER DISTRICT

VIA: Mr. Dennis D. LaMoreaux, General Manager

December 7, 2022

All vendors were evaluated based on the proposed PPA rate, timeline, design and space allocation, and the overall assumption to the project scope. Distributed Solar Development, LLC (“DSD”), provides a low PPA that meets the District’s needs and conforms to California Government Code section 4217.12 savings requirement as shown in the Savings Pro Forma attached to the Resolution. East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC, are both wholly-owned by Distributed Solar Projects, LLC, which is a subsidiary of Distributed Solar Development, LLC.

Below is a summary of the cost savings estimation evaluated by TerraVerde Energy and staff. Staff’s analysis accounts for the generation and distribution charge components, whereas TerraVerde Energy’s analysis includes demand charge.

Project Site	TerraVerde 2022 Utility Bill Avoided Cost (\$/kWh)	Staff’s Break-Even Cost Avoidance (\$/kWh)	Staff’s Targeted Saving Evaluation (\$/kWh)	DSD PPA Proposed Rate (\$/kWh)	Estimated Rate Saving (%)
Tank Site	\$0.1361	\$0.0747	\$0.0657	\$0.0626	16.1%
HQ Site	\$0.0883	\$0.0636	\$0.0533	\$0.0554	12.9%

The Tank Site project aggregates the meters from the Leslie O. Carter Water Treatment Plant and the 6MG Reservoir site. The HQ Site project aggregates the meter from headquarters, Well 2A, Well 3A, Well 8A and Well 14. This savings estimation is based on a conservative assumption of energy consumption for each Well site using data between 2020 through 2022 and does not include Well 4A, Well 7A, or Well 23 as part of the NEM-A arrangement for the HQ project. These Wells can be used to provide an additional buffer to generate utility bill savings.

The projects were evaluated based on some assumptions. Below are several potential scenarios that can reduce the saving estimation.

1. The SCE rate can decline. Staff has assumed the current SCE rate to calculate savings. Depending on overall renewable energy development in the State, the rate can go down. If so, our savings will be reduced.
2. The assumptions are incorrect. Staff and TerraVerde Energy have evaluated various scenarios and might have over-estimated the savings potential if conditions change.
3. The District has a low well production year. In years that we pump very little or wells are down, District will still need to purchase all energy generated and forgo the excess we send to the SCE grid. This will reduce overall savings.
4. Decommission of wind turbine. The agreement with SCE on the wind turbine will be replaced by this new agreement. The District is obligated to remove the wind turbine. The agreement with DSD includes \$1.15 million to cover expenses, such as TerraVerde Energy’s fee, CEQA study, legal counseling, SCE connection application, and etc. There might be some funds available to cover part of the decommissioning.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 1- Water Resource Reliability.

This item directly relates to the District's Mission Statement.

Budget:

There is no budget impact.

Supporting Documents:

- Resolution 22-35 being a Resolution of the Board of Directors of the Palmdale Water District Authorizing the General Manager to Execute Power Purchase Agreements and Easement Agreements with East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC, to Build, Own and Operate a Solar Arrays System at the District Headquarters and 6MG Reservoir Site
- Power Purchase Agreements and Easement Agreements with East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC

RESOLUTION NO. 22-35

RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT MAKING FINDINGS, AUTHORIZING THE GENERAL MANAGER TO EXECUTE POWER PURCHASE AGREEMENTS AND EASEMENT AGREEMENTS WITH EAST AVENUE Q SOLAR PROJECT 2022, LLC, AND EAST AVENUE SOUTH SOLAR PROJECT, LLC, TO BUILD, OWN AND OPERATE A SOLAR ARRAYS SYSTEM AT THE DISTRICT HEADQUARTERS AND 6MG RESERVOIR SITE

WHEREAS, it is the policy of the State of California and the intent of the State Legislature to promote all feasible means of energy conservation and all feasible uses of alternative energy supply sources; and

WHEREAS, Palmdale Water District (“District”) desires to reduce the steadily rising costs of meeting the energy needs at its facilities; and

WHEREAS, TerraVerde Energy, LLC (“TerraVerde”), has provided the District with analysis showing the benefits of implementing certain energy conservation measures through the installation of certain solar photovoltaic and battery energy storage facilities, and TerraVerde’s analysis (“Analysis”) is attached hereto as Exhibit A and made part hereof by this reference; and

WHEREAS, the District proposes to enter into a power purchase agreements and related contract documents (“Power Purchase Agreement”) with East Avenue Q Solar Project 2022, LLC, and East Avenue South Solar Project 2022, LLC, (“Providers”), pursuant to which Providers will design, construct, install, maintain, operate, and own on District property certain energy saving improvements consisting of solar photovoltaic facilities and battery storage systems and arrange with the local utility for interconnection of the facilities, which will generate energy for the sites on which such facilities are located; and

WHEREAS, Providers are wholly-owned subsidiaries of Distributed Solar Development, LLC (“DSD”); and

WHEREAS, the sites where such solar photovoltaic and battery energy storage facilities (“Project”) will be located are: Palmdale Water District Headquarters, and 6MG Tank; and

WHEREAS, the Analysis includes data showing that the anticipated cost to the District for the electrical energy provided by the Project will be less than the anticipated marginal cost to the District of electrical energy that would have been consumed by the District in the absence of those purchases; and

WHEREAS, the Board proposes to enter into Power Purchase Agreements and Easement Agreements substantially in the form presented at this meeting, subject to such changes, insertions or omissions as the General Manager or his designee reasonably deems necessary following the Board’s adoption of this Resolution; and

WHEREAS, pursuant to Government Code section 4217.12, the Board has held a public hearing, public notice of which was given at least two weeks in advance, to receive public comment.

NOW, THEREFORE, based upon the above-referenced recitals, the Board hereby finds, determines and orders as follows:

1. The Board finds that the terms of the Power Purchase Agreements and Easement Agreements are in the best interests of the District.

2. In accordance with Government Code section 4217.12, and based on data provided by the Analysis, the Board finds that the anticipated cost to the District for electrical energy provided by the Project under the Power Purchase Agreements and Easement Agreements will be less than the anticipated marginal cost to the District of electrical energy that would have been consumed by the District in the absence of those purchases.

3. The Board hereby approves the Power Purchase Agreements and Easement Agreements, both of which shall be subject to such changes, insertions or omissions as the District's General Manager or his designee reasonably deems necessary.

4. The District's General Manager or designee is hereby authorized and directed to negotiate any further changes, insertions and omissions to the Power Purchase Agreements and Easement Agreements as he reasonably deems necessary, and thereafter to execute and deliver the Power Purchase Agreements and Easement Agreements following the Board's adoption of this Resolution. The District's General Manager or designee is further authorized and directed to execute and deliver any and all papers, instruments, opinions, certificates, affidavits and other documents and to do or cause to be done any and all other acts and things necessary or proper for carrying out this resolution and said agreements.

The foregoing Resolution was adopted at a meeting of the Board of Directors of the Palmdale Water District on December 12, 2022, by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

Gloria Dizmang, President
Palmdale Water District

CERTIFIED TO BE A TRUE
AND CORRECT COPY:

Kathy Mac Laren-Gomez, Secretary
Palmdale Water District

APPROVED AS TO FORM:

Aleshire & Wynder, LLP, General Counsel

EXHIBIT A
ANALYSIS OF BENEFITS

[Attached]

Palmdale Water District



Pro Forma 4217 Exhibit A

Scenarios Included in this Pro Forma:

- #1 - : Solar Power Purchase Agreement and Battery Payments to Provider - 641 E Avenue - Tank 12MG, Waste Water Treatment Plant
- #2 - NEM-A 2.0: Solar Power Purchase Agreement - District Office 2029 E Ave, Station W3A, Station W2A, Station W8A, Well 14

Summary of Results



Financing Scenario	PPA Start Price	PPA Escalator	Net Benefit Year 1	Net Benefit Years 1-10	Net Benefit Years 1-25	Years to Payback
#1 - Solar Power Purchase Agreement and Battery Payments to Provider - 641 E Avenue - Tank 12MG, Waste Water Treatment Plant	\$ 0.0626	0.00%	\$214,761	\$2,658,347	\$9,298,865	1
#2 - NEM-A 2.0: Solar Power Purchase Agreement - District Office 2029 E Ave, Station W3A, Station W2A, Station W8A, Well 14	\$ 0.0554	0.00%	\$149,498	\$1,978,716	\$7,314,807	1

Project Portfolio



Meter Name	Service Account ID	Meter Number	Connection Level	Rate (Current)	Rate (Optimal Before Project, New TOU)	Rate (Optimal After Project, New TOU)	Program	Meter Max Demand (kW)	Ex-Solar Customer Usage (kWh)
#1 - 641 E Avenue - Tank 12MG	8002835629	359150-007802	0-2kv	TOU-8 D	TOU-8 D	TOU-8 E	NEM-A + AES	601	1,482,252
#2 - Waste Water Treatment Plant (NEM-A with #1)	8003366592	V345N-001391	2kv-50kv	TOU-GS-3 D	TOU-GS-3 D	TOU-GS-3 E	NEM-A	496	1,946,020
#3 - District Office 2029 E Ave	8003094788	259000-053774	0-2kv	TOU-GS-2 D	TOU-GS-2 D	TOU-GS-2 E	NEM-A	85	264,205
#4 - Station W3A (NEM-A with #3)	8003502407	359150-006612	0-2kv	TOU-PA-3 A	TOU-PA-3 E	TOU-PA-3 E	NEM-A	264	1,167,643
#5 - Station W2A (NEM-A with #3)	8001204796	359150-009803	0-2kv	TOU-PA-3 A	TOU-PA-3 E	TOU-PA-3 E	NEM-A	306	1,263,954
#6 - Station W8A (NEM-A with #3)	8002629500	359150-009801	2kv-50kv	TOU-PA-3 A	TOU-PA-3 E	TOU-PA-3 E	NEM-A	386	1,631,180
#7 - Well I4 (NEM-A with #3)	8000465880	V345N-000672	0-2kv	TOU-PA-3 E	TOU-PA-3 E	TOU-PA-3 E	NEM-A	281	703,653
Portfolio Totals									8,458,908

Project Details



Meter Name	Service Account ID	Customer Usage (kWh)	Solar Production (kWh)	Solar Sizing	Solar Array Size (kW, DC)	Meter Max Demand (kW)	Battery Sizing	Battery Size (kWh)	Battery Size (kW)
#1 - 641 E Avenue - Tank 12MG	8002835629	1,482,252	2,883,216	84%	1,225	601	42%	574	250
#2 - Waste Water Treatment Plant (NEM-A with #1)	8003366592	1,946,020	-	-	-	496	-	-	-
#3 - District Office 2029 E Ave	8003094788	264,205	4,554,247	91%	1,837	85	-	-	-
#4 - Station W3A (NEM-A with #3)	8003502407	1,167,643	-	-	-	264	-	-	-
#5 - Station W2A (NEM-A with #3)	8001204796	1,263,954	-	-	-	306	-	-	-
#6 - Station W8A (NEM-A with #3)	8002629500	1,631,180	-	-	-	386	-	-	-
#7 - Well 14 (NEM-A with #3)	8000465880	703,653	-	-	-	281	-	-	-
Totals		8,458,908	7,437,463	88%	3,062		10%	574	250

Savings



Meter Name	Service Account ID	Pre-Project Total Electricity Bill (year 1)	Post-Project Total Electricity Bill (year 1)	Total Savings (year 1)	Solar Savings (year 1)	Solar Savings (\$/kWh)	Battery Savings From Demand Reduction (year 1)	Battery Savings From Arbitrage (year 1)
#1 - 641 E Avenue - Tank 12MG	8002835629	\$358,405	\$102,002	\$256,404	\$213,850	\$0.1361	\$26,015	\$16,538
#2 - Waste Water Treatment Plant (NEM-A with #1)	8003366592	\$403,819	\$225,172	\$178,647	\$178,647	-	-	-
#3 - District Office 2029 E Ave	8003094788	\$61,945	\$22,247	\$39,698	\$39,698	\$0.0883	-	-
#4 - Station W3A (NEM-A with #3)	8003502407	\$184,836	\$97,316	\$87,520	\$87,520	-	-	-
#5 - Station W2A (NEM-A with #3)	8001204796	\$213,663	\$115,694	\$97,969	\$97,969	-	-	-
#6 - Station W8A (NEM-A with #3)	8002629500	\$270,019	\$145,839	\$124,180	\$124,180	-	-	-
#7 - Well 14 (NEM-A with #3)	8000465880	\$117,744	\$64,907	\$52,836	\$52,836	-	-	-
Totals		\$1,610,430	\$773,176	\$837,254	\$794,701	\$0.1069	\$26,015	\$16,538

Dashboard



Scenario: #1 - : Solar Power Purchase Agreement and Battery Payments to Provider - 641 E Avenue - Tank 12MG, Waste Water Treatment Plant

Technical Assumptions	
Total Solar Project Size	1.23 MW, DC
Annual Solar Yield	2,354 kWh/kW
Year-1 Solar Production	2,883,216 kWh
Annual Solar Degradation Factor	0.50%
Total Storage Project Size	574 kWh
Year-1 Demand Reduction	1,411 kW
Number of SCE Accounts	2

Avoided Cost & Revenue Sources	
Savings from Solar Production, yr-1	\$0.1361 /kWh
Estimated Utility Cost Escalator	3.00%
Average 25-year REC Price	\$0.0112 /kWh

Pricing	
PPA Rate	\$0.0626
PPA Annual Escalator	0.00%

Asset Management Services Assumptions	
Asset Management Services, Solar (PPA)	\$0.0100 /kWh
Asset Management Services, Storage	\$1,000 /battery
Asset Management Services Escalator	3.00%

Total Net Benefit (25 years)	
Utility Bill Savings	\$14,834,831
Power Purchase Agreement (PPA) Payments	(\$4,251,597)
Payments to 3rd Party Provider	(\$960,000)
Asset Management Services	(\$1,087,659)
Renewable Energy Certificates (RECs)	\$763,290
Total Net Benefit	\$9,298,865

Cash Flow

Year	Electricity		Utility Savings				Expenses				Cash Position				Term				
	Annual Solar Production (kWh)	Solar Savings per kWh Produced	Savings from Solar	Savings from Demand Reduction	Savings from Storage due to Arbitrage	Storage Savings (Total)	Subtotal: Annual Utility Bill Savings	PPA Payments	Battery Payments to Provider	Battery Service (Solar & Storage)	Management Annual Operating Expenses	Subtotal: Annual Operating Expenses	Net Benefits (Solar)	Net Benefits (Storage)		Net Benefits (Total)	Renewable Energy Certificates (RECs)	Cumulative Cash Position	Conservative Cumulative Cash Position
2023																			
2024	2,883,216	\$ 0.1361	\$ 392,497	\$ 26,015	\$ 16,538	\$ 42,553	\$ 435,050	\$ (180,489)	\$ (38,400)	\$ (29,832)	\$ (248,721)	\$ 183,176	\$ 3,153	\$ 186,329	\$ 28,432	\$ 214,761	\$ 171,256	1	
2025	2,868,800	\$ 0.1402	\$ 402,251	\$ 26,796	\$ 16,012	\$ 42,808	\$ 445,058	\$ (179,587)	\$ (38,400)	\$ (30,727)	\$ (248,714)	\$ 192,867	\$ 3,378	\$ 196,344	\$ 28,975	\$ 440,080	\$ 352,069	2	
2026	2,854,456	\$ 0.1444	\$ 412,247	\$ 27,599	\$ 15,911	\$ 43,590	\$ 455,637	\$ (178,689)	\$ (38,400)	\$ (31,649)	\$ (248,738)	\$ 202,970	\$ 3,929	\$ 206,899	\$ 29,118	\$ 676,098	\$ 542,523	3	
2027	2,840,183	\$ 0.1488	\$ 422,491	\$ 28,427	\$ 15,722	\$ 44,150	\$ 466,641	\$ (177,795)	\$ (38,400)	\$ (32,598)	\$ (248,794)	\$ 213,190	\$ 4,657	\$ 217,847	\$ 29,262	\$ 923,207	\$ 742,968	4	
2028	2,825,983	\$ 0.1532	\$ 432,990	\$ 29,280	\$ 15,636	\$ 44,916	\$ 477,906	\$ (176,907)	\$ (38,400)	\$ (33,576)	\$ (248,883)	\$ 223,632	\$ 5,390	\$ 229,023	\$ 29,407	\$ 1,181,637	\$ 953,508	5	
2029	2,811,853	\$ 0.1578	\$ 443,750	\$ 30,159	\$ 15,517	\$ 45,676	\$ 489,725	\$ (176,022)	\$ (38,400)	\$ (34,584)	\$ (249,006)	\$ 234,303	\$ 6,416	\$ 240,720	\$ 29,553	\$ 1,451,509	\$ 1,174,508	6	
2030	2,797,793	\$ 0.1625	\$ 454,777	\$ 31,063	\$ 16,193	\$ 47,256	\$ 502,033	\$ (175,142)	\$ (38,400)	\$ (35,621)	\$ (249,163)	\$ 245,308	\$ 7,662	\$ 252,970	\$ 29,699	\$ 1,734,078	\$ 1,406,873	7	
2031	2,783,804	\$ 0.1674	\$ 466,078	\$ 31,995	\$ 16,577	\$ 48,572	\$ 514,650	\$ (174,266)	\$ (38,400)	\$ (36,690)	\$ (249,356)	\$ 256,352	\$ 8,942	\$ 265,294	\$ 29,846	\$ 2,029,219	\$ 1,650,549	8	
2032	2,769,885	\$ 0.1724	\$ 477,660	\$ 32,955	\$ 16,969	\$ 49,925	\$ 527,585	\$ (173,398)	\$ (38,400)	\$ (37,790)	\$ (249,585)	\$ 267,742	\$ 10,258	\$ 277,999	\$ 29,994	\$ 2,337,212	\$ 1,905,784	9	
2033	2,756,086	\$ 0.1776	\$ 489,530	\$ 33,944	\$ 17,371	\$ 51,314	\$ 540,844	\$ (172,528)	\$ (38,400)	\$ (38,924)	\$ (249,852)	\$ 279,383	\$ 11,610	\$ 290,992	\$ 30,142	\$ 2,659,347	\$ 2,171,834	10	
2034	2,742,256	\$ 0.1829	\$ 501,695	\$ 34,962	\$ 17,781	\$ 52,743	\$ 554,437	\$ (171,665)	\$ (38,400)	\$ (40,092)	\$ (250,157)	\$ 291,382	\$ 12,999	\$ 304,280	\$ 30,292	\$ 2,992,519	\$ 2,451,562	11	
2035	2,728,344	\$ 0.1884	\$ 514,162	\$ 36,011	\$ 17,856	\$ 53,867	\$ 568,029	\$ (170,807)	\$ (38,400)	\$ (41,295)	\$ (250,502)	\$ 303,445	\$ 14,083	\$ 317,527	\$ 30,442	\$ 3,340,488	\$ 2,747,728	12	
2036	2,714,902	\$ 0.1941	\$ 526,939	\$ 37,091	\$ 17,920	\$ 55,012	\$ 581,950	\$ (169,953)	\$ (38,400)	\$ (42,534)	\$ (250,866)	\$ 315,878	\$ 15,186	\$ 331,064	\$ 30,592	\$ 3,702,144	\$ 3,046,189	13	
2037	2,701,327	\$ 0.1999	\$ 540,033	\$ 38,204	\$ 17,972	\$ 56,176	\$ 596,209	\$ (169,103)	\$ (38,400)	\$ (43,810)	\$ (251,313)	\$ 328,589	\$ 16,308	\$ 344,897	\$ 30,744	\$ 4,077,784	\$ 3,362,209	14	
2038	2,687,821	\$ 0.2059	\$ 553,453	\$ 39,350	\$ 18,011	\$ 57,361	\$ 610,814	\$ (168,258)	\$ (38,400)	\$ (45,124)	\$ (251,781)	\$ 341,584	\$ 17,449	\$ 359,033	\$ 30,896	\$ 4,467,713	\$ 3,691,056	15	
2039	2,674,302	\$ 0.2121	\$ 567,206	\$ 40,531	\$ 25,766	\$ 66,296	\$ 633,503	\$ (167,416)	\$ (38,400)	\$ (46,478)	\$ (252,294)	\$ 354,870	\$ 26,339	\$ 381,209	\$ 30,649	\$ 4,879,571	\$ 4,039,563	16	
2040	2,661,010	\$ 0.2185	\$ 581,301	\$ 41,747	\$ 24,947	\$ 66,693	\$ 647,994	\$ (166,579)	\$ (38,400)	\$ (47,872)	\$ (252,851)	\$ 368,455	\$ 26,688	\$ 395,143	\$ 31,202	\$ 5,305,916	\$ 4,401,110	17	
2041	2,647,705	\$ 0.2250	\$ 595,747	\$ 42,999	\$ 24,601	\$ 67,600	\$ 663,347	\$ (165,746)	\$ (38,400)	\$ (49,308)	\$ (253,454)	\$ 382,345	\$ 27,548	\$ 409,893	\$ 31,357	\$ 5,747,166	\$ 4,776,025	18	
2042	2,634,466	\$ 0.2318	\$ 610,551	\$ 44,289	\$ 24,495	\$ 68,784	\$ 679,335	\$ (164,918)	\$ (38,400)	\$ (50,787)	\$ (254,055)	\$ 396,549	\$ 28,681	\$ 425,230	\$ 31,512	\$ 6,203,908	\$ 5,164,833	19	
2043	2,621,294	\$ 0.2387	\$ 625,723	\$ 45,618	\$ 24,360	\$ 69,977	\$ 695,701	\$ (164,093)	\$ (38,400)	\$ (52,311)	\$ (254,804)	\$ 411,073	\$ 29,824	\$ 440,897	\$ 31,668	\$ 6,676,473	\$ 5,567,828	20	
2044	2,608,187	\$ 0.2459	\$ 641,272	\$ 46,986	\$ 24,642	\$ 71,629	\$ 712,901	\$ (163,273)	\$ (38,400)	\$ (53,880)	\$ (255,553)	\$ 425,926	\$ 31,422	\$ 457,348	\$ 31,825	\$ 7,165,246	\$ 5,985,311	21	
2045	2,595,146	\$ 0.2532	\$ 657,208	\$ 48,396	\$ 25,228	\$ 73,624	\$ 730,832	\$ (162,456)	\$ (38,400)	\$ (55,497)	\$ (256,353)	\$ 441,116	\$ 33,363	\$ 474,479	\$ 31,982	\$ 7,671,708	\$ 6,418,689	22	
2046	2,582,171	\$ 0.2608	\$ 673,540	\$ 49,848	\$ 25,826	\$ 75,674	\$ 749,214	\$ (161,644)	\$ (38,400)	\$ (57,161)	\$ (257,205)	\$ 456,650	\$ 35,358	\$ 492,008	\$ 32,141	\$ 8,195,856	\$ 6,867,917	23	
2047	2,569,260	\$ 0.2687	\$ 690,277	\$ 51,343	\$ 26,438	\$ 77,781	\$ 768,058	\$ (160,836)	\$ (38,400)	\$ (58,876)	\$ (258,112)	\$ 472,539	\$ 37,407	\$ 509,946	\$ 32,300	\$ 8,738,102	\$ 7,333,357	24	
2048	2,556,413	\$ 0.2767	\$ 707,431	\$ 52,883	\$ 27,063	\$ 79,946	\$ 787,377	\$ (160,031)	\$ (38,400)	\$ (60,643)	\$ (259,074)	\$ 488,789	\$ 39,513	\$ 528,303	\$ 32,460	\$ 9,298,865	\$ 7,815,382	25	
			\$ 13,380,808	\$ 948,490	\$ 505,533	\$ 1,454,023	\$ 14,834,831	\$ (4,251,597)	\$ (960,000)	\$ (1,087,659)	\$ (6,299,256)	\$ 8,078,011	\$ 457,564	\$ 8,535,575	\$ 763,290	\$ 9,298,865	\$ 7,815,382		

Dashboard



Scenario: #2 - NEM-A 2.0: Solar Power Purchase Agreement - District Office 2029 E Ave, Station W3A, Station W2A, Station W8A, Well 14

Technical Assumptions	
Total Solar Project Size	1.84 MW, DC
Annual Solar Yield	2,479 kWh/kW
Year-1 Solar Production	4,554,247 kWh
Annual Solar Degradation Factor	0.50%
Number of SCE Accounts	5

Avoided Cost & Revenue Sources	
Savings from Solar Production, yr-1	\$0.0883 /kWh
Estimated Utility Cost Escalator	3.00%
Average 25-year REC Price	\$0.0112 /kWh

Pricing	
PPA Rate	\$0.0554
PPA Annual Escalator	0.00%

Asset Management Services Assumptions	
Asset Management Services, Solar (PPA)	\$0.0100 /kWh
Asset Management Services Escalator	3.00%

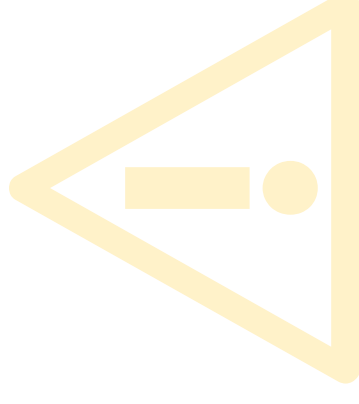
Total Net Benefit (25 years)	
Utility Bill Savings	\$13,711,712
Power Purchase Agreement (PPA) Payments	(\$5,943,291)
Asset Management Services	(\$1,660,445)
Renewable Energy Certificates (RECs)	\$1,206,830
Total Net Benefit	\$7,314,807

Cash Flow

Year	Electricity		Utility Savings		Expenses		Cash Position				
	Annual Solar Production (kWh)	Solar Savings per kWh Produced	Savings from Solar	Subtotal: Annual Bill Savings	Asset Management Service (Solar)	Subtotal: Annual Operating Expenses	Net Benefits (Solar)	Renewable Energy Certificates (RECs)	Cumulative Cash Position	Conservative Cumulative Cash Position	Term
2023	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0
2024	4,554,247	\$ 0.0883	\$ 402,203	\$ 402,203	\$ (252,305)	\$ (45,542)	\$ (297,848)	\$ 104,356	\$ 45,142	\$ 149,498	1
2025	4,531,476	\$ 0.0910	\$ 412,198	\$ 412,198	\$ (251,044)	\$ (46,909)	\$ (297,952)	\$ 114,246	\$ 45,768	\$ 309,512	2
2026	4,508,818	\$ 0.0937	\$ 422,441	\$ 422,441	\$ (249,789)	\$ (48,316)	\$ (298,105)	\$ 124,337	\$ 45,994	\$ 479,843	3
2027	4,486,274	\$ 0.0965	\$ 432,939	\$ 432,939	\$ (248,540)	\$ (49,765)	\$ (298,305)	\$ 134,634	\$ 46,222	\$ 660,699	4
2028	4,463,843	\$ 0.0994	\$ 443,698	\$ 443,698	\$ (247,297)	\$ (51,258)	\$ (298,555)	\$ 145,142	\$ 46,451	\$ 852,292	5
2029	4,441,523	\$ 0.1024	\$ 454,723	\$ 454,723	\$ (246,060)	\$ (52,796)	\$ (298,857)	\$ 155,867	\$ 46,281	\$ 1,054,440	6
2030	4,419,316	\$ 0.1055	\$ 466,023	\$ 466,023	\$ (244,830)	\$ (54,380)	\$ (299,210)	\$ 166,813	\$ 46,912	\$ 1,268,165	7
2031	4,397,219	\$ 0.1086	\$ 477,604	\$ 477,604	\$ (243,606)	\$ (56,011)	\$ (299,617)	\$ 177,987	\$ 47,144	\$ 1,493,296	8
2032	4,375,233	\$ 0.1119	\$ 489,472	\$ 489,472	\$ (242,388)	\$ (57,692)	\$ (300,080)	\$ 189,393	\$ 47,378	\$ 1,730,066	9
2033	4,353,357	\$ 0.1152	\$ 501,636	\$ 501,636	\$ (241,176)	\$ (59,423)	\$ (300,599)	\$ 201,037	\$ 47,612	\$ 1,978,716	10
2034	4,331,590	\$ 0.1187	\$ 514,102	\$ 514,102	\$ (239,970)	\$ (61,205)	\$ (301,175)	\$ 212,926	\$ 47,448	\$ 2,239,089	11
2035	4,309,932	\$ 0.1222	\$ 526,877	\$ 526,877	\$ (238,770)	\$ (63,041)	\$ (301,812)	\$ 225,065	\$ 48,085	\$ 2,512,239	12
2036	4,288,383	\$ 0.1259	\$ 539,970	\$ 539,970	\$ (237,576)	\$ (64,933)	\$ (302,509)	\$ 237,461	\$ 48,323	\$ 2,798,023	13
2037	4,266,941	\$ 0.1297	\$ 553,388	\$ 553,388	\$ (236,389)	\$ (66,881)	\$ (303,269)	\$ 250,119	\$ 48,562	\$ 3,096,703	14
2038	4,245,606	\$ 0.1336	\$ 567,140	\$ 567,140	\$ (235,207)	\$ (68,887)	\$ (304,094)	\$ 263,046	\$ 48,802	\$ 3,408,552	15
2039	4,224,378	\$ 0.1376	\$ 581,233	\$ 581,233	\$ (234,031)	\$ (70,954)	\$ (304,984)	\$ 276,249	\$ 48,644	\$ 3,733,444	16
2040	4,203,256	\$ 0.1417	\$ 595,677	\$ 595,677	\$ (232,860)	\$ (73,082)	\$ (305,943)	\$ 289,734	\$ 49,286	\$ 4,072,465	17
2041	4,182,240	\$ 0.1460	\$ 610,479	\$ 610,479	\$ (231,696)	\$ (75,275)	\$ (306,971)	\$ 303,509	\$ 49,530	\$ 4,425,504	18
2042	4,161,329	\$ 0.1503	\$ 625,650	\$ 625,650	\$ (230,538)	\$ (77,533)	\$ (308,071)	\$ 317,579	\$ 49,776	\$ 4,792,859	19
2043	4,140,522	\$ 0.1549	\$ 641,197	\$ 641,197	\$ (229,385)	\$ (79,859)	\$ (309,244)	\$ 331,953	\$ 50,022	\$ 5,174,834	20
2044	4,119,819	\$ 0.1595	\$ 657,131	\$ 657,131	\$ (228,238)	\$ (82,255)	\$ (310,493)	\$ 346,638	\$ 49,870	\$ 5,571,342	21
2045	4,099,220	\$ 0.1643	\$ 673,461	\$ 673,461	\$ (227,097)	\$ (84,722)	\$ (311,819)	\$ 361,641	\$ 50,518	\$ 5,983,502	22
2046	4,078,724	\$ 0.1692	\$ 690,196	\$ 690,196	\$ (225,961)	\$ (87,264)	\$ (313,225)	\$ 376,971	\$ 50,769	\$ 6,411,241	23
2047	4,058,331	\$ 0.1743	\$ 707,348	\$ 707,348	\$ (224,832)	\$ (89,882)	\$ (314,714)	\$ 392,634	\$ 51,020	\$ 6,854,895	24
2048	4,038,039	\$ 0.1795	\$ 724,925	\$ 724,925	\$ (223,707)	\$ (92,578)	\$ (316,286)	\$ 408,639	\$ 51,272	\$ 7,314,807	25
	107,279,615	\$ 0.1278	\$ 13,711,712	\$ 13,711,712	\$ (5,943,291)	\$ (1,660,445)	\$ (7,603,736)	\$ 6,107,977	\$ 1,206,830	\$ 7,314,807	\$ 5,943,636

Disclaimers and Assumptions

- 1) Projections of future savings are calculated based on patterns of previous electricity usage, and assume that historical usage patterns hold at the same level over the life of the project. Billing and usage data for 641 E Avenue - Tank 12M/G, Waste Water Treatment Plant, and District Office 2029 E Ave are from April 2021 through April 2022. Billing and usage data for the remaining sites are as follows: Well 14 data is from February 2020 through January 2021, Station W8A data is from April 2020 through March 2021, Station W3A data is from November 2020 through October 2021, and Station W2A data is from January 2020 through January 2021.
- 2) Projections of future savings are subject to rate tariff eligibility over the life of the installation. This analysis uses SCE rate tariffs published October 2022.
- 3) This analysis assumes the electrical service will not require significant upgrades.
- 4) Projections of future savings are based on interconnection of all sites under NEM 2.0 tariff. Remaining capacity under the NEM 2.0 tariff is subject to availability.
- 5) The PPA rates include a \$250,000 distribution utility upgrade cost assumption per site; PPA rates may change if actual cost is higher or lower than anticipated.
- 6) NEM-A analysis assumes the client solely owns contiguous parcels where the aggregated meters exist.
- 7) This analysis has been performed assuming SCE New TOU rate tariffs. A few sites have legacy PA treatment, which should be preserved until expired for optimal financial benefit.
- 8) Applicable NEM 2.0 tariff eligibility is assumed to be available for 20 years from Permission to Operate. Projections of savings shown beyond year 20 are subject to change based on any future NEM, or similar, tariffs in effect at that time.
- 9) This analysis assumes an Investment Tax Credit of 30% per site based on achieving Permission to Operate between 2023 and 2032. This does not constitute tax advice and Palmdale Water District should seek professional tax advice from their tax advisors to confirm all potential tax savings and the assumptions made in this analysis.
- 10) Due to the total system size of the project being over 1MW, this analysis assumes that all prevailing wage and apprenticeship requirements of the 30% Investment Tax Credit level will be met. If these requirements are not met, the Investment Tax Credit will be 6%.
- 11) Asset Management Services include system performance monitoring and detailed energy & financial reporting.
- 12) Renewable Energy Credits (RECs) have been included in this analysis as potential revenue, however, by selling the RECs they cannot be claimed for clean energy use.
- 13) No part of Terra Verde Energy's deliverables, messaging, presentation or anything else shared with its clients should be construed by the client or any other entity as advice on scope for future contracts, work orders or other engagements.



POWER PURCHASE AGREEMENT

by and between

East Avenue South Solar Project 2022, LLC

and

Palmdale Water District

dated

_____, 2022

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POWER PURCHASE AGREEMENT

This Power Purchase Agreement (“**Agreement**” or “**PPA**”) is made and entered into as of this 12th day of December, 2022, (“**Effective Date**”), between East Avenue South Solar Project 2022, LLC (“**Provider**”), and the Palmdale Water District (“**District**”). District and Provider are collectively referred to herein as “**Parties**” and individually as “**Party.**”

RECITALS

WHEREAS, Provider is in the business of installing and operating solar photovoltaic and battery energy storage facilities and selling electric energy generated from such facilities;

WHEREAS, Government Code section 4217.10 *et seq.* provides that public agencies may enter into agreements, including but not limited to, lease agreements, for real property upon which alternative energy facilities may be constructed so that the public agency may purchase the energy generated from the facilities constructed on the real property under a power purchase agreement; and

WHEREAS, the governing body of District has made those findings required by Section 4217.12 of the Government Code that: (i) the anticipated cost to District for electrical energy services provided by the solar photovoltaic and battery energy storage system under this Agreement will be less than the anticipated marginal cost to District of electrical energy that would have been consumed by District in the absence of those purchases and (ii) the difference, if any, between the fair market value of the right to access and occupy the real property subject to this Agreement and related payments under this Agreement, if any, is anticipated to be offset by below-market energy purchases or other benefits provided under this Agreement; and

WHEREAS, District desires to reduce its energy costs as well as its dependence on fossil fuel electric generating resources and to promote the generation and storage of electricity from solar photovoltaic and battery energy storage facilities; and

WHEREAS, Provider desires to design, install, own, maintain, and operate a solar photovoltaic and battery energy storage system including all solar photovoltaic panels and equipment components of the solar photovoltaic system (a “**Solar Facility**”) and the battery energy storage system and all equipment components (the “**BESS**”) (collectively the “**System**”) on the real property (the “**Site**”) owned by the District, and Provider shall sell the output from the Solar Facility and provide services from the BESS to District at those rates set forth herein (collectively the “**Project**”); and

WHEREAS, Provider has developed an ownership and financing structure for the System, which facilitates the use of certain tax incentives, and accelerated depreciation to reduce the expected investment returns of its investors, and which benefits District by offering a competitive Power Price, as defined herein; and

WHEREAS, District desires to provide Provider an easement for the sole purpose of accessing District’s property to install, operate, maintain and repair the System; and

WHEREAS, as part of this PPA and in consideration of the easement, Provider and District intend that Provider would obtain title, an ownership interest, and retain all financial incentives and tax benefits generated by the System and associated with the development of the System, including the installation, ownership and operation of the System and the sale of energy and services from the System to District.

NOW, THEREFORE, in consideration of the promises and the mutual benefits from the covenants hereinafter set forth, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound, Provider and District hereby agree as follows:

AGREEMENT

1. Definitions.

Capitalized terms used in this Agreement shall have the meanings ascribed to them herein or in the attached Exhibit A.

2. Term.

A. Term. The Term of this Agreement shall commence upon the Effective Date and terminate automatically on the Expiration Date (“**Initial Term**”), unless terminated earlier as provided herein. The Parties may mutually agree to renew this Agreement for up to two (2) five-year renewal terms (“**Renewal Term**”). The Initial Term and all subsequent Renewal Terms are referred to collectively as “**Term**.” This Agreement shall terminate automatically and concurrently with any termination of the Site Easement provided by this Agreement.

3. Removal of System.

A. Removal of System. Within one hundred eighty (180) Days of the expiration or any termination of this Agreement (unless District has: (i) purchased the System under the terms of this Agreement, including, without limitation, all applicable requirements under Article 5, below; or (ii) otherwise consented in writing to allowing the System to remain installed on the Site), Provider shall, in coordination with District and, except as otherwise provided herein, at Provider’s sole cost and expense, remove the System from the Site. Provider shall bear the cost of any required storage of the System, if necessary, during Provider’s removal of the System.

B. Removal and Site Restoration. Removal of the System shall include all installed equipment, including, but not limited to, the System and all tangible and structural support materials, as well as all appurtenant equipment, above and below ground (except for empty conduits). Provider shall additionally restore the Site to a condition substantially similar to the pre-installation condition of the Site, excluding ordinary wear and tear, through reasonable efforts. Provider’s restoration of the Site shall include, but is not limited to, any refinishing, landscaping, hardscaping, painting or other finish work, and cleaning. Provider shall undertake any repairs

necessary as a result of such removal and restoration. The Parties shall reasonably coordinate all such removal, restoration, storage and transportation activities and dates.

C. Failure to Remove. If Provider fails to comply with this Section 3 and remove the System and restore the Site as required within such one-hundred and eighty (180) day period, District shall have the right, but not the obligation, to remove the System and restore the Site and charge Provider for the reasonable costs incurred by District, which cost shall include, the reasonable value of administrative time and resources as reasonably documented. The Parties shall reasonably coordinate all such removal and pick-up activities. In the event that the Provider does not remove the System as specified herein, District shall also have the option of allowing the System to remain in place and Provider shall transfer title to the System to the District and the District shall become the beneficial owner of the System at no cost to the District including without limitation fees related to termination or default and with no further obligations or liability of Provider other than for liabilities accrued prior to the date of transfer of ownership. This Section shall not be interpreted to limit District's other available lawful remedies.

4. Purchase and Sale of Output and BESS Services.

A. Purchase and Sale of Output. Beginning on the Commercial Operation Date and through the remainder of the Term, Provider agrees to sell and District agrees to buy all Output from the Solar Facility at the applicable Power Price as set forth in Exhibit B, and BESS Services at the applicable BESS Rate, as set forth in Exhibit C. District shall have no obligation to pay for Output delivered from the Solar Facility or BESS Services after the expiration date of this Agreement or the early termination thereof.

B. Cost Reimbursement. The Parties acknowledge that District will incur costs associated with this Project including amounts payable by District to third-party engineers, consultants, legal counsel, inspectors, and other costs related to the District's undertaking of the Project ("**Development Costs**"). The Power Price set forth in Exhibit B includes consideration for reimbursement of Development Costs in the amount of \$471,785 which shall be paid by Provider to District based on the following schedule:

- 1) 50% of the Development Costs within fifteen (15) days of the Notice to Proceed;
and
- 2) 50% of the Development Costs within fifteen (15) days of the Commercial Operation Date.

C. Adjustment to Power Price. The Parties acknowledge that the Power Price set forth in Exhibit B is based on assumptions by Provider regarding the items outlined below. The Provider shall be solely responsible for ensuring compliance with applicable legal requirements of all Federal Investment Tax Credit ("**ITC**") incentives necessary to achieve their assumed ITC rate. Provider assumes the risk that Provider may not achieve their assumed ITC incentive rate. Notwithstanding the foregoing, the Parties acknowledge that the Power Price shall be adjusted, if (and only if) the assumptions provided in this Section 4(C) are inaccurate, as follows:

- 1) Distribution Utility Upgrades Adder: Provider assumed that the total cost to be paid to the Distribution Utility in connection with the Distribution Utility Upgrades would be \$250,000. If the actual cost reasonably incurred by Provider for Distribution Utility Upgrades exceeds \$250,000, then a proportionate increase of the Power Price in an amount of \$0.0002/kWh for each additional \$10,000 increase in cost will be required. Provider will notify the District of the actual Distribution Utility Upgrade costs within five (5) Days of receipt from the Distribution Utility, and in all cases, prior to District acceptance of any such changes as contemplated under Sections 6(A) or satisfaction of the District's Conditions Precedent under Section 6(B). If the Power Price increases in an amount in excess of \$0.003/kWh ("**Distribution Utility Upgrade Cap**") as a result of Distribution Utility Upgrades the Parties will engage in good faith negotiations to adjust the Power Price or System specifications to accommodate the actual Distribution Utility Upgrade costs for a period of thirty (30) days after Provider provides such notice. If the Parties, in good faith, fail to reach agreement on an amendment to this Agreement regarding such adjustments within a thirty (30) day period, Provider may (i) terminate this Agreement which termination shall not comprise a default under this Agreement, nor shall such termination result in any further liability to either Party including, without limitation, any default provision which would otherwise require payment of the Termination Value; or (ii) elect to proceed with the Power Price equal to the Distribution Utility Upgrade Cap. If the actual cost reasonably incurred by Provider for Distribution Utility Upgrades is less than \$250,000, District shall be entitled to a proportionate decrease of the Power Price in an amount of \$0.0002/kWh per \$10,000 decrease in cost. Provider shall work diligently with District to minimize the costs for Distribution Utility Upgrades at all points of the Project.

- 2) District Equipment Adder. Provider assumed that the total cost to Provider for District owned equipment upgrades would be \$0 ("Assumed District Upgrade Costs"). If the actual costs incurred by Provider for District owned equipment upgrade costs ("**District Upgrade Costs**") exceeds the Assumed District Upgrade Costs, then a proportionate increase to the Power price in an amount of \$0.0002/kWh for each additional \$10,000 increase in cost will be required. Provider will notify District of the actual District Upgrade Costs within five (5) Days of receipt of a firm bid for such costs, and in all cases, prior to District acceptance of any such changes as contemplated under Sections 6(A) or satisfaction of the District's Conditions Precedent under Section 6(B). If the Power Price increases in an amount in excess of \$0.001/kWh ("**District Upgrade Costs Cap**") as a result of District Upgrade Costs, the Parties will engage in good faith negotiations to adjust the Power Price or System specifications to accommodate the actual District equipment upgrade requirement costs for a period of thirty (30) days after Provider provides such notice. If the Parties, in good faith, fail to reach agreement on an amendment to this Agreement regarding such adjustments within a thirty (30) day period, Provider may (i) terminate this Agreement which termination shall not comprise a default under this Agreement, nor shall such termination result in any further liability to either Party including, without limitation, any default provision which would otherwise require payment of the Termination Value; or (ii) elect to

proceed with the Power Price equal to the District Equipment Upgrade Requirements Cap. Provider shall work diligently with District to minimize the costs for District Upgrade Costs at all points of the Project.

- 3) Solar Facility Federal Investment Tax Credit Domestic Content Adder. Within two (2) months of the applicable Governmental Authority issuing final guidance regarding the eligibility requirements for the ITC 10% adder related to meeting domestic content requirements (“**Solar Facility ITC Domestic Content Adder**”), Provider shall provide District with their determination on the Project eligibility. If the Project is eligible for the Solar Facility ITC Domestic Content Adder, District shall be entitled to a decrease of the Power Price by \$0.0116/kWh for each additional \$354,249 increase in the net benefit to the Project of the Solar Facility ITC Domestic Content Adder, taking into account any additional work, requirements, or costs incurred by Provider in qualifying for the Solar Facility ITC Domestic Content Adder. Provider shall pursue the Solar Facility ITC Domestic Content Adder diligently in good faith; provided, however, Provider shall not be required to pursue the Solar Facility ITC Domestic Content Adder if Provider reasonably determines that the Solar Facility ITC Domestic Content Adder will provide no or marginal net benefit to the Project. If an additional EPC cost to Provider is identified, then Provider shall provide written confirmation of the additional EPC cost and the resulting impact to the Power Price.
- 4) BESS Federal Investment Tax Credit Domestic Content Adder. Within two (2) months of the applicable Governmental Authority issuing final guidance regarding the eligibility requirements for the ITC 10% adder related to meeting domestic content requirements (“**BESS ITC Domestic Content Adder**”), Provider shall provide District with their determination on the Project eligibility. If the Project is eligible for the BESS ITC Domestic Content Adder, District shall be entitled to a decrease of the BESS Rate by \$267/month for each additional \$63,604 increase in the net benefit to the Project of the BESS ITC Domestic Content Adder, taking into account any additional work, requirements, or costs incurred by Provider in qualifying for the BESS ITC Domestic Content Adder. Provider shall pursue the BESS ITC Domestic Content Adder diligently in good faith; provided, however, Provider shall not be required to pursue the BESS ITC Domestic Content Adder if Provider reasonably determines that the BESS ITC Domestic Content Adder will provide no or marginal net benefit to the Project. If an additional EPC cost to Provider is identified, then Provider shall provide written confirmation of the additional EPC cost and the resulting impact to the BESS Rate.
- 5) Solar Facility Federal Investment Tax Credit Low Income Adder. Within two (2) months of the applicable Governmental Authority issuing final guidance regarding the eligibility requirements for the ITC 10% adder related to meeting the low-income siting requirements, (“**Solar Facility ITC Low Income Adder**”), Provider shall apply to the applicable Governmental Authority for determination on Project eligibility. Within one (1) month of response from the applicable Governmental Authority, Provider shall notify the District in writing of the Project eligibility for the Solar Facility ITC Low Income Adder. If the Project is eligible for the Solar

Facility ITC Low Income Adder, District shall be entitled to a decrease of the Power Price by \$0.0116/kWh. Provider shall pursue the Solar Facility ITC Low Income Adder diligently in good faith.

- 6) BESS Federal Investment Tax Credit Low Income Adder. Within two (2) months of the applicable Governmental Authority issuing final guidance regarding the eligibility requirements for the ITC 10% adder related to meeting the low-income siting requirements (“**BESS ITC Low Income Adder**”), Provider shall apply to the applicable Governmental Authority for determination on Project eligibility. Within one (1) month of response from the applicable Governmental Authority, Provider shall notify the District in writing of the Project eligibility for the BESS ITC Low Income Adder. If the Project is eligible for the BESS ITC Low Income Adder, District shall be entitled to a decrease of the BESS Rate by \$267/month. Provider shall pursue the BESS ITC Low Income Adder diligently in good faith.

D. Provider’s Solar Facility Output Guarantee. Commencing with the third (3rd) Contract Year after the Commercial Operation Date of the System, and for each subsequent three Contract Year Period thereafter during the Initial Term, the aggregate metered Output from the Solar Facility for the previous Contract Year (the “**Measurement Period**”) shall be at least ninety-five percent (95%) of the Annual Production Estimate for such Measurement Period for the Solar Facility as defined in Exhibit B (“**Output Guarantee**”); provided, the Output Guarantee for any Measurement Period will be reduced by the estimated generation of the Solar Facility that would have been generated during such Measurement Period, but was not generated, due to one or more of the following causes: (i) an Outage; (ii) the actions or omissions of the Distribution Utility or the request or direction of the Distribution Utility; (iii) a Force Majeure event; (iv) new soiling in excess of what is shown in the production modeling completed by the Provider and as shown in Exhibit J or shading sources, which, in each case, shall include only sources not in existence or otherwise discoverable as of the Effective Date, or preventable by Provider pursuant to its obligations under this Agreement, affecting the Solar Facility after the Commercial Operation Date overshadowing or otherwise blocking access or sunlight to the Solar Facility on or at the Site; (v) a breach of this Agreement by District; or (vi) Temporary Suspension by District.

If the Output delivered by the Solar Facility during any Measurement Period does not equal or exceed the Output Guarantee for such Measurement Period, Provider shall include in its next invoice to District (and in the final invoice for any credit owed for the final Contract Year) a credit for the Energy Shortfall Amount. Alternatively, District has the option to request that the Energy Shortfall Amount be paid by check independently of an invoice. Payment of the Energy Shortfall Amount, whether by credit or check, shall be the District’s sole and exclusive remedy for Provider’s failure to achieve the Output Guarantee for a Measurement Period.

E. Provider’s BESS Guarantee. Commencing with the first (1st) Contract Year after the Commercial Operation Date of the System, and for each Contract Year thereafter during the Initial Term, Provider shall provide District with a BESS Guarantee pursuant to the terms of **Exhibit H**.

F. Resale of Output. If at any time during the term of this Agreement, the District reduces its consumption requirements for Output or BESS Output or District otherwise determines that the Distribution Utility or any other purchaser is willing to purchase Output or BESS Output from the System, District, at its option, may sell Output or BESS Output to the Distribution Utility or any other purchaser. If applicable and required by law, District may also request that Provider enter into negotiations with District to pursue a third-party sale agreement. Upon such request, Provider and District shall negotiate in good faith regarding the terms and conditions of the third-party sale agreement. The District shall reimburse Provider for any out-of-pocket expenses in connection with such actions and Provider shall not incur further liability with respect to such actions.

G. Net Metering, Credits and Storage of Output. Nothing in this Agreement shall limit District's ability during the term of this Agreement to participate in or otherwise take advantage of any current or future program or technology which may enable District to store Output or BESS Output at any Site or to export Output or BESS Output to any other site or to the Distribution Utility for any available energy credits, offsets, or revenue. District will give reasonable notice to Provider of its intention to undertake any such project or program and will coordinate with the Provider to ensure that the System, the terms and conditions of this Agreement and all associated warranties are reasonably preserved. The District shall reimburse Provider for any out-of-pocket expenses in connection with such actions and Provider shall not incur further liability with respect to such actions.

H. Grid Services Programs. From time to time, Provider or District may identify demand response or similar grid services programs, whereby the BESS can help meet demands of the electrical grid, or improve its reliability, by charging or discharging the BESS (or agreeing to make the BESS available for charging or discharging) for which the Provider is eligible to participate (collectively, a "**Grid Services Program**"). Provider shall only enroll the BESS in any Grid Services Program upon written agreement from the District. Nothing in this paragraph shall prohibit the District from notifying Provider of Grid Services Programs the District is eligible to participate in, and Provider shall undertake reasonable efforts to determine, in its sole discretion, whether to participate in such Grid Services Program. The District shall reimburse Provider for any out-of-pocket expenses in connection with such actions.

I. Outages. Provider may suspend delivery of Output or BESS Output as reasonably necessary for testing, maintaining, replacing and repairing the System, or in response to any Distribution Utility directive or dispatch order (an "**Outage**"). Provider shall take all steps necessary to minimize the duration and scope of any such Outage. In the event that an Outage is caused or prolonged by Provider's negligent act or omission, Provider shall compensate District for the difference between the total electricity cost to the District for the applicable period of outage caused or prolonged by Provider's negligent act or omission and the Power Price for each 15 minute interval that the Power Price is less than the electricity cost to the District. In such event, District shall provide Provider with evidence of the pricing for such applicable periods in the form of Distribution Utility bills during the outage period of the pricing for such applicable periods, and Provider shall provide the calculation and supporting documentation for determining these amounts, to the reasonable satisfaction of District. Except as set forth herein, District waives

claims related to District's costs of purchasing energy to replace what would have been produced by the System but for such Outages, along with any associated net metering, or similar, benefits.

If an Outage occurs under this Section and a payment is due from Provider to District, Provider shall include in its next invoice(s) to District (and in the final invoice for any credit owed for the final Contract Year) a credit for the difference between the electricity cost to the District for the applicable period.

J. Distribution Utility Electric Service. District may take parallel energy services from Distribution Utility.

5. Design, Construction, Operation & Maintenance.

A. All Provisions in this Article 5 shall apply to all activities of Provider undertaken in relation to the design, construction, installation, maintenance, repair, and operation of the System(s) throughout the Term of this Agreement.

B. Provider's Contractor and Consultants. Provider shall ensure that any party contracting with Provider for any engineering, procurement, design, installation or construction of the System shall possess sufficient knowledge, experience, expertise, licensing, registration, and financial capacity and creditworthiness necessary for satisfactory completion of Provider's obligations under this Agreement. The contractor performing the construction work on the Project shall possess a Class B and C-10 California Contractor State License, be a registered public works contractor in accordance with Labor Code Section 1725.5, and all other required licenses for performing work under this Agreement, prior to performing any work on the Project. Provider represents and warrants that it has the financial capacity, creditworthiness and bonding sufficient to satisfy all of Provider's obligations under this Agreement, including, but not limited to, any instance of default or other failure by Provider's contractor(s) to complete the work required to satisfy Provider's obligations in this Agreement. Prior to contracting with any such party, Provider shall obtain and review the qualification of such party and complete any necessary background check or fingerprinting required by law or District. Provider shall further procure from the contractor performance and payment bonds and any other assurances as Provider deems reasonably necessary to secure contractor's timely completion of the Project.

C. Permits. Provider shall be solely responsible for ensuring that the System is constructed in compliance with all applicable laws, regulations and Permits, and in accordance with the standards set by any governmental program providing funding for the System, including, but not limited to, all improvements, conditions and mitigation measures required for compliance with the California Environmental Quality Act ("CEQA"). Except as otherwise provided herein, Provider shall, at Provider's sole cost and expense, obtain from all Governmental Authorities having jurisdiction over the Project, all necessary Governmental Approvals and other Permits and approvals required for the installation, operation and maintenance of the System, including, but not limited to fire safety, California Occupational Safety and Health Administration ("Cal/OSHA"), utility interconnection, right-of-way permits, easement agreements and other related requirements.

To the extent action is required by District, District shall, upon the request of Provider, use reasonable efforts to assist Provider in obtaining and retaining Permits, licenses, releases and other approvals necessary for the design, construction, engineering, installation, operation and maintenance of the System. Provider shall reimburse District for costs reasonably incurred by District in assisting the Provider under this Section. Except as otherwise provided herein, Provider shall be responsible for all costs, expenses and improvements to the extent required to obtain or comply with any permits, Government Approvals or other requirement under state or federal law made necessary as a result of the System installation, operation and maintenance. Specifically, the Provider is required to obtain and submit all documents to close out the Project with the Governmental Authorities having jurisdiction over the Project. In addition to stamped and approved plans, Provider shall provide any required installation compliance confirmation letter(s) to any applicable Governmental Authorities.

D. Inspections. Provider and District shall work together reasonably to mutually select any company that performs inspections of the materials and equipment for the design, engineering, procurement, construction or installation of the Systems, including, but not limited to, any inspections to verify the Systems' compliance with the Applicable Law. In the event of disagreement between Provider and District regarding selection of the aforementioned inspection company, the District shall select the company.

E. Notice of Output Interruptions. Each Party shall notify the other Party as soon as reasonably practicable following its discovery of any material malfunction of any System or interruption in the supply of electricity from any System. Each Party shall designate and advise the other Party of personnel to be notified in the event of such a malfunction or interruption. Provider shall correct, or cause to be corrected, the conditions that caused the malfunction or interruption as soon as reasonably practicable. However, in no event shall Provider's response to investigate the problem and initiate appropriate corrective action be greater than two (2) business days following receipt of notice or upon discovery of such malfunction or interruption. In addition, Provider shall remotely monitor the System on a daily basis for the presence of alarm conditions and general performance utilizing the data acquisition systems and monitoring systems installed by the Provider at the Site, as described in Exhibit G.

F. Site Operations. Except in the event of an emergency, in order to prevent any unreasonable disturbance or interruption of District activities, Provider shall accommodate the District's normal operations schedule and scope of activities conducted on the Site during construction and on-going operation of the System pursuant to this Agreement. In the event of an emergency, comprising an imminent threat to the health and safety of persons and/or imminent threat of damage to or destruction of property, the District may take any and all actions to ensure safety of persons and property or comply with a compulsory demand of a competent Governmental Authority in the event of an emergency, including, without limitation, disconnection or shut-down of any System(s) in accordance with the training provided by Provider to District pursuant to Section 7.1 of Exhibit G ("Training"), incorporated herein by this reference; provided, the District shall be responsible for and shall indemnify, defend, and hold harmless Provider for any damage to or destruction of property, including, but not limited to, the System, and any damage or injury to persons, including, but not limited to, anyone acting for or on behalf of District who received the Training, in connection with the foregoing which fails to conform to the Training, and shall

pay Provider an amount equal to the District Suspension Rate for the amount of time, if any, the System is not in Commercial Operation beyond the period of time necessary for the emergency due to damage to the System.

G. Operation and Maintenance of System. Provider shall be responsible for all operations, maintenance, and repair of the System, except to the extent that any maintenance or repair is made necessary by the sole or active negligent acts or omissions or willful misconduct of District. All maintenance, repairs and operations, shall be conducted in the manner set forth in this Agreement, and Provider shall reasonably accommodate and cooperate with District to ensure the District's activities, facility uses, and scheduling requirements are not unreasonably impeded. Provider's repair work responsibilities shall include, but are not limited to, any repair required as a result of damage caused by the Provider or its contractors, subcontractors or vendors, to the District's facilities within a period of five (5) years following the date the damage was discovered or reasonably should have been discovered by the District. Except to the extent of the District's active negligence or material breach of this Agreement, Provider is responsible for repairs and/or replacement of system components that are damaged from vandalism, theft or criminal activity.

H. Prevailing Wages. This Project is subject to compliance with the prevailing wage provisions of the California Labor Code and the prevailing wage rate determinations of the Department of Industrial Relations. These rates are on file at District's main office or may be obtained online at <http://www.dir.ca.gov/dlsr>. A copy of these rates shall be posted at the job site by Provider. Provider and all contractors and subcontractor(s) under it, shall comply with all applicable Labor Code provisions, which include, but are not limited to the payment of not less than the required prevailing rates to all workers employed by them in the execution of this PPA and the employment of apprentices. Provider hereby agrees to indemnify and hold harmless District, their officials, officers, agents, employees and authorized volunteers from and against any and all claims, demands, losses or liabilities of any kind or nature which District, their officials, officers, agents, employees and authorized volunteers may sustain or incur for noncompliance with any applicable Labor Code provisions arising out of or in connection with the Project.

(a) Wages.

(i) Pursuant to the provisions of Article 2 (commencing at Section 1770), Chapter 1, Part 7, Division 2 of the Labor Code of California, the governing body of District has ascertained the general prevailing rate of per diem wages in the locality in which this public work is to be performed for each craft, classification, or type of workmen needed to execute the Agreement.

(ii) Per Diem wages shall be deemed to include employer payments for health and welfare, pension, vacation, travel time and subsistence pay as provided in Labor Code § 1773.1 apprenticeship or other training programs authorized by Labor Code § 3093, and similar purposes when the term "per diem wages" is used herein.

(iii) Each worker needed to execute the Work must be paid travel and subsistence payments as defined in the applicable collective bargaining agreements in accordance with Labor Code § 1773.1.

(iv) Holiday and overtime work when permitted by law shall be paid for at a rate of at least one and one-half times the above specified rate of per diem wages, unless otherwise specified.

(v) Each worker in work on the System on District's Property shall be paid not less than the prevailing wage rate, regardless of any contractual relationship which may be alleged to exist between Provider, or any subcontractors of Provider, and such workers.

(vi) Provider shall, as a penalty to the District, forfeit an amount as determined by the Labor Commissioner pursuant to Labor Code § 1775 for each calendar day, or portion thereof, for each worker paid less than the prevailing rate as determined by the director for such work or craft in which such worker is employed for any public work done under the contract by him or by any subcontractor under him. The difference between such prevailing wage rate and the amount paid to each worker for each calendar day or portion thereof, for which each worker was paid less than the prevailing wage rate, shall be paid to each worker by Provider.

(vii) Any worker employed to perform work on the System which is not covered by any classification available in the District office, shall be paid not less than the minimum rate of wages specified for the classification which most nearly corresponds with work to be performed by him, and that minimum wage rate shall be retroactive to the time of initial employment of the person in the classification.

(b) Record Of Wages Paid: Inspection. Pursuant to Labor Code § 1776, Provider stipulates to the following:

(i) Provider and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the Project. Such records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information of such forms. The payroll records may consist of payroll data that are maintained as computer records, if printouts contain the same information as the forms provided by the division and the printouts are verified as specified in subdivision (a) of Labor Code § 1776.

(ii) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of Provider, or Provider's subcontractors, on the following basis:

(iii) A certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his or her authorized representative.

(iv) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished to a representative of the District, and to the Division of Labor Standards Enforcement, and Division of Apprenticeship Standards of the Department of Industrial Relations.

(v) A certified copy of all payroll records enumerated in subdivision (a) shall be made available to the public for inspection or copies thereof. However, a request by the public shall be made through either the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to the above, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Provider, subcontractors, and the entity through which the request was made. The public shall not be given access to such records at the principal office of Provider or Provider's subcontractors.

(vi) Provider shall file, or caused to be filed, a certified copy of the records enumerated in subdivision (a) with the entity that requested such records within ten (10) days after receipt of the written request.

(vii) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency, by the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of Provider or subcontractors performing the work shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual's name and social security number. Notwithstanding any other provision of law, agencies that are included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided non-redacted copies of certified payroll records.

(viii) Provider shall inform the District of the location of the records enumerated under subdivision (a), including the street address, city, and county, and shall, within five (5) working days, provide a notice of a change of location and address.

(ix) In the event of noncompliance with the requirements of this Section, Provider shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Provider must comply with this Section. Should noncompliance still be evident after such 10-day period, Provider shall pay a penalty in the amount prescribed by statute to the District for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from the progress payment then due.

(x) The responsibility for compliance with this Section shall rest upon Provider.

(c) Hours Of Work.

(i) As provided in Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, Provider stipulates that eight (8) hours of labor shall

constitute a legal day's work. The time of service of any worker employed at any time by Provider or by the work or upon any part of the work contemplated by this contract is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, work performed on the District's Property by employees or subcontractors of Provider in excess of eight (8) hours per day and forty (40) hours during any one week upon this public work shall be permitted compensation of all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

(ii) Provider shall pay to the District a penalty in the amount prescribed by statute for each worker employed in the execution of these Construction Provisions by Provider or by any Subcontractor for each calendar day during which such workman is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one calendar week in violation of the provisions of Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation to the worker so employed by Provider is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

(iii) Any work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to District, unless otherwise agreed to by the parties.

(iv) Construction work under the Construction Provisions shall be accomplished on a schedule consistent with the normal and reasonable practices of Provider and in compliance with applicable ordinances.

(d) Apprentices.

(i) All apprentices employed by Provider to perform services under these Construction Provisions shall be paid the standard wage paid to apprentices under the regulation of the craft or trade at which that apprentice is employed, and shall be employed only at the work of the craft or trade in which that apprentice is registered. Only apprentices, as defined in Labor Code § 3077, who are in training under apprenticeship standards and written apprenticeship agreements under Chapter 4 (commencing at Section 3070), Division 3 of the Labor Code, are eligible to be employed under these Construction Provisions. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprenticeship agreements under which that apprentice is training.

(ii) When Provider to whom the work under these Construction Provisions is awarded by the District or any Subcontractor under Provider, in performing any of the work under the Construction Provisions, employs workers in any apprenticeable craft or trade, Provider and Subcontractor shall apply to the joint apprenticeship committee administering the apprenticeship standards of the craft or trade in the area of the Site of the public work, for a certificate approving Provider or Subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, approval as established by the joint apprenticeship committee or committees shall be subject to the approval of the Administrator of Apprenticeship. Provider or Subcontractors shall

not be required to submit individual applications for approval to local joint apprenticeship committees provided they are already covered by the local apprenticeship standards. The ratio of work performed by apprentices to journeymen, who shall be employed in the craft or trade on the public work, may be the ratio stipulated in the apprenticeship standards under which the joint apprenticeship committee operates, but in no case shall the ratio be less than one hour of apprentice work for each five (5) hours of labor performed by a journeyman, except as otherwise provided in Section 1777.5 of the Labor Code. However, the minimum ratio for the land surveyor classification shall not be less than one apprentice for each five journeymen.

(iii) “Apprenticeable craft or trade” as used in Labor Code § 1777.5 and this Article, means a craft or trade determined as an apprenticeable occupation in accordance with rules and regulations prescribed by the Apprenticeship Council.

(iv) Provider, or any Subcontractor which, in performing any of the work under this contract, employs journeymen or apprentices in any apprenticeable craft or trade and which is not contributing to a fund or funds to administer and conduct the apprenticeship programming of any craft or trade in the area of the Site of the public work, to which fund or funds other Providers in the area of the Site of the public work are contributing, shall contribute to the fund or funds in each craft or trade in which that Provider employs journeymen or apprentices on the public work in the same amount or upon the same basis and in the same manner as other Providers do, but where the trust fund administrators are unable to accept the funds, Providers not signatory to the trust agreement shall pay like amount to the California Apprenticeship Council. Provider or Subcontractor may add the amount of such contributions in computing their bid for the contract. The Division of Labor Standards Enforcement is authorized to enforce the payment of the contributions to the fund or funds as set forth in Labor Code § 227.

(v) The responsibility of compliance with Labor Code § 1777.5 and this Article for all apprenticeable occupations is with Provider.

(vi) The interpretation and enforcement of Sections 1777.5 and 1777.7 of the Labor Code shall be in accordance with the rules and procedures of the California Apprenticeship Council.

I. Community Workforce Agreement. Provider shall acknowledge, accept and adhere to the terms of the Community Workforce Agreement by and between District and the Los Angeles/Orange Counties Building and Construction Trades Council and the Signatory Craft Councils and Unions provided in the Bid Documents. “Bid Documents” refers to all of the documents included in the solicitation of bids for the Project.

J. Safety Precautions and Programs. Provider shall ensure that its contractor and subcontractors performing work on the Site comply with the following safety precautions.

- a. Provider's contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the construction and installation of the Systems, for maintaining all safety and health conditions on each site and for ensuring against and/or correcting any hazardous conditions on the site.

- b. Certain work may be ongoing at the time employees are onsite; therefore, Provider's contractor shall take precautions to prevent injury and access to staff and shall comply with the District's guidelines for onsite safety. Material storage and vehicle access and parking shall be subject to District approval.
- c. The use of alcohol, drugs, or tobacco will not be permitted on District property. Workers employed by Provider's contractor or subcontractors shall have no contact with employees. All workers will present themselves with appropriate language, actions and work wear while on construction site.
- d. Provider's contractor shall designate a responsible member of its organization at the Site whose duty shall be the prevention of accidents and overall jobsite safety for contractor/subcontractor employees and visitors.

K. Conduct of Project Construction, Installation, Alteration, Operation, Repair, Maintenance and Removal. Throughout the Term of this Agreement, all work of construction, installation, alteration, operation, repair, maintenance and removal of the Projects shall conform with the following:

- a. Provider shall not leave debris under, in, or about the Site, but shall promptly remove same from the Site and dispose of it in a lawful manner.
- b. Provider shall remove rubbish and debris on a daily basis during the period of its activities at the Site.
- c. When performing activities at the Site Provider shall enclose the working area with temporary fencing. Provider shall coordinate with District's designated contact to develop a mutually agreeable schedule for any activity at the Site to mitigate any inconvenience to or disruption of staff in their regular activities and to otherwise eliminate any substantial interference with normal operations of the Site.
- d. Provide fencing and/or demarcations around any shrubs or trees indicated to be preserved, sufficient to protect such foliage from substantial damage that might ordinarily occur during activities of the kind undertaken by Provider at the Site.
- e. Deliver personnel, tools, equipment and materials to the work area over route(s) reasonably designated by the District, provided that District ensures that Provider shall have all access rights necessary to use such designated routes.
- f. Take commercially reasonable measures to mitigate objectionable dust, noise, or other disturbances as necessary to ensure Provider's activities do not result in substantial interference with or disruption of regular Site activities and normal operations of the Site.
- g. Confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits or the reasonable directions of the District, not unreasonably encumber Site or overload any structure with materials, enforce all reasonable instructions of the District regarding signs, advertising, fires, and

use, handling, treatment, storage, disposal and transportation of Hazardous Substances.

6. Commercial Operation Date; Conditions Precedent; Notice to Proceed.

A. Provider's Conditions Precedent to Construction. Provider's obligations to install the System and sell electric energy generated by the System to the District are conditioned on the completion of the following conditions to Provider and District's satisfaction, which Provider shall exercise diligent effort to achieve, ("**Provider's Construction Conditions Precedent**") within eight (8) months of the Effective Date:

- 1) Provider shall have completed all design and engineering of the System(s) in accordance with the requirements of Article 5, above, including, without limitation, having obtained all necessary approvals, permits and entitlements precedent to construction or installation.
- 2) Provider shall submit to District certificates of insurance and endorsements demonstrating compliance with the requirements defined in Section 17 of this Agreement and carriage of workers' compensation insurance.
- 3) Provider shall submit to District the certificates in a form provided by District regarding compliance with, tobacco use and drug use.
- 4) Provider shall submit to District a fully executed copy of any and all contracts entered into for the engineering, procurement and/or construction of the System.
- 5) Provider shall submit an interconnection application to the Distribution Utility and undertake all commercially reasonable efforts to assess the capacity of the Distribution Utility facilities, including but not limited to, the applicable transformer(s) and conductor(s) and provide a written assessment of such to District.
- 6) Provider shall submit to District for approval a 90% completed design of the System, a detailed construction and installation schedule and a detailed project safety plan. Provider's construction and installation schedule shall include start and completion dates for all categories of work on the Site, including but not limited to pre-construction activities, installation of major equipment and anticipated Site deliveries and all required submittal and procurement documentation.
- 7) Reserved.
- 8) Provider shall obtain or cause to be obtained all necessary Permits, entitlements, contracts and agreements required for the installation, operation and maintenance of the System and the sale and delivery of Output to District.

- 9) Provider shall have received the Site Easement and any additional documents required thereunder duly executed and delivered by the District and any applicable third parties.
- 10) Provider shall have received results, reasonably satisfactory to Provider, of a recent search of the District's jurisdiction of all encumbrances and real property filings that have been made with respect to the Site.
- 11) Provider shall have received:
 - a. District's approval of all material changes, if any, within thirty (30) days following District's receipt of same, provided that such thirty (30) day period shall be extended (but not beyond sixty (60) days) if and to the extent reasonably necessary for District to provide approval, to the System specifications provided in the Agreement and required by (a) Provider, (b) the Utility, or (c) a Governmental Authority; provided, in the case of (a), such material changes shall be in accordance with good solar PV and battery energy storage industry practices.
 - b. Proof of insurance for all insurance required to be maintained by the District under this Agreement.
 - c. Written confirmation from any person holding any encumbrance or title impairment over the Site or any portion thereof, that such person will recognize Provider's rights to the System under this Agreement.

B. District's Conditions Precedent to Construction. The District's obligations under this Agreement are conditioned on the completion of the following conditions ("**District's Conditions Precedent**"):

- a. Within one hundred and twenty (120) days after the Effective Date, District shall have received from Provider all documentation provided pursuant to Section 6(A)(2), (3), (4), (5), (6), (10) and (11).
- b. Within seven (7) months of the Effective Date, the District shall have received from Provider all documentation and relevant requests related to Section 6(A)(11).
- c. Within eight (8) months of the Effective Date, District shall have:
 - i. Granted approval of all material changes, if any, to the System specifications provided in the Agreement and required by (a) Provider, (b) the Utility, or (c) a Governmental Authority; provided, in the case of (a), such material changes shall be in accordance with good solar PV and battery energy storage industry practices.
 - ii. Received from Provider Proof of insurance for all insurance required to be maintained by Provider under this Agreement.

- iii. Written confirmation from any person holding any encumbrance or title impairment over the Site or any portion thereof, that such person will recognize Provider's rights to the System under this Agreement.
- iv. District shall have received evidence that Provider has obtained and secured sufficient financing to fund Provider's obligations under this Agreement. Such evidence shall include a signed letter from the Provider describing its intent and commitment to finance the project.

C. Completion of Condition Precedent to Construction; Termination. If Provider is unable to timely complete any of the Provider's Construction Conditions Precedent (1) through (11) above by the "**Conditions Precedent Deadline**" (eight (8) months after the Effective Date), as such period may be extended on a day-for-day basis for Force Majeure events, Utility, Governmental Authority or District delays, in each case, which Provider is diligently pursuing, District may, but is not required to, either (i) waive Provider's obligations to provide documentation under Section 6(A)1, 2, 3, 4, 6, 8, or 11; (ii) extend such requirements in a written notice to Provider, or (iii) solely with respect to Provider's failure to achieve Provider's Construction Conditions Precedent 1, 2, 3, 4, 5, 6, and 8, terminate this Agreement without triggering the default provisions of this Agreement, including, but not limited to any default provision requiring payment of the Termination Value, nor shall any such termination subject District to any liability; notwithstanding the foregoing, Provider may (a) waive its obligations solely with regard to Sections 6(A)9 and 11(b) in a written notice to the District; or (b) subject to Provider providing District documentation of its diligent efforts to achieve and solely with regard to Sections 1, 5, 8, 9, 10, and 11, terminate this Agreement without triggering the default provisions of this Agreement, nor shall any such termination subject Provider to any liability. Upon Provider's timely satisfaction of all Construction Conditions Precedent and written confirmation from Provider of the same, District shall issue a notice to proceed to Provider ("**Notice to Proceed**") within ten (10) business days, informing Provider that it may commence the construction of the System on the Site. Provider shall not proceed with construction of the System until it has received the Notice to Proceed. Provider shall promptly provide District with copies of all forms, documents and communications received or generated by Provider in connection with this Agreement.

D. Construction; Commercial Operation. Promptly upon receipt of the Notice to Proceed from District, Provider shall commence construction of the System, subject to Exhibit G, and shall cause complete installation and start-up of Commercial Operation thereof on or before July 17, 2024 (the "**Commercial Operation Deadline**"). Prior to declaring Commercial Operation, Provider shall achieve the following:

- 1) Effect the execution, in coordination with District, of all agreements required for interconnection of the System with the Distribution Utility, including, without limitation, the Interconnection Agreement and net metering agreement if applicable; and
- 2) Ensure that all necessary connections and equipment are installed in compliance with all applicable codes and standards, and that Provider has procured or caused

the complete installation of all necessary equipment and protection devices to enable delivery of Output and BESS Output from the Delivery Point to District's facilities.

- 3) Obtain or cause to be obtained all necessary Permits, entitlements, contracts and agreements required for the operation and maintenance of the System and the sale and delivery of Output and BESS Output to District.
- 4) Provide written confirmation that (i) all required commissioning has been completed; (ii) District and its agents have been provided access to the monitoring data for the System at the level required by this Agreement; and (iii) the System has been operating at full capacity for at least seven (7) calendar days.

E. Commercial Operation. The "**Commercial Operation Date**" shall be the date on which Provider accurately notifies District of the fact that the System is mechanically and electrically complete and operational and providing Output and BESS Output through the Meter(s) to the Delivery Point under approved and executed Distribution Utility Interconnection Agreement and that Provider has met all of the requirements in Section 6(C) above. Provider shall cause the Commercial Operation Date to occur on or before the Commercial Operation Deadline.

Except in the event of delays unforeseeable to an experienced solar developer caused by any third-party, Governmental Authority, or District delays, or Force Majeure events, which Provider could not mitigate through diligent efforts, Provider shall be solely liable to District for any delay by Provider or Provider's contractor(s) in completing the work, including any costs of District associated with impacts to the Site or a delay in the Commercial Operation Date.

If Commercial Operation has not commenced on or before the thirtieth (30th) day following the Commercial Operation Deadline, District may, but shall not be required to, assess Delay Liquidated Damages against Provider in an amount equal to five hundred dollars (\$500) per Day. If Commercial Operation has not commenced on or before the one hundred and twentieth (120th) day following the Commercial Operation Deadline, District may, but shall not be required to, terminate this Agreement without triggering the default provisions of this Agreement as to District or any other District liability, including any default provision which would otherwise require payment of the Termination Value; provided, the District shall not be permitted to terminate this Agreement so long as Provider timely remits to the District Delay Liquidated Damages and the deadline has not lapsed for District eligibility in the net energy metering tariff established by Public Utilities Commission of the State of California in Decision 16-01-044 (NEM 2.0), applicable as of the Effective Date of this Agreement.

Liquidated damages may also be applied to compensate District for undue delays in the completion of punch list items, Final Binder, site clean-up, demobilization, and miscellaneous contractual obligations after Commercial Operation has been achieved. The cost to District for administration, inspection, mileage, and other similar items would be extremely difficult to determine. For that reason, additional liquidated damages, known as Administrative Delay Liquidated Damages shall be imposed in the amount of \$500 per day, effective thirty (30) days

after Commercial Operation has been achieved. Charges will be assessed until District agrees that all outstanding work has been completed.

F. Extension of Commercial Operation Deadline. Provider may request in writing an extension of the Commercial Operation Deadline. At the time of the request, Provider shall present District in writing with the reason for delay, confirmation that Commercial Operation shall commence within the requested extension time as well as valid and persuasive evidence demonstrating that the delay in achieving the Commercial Operation Deadline could not have been reasonably avoided by Provider. Provider's written request must also state the date on which Provider reasonably believes Commercial Operation will be achieved following such extension. The approval of the request will be at the sole discretion of District and if approved by District, Provider shall pay to District a non-refundable extension fee of \$350 per day for each day of the extended time period. To the extent that Provider fails to meet the Commercial Operation Deadline as extended by District pursuant to this Section, District shall have the options to terminate or assess liquidated damages as set forth in subsection D above.

7. Ownership of System, Output, Green Attributes and Environmental Financial Incentives.

A. Ownership of System. Title to the System shall remain with Provider during the Term unless and until District exercises its option to purchase the System as set forth herein. None of the System, including, but not limited to any components thereof may be sold, leased, assigned, mortgaged, pledged or otherwise alienated or encumbered by District. District shall not cause or permit the System or any part thereof to become subject to any lien, encumbrance, pledge, levy or attachment arising by, under or through District. Provider shall bear all risk of loss with respect to the System, except for losses arising from the negligence or willful acts or omissions by District, or their agents or employees. Provider shall be solely responsible for the System operation and maintenance in compliance with all applicable laws, regulations and Permits. Provider shall not be responsible for the cost or expense of any maintenance required as a direct result of District's negligence or willful misconduct.

B. Ownership of Output, Green Attributes and Environmental Financial Incentives. Provider is the exclusive owner of any Environmental Financial Incentives associated with the construction, ownership and operation of the System. District will assign its interest (if any) in all such credits and other financial incentives to Provider. District is the exclusive owner of, and may assign or sell in its sole discretion, all Green Attributes, including, but not limited to, Renewable Energy Certificates ("REC"), and REC Reporting Rights, attributable to the System and the Output or BESS Output therefrom. Without additional charge to District, Provider shall take and bear the reasonable costs of all steps necessary to secure and perfect District's interest in the Green Attributes, including, but not limited to, registering the RECs with WREGIS. The Parties agree to subsequently negotiate in good faith the ownership of any additional benefit or incentive associated with this Agreement which did not exist at the time this Agreement was entered into.

8. Payment.

A. Monthly Invoices. Provider shall provide an invoice for the System to District on a monthly basis, by the 15th day of each calendar month following the Commercial Operation

Date of the System. Each invoice will set forth (i) the Output delivered in the preceding month, (ii) the Power Price for such month, (iii) the total amount to be paid by District to Provider for Output delivered in the preceding month, (iv) the BESS Output delivered in the preceding month, (v) the BESS Rate for such month, (vi) the year and month of the PPA term, (vii) Annual Production Estimate for the relevant year as set forth in Exhibit B, (viii) running total of Annual Production Estimate for the relevant year as set forth in Exhibit B versus cumulated actual Output for the relevant year, (ix) running total of BESS Guarantee for the relevant year as set forth in Exhibit C versus cumulated actual BESS Output for the relevant year (x) and any applicable offsets or credits to such invoice amounts.

B. Due Date. All payment of invoices shall be in U.S. Dollars and paid by wire transfer, check, or automated check handling (ACH) payment delivered to Provider at the address specified herein within thirty (30) Days of the date the invoice is received by District (“**Due Date**”). If the Due Date is a weekend or a bank holiday, payment will be due the next following business day. District shall, for a period of time not to exceed thirty (30) days from the Due Date of Provider’s invoice, be excused for any delay in payment due to delays in processing.

C. Payment Disputes. In the event a Party disputes all or a portion of an invoice, or any other claim or adjustment arises, such disputes shall be resolved pursuant to Section 15.

9. **Purchase Option.**

A. Purchase of System. Unless District is in default of its obligations under this Agreement, District shall have the option to purchase all of Provider’s right, title, and interest in and to the System on the sixth (6th), tenth (10th), and fifteenth (15th) anniversary of the Commercial Operation Date or upon expiration of the Term hereof (“**Purchase Option**”). If District wishes to exercise its Purchase Option, it must provide notice to Provider at least ninety (90) Days in advance of any such anniversary or the expiration of the Term. The purchase price shall be the greater of (i) the Fair Market Value, as defined under this Agreement, of the System as of the applicable anniversary date or the expiration of the Term or (ii) the applicable Purchase Option Price indicated in Exhibit E. Upon the exercise of the Purchase Option and Provider’s receipt of all amounts then owing by District under this Agreement, the Parties will execute all documents necessary for the purchase and sale of the System, including but not limited to, the delivery of the purchase price, the transfer of title to the System, and to the extent transferable, the remaining period, if any, on all warranties and Environmental Financial Incentives and Green Attributes for the System to District. Provider shall remove any encumbrances placed or allowed on the System by Provider. On the date on which Provider transfers title to the System to District in accordance with this Section, this Agreement shall terminate without default or penalty to District or Provider other than for then current liabilities.

B. Fair Market Value. For the purposes of this Agreement and the Site Easement Agreement, the “**Fair Market Value**” of the System shall be the value thereof as determined by a nationally recognized independent appraiser selected by the Parties, with experience and expertise in the solar photovoltaic and battery energy storage industry to value such equipment. The Fair Market Value of the System shall be based upon an amount that would be paid in an arm’s length, free market transaction, for cash, between an informed, willing seller and an informed willing buyer, neither of whom is under compulsion to complete the transaction, taking into account the

age and condition, and performance of the System, provided that installed equipment shall be valued on an installed basis, shall not be valued as scrap if it is functioning and in good condition, and its fair market value in continued use for the Term and in including the costs of removal, shipping and reinstallation, as a cost credit against the value of the System. The valuation of the System shall take into account the present valuation of all associated future income streams expected to arise from the operation of the System for the remaining useful life of the System, including but not limited to the expected price of electricity, Green Attributes and Environmental Financial Incentives, and factoring in future avoided costs and expenses associated with the System and assuming the System is able to generate revenue for the then-remaining term of the Agreement at a price equal to the then-applicable energy rate and thereafter for the remaining useful life of the System at a price equal to the then fair market energy price for energy. The valuation made by the appraiser shall be binding on the Parties in the absence of fraud or manifest error. The costs of the appraisal shall be borne by the Parties equally. If the Parties are unable to agree on the selection of an appraiser, such appraiser shall be selected by the two appraiser firms proposed by each Party.

10. Early Termination.

A. Provider's Early Termination Rights. Provider shall have the right, but not the obligation, to terminate this Agreement without triggering the default provisions of this Agreement or any liability under this Agreement prior to expiration of its Term upon the occurrence of:

- 1) An unstayed order of a court or administrative agency, or a change in state or federal law or regulation, imposing a material cost, regulation or other requirement upon the sale of Output or BESS Output which precludes the Provider from providing Output or BESS Output pursuant to this Agreement. Such termination shall be conditioned upon Provider's proof of the financial impossibility and violation of Provider's System financial arrangement to the reasonable satisfaction of District.
- 2) Condemnation, destruction, or other material damage to the Site that results in the termination of the Site Easement to such Site.

In the event Provider exercises its right under this Section, District may elect to either (i) purchase the System pursuant to Section 9 as of the time of Provider's notice; or (ii) require Provider to remove the System within one hundred eighty (180) days at Provider's sole cost and expense and restore the Site as required in Section 3.

B. District's Early Termination Rights. After the sixth (6th) year of the Term, if District ceases to conduct operations at or vacates a Site, District may, upon payment to Provider of the Termination Value, without further penalty hereunder, terminate this Agreement, which termination shall not constitute an event of default. Provider shall remove the System at the Site in accordance with Section 3.

11. Output and BESS Output Specifications Delivery.

A. Output Specifications. Provider shall ensure that all energy generated and / or discharged by the System conforms to Distribution Utility specifications for energy being

generated and / or discharged and delivered to the Sites' electric distribution systems, which shall include the installation of proper power conditioning and safety equipment, submittal of necessary specifications, coordination of Distribution Utility testing and verification, and all related costs.

B. BESS Operation Requirements. Provider shall cooperate and coordinate with District to operate the BESS with the following characteristics:

- 1) BESS shall charge one hundred percent (100%) from the solar PV system and be capable of getting NEM credits for exported energy.
- 2) BESS shall prioritize operations in the following order:
 - a. Demand Reduction
 - b. Maximize savings from energy arbitrage
 - c. Maximize revenue from Grid Services Programs

Provider shall coordinate with District as requested to revise the priority of operations for the BESS.

C. Transfer of Output. Provider shall be responsible for the delivery of Output and BESS Output to the Delivery Point. Provider shall undertake all commercially reasonable efforts to assess the capacity of the Distribution Utility transformer(s) and conductor(s). Except as otherwise provided in Section 4(c), to the extent any subsequent upgrade to such facilities is required and not performed and funded by the Distribution Utility, the Provider shall cause such upgrades to be completed at its sole cost and expense. Title and risk of loss of the Output and BESS Output shall pass from Provider to District upon delivery of the Output and BESS Output from the Delivery Point to District. To the extent applicable to the Project, prior to the start of construction of the System, Provider shall use commercially reasonable efforts to assist with District's selection of equipment installations on District's side of any Delivery Point.

D. Relocation. On or after the sixth (6th) anniversary of the Commercial Operation Date, District may, at its option, require that the System be permanently relocated, either on the existing Site or to another site of District's choosing, at a location with at least equal insolation to the existing Site and reasonably acceptable to both Parties (the "**Relocation Site**"). District shall give Provider at least sixty (60) calendar Days' notice of District's need to move or relocate the System. Following agreement on a Relocation Site, the Parties will amend this Agreement to memorialize the required changes in the definition of "**Site**."

District shall pay the reasonable costs arising in connection with the relocation of the System, including removal costs, necessary storage costs, re-installation, re-commissioning costs, and any applicable interconnection fees, provided that Provider provides District with information detailed herein below in a timely manner. District shall additionally compensate Provider for any revenue during the period in which energy cannot be generated and delivered to District from the System being relocated, at District Suspension Rate, as defined below, prorated as needed to apply on a daily basis. District shall also execute such consents or releases reasonably required by Provider or Provider's financing Parties in connection with the relocation. Within thirty (30) Days of agreement on a Relocation Site, Provider will provide District with a calculation of the estimated

time required for such relocation, and the total anticipated amount of lost revenues and additional costs to be incurred by Provider as a result of such relocation. District will have twenty (20) Days to review the calculation and make, in writing, any objections to the calculation. Provider shall make all commercially reasonable efforts to achieve the relocation of the System in the estimated time and for the estimated cost provided to District. All additional time and / or costs shall require advance written approval of District.

If an acceptable Relocation Site cannot be located, this Agreement shall terminate with respect to the Site, upon Provider's thirty (30) Days' written notice. In the event that an acceptable Relocation Site cannot be agreed upon, District shall pay Provider an amount equal to the Termination Value. In the event of a termination occurring under this Section, Provider shall remove the System and restore the Site in accordance with Section 3, at no additional cost to District.

E. Temporary Suspension by District. Notwithstanding any other provision of this Agreement, District shall have the right, upon written notice to Provider, to temporarily suspend operations and Output and / or BESS Output for any reason. District shall have the right, upon written notice to Provider, to temporarily render the System non-operational for up to forty-eight (48) hours per year without penalty or charge by Provider; provided no more than twelve (12) hours shall occur during the hours of 9AM to 3PM local time. For avoidance of doubt, an event of Force Majeure shall not comprise a temporary suspension by District under this section. If District requires temporary suspension of the System for more than forty eight (48) hours in a given year, District shall pay to Provider an amount, prorated as necessary, equal to the amount of the monthly payment for power purchased pursuant to this Agreement for the same month(s) (or portion thereof) in the preceding twelve (12) months, or for the average of the entire period the System has been in Commercial Operation if less than twelve (12) months, for the period of time during which the System is not in Commercial Operation in excess of forty eight (48) hours ("**District Suspension Rate**") due to the temporary suspension by District; provided, in no event shall Provider be obligated to suspend operations and Output from the BESS or System for more than ninety (90) days in any Contract Year.

F. Temporary Suspension by Provider. Provider shall have the right, upon written notice to District, to temporarily render the System non-operational for up to forty-eight (48) hours per year without penalty or charge by District. If Provider renders the System non-operational for a period in excess of forty-eight (48) hours, Provider shall pay to District a monthly payment (prorated as needed) equal to the difference between the cost to District of purchasing energy from the Distribution Utility during the System's period of non-operation and the average monthly cost of power purchased under this Agreement for the preceding twelve (12) months, or for the entire period the System have been in Commercial Operation if less than twelve (12) months, for the period of time during which the System are non-operational.

If an Outage occurs under this Section and a payment is due from Provider to District, Provider shall include in its next invoice(s) to District (and in the final invoice for any credit owed for the final Contract Year) a credit for the difference between the electricity cost as provided by the Distribution Utility to District for the applicable period.

G. Change in Conditions. If District requests an increase in the Output or BESS Output delivered to the Delivery Point, the Parties agree to use good faith efforts to increase such capacity. If Provider and District are not able to reach an agreement for such additional Output or BESS Output, District may, at its sole discretion, obtain the services of a third party for such purposes, provided that such additional third party provided services and any site easement shall not interfere with Provider's right, title and interest in the System under this Agreement.

H. Performance and Payment Bonds. Provider to shall deliver to District evidence that the prime contractor performing the construction and installation services of the Systems maintains payment and performance bonding in favor of the Provider and meeting the following requirements, which shall be provided to the District prior to the commencement of construction on any Site:

- a. Performance Bond. A bond issued by a corporate surety authorized to issue surety insurance in California, in a form commonly used for such purposes, in an amount equal to one hundred percent (100%) of the Provider's construction contract price payable under the contract securing the faithful performance of the contractor of its contract with Provider; and
- b. Payment Bond. A bond issued by a corporate surety authorized to issue surety insurance in California, in a form commonly used for such purposes, in an amount equal to one hundred percent (100%) of Provider's construction contract payable under the contract securing the payment of all claims for the performance of labor or services on, or the furnishing of materials for, the performance of the contract.
- c. All bonds shall be provided by a corporate surety authorized and admitted to transact business in California and shall be in the form provided by District.

I. Prior to commencing any portion of the work on the Project, the Provider, and / or its Contractors, as applicable, shall apply for and furnish District with separate payment and performance bonds for such work which shall cover 100% faithful performance of and payment of all obligations arising under this Agreement and / or guaranteeing the payment in full of all claims for labor performed and materials supplied for the Work. All bonds shall be provided by a corporate surety authorized and admitted to transact business in California. All bonds shall be submitted on forms subject to District's reasonable approval. To the extent available, the bonds shall provide that no change or alteration of the Agreement, extensions of time, or modifications of the time or terms, will release the surety. If the Provider, and / or its Contractors, as applicable, fails to furnish the required bond, District may terminate the Agreement for cause without resulting in any default of District.

J. Provider shall make no alteration to the System after the Commercial Operation Date intended or reasonably anticipated to permanently increase the nameplate capacity, Output, or BESS Output of the System without express written approval by District. Notwithstanding the foregoing, Provider may alter the System's nameplate capacity on a temporary basis when performing maintenance and repair activities provided that Provider returns the System's nameplate capacity to that as of the Effective Date upon the completion of such activities.

12. Metering.

A. Meter. Provider shall provide and maintain standard revenue grade meters and an electronic data acquisition system at the Delivery Point (each a “**Meter**”, collectively “**Meters**”) to individually measure the actual amount of electricity supplied to District by each of the Solar Facility and the BESS on a continuous basis. Meters shall be installed and maintained at Provider’s sole expense and shall be located in close proximity to the Delivery Point and in all cases on the Distribution Utility side of all Provider owned transformers and other electrical losses.

B. Meter Testing. Provider shall arrange for all Meters to be tested and calibrated prior to Commercial Operation and as recommended by the meter manufacturer. In the event Provider’s identifies more than a two percent (2%) deviation in Solar Facility or BESS performance between what is being measured by the relevant Meter and the output monitoring platform, Provider shall notify the District of such deviations and shall be responsible for testing and calibrating Meters as required to resolve the deviation. The calibration shall be conducted by independent third parties who are qualified to conduct such tests. Provider shall bear all costs and expenses associated with Meter calibration. District shall be notified ten (10) Days in advance of such tests and shall have a right to be present during such tests. Provider shall provide District with the detailed results of all Meter tests.

In addition, the Meters shall be inspected and tested for accuracy at such other times as District may reasonably request, but in no event more than once every one (1) year period. District shall bear the cost of the additionally requested Meter testing, unless such test shows that a Meter was inaccurate by more than two percent (2%), in which case the Provider shall bear the Meter testing costs. The tests shall be conducted by independent third parties who are qualified to conduct such tests. District shall be notified ten (10) Days in advance of such tests and shall have a right to be present during such tests. Provider shall provide District with the detailed results of all Meter tests.

C. Cost of Meter Repair. If the Meter testing demonstrates that a Meter was operating outside of its allowable calibration (+/- 2%), then the Provider will pay for the cost of the repairs, or replacement, necessary to restore a Meter to proper working order. If a Meter is found to be inaccurate by more than two percent (2%), Invoices from the prior six (6) months, or from the last time such Meter was registering accurately, whichever is less, shall be adjusted in accordance with Section 8, except that District shall not be obligated to pay interest on any amount found to be due because Meter was operating outside of its allowable calibration (+/- 2%). Provider shall submit any request for an adjustment to District no later than two (2) months after Meter testing had been performed, and District shall not be obligated to pay any adjustment for a prior fiscal year that was not submitted to District within two months after Meter testing was performed. District may withhold payments to Provider if a Meter has registered production in excess of 2% of the Output or BESS Output delivered to District and Provider fails to provide District with the appropriate payment pursuant to Section 8 for the amount which District overpaid to Provider as a result of the Meter being outside of the established calibration range.

D. Meter Data. Provider shall gather and maintain the data from a Meter, including but not limited to interval data registered at least once every fifteen (15) minutes (the “**Meter Data**”) and shall make such Meter Data available to District or maintain the Meter Data such that

District can access the Meter Data remotely through a secure internet site or such other remote access as the Parties mutually agree to.

E. Meter Data Audit. District shall have the right to audit the Invoices and/or the Meter Data once per calendar year. If the audit reveals that District has been overcharged by more than two percent (2%), Provider shall bear the cost of such audit, but in all other cases District shall bear the cost of such audit.

F. Maintenance of Meter Data. The Parties shall maintain all records related to Invoices and Meter Data for a period of the greater of (i) forty-eight (48) months from the date of such Invoice or Meter Data, or (ii) as otherwise required by law. Such records shall be available for audit as described in above.

13. Representations, Warranties and Covenants.

A. Authorization and Enforceability. Each Party represents to the other Party as of the Effective Date that: (i) such Party is duly organized, validly existing and in good standing under the laws of the state of its formation; (ii) the execution and delivery by such Party of, and the performance of its obligations under, this Agreement has been duly authorized by all necessary action, does not and will not require any further consent or approval of any other Person, and does not contravene any provision of, or constitute a default under such Party's organizational documents, any indenture, mortgage or other material agreement binding on such Party or any valid order of any court, or regulatory agency or other body having authority to which such Party is subject; (iii) this Agreement constitutes the legal and valid obligation of such Party, enforceable against such Party in accordance with its terms, except as may be limited by bankruptcy, reorganization, insolvency, bank moratorium or similar laws relating to or affecting creditors' rights generally and general principles of equity, whether such enforceability is considered in a proceeding in equity or at law; and (iv) such Party has obtained all permits, licenses, authorizations, consents, and approvals required by any Governmental Authority or other third party and necessary for such Party to own its assets, carry on its business and to execute and deliver this Agreement; and such Party is in compliance with all laws (including environmental laws) that relate to this Agreement in all material respects to the best of the Party's knowledge with due inquiry.

B. Insolation. District agrees that access to sunlight ("**Insolation**") is essential to Provider's ability to provide the projected Output and is a material inducement to Provider in entering into this Agreement. Accordingly, District shall not permit any interference with Insolation available to the System. If District becomes aware of any potential development, foliage or trees, or other activity on adjacent or nearby properties that will diminish the Insolation to the System, District shall advise Provider of such information and reasonably cooperate with Provider in reasonable measures taken by Provider in an attempt to preserve existing levels of Insolation upon the System.

C. Notice of Damage. Each Party shall promptly notify the other Party of any matters it is aware of pertaining to any damage to or loss of the use of the System or that could reasonably be expected to adversely affect the System.

14. Default and Remedies.

A. Events of Default. In the event of a Party's breach of any performance obligation hereunder or breach of any representation, warranty, covenant or material term of this Agreement, the non-defaulting Party shall provide the defaulting Party with written notice of the default, which notice shall describe the default in reasonable detail. Following the date of receipt of written notice of default, the defaulting Party shall have thirty (30) Days to cure any payment default and forty-five (45) Days to cure any other breach or default described in this Agreement.

B. Event of Default. In addition to the foregoing, with respect to a Party, there shall be an event of default (each an "**Event of Default**") if:

- 1) such Party fails to timely pay any amount due, other than an amount that is subject to a good faith dispute;
- 2) such Party concedes in writing to its inability to pay its debts generally as they become due;
- 3) such Party files a petition seeking reorganization or arrangement under the federal bankruptcy laws or any other applicable law or statute of the United States of America or any State, City or territory thereof;
- 4) such Party makes an assignment for the benefit of creditors in connection with bankruptcy proceedings;
- 5) such Party consents to the appointment of a receiver of the whole or any substantial part of its assets;
- 6) such Party has a petition in bankruptcy filed against it, and such petition is not dismissed within sixty (60) Days after the filing thereof;
- 7) a court of competent jurisdiction enters an order, judgment, or decree appointing a receiver of the whole or any substantial part of such Party's assets, and such order, judgment or decree is not vacated or set aside or stayed within sixty (60) Days from the date of entry thereof;
- 8) under the provisions of any other law for the relief or aid of debtors, any court of competent jurisdiction shall assume custody or control of the whole or any substantial part of such Party's assets and such custody or control is not terminated or stayed within sixty (60) Days from the date of assumption of such custody or control;
- 9) such Party ceased its legal existence or ceases doing business or otherwise dissolves;
- 10) such Party breaches a material term of this Agreement;

- 11) the District ceases to conduct business operations at the Site and fails to provide Provider an alternative location under the Relocation option in Section 11(D);
- 12) such Party breaches a material term of the relevant Easement.

C. Provider Remedies. If an event of default by District under Sections 14(A) or 14(B) has occurred and is continuing, then following the expiration of any applicable cure period, Provider may at its discretion: (i) suspend performance under this Agreement, (ii) seek specific performance from a court of appropriate jurisdiction pursuant, and/or (iii) terminate this Agreement, and as Provider's sole and exclusive remedy in connection with such termination, require District to pay to Provider as liquidated damages, and not as a penalty, the Termination Value for the System, Provider's reasonable and documented costs for System removal, and any and all amounts then owed Provider for Output or BESS Output delivered to District as of the date of such termination pursuant to this Agreement. In the event of such termination, Provider shall remove the System in accordance with Section 3.

D. District Remedies. If an event of default by Provider under Sections 14(A) or 14(B) has occurred and is continuing, then following the expiration of any applicable cure period, District may at its discretion: (i) suspend performance under this Agreement, (ii) seek damages or specific performance from a court of appropriate jurisdiction, and/or (iii) terminate this Agreement. In the event that District terminates this Agreement pursuant to this Section, District may elect to either (i) purchase the System pursuant to Section 9 as of the time of the event of default; or (ii) require Provider to remove the System within one hundred eighty (180) Days at Provider's sole cost and expense and restore the Site as required in Section 3.

15. Dispute Resolution.

The Parties agree to make a good faith attempt to resolve any and all controversies, claims, disagreements, or disputes between the Parties arising out of or related to this Agreement ("**Dispute**"). In the event of any Dispute, either Party may give notice of the dispute to the other Party. In the event a Party Disputes all or a portion of an invoice or other payment, the disputing Party shall timely pay any undisputed portion of such amount due. The Parties shall first use good faith, reasonable, diligent efforts to resolve the dispute within ninety (90) Days from the date of such notice. If the Parties do not resolve their dispute within ninety (90) Days of notice, then the Parties may, upon mutual agreement, submit to mediation before a mutually agreed upon mediator. In the event the dispute is not resolved through mediation, the Parties may pursue their legal rights through any other legally permissible means. If a Dispute, or any portion thereof, remains unresolved after applicable dispute resolution requirements, the Provider shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Provider's right to bring a civil action against District. For purposes of those provisions, the running of the time within which a claim must be presented to District shall be tolled from the time the Provider submits its written Dispute until the time the Dispute is denied, including any time utilized by any applicable meet and confer process. Pending resolution of the dispute, Provider and its subcontractors shall continue to perform the Work under the Agreement and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement of District.

16. Taxes; Liens.

A. Taxes. Provider shall pay any income taxes imposed on Provider due to the sale of energy under this Agreement. District shall pay all real property taxes and assessments applicable to the Site. This Agreement may result in the creation of a possessory interest (Rev. & Tax. Code § 107.6). If such a possessory interest is vested in Provider, Provider may be subjected to the payment of personal property taxes levied on such interest in the System. Provider shall be responsible for the payment of, and shall pay before becoming delinquent, all taxes, assessments, fees, or other charges assessed or levied upon Provider, the Project and the System. Provider further agrees to prevent such taxes, assessments, fees, or other charges from giving rise to any lien against the Site or any improvement located on or within the Site. Nothing herein contained shall be deemed to prevent or prohibit Provider from contesting the validity or amount of any such tax, assessment, or fee in the manner authorized by law. Provider shall be responsible for payment of any personal property taxes, possessory interest taxes, permit fees, business license fees and any and all fees and charges of any nature levied against the System and operations of Provider at any time. If bills for taxes on the System are received by District, District shall remit such bills to Provider.

B. Liens. Provider shall not directly or indirectly cause, create, incur, assume or suffer to exist any liens on or with respect to the Site or District's interest therein. If Provider breaches its obligations under this Section, it shall immediately notify District in writing, shall promptly cause such lien to be discharged and released of record without cost to District, and shall defend and indemnify District against all costs and expenses (including reasonable attorneys' fees and court costs at trial and on appeal) incurred in discharging and releasing such lien.

17. Liability and Indemnity; Insurance.

A. Indemnity. To the fullest extent provided for by law, each Party ("**Indemnifying Party**") agrees to indemnify, defend and hold harmless the other Party, its directors, officers, employees, and agents (each, an "**Indemnified Party**") from and against any and all third-party claims, including demands, actions, damages, loss, costs, expenses, and reasonable attorney's fees (collectively, "**Indemnity Claims**"), arising out of or resulting from any breach, negligent act, error or omission or intentional misconduct by the Indemnifying Party or its trustees, directors, officers, employees, contractors, subcontractors or agents under the terms of this Agreement; provided, however, that the Indemnifying Party will not have any obligation to indemnify the Indemnified Party from or against any Indemnity Claims to the extent caused by, resulting from, relating to or arising out of the negligence or intentional misconduct of an Indemnified Party or any of its directors, officers, employees or agents.

If an Indemnified Party determines that it is entitled to defense and indemnification under this Section, such Indemnified Party shall promptly notify the Indemnifying Party in writing of the Indemnity Claim and provide all reasonably necessary or useful information, and authority to settle and/or defend Indemnity Claim. Defense and indemnification provided by the Indemnifying Party under this Section shall be provided with legal counsel reasonably agreed to by the Indemnified Party. No settlement that would impose costs or expense upon the Indemnified Party shall be made without such Party's written consent.

B. Insurance.

- 1) Provider Insurance. At all times during the term of the PPA, and any necessary extension thereof for removal of the System from the Site, and for one year after such removal for any and all “claims made” type policies, Provider and all of its sub-contractors, shall obtain, maintain and keep in full force and effect the following insurance for coverage of all obligations and associated activities under this Agreement, including but not limited to the use and occupancy of the Site, the business operated by the District thereon, and the construction, installation, operation, maintenance and repair of the System, in the amounts, and with the conditions required, as set forth herein. Each policy required in (b)(c)(d) below shall include an additional insured endorsement in favor of District with an additional insured endorsement for both ongoing and completed operations as it pertains to (b) and shall include an endorsement specifying that such coverage is primary and non-contributory as to any other coverage available to the additional insured. Provider shall, within thirty (30) days of the Effective Date of this Agreement and annually thereafter or as requested by District, provide certificates of insurance and endorsements demonstrating compliance with the requirements of this Section.
- a. Workers’ Compensation Insurance for Provider’s employees to the extent of statutory limits and Occupational Disease and Employer’s Liability Insurance for not less than \$1,000,000 per occurrence.
 - b. Commercial General Liability Insurance with a \$1,000,000 per occurrence and \$2,000,000 aggregate limit of liability for Bodily Injury, Personal and Advertising Injury and Property Damage Liability, including coverage for Contractual Liability and Products and Completed Operations Liability.
 - c. Automobile Liability Insurance with limits not less than: Bodily Injury coverage at \$1,000,000 each accident, and Property Damage coverage at \$1,000,000 each accident.
 - d. Excess Liability Insurance in an aggregate amount of not less than \$2,000,000 providing greater limits of insurance to Provider's Employer's Liability, Commercial General Liability and Automobile Liability Insurance which also shall not be more restrictive than coverage provided by these policies.
 - e. Builder's Risk/Installation Floater Insurance in a sufficient amount to protect Provider's property, materials, tools and other financial interests on the Project.
 - f. Professional Liability Insurance with limits not less than \$1,000,000 per claim, with a two-year tail.

2) District Insurance. District shall maintain and covenants that it shall maintain during the Term (i) insurance sufficient to insure it against loss or destruction of the Site, including losses occasioned by operation of the System, and (ii) general liability insurance including bodily injury, property damage, contractual and personal injury. Notwithstanding the foregoing, District reserves the right to self-insure.

3) RESERVED.

4) Subcontractor Insurance. Provider shall require and verify that all of its subcontractors maintain insurance meeting the requirements of Section 17(B)(1) except Section 17(B)(1)(e) and except as to Section 17(B)(1)(f) which shall only be required of subcontractors providing professional services.

C. No Consequential Damages. EXCEPT WITH RESPECT TO PAYMENT OF DISTRICT TERMINATION VALUES, DISTRICT SUSPENSION RATE, PROVIDER PAYMENTS UNDER THE OUTPUT GUARANTEE OR BESS GUARANTEE, OR IN CONNECTION WITH THIRD-PARTY INDEMNIFICATION CLAIMS, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY SPECIAL, PUNITIVE, EXEMPLARY, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT.

D. Actual Damages. Provider's aggregate liability under this Agreement and the Site Easement arising out of or in connection with the performance or non-performance of this Agreement and the Site Easement shall not exceed an amount equal to \$2,800,000 (the "Liability Cap"); provided that (i) the Liability Cap shall not apply in connection with third-party claims subject to indemnification hereunder, and (ii) any losses, damages or claims that are covered by Provider's insurance, as set forth in Section 17(B)(1), required to be maintained pursuant to this Agreement shall be limited to the greater of the insurance coverage limits set forth herein or the Liability Cap. The provisions of this Section 17(D) shall apply whether such liability arises in contract, tort (including negligence), strict liability or otherwise.

E. TO THE EXTENT ENFORCEABLE UNDER APPLICABLE LAW, EACH PARTY HEREBY KNOWINGLY, VOLUNTARILY, AND INTENTIONALLY WAIVES ANY RIGHTS THEY MAY HAVE TO A TRIAL BY JURY, AND INSTEAD AGREE TO A BENCH TRIAL, IN RESPECT OF ANY LITIGATION BASED HEREON, OR ARISING OUT OF, UNDER, OR IN CONNECTION WITH, THIS AGREEMENT OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN), OR ACTIONS OF EITHER PARTY. THIS PROVISION IS A MATERIAL INDUCMENT FOR PROVIDER TO ENTER INTO THIS AGREEMENT.

18. Site Easement.

District shall grant to Provider an easement for the sole purpose of access to, on, over, under and across the Site for the purposes of undertaking the work required by Provider under this Agreement, including: installing, constructing, inspecting, operating, owning, maintaining, accessing, repairing, removing and replacing the System (the "**Site Easement**"). Prior to

commencing any portion of the work on the Project at the Site, Provider shall obtain a signed and notarized original copy of an easement agreement for the Site suitable for recording, substantially in the form attached hereto as Exhibit I (the “**Site Easement Agreement**”). During the period of time between and including the date of the Notice to Proceed and the Commercial Operation Date, the Site Easement shall include, subject to the scheduling and activity needs of District, the reasonably necessary use of District’s Site for the reasonably necessary construction and installation activities under this Agreement, including, but not limited to, staging areas. District shall have no liability whatsoever in connection with property or equipment of Provider or Provider’s contractor(s), subcontractors or vendors. The Site Easement term shall continue until the date that is one hundred eighty (180) days following the date of expiration or termination of this Agreement. Provider shall notify District prior to entering the Site except in situations where there is imminent risk of damage to persons or property.

19. Assignment; Cooperation with Financing.

A. Assignment by Provider. Except as expressly provided in this Agreement, Provider may not sell, transfer, or assign its rights under this Agreement or any right, interest, or obligation therein (collectively, an “**Assignment**”), until at least twenty four (24) months have expired following the Commercial Operation Date, and only upon the prior written consent of District, which consent may not be unreasonably withheld, conditioned or delayed, provided that any assignee possesses all required skills, knowledge, expertise, experience, and financial capacity and creditworthiness necessary to perform Provider’s obligations under this Agreement, and assumes in writing the obligations of Provider under this Agreement. Provider shall provide District with no less than sixty (60) Days’ notice of the request to transfer ownership of the Project. Notice shall identify the party purchasing the Project and provide sufficient detail of the proposed owner for District to evaluate the new owner. Notice shall include, but not be limited to, the following details of the proposed owner: Experience with PPAs and current portfolio; Past two years of financials; Proof of insurance, meeting District requirements and naming District; Confirmation of operations and maintenance provider and outline of operations and maintenance program if different from existing; Details and example of annual report and invoicing; and Confirmation that all terms under this Agreement and any related documents and agreements will be performed. Notwithstanding the foregoing, Provider may, without the prior written consent of District, (i) assign, mortgage, transfer, pledge or otherwise collaterally assign its interests in this Agreement and the System to any entity through which Provider is obtaining financing or capital for the System, or (ii) assign this Agreement to an affiliate or subsidiary of Provider which is controlled by Provider or under common control with Provider. This Agreement shall be binding on and inure to the benefit of the successors and permitted assignees.

B. Collateral Assignment by Provider for Financing Purposes. In the event Provider assigns its rights under this Agreement as security in connection with any financing transaction entered into by Provider, Provider may mortgage or grant a security interest in this Agreement and the System, and may collaterally assign this Agreement and the System to any mortgagees or holders of security interests, including their successors or assigns (hereinafter collectively referred to as “**Secured Parties**”), provided that any such collateral assignment of this Agreement by Provider shall not release Provider from its obligations or liabilities under this Agreement. District agrees to not unreasonably withhold, condition or delay its compliance with any reasonable request that District execute any consent, estoppel agreement or other documents related to such financing

transaction as may reasonably be required by such Secured Parties, provided that Provider will reimburse District for the legal fees and costs incurred by such assignment.

C. Assignment by District. Except as otherwise provided in this Agreement, District may assign its rights under this Agreement only upon the prior written consent of Provider, which consent may not be unreasonably withheld, conditioned or delayed; provided that any such assignee (i) is of equal or greater creditworthiness than District and (ii) assumes in writing the obligations of District under this Agreement. Notwithstanding the foregoing, District may assign its rights under this Agreement without Provider's consent to any Person succeeding to all or substantially all of the assets, including without limitation real property rights to the Site, of District of equal or greater creditworthiness than District, and provided, further, that any such transferee or assignee assumes in writing the obligations of District under this Agreement.

20. Confidentiality; Publicity.

A. Confidential Information. Any financial, statistical, personal, technical and other data and information relating to a Party's operations which are made available to the other Party in order to carry out this Agreement shall be reasonably protected by such other Party from unauthorized use, except to the extent that disclosure thereof is required to comply with applicable law, including but not limited to the California Public Records Act and the Brown Act. The disclosing Party shall identify all confidential data and information at the time it is provided in writing, including by conspicuously marking each such document as "Confidential." Confidentiality does not apply to information, which is known to a receiving Party from other sources, which is otherwise publicly available, or which is required to be disclosed pursuant to an order or requirements of a regulatory body or a court.

- a. Confidential Information shall comprise that which Provider identifies as confidential in accordance with Applicable Law, including the California Public Records Act, California Government Code § 6250-6270 ("CPRA"), such as, for example only, trade secrets.
- b. The Parties agree and acknowledge that this Agreement, and each document incorporated herein, is a public record subject to public disclosure, and shall be publicly disclosed in conjunction with any actions by District's Governing Board related to approval or ratification hereof, including, without limitation, consideration during a public hearing as required under Government Code section 4217.12. Notwithstanding the preceding sentence, for avoidance of doubt, documents related to this Agreement but not incorporated herein, including, without limitation, plans and specifications for the Systems, shall not be subject to this section. For such other and further documents related to this Agreement but not incorporated herein, the District shall provide Provider the notice contemplated in Section 20(A)(d) and, otherwise, shall exercise its reasonable discretion in good faith in determining whether such document(s) is subject to and/or exempt from disclosure without further liability to Provider.
- c. District shall not be liable to Provider for any disclosure made in its reasonable determination and in good faith compliance with applicable provisions of the

CPRA, and Provider will be solely responsible for and shall solely bear all costs and expenses related to or arising from litigation costs if Provider chooses to pursue enforcement of its rights under the CPRA, and, in any event the District is subject to any third-party liability, including, without limitation, attorneys' fees incurred related to any action arising from Provider's efforts to prevent public disclosure of documents, Provider shall reimburse District for all reasonable costs and expenses related to or arising from litigation related to this Article 20 in which District is reasonably compelled to engage.

- d. To the extent the District receives a request for the release of any information related to this Agreement, the District shall give Provider reasonable notice of same and provide Provider a reasonable amount of time to identify any Confidential Information contained therein, if any, and to substantiate the confidentiality of same, subject to District's obligations under law.

B. Disclosure. Other than under the REC Reporting Rights and except as may be required by applicable law, including but not limited to, the California Public Records Act, the Brown Act, or as otherwise identified above, neither Party shall make any disclosure of any designated confidential information related to this Agreement without the specific prior written approval from the other of the content to be disclosed and the form in which it is disclosed, except for such disclosures to the Parties' financing sources, creditors, beneficiaries, partners, members, officers, employees, agents, consultants, attorneys, accountants and exchange facilitators as may be necessary to permit each Party to perform its obligations hereunder and as required to comply with applicable laws or rules of any exchange upon which a Party's shares may be traded. Notwithstanding the foregoing, nothing contained herein shall be deemed to restrict or prohibit District from complying with applicable law regarding disclosure of information, including but not limited to the California Public Records Act and the Brown Act.

C. Publicity. The Parties share a common desire to generate favorable publicity regarding the System and their association with it. The Parties agree that they may, from time to time, issue press releases regarding the System and that they shall reasonably cooperate with each other in connection with the issuance of such releases. Each Party agrees that it shall not issue any press release regarding the System without the prior written approval from the other of the content to be disclosed and the form in which it is disclosed, and each Party agrees not to unduly withhold, condition or delay any such approval. In addition, the Parties hereby agree that (i) the District may publicize that it is serving as a "solar host" for the System; (ii) Provider may publicize that it is serving as the developer, owner and/or operator of the System; and (iii) District, and Provider may display photographs of the System and disclose the nameplate capacity rating of the as-built System in its advertising and promotional materials, provided that any such materials identify the District as the solar host, and Provider as the owner, operator and developer, of the System and all information shall be consistent with this Agreement. Without limitation of the foregoing, Provider agrees to share with District, in digital format, any photographs and other schematics taken by Provider of the Site and the System, and further agrees that District may use such photographs and other schematics for the purpose of marketing and promoting their operations.

Nothing herein shall limit in any way, to any extent the right of individual persons, including, without limitation, members of District's Governing Board, from exercising their right to free

speech in relation to this Agreement and any subject matter hereof, within the constraints of Applicable Law. Nothing herein shall compel either Party to make statements beyond its sole, reasonable, good faith discretion.

21. Legal Effect and Status of Agreement.

A. District Not Operator. Neither District nor any Party related to District shall have the right or be deemed to operate the System for purposes of Section 7701(e)(4)(A)(i) of the Internal Revenue Code.

B. Burdens/Benefits of System Ownership. Notwithstanding any provision to the contrary under this Agreement, neither District nor any Party related to District shall (i) bear or be deemed to bear any significant financial burden if there is nonperformance by Provider under this Agreement, as the phrase “any significant financial burden if there is nonperformance” is used in Section 7701(e)(4)(A)(ii) of the Internal Revenue Code; or (ii) be deemed to receive any significant financial benefit if the operating costs of the System are less than the standard of performance and/or operation set forth in this Agreement, as the phrase “significant financial benefit if the operating costs of such facility are less than the standards of performance or operation” is used in Section 7701(e)(4)(A)(iii) of the Internal Revenue Code.

C. No Capital Lease; Forward Contract. The Parties acknowledge and agree that for accounting or tax purposes, this Agreement is not and shall not be construed as a capital lease and, pursuant to Section 7701(e)(3) of the Internal Revenue Code, this Agreement is and shall be treated by each Party as a service contract for the sale to District of electric energy produced at an alternative energy System. Each of the Parties agrees that it will not dispute that (i) the transaction contemplated by this Agreement constitutes a “forward contract” within the meaning of the United States Bankruptcy Code and (ii) each Party is a “forward contract merchant” within the meaning of the United States Bankruptcy Code.

22. Miscellaneous.

A. Amendments. This Agreement may be amended only in a writing signed by both Provider and District or their respective successors in interest.

B. Notices. Any notice required or permitted to be given in writing under this Agreement shall be mailed by certified mail, postage prepaid, return receipt requested, or sent by overnight courier service, or personally delivered to a representative of the receiving Party, or sent by facsimile or email (provided an identical notice is also sent simultaneously by mail, overnight courier, or personal delivery as otherwise provided in this Section). All such communications shall be mailed, sent or delivered, addressed to the Party for whom it is intended, at its address set forth below. A Party may change its address by providing written notice to the other Party in accordance with this Section.

If to District:
Palmdale Water District

If to Provider:
c/o Distributed Solar Development

Attention: Adam Ly
2029 East Avenue Q
Palmdale, CA 93550
Phone: 661-456-1062
Facsimile: 661-947-8604
Email: aly@palmdalewater.org

Attention: Erik Schiemann
200 Harborside Drive, Suite 200
Schenectady NY 12305
Phone: 518 742 6863
Facsimile: N/A
Email: erik.schiemann@dsdrenewables.com

Copy of notices to:
Jennifer Gerrard, General Counsel
200 Harborside Drive, Suite 200
Schenectady NY 12305
Email: jennifer.gerrard@dsdrenewables.com

C. Non-Waiver. The failure, delay or forbearance by either Party to exercise any of its rights or remedies under this Agreement or to provide written notice of any default to a defaulting Party, will not constitute a waiver of such rights or remedies. No Party will be deemed to have waived any right or remedy unless it has made such waiver specifically in writing. The waiver by either Party of any default or breach of any term, condition or provision herein contained shall not be deemed to be a waiver of any subsequent breach of the same term, condition or provision, or any other term, condition or provision contained herein.

D. No Set-Off. Except as otherwise set forth herein, each Party hereby waives all rights to set-offs of amounts due hereunder. The Parties agree that all amounts due hereunder are independent obligations and shall be made without set-off for other amounts due or owed hereunder.

E. Intellectual Property. Nothing in this Agreement shall be construed to convey to District an easement or other right to trademarks, copyrights, technology or other intellectual property of Provider.

F. Severability. Should any provision of this Agreement for any reason be declared invalid or unenforceable by final and non-appealable order of any court or regulatory body having jurisdiction, such decision shall not affect the validity of the remaining portions, and the remaining portions shall remain in full force and effect as if this Agreement had been executed without the invalid portion.

G. Survival. Any provision of this Agreement that expressly or by implication comes into or remains in full force following the termination or expiration of this Agreement shall survive the termination or expiration of this Agreement.

H. Headings. The headings in this Agreement are solely for convenience and ease of reference and shall have no effect in interpreting the meaning of any provision of this Agreement.

I. Choice of Law. This Agreement shall be construed in accordance with the laws of the State of California (without regard to its conflict of laws principles). The venue for any dispute arising out of or relating to this Agreement shall be in the California County in which the System is located.

J. Binding Effect. This Agreement and its rights, privileges, duties and obligations shall inure to the benefit of and be binding upon each of the Parties hereto, together with their respective successors and permitted assigns.

K. No Partnership. This Agreement is not intended, and shall not be construed, to create any association, joint venture, agency relationship or partnership between the Parties or to impose any such obligation or liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act as or be an agent or representative of, or otherwise bind, the other Party.

L. No Third-Party Beneficiaries. This Agreement is solely for the benefit of the Parties hereto and no right or cause of action shall accrue by reason hereof for the benefit of any third party not a party hereto, other than the Indemnitees and any Secured Parties.

M. Counterparts. This Agreement may be executed in counterparts, which shall together constitute one and the same agreement. Electronic, facsimile or copies of signature pages shall have the same force and effect as originals.

N. Further Assurances. Upon the receipt of a written request from a Party, each Party shall execute or cause to be executed such additional documents, instruments, estoppels and assurances, and take such additional actions, as are reasonably necessary and desirable to carry out the terms and intent hereof, including but not limited to an Interconnection Agreement. Neither Party shall unreasonably withhold, condition or delay its compliance with any reasonable request made pursuant to this Section.

O. Entire Agreement. This instrument and the documents referenced herein represent the full and complete agreement between the Parties hereto with respect to the subject matter contained herein and supersedes all prior written or oral agreements between said Parties with respect to said subject matter.

IN WITNESS WHEREOF, the Parties have executed this Agreement on the Effective Date.

DISTRICT:

Palmdale Water District

By: _____

Name: Dennis LaMoreaux

Title: CEO/General Manager

PROVIDER:

East Avenue South Solar Project 2022, LLC

By: _____

Name: Erik Schiemann

Title: President

Exhibit A – Definitions

1. “Annual Production Estimate” shall mean, for the Solar Facility, the estimated energy production for a Contract Year as set forth in Exhibit B.
2. “Applicable Law” shall mean, with respect to any person, any law, statute, rule, regulation, ordinance, treaty, order, decree, judgment, decision, holding, injunction, registration, license, guideline, Governmental Approval, consent or requirement of any Governmental Authority having jurisdiction over such person or its property, as any of the foregoing may be amended from time-to-time, and any corresponding provisions of any successor to the foregoing, together any rules or regulations promulgated under such successor.
3. “Assignment” shall have the meaning as defined in Section 19(A).
4. “Authorities Having Jurisdiction” shall mean the governmental organization, office or individual responsible for approving equipment, an installation or a procedure.
5. “Battery Energy Storage System” (or “BESS”) shall mean an energy storage system with the minimum nameplate power and energy capacity as shown in Exhibit F.
6. “BESS Energy Shortfall Amount” shall mean an amount equal to the product of: (i) the BESS Guarantee Rate, multiplied by (ii) the number of hours that one hundred percent (100%) of the nameplate power capacity of the BESS was not available during the Measurement Period.
7. “BESS Output” shall mean the total quantity of all actual electrical energy discharged by the BESS as measured in kWhac by a Meter installed in close proximity to the Delivery Point. Output does not include the Green Attributes, Environmental Financial Incentives, RECs or REC Reporting Rights.
8. “BESS Services” shall mean generating electricity bill cost savings for District through storage and discharge of electrical energy on and from the BESS in accordance with Section 11(B).
9. “BESS Guarantee Rate” means as defined in Exhibit C.
10. “Commercial Operation” shall mean that (i) the Project is operating and able to produce and deliver Energy to District pursuant to the terms of this Agreement; (ii) Provider has received all local, state and federal Permits and other approvals as may be required by Law for the construction, operation and maintenance of the Project, including approvals, if any, required under the California Environmental Quality Act for the Project and related interconnection facilities.
11. “Commercial Operation Date” shall mean the date on which Provider achieves Commercial Operation for the Project.
12. “Commercial Operation Deadline” shall have that meaning as set forth in Section 6(C) of this Agreement.

13. Conditions Precedent Deadline” shall have that meaning as set forth in Section 6(B) of the Agreement.
14. Contract Year” shall mean a period of twelve (12) consecutive months (except in the case of the first Contract Year which may be shorter) with the first Contract Year commencing on the Commercial Operation Date and each subsequent Contract Year commencing on the anniversary of the first day of the first month following the Commercial Operation Date.
15. Days” shall mean calendar days, unless otherwise specified.
16. Delay Liquidated Damages” shall mean the daily rate payable by the Provider to District for unexcused delays past the Commercial Operation Deadline as outlined in Section 6(C).
17. Delivery Point” shall mean the Energy delivery point within Site’s electrical system on District’s side of the Site’s Distribution Utility meter, as designated by the physical interface of the System with the Site’s electrical system.
18. Distribution Utility” shall mean Southern California Edison.
19. Distribution Utility Upgrades” shall mean that scope of work and associated costs that the Distribution Utility requires on the Distribution Utility side of the Distribution Utility meter in order for the System to interconnect to the Distribution Utility system.
20. Energy” shall mean electrical energy measured in kWhac.
21. Energy Shortfall Amount” shall mean an amount equal to the product of: (i) the Output Guarantee Rate, multiplied by (ii) the difference between the delivered Output for such Measurement Period and the Output Guarantee for such Measurement Period.
22. Environmental Financial Incentives” shall mean each of the following financial rebates and incentives that is in effect as of the Effective Date: (i) investment tax credits associated with the development, construction, ownership or operation of the System, accelerated depreciation, and other financial incentives in the form of credits, reductions or allowances associated with the System that may be applied to reduce any state or federal income taxation obligation, and (ii) the right to claim federal income tax credits under Sections 26 or 48 of the Internal Revenue Code or any state tax law or income tax deductions with respect to the System under the Internal Revenue Code or any state tax law. Environmental Financial Incentives do not include Green Attributes.
23. Expiration Date” shall mean the last day of the month that follows the twenty-fifth (25th) annual anniversary of the Commercial Operation Date.
24. Force Majeure” shall mean any event or circumstances beyond the reasonable control of and without the fault or negligence of the Party claiming Force Majeure, which cannot reasonably be avoided, mitigated or cured through the reasonable and diligent efforts of the Party claiming

Force Majeure. It shall include, without limitation, interruption or delay of the construction of the System or failure or interruption of the production, delivery or acceptance of electricity due to: (i) natural phenomena, such as storms, hurricanes, floods, lightning, volcanic eruptions and earthquakes; (ii) explosions or fires arising from lightning or other causes unrelated to the acts or omissions of the Party seeking to be excused from performance; (iii) acts of war or public disorders, civil disturbances or riots, insurrection, sabotage, epidemic, terrorist acts, or rebellion; (iv) action or inaction by a Governmental Authority which, by compulsion or prohibition, prevents a Party from performing, or causes a Party to take action that would comprise a breach of any covenant, term or condition of this Agreement; and (v) the inability of one of the Parties, despite its reasonable efforts, to obtain, in a timely manner, any Permit necessary to enable the affected Party to fulfill its obligations in accordance with this Agreement, provided that the delay or non-obtaining of such Permit is not attributable to the Party in question and that such Party has exercised due diligence to obtain such Permit. Force Majeure will not be based on (i) District's inability to use Energy purchased hereunder, (ii) Provider's ability to sell Energy at a price greater than the price of Energy under this Agreement, or (iii) District's involuntary shutting down or closing of the facilities located at the Property. Economic hardship of either Party shall not constitute Force Majeure.

25. "Governmental Authority" shall mean the government of the United States of America, any other nation or any political subdivision thereof, whether state or local, and any agency, authority, instrumentality, regulatory body, court, central bank or other entity exercising executive, legislative, judicial, taxing, regulatory or administrative powers or functions of or pertaining to government (including any supra-national body exercising such powers or functions, such as the European Union or the European Central Bank).
26. "Governmental Approvals" shall mean any notices to, reports or other filings to be made with, or any consents, registrations, permits or authorizations to be obtained from, any Governmental Authority.
27. "Green Attributes" shall mean any and all credits, benefits, emissions reductions, offsets and allowances, howsoever entitled, attributable to the generation of Output from the System, and its displacement of conventional energy generation, that is in effect as of the Effective Date or may come into effect in the future. Green Attributes include but are not limited to Renewable Energy Certificates, as well as: (i) any avoided emissions of pollutants to the air, soil or water such as sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO) and other pollutants; (ii) any avoided emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride and other greenhouse gases (GHGs) that have been determined by the United Nations Intergovernmental Panel on Climate Change, or otherwise by law, to contribute to the actual or potential threat of altering the Earth's climate by trapping heat in the atmosphere; and (iii) the reporting rights to these avoided emissions, such as REC Reporting Rights. Green Attributes do not include (i) any energy, capacity, reliability or other power attributes from the System, (ii) Environmental Financial Incentives, (iii) fuel-related subsidies or "tipping fees" that may be paid to Provider to accept certain fuels, or local subsidies received by the generator for the destruction of particular preexisting pollutants or the promotion of local environmental benefits or (iv)

emission reduction credits encumbered or used by the System for compliance with local, state or federal operating and/or air quality Permits.

28. “Insolation” shall mean the amount of solar energy measured in watts per square meter (W/m²) falling on a particular location during a specific time, as published by the National Renewable Energy Laboratory.
29. “Interconnection Agreement” shall mean an agreement entered into by and between District and the Distribution Utility which agreement shall provide for (i) each System to be interconnected with the Distribution Utility’s electricity distribution system, (ii) for energy to flow from each System to such system and (iii) for energy to flow from such system to the Site, as applicable, under the provisions of all applicable Distribution Utility’s tariffs.
30. “Internal Revenue Code” shall mean the Internal Revenue Code of 1986, as amended.
31. “kWac” shall mean kilowatt alternating current.
32. “kWdc” shall mean kilowatt direct current.
33. “kWhac” shall mean kilowatt-hour alternating current.
34. “Notice to Proceed” shall mean as defined in Section 6(B).
35. “Outage” shall mean as defined in Section 4(F).
36. “Output” shall mean the total quantity of all actual electrical power generated by the Solar Facilities as measured by a Meter in close proximity to the Delivery Point measured in kWhac. Output does not include the Green Attributes, Environmental Financial Incentives, RECs or REC Reporting Rights.
37. “Output Guarantee Rate” shall mean as defined in Exhibit B.
38. “Parallel Energy Services” shall mean to remain interconnected to and receive grid services.
39. “Permits” shall mean all government permits and approvals, regulatory or otherwise required for the construction, installation, completion and operation of the System.
40. “Person” shall mean any individual, corporation, partnership, joint venture, association, joint stock company, trust, trustee, estate, limited liability company, unincorporated organization, real estate investment trust, government or any agency or political subdivision thereof, or any other form of entity.
41. “Power Price” shall mean the per kWhac rate(s) as set forth on Exhibit B

42. “Provider’s Construction Conditions Precedent” and “District’s Construction Conditions Precedent” shall have that meaning as set forth in Section 6(A) and 6(B) of the Agreement, respectively.
43. “Project” shall have that meaning as set forth in the Recitals of this Agreement.
44. “RECs” or “Renewable Energy Certificates” shall mean renewable energy certificates related to and representing Green Attributes (also known as green tags, renewable energy credits, or tradable renewable certificates), which are tradable environmental commodities in the United States and represent 1 megawatt-hour (MWh) of electricity generated from an eligible renewable energy resource. These certificates can be sold and traded and the owner of the REC can claim to have purchased renewable energy.
45. “REC Reporting Rights” shall mean the right of a REC purchaser to report the ownership of accumulated RECs in compliance with federal or state law, if applicable, and to a federal or state agency or any other Party at the REC purchaser’s discretion, and include without limitation those REC Reporting Rights accruing under Section 1605(b) of the Energy Policy Act of 1992 and any present or future federal, state, or local law, regulation or bill, and international or foreign emissions trading program.
46. “Supervisory Control and Data Acquisition” or “SCADA” shall mean the system that monitors, communicates with, and controls devices throughout the System.
47. “Site” shall mean the portion of District’s real property on which a System is to be located pursuant to this Agreement. See Exhibit F for additional details.
48. “Solar Facility” means each solar photovoltaic generation plant, together with all necessary inverters, ancillary equipment with a target installation size expressed in kWdc and kWac as shown in Exhibit F to be installed at the Site.
49. “Termination Value” shall equal the amount shown in Exhibit D for each Contract Year.

Exhibit B – Power Price and Output Guarantee Rate

Contract Period, Months	Contract Year	Power Price		Annual Production Estimate (kWh)	Output Guarantee Rate	
		\$/kWh	/kWhac		\$/kWh	/kWhac
1-12	1	\$0.0626	/kWhac	2,915,892	\$0.0364	/kWhac
13-24	2	\$0.0626	/kWhac	2,901,313		/kWhac
25-36	3	\$0.0626	/kWhac	2,886,806		/kWhac
37-48	4	\$0.0626	/kWhac	2,872,372	\$0.0398	/kWhac
49-60	5	\$0.0626	/kWhac	2,858,010		/kWhac
61-72	6	\$0.0626	/kWhac	2,843,720		/kWhac
73-84	7	\$0.0626	/kWhac	2,829,501	\$0.0435	/kWhac
85-96	8	\$0.0626	/kWhac	2,815,354		/kWhac
97-108	9	\$0.0626	/kWhac	2,801,277		/kWhac
109-120	10	\$0.0626	/kWhac	2,787,271	\$0.0475	/kWhac
121-132	11	\$0.0626	/kWhac	2,773,334		/kWhac
133-144	12	\$0.0626	/kWhac	2,759,468		/kWhac
145-156	13	\$0.0626	/kWhac	2,745,670	\$0.0519	/kWhac
157-168	14	\$0.0626	/kWhac	2,731,942		/kWhac
169-180	15	\$0.0626	/kWhac	2,718,282		/kWhac
181-192	16	\$0.0626	/kWhac	2,704,691	\$0.0567	/kWhac
193-204	17	\$0.0626	/kWhac	2,691,167		/kWhac
205-216	18	\$0.0626	/kWhac	2,677,712		/kWhac
217-228	19	\$0.0626	/kWhac	2,664,323	\$0.0620	/kWhac
229-240	20	\$0.0626	/kWhac	2,651,001		/kWhac
241-252	21	\$0.0626	/kWhac	2,637,746		/kWhac
253-264	22	\$0.0626	/kWhac	2,624,558	\$0.0677	/kWhac
265-276	23	\$0.0626	/kWhac	2,611,435		/kWhac
277-288	24	\$0.0626	/kWhac	2,598,378		/kWhac
289-300	25	\$0.0626	/kWhac	2,585,386	\$0.0740	/kWhac

Exhibit C – BESS Rate

Contract Period, Months	Contract Year	BESS Rate	
1-12	1	\$3,200.00	/month
13-24	2	\$3,200.00	/month
25-36	3	\$3,200.00	/month
37-48	4	\$3,200.00	/month
49-60	5	\$3,200.00	/month
61-72	6	\$3,200.00	/month
73-84	7	\$3,200.00	/month
85-96	8	\$3,200.00	/month
97-108	9	\$3,200.00	/month
109-120	10	\$3,200.00	/month
121-132	11	\$3,200.00	/month
133-144	12	\$3,200.00	/month
145-156	13	\$3,200.00	/month
157-168	14	\$3,200.00	/month
169-180	15	\$3,200.00	/month
181-192	16	\$3,200.00	/month
193-204	17	\$3,200.00	/month
205-216	18	\$3,200.00	/month
217-228	19	\$3,200.00	/month
229-240	20	\$3,200.00	/month
241-252	21	\$3,200.00	/month
253-264	22	\$3,200.00	/month
265-276	23	\$3,200.00	/month
277-288	24	\$3,200.00	/month
289-300	25	\$3,200.00	/month

Exhibit D – Termination Values

Contract Period, Months	Contract Year	Termination Value
1-12	1	\$5,023,983
13-24	2	\$4,340,002
25-36	3	\$3,668,360
37-48	4	\$3,098,698
49-60	5	\$2,565,786
61-72	6	\$2,042,135
73-84	7	\$1,951,140
85-96	8	\$1,746,343
97-108	9	\$1,684,858
109-120	10	\$1,620,145
121-132	11	\$1,551,963
133-144	12	\$1,558,310
145-156	13	\$1,503,646
157-168	14	\$1,446,368
169-180	15	\$1,386,287
181-192	16	\$1,308,196
193-204	17	\$1,225,675
205-216	18	\$1,138,391
217-228	19	\$1,045,983
229-240	20	\$948,066
241-252	21	\$844,448
253-264	22	\$737,055
265-276	23	\$623,861
277-288	24	\$503,591
289-300	25	\$375,705

Exhibit E – Purchase Option Price

End of Contract Year	Purchase Option Price
6	\$2,042,135
10	\$1,620,145
15	\$1,386,287
25	\$375,705

Exhibit F – Description of System and Site

1. Solar Facility Size (kWDC / kWAC): 1,225 / 1,000
2. BESS Size (kW / kWh): 250 / 573
3. System Description: Attachment A to this Exhibit F contains one or more drawings or images depicting:
 - a. Premises;
 - b. Proposed Solar Facility and BESS location;
 - c. Access points needed for Provider to install and service the System (building access, electrical room, stairs etc.); and
 - d. Construction assumptions (if any).

Attachment A

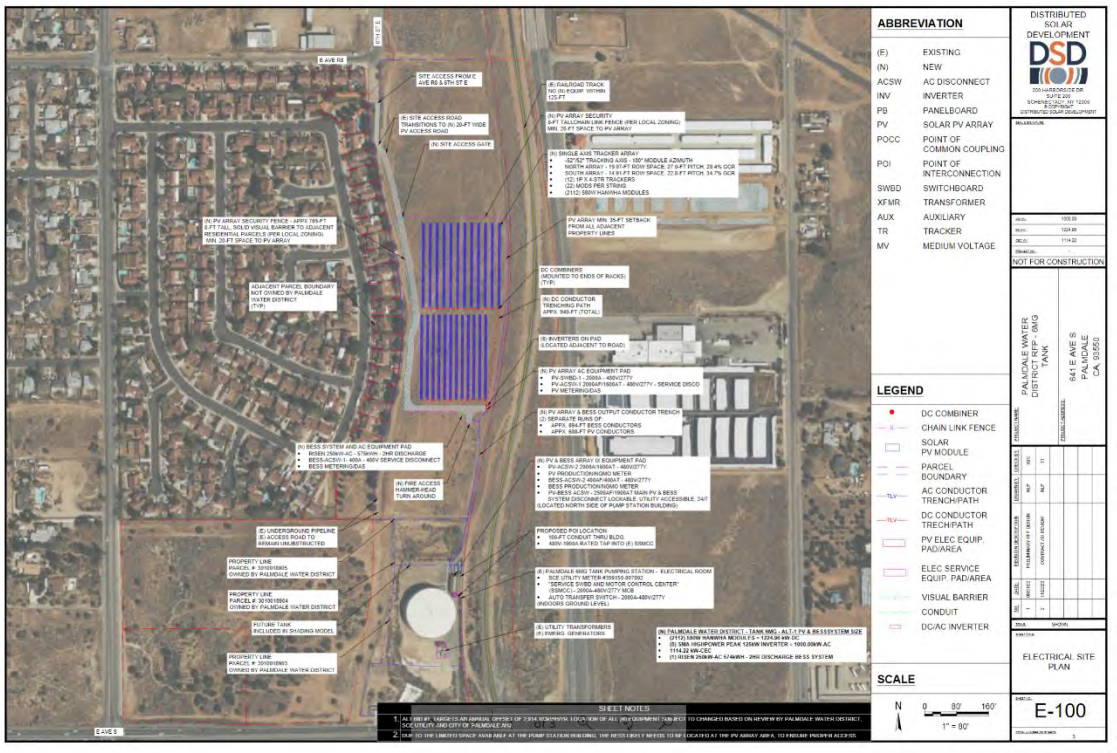


Exhibit G – General Conditions and Technical Specifications

[ATTACHED BEHIND THIS COVER PAGE]

EXHIBIT G

GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

This EXHIBIT G is a summary of the scope of work and is not all inclusive of terms and conditions of the Agreement.

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1. PROJECT OVERVIEW

As set forth in detail below, and except as otherwise provided herein or in that certain Power Purchase Agreement (“PPA”) and Site Easement Agreement, Provider shall be responsible for supplying, at Provider’s sole cost, all expertise, labor and materials necessary to construct, install, commission, own, and operate the System, including but not limited to: planning, permitting, designing, engineering, procuring, delivering, installing, constructing, interconnecting, commissioning, owning, and operating. Access to the Project Sites of the System shall be subject to approval of District.

Provider shall be solely responsible for all work required to complete the Project including but not limited to: (a) project management including design, engineering, submittals, construction, interconnection, commissioning and Distribution Utility sign off; (b) procurement of all materials and equipment; (c) design and engineering including civil, structural, electrical, seismic and wind loading requirements and fire protection requirements; (d) permitting and environmental compliance with the current version of all applicable codes and standards; (e) Distribution Utility interconnection requirements compliance; (f) Site preparations including but not limited to grubbing, clearing, grading, roads, dust control, drainage requirements, construction wastewater and storm water disposal, removing excess debris, all final Site preparation, and all other requirements set forth in the Agreement; (g) meters, monitoring, and Data Acquisition System (“DAS”) and weather station; (h) production analysis and performance guarantee for the Solar Facilities and performance analysis and savings guarantee for the BESS; (i) conformance to manufacturers’ installation requirements and warranty terms; (j) acceptance testing, commissioning, interconnection signoff and Permission to Operate (“PTO”) by the Distribution Utility; (k) construction closeout including punch list, as-built drawings and documents package, PV module washing and Site cleanup; (l) operation and maintenance for the term of the PPA; (m) Site security requirements; (n) safety plans and measures per District approval. In addition to these general responsibilities, the Provider shall be responsible for all additional requirements as set forth in this Agreement and all Exhibits and Attachments, including but not limited to this Exhibit G – General Conditions and Technical Specifications.

Provider shall also be responsible for providing District with copies of Provider’s Operations and Maintenance (“O&M”) manuals, testing reports, start-up procedures, warranties, guarantees, and commissioning reports corresponding to the Project, each of which shall be evaluated as to whether such documentation comprises Confidential Information, as defined in the PPA. Provider shall execute all of its obligations in a manner which reasonably minimizes interference and inconvenience to District. Provider shall regularly report status of Provider’s execution of its obligations under this Agreement to District.

2. GENERAL REQUIREMENTS

2.1 Project Management

Provider shall own and operate the Project and is responsible for overall safety on each Project Site. Provider shall conduct all project management activities required to complete the Project, including coordination efforts with District’s representative, the Distribution Utility, inspectors, permitting agencies, suppliers, subcontractors, Provider’s office, field Project staff and any other third parties that are involved in or impacted by the Project. The installation must be “turn-key,” requiring a minimum level of supervision and project management by District, including all materials, equipment and labor, completed and commissioned per the specifications and general conditions contained herein. Except as otherwise provided in the PPA, all Distribution Utility related interconnection work, fees, and installations necessary to make the System operational will be the sole responsibility of the Provider in accordance with any requirements of the Distribution Utility.

2.2 District Project Objectives

District requires that Provider perform each of the following in accordance with the Agreement:

- A. Ensure that construction activities and Project installation and operation are performed safely, comply with all applicable laws, and do not result in any unreasonably adverse effect on District staff, existing District facilities, Site power quality, Site data systems or daily operations at any Project Site throughout the life cycle of the installation. Provider shall undertake commercially reasonable efforts to prevent unreasonably adverse effects on surrounding persons and property to the extent within Provider's knowledge. Manage construction and operation activities so that they minimally disrupt the calendar of operations at each Project Site.
- B. Create a definitive scope of work and project schedule for the Project and manage the entire Project, including but not limited to contracts, design, engineering, permitting, approvals, procurement, pre-construction, Distribution Utility interconnection, installation, testing, commissioning, performance validation, and on-going maintenance and operation in accordance with this Agreement. Ensure work is completed when needed to meet Project deadlines.
- C. Design and implement Solar Facilities to obtain projected net savings and cash flow over the term of the PPA using proven technology that complies with the terms and conditions of the PPA and complies with all relevant codes and regulations.
- D. Subject to Section 2.6, design and implement BESS to be capable of providing Backup Power and to provide net savings using proven technology that complies with all relevant codes and regulations.
- E. Design and implement the System sized in compliance with the Utility's applicable rate structure, energy consumption, and load profiles for each Project Site, and in compliance with all applicable Distribution Utility requirements. Undertake reasonable efforts to ensure that the System is designed and installed to avoid/minimize Distribution Utility upgrades and that such costs are avoided/minimized throughout the entire Project.
- F. Ensure that the Project meets all identified financial and environmental incentive requirements and deadlines. Should additional incentives be identified, Provider will work with District to ensure that the deadlines can be achieved in order to allow for the incentive to be wrapped into the Project.
- G. Ensure that all Project design and construction activities are coordinated with Site facility operations and/or construction activities and are in compliance with Site provided written work rules, safety requirements, and specifications at all times.

2.3 Communication Protocol

Throughout the entire Project timeline, the representative selected by District will be Provider's main source of contact regarding any and all Project related issues. At all times between the release date of the Request for Proposals and Commercial Operation, Provider shall include District's representative in all communications with District. Unless otherwise stated, District's representative will act as a liaison, facilitator and intermediary between Provider and District.

Unless otherwise stated in the Agreement Documents and subject to change by District, the Parties shall meet bi-weekly during the design phase of the Project and weekly during the construction phase

of the Project to, among other things, review work performed to date and to be performed. Provider shall organize the meeting, prepare, and distribute meeting notes. Meeting minutes shall include a three-week look-ahead schedule, RFI log, Change Order log and Submittal Log with two week look-ahead priority list(s). Meeting minutes shall be updated during the meeting and distributed at the end of the meeting. District shall have five business days after District's receipt of such minutes to object to them in writing and provide corrections in writing. A quorum of meeting attendees will be named at the first meeting but may be modified as necessary by District. The named quorum shall be in attendance in all Project meetings. A pre-construction meeting shall be held prior to any work being performed on the Site with all required parties.

2.4 Solar Facility Sizing

It is the sole responsibility of the Provider to ensure that the sizing of the total installed system capacity per Project Site (kWDC / kWAC) achieves the Annual Production Estimate as closely as practical for each Project Site. The total installed system capacity per Project Site shall not increase or decrease the Annual Production Estimate without prior written approval of District.

2.5 BESS Sizing

It is the sole responsibility of the Provider to ensure that the sizing of the total installed BESS capacity (kW and kWh) provides identified electricity bill savings for the District.

2.6 Microgrid Configuration

The BESS equipment installed as part of this Project shall not provide backup power.

2.7 Incentives

Provider shall be responsible for preparing and submitting to all applicable agencies, all applications, proof of progress submittals, claim forms and documentation necessary for any environmental or financial incentives and rebates, including but not limited to, the Self Generation Incentive Program ("SGIP"). To the extent action is required by District, District shall, upon request of Provider, use reasonable efforts to assist Provider in obtaining and retaining the SGIP incentive. District shall have the opportunity to review, comment on, and approve all such applications and documentation prior to submission by Provider. Provider has incorporated into their BESS Rate an SGIP incentive in the amount of \$0. Should an SGIP incentive become available, the Provider shall adjust their BESS Rate accordingly. Provider shall bear all risk of loss with respect to the SGIP incentive, except for losses arising from the negligence or willful acts or omissions by District, or their agents or employees.

2.8 Physical Site Investigation & Project Feasibility Assessment

Provider shall read and become knowledgeable with all documentation available relevant to the Project and visit the Project Sites to assess its conditions and logistics, including but not limited to all Distribution Utility interconnection related requirements. Provider shall conduct feasibility and configuration assessments, environmental assessments, and all other inspections of the Project Sites to determine that the Project Sites can support the installation and interconnection of the System. Provider must visit the Project Sites to ascertain Site conditions, accuracy of provided drawings and feasibility of design. Provider shall be solely responsible to ensure that each Project Site's soil conditions and terrains are favorable for Project construction.

Although District may provide historical information regarding the Project Sites, District makes no representation as to the accuracy of the information about the Project Sites provided in the RFP package or otherwise, including data, drawings and reports developed by third parties. Except as otherwise provided in the Agreement with respect to information provided by the District, Provider shall rely solely on its own due diligence to discover and confirm existing conditions at the Project Sites. Provider shall report any discovered and previously unknown Site conditions of a substantial nature to District within five (5) days of discovery.

Provider shall be solely responsible for ensuring the existing Project Sites' electrical distribution equipment, including but not limited to the main service switchgear and Distribution Utility transformer, will support the interconnection of the System. Except as otherwise provided in the PPA, Provider is responsible for all scope, costs and designs relating to upgrades to the existing electrical system required to accommodate the System installation and interconnection, and has included these upgrades in its scope, costs, and design drawings.

Provider shall confirm that each System will be interconnected to the correct meter at each Project Site by validating the meter and service account identification numbers (SAID) with the Distribution Utility.

District operates under several environmental permits issued by various agencies. To the extent that District has provided such a permit to Provider in advance of the Effective Date, and due to an action, inaction, or negligence by Provider, District becomes subject to non-compliance penalties, the cost of such penalties shall be borne by Provider.

Provider shall identify, if any, third-party Site assessments that are required and be responsible for obtaining all required studies at their sole cost and expense. Except as otherwise provided herein or in the PPA or Site Easement Agreement, Provider shall assume any and all costs and risks associated with physical Project Site conditions, real estate constraints and environmental Site assessment.

Reports which may be required to be obtained by Provider at Provider's judgment (unless otherwise noted below) and at the Provider's sole cost include, but are not limited to:

- Structural Report
- Geotechnical Report
- Title Reports / ALTA Surveys
- Boundary Surveys
- Topographic Surveys
- Underground Utility Survey
- Glint and Glare Study
- Arc Flash Study / Coordination Study from the System back to the existing electrical service board, not the full Site (must be completed)
- Site Electrical Service Assessments
- Environmental Studies

These reports must be obtained when requested by District or any other Governmental Authority having jurisdiction.

2.9 Permitting, Codes, Regulatory Compliance

Provider shall obtain, oversee and adhere to all required permissions for Project construction and operation by obtaining approvals from all Governmental Authorities having jurisdiction over the

Project, including, but not limited to: the permitting agency, the Distribution Utility, incentive authorities, the California Energy Commission (“CEC”), County of Los Angeles fire department, California Occupational Safety and Health Administration (“Cal OSHA”), right-of-way permits, easement agreements and other codes and best practices. Specifically, the Provider shall obtain and submit all documents to achieve and maintain permission to operate with all required Governmental Authorities. In addition to stamped and approved plans, Provider shall provide District with installation compliance confirmation letters from all authorities having jurisdiction within five (5) days of receipt.

2.10 Compliance with The California Environmental Quality Act (“CEQA”)

Provider agrees to coordinate its work on the Project with that of any CEQA consultant(s) retained by District, to provide any reasonably available information such as current elevations and schematic drawings for use in CEQA compliance documents, and to incorporate any mitigation measures adopted by District prior to the Execution Date into the Project design at no additional cost to District.

2.11 Procurement

Provider shall procure all equipment and services required for Project design, construction, commissioning, system monitoring, warranties, operation and maintenance, as described in this Agreement and as shown in District-approved final design engineering drawings, specifications and data sheets. Any proposed changes or substitutions must be presented to District in standard submittal format with detailed explanations and instructions for review, comment and approval. District approval of any of the submittals provided by Provider, including drawings, does not excuse the Provider from their responsibility to meet all safety requirements, applicable codes and standards requirements, requirements of all Governmental Authorities and the requirements of the Agreement including this Exhibit G.

2.12 Construction

Provider shall conduct all construction and construction management work per the Project scope, schedule and per the requirements of this Agreement. Any proposed changes that represent a deviation from scope or schedule must immediately be brought to District’s attention for review. All work must be performed and supervised by skilled workers trained and experienced in the installation of the System in accordance with equipment manufacturers’ installation requirements. Provider shall effectively manage the schedule and coordinate construction activities around District’s maintenance activities and other construction projects where applicable.

2.13 Commissioning

Provider shall conduct all activities required for proper testing and commissioning of the System and any related installations/systems. Commissioning will include testing of all systems to ensure proper operations per the design standards and testing parameters. Provider is required to verify that the (i) the System is functioning as expected within acceptable parameters and as designed at a nameplate capacity; (ii) the Solar Facility is capable of producing the amount of energy expected in the first year of the Annual Production Estimate, when adjusted for actual weather conditions; and (iii) and meets expected performance requirements described within the Agreement. Provider shall manage all necessary final inspections with all Governmental Authorities having jurisdiction over the Project, the Distribution Utility, District representatives, and any other required inspectors. Provider shall also be responsible for completing the Commissioning Schedule and submitting it to District for review and approval. Provider will notify District no less than five (5) days prior to the commencement of any testing and/or inspections and District and/or its representative will have the right to observe all such

tests and/or inspections. As part of the commissioning activities, Provider must confirm that no negative impacts are experienced by existing facilities that connect or interface with the new installations and systems and shall be solely responsible for resolving all issues that arise.

2.14 Distribution Utility Interconnection

Except as otherwise provided herein or in the PPA, Provider is responsible for coordinating and implementing all requirements related to the interconnection of the System with the Distribution Utility, which shall include Distribution Utility provided and installed facilities and District Site facilities, at Provider's sole cost and expense. Provider will coordinate with the Distribution Utility and District to meet all milestones for the Project required by any Interconnection Agreement. Provider is responsible for compliance with all milestones, including payment milestones to the Distribution Utility for design and installation services provided by the Distribution Utility. Provider shall be responsible for obtaining written Permission to Operate for the System from the Distribution Utility and activate the system to begin operating in compliance with this Agreement. In addition, Provider shall be responsible for all on-going terms, obligations and costs described in the Interconnection Agreement, and any other necessary permit signoffs from any Governmental Authorities having jurisdiction over the Project, to operate the System in parallel with the Distribution Utility grid.

Provider shall also be responsible for coordinating the desired rate tariff changes with the Distribution Utility for the System. Desired rate tariffs for each Distribution Utility meter are defined in the Site Assessment Tables. Provider will be responsible for ensuring that the System meets the requirements for inclusion in the desired rate tariffs and will promptly inform District if there is any discrepancy between such requirements and the specifications for the System set forth in this Agreement. Rate changes shall occur as soon as possible following Permission to Operate. Provider shall be responsible for ensuring that the rate tariff change has taken place for each Distribution Utility meter and providing confirmation of the rate tariff change to District.

2.15 Completion Ceremony and District Public Affair Support

Provider will coordinate a ribbon cutting ceremony at one District location at a mutually agreed time at no additional cost to District, including coordination on a press release. Provider will also support the District with materials throughout the project as required to support District public outreach.

2.16 Display Kiosks / Public Data Access

Provider shall provide a public webpage to be made available through a link on District's existing website and one (1) 42" monitor or television will be delivered to District at project completion. Provider shall coordinate and obtain approval of all data points to be displayed on the public webpage and monitor with District prior to implementation. District shall install mounting bracket, provide WiFi connection, and be responsible for IT and firewall.

2.17 Criminal Background Check

Provider shall provide criminal background checks for any person who will be accessing the District Sites, outside of the fenced construction area.

3. ENGINEERING AND DESIGN REQUIREMENTS

Provider shall, at its own cost and expense, (i) design, prepare and cause to be sealed all drawings and Engineering Design Packages, perform engineering studies and estimates and attend meetings as may be

required (or arrange for design and engineering pursuant to a subcontract executed in accordance with this Agreement), for the construction of the Project and interfaces required by the Distribution Utility including, without limitation, sizing of equipment, communication systems and components, preparing specifications and calculations for equipment and material to be included in the Project, completing all work in accordance with this Agreement, providing administration and other services and items required to complete and deliver to District and Distribution Utility the design and Engineering Design Packages, calculations, studies, and drawings necessary to construct a fully integrated and operational Project, and (ii) provide services, attend meetings and prepare all necessary documents and permit applications required to obtain all Governmental Approvals, including, without limitation, coordinating with the Governmental Authorities, the Distribution Utility and other agencies regarding Governmental Approvals necessary for the completion of the Project, completing the permitting process beginning from the permit application through to final approval and receipt of all Applicable Permits, all in accordance with this Agreement and its Exhibits, Applicable Law, Governmental Approvals, District Requirements, Distribution Utility requirements, Engineering Design Packages, industry standards, the actual condition of the Project Sites and all requirements to be sufficient, complete and adequate in all aspects to enable the Solar Facilities to achieve the Annual Production Estimate and a minimum twenty-five (25) year design life, and enable the BESS to achieve minimum twenty-five (25) year design life.

3.1 Design Codes

The Project shall be designed and installed in accordance with the latest edition of all applicable codes, standards, and recommendations of the following agencies:

- ACI – American Concrete Institute
- AISC – American Institute of Steel Construction
- ANSI – American National Standards Institute.
- ASCE – American Society of Civil Engineers
- ASME – American Society of Mechanical Engineers
- ASTM – American Society for Testing and Materials
- CAL OSHA – California Occupational Safety and Health Administration
- CBC – California Building Code
- CEC – California Electrical Code
- CFC – California Fire Code
- CSI – California Solar Initiative
- Distribution Utility Manuals and Standards
- ETL – Electrical Testing Laboratories
- IAEE – International Association of Electrical Inspectors
- ICEA – Insulated Cable Engineer's Association
- IEEE – Institute of Electrical and Electronic Engineers
- IPMVP – International Performance Measurements and Verification Protocol
- NEC – National Electrical Code
- NEMA – National Electrical Manufacturers Association
- NESC – National Electrical Safety Code
- NETA – National Electrical Testing Association
- NFPA – National Fire Protection Association codes, including but not limited to
 - NFPA 101 – Life Safety Code
 - NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems
- UL – Underwriters Laboratories

3.2 General Requirements

3.2.1 Licensing

- (a) In all cases, engineers are to be properly licensed by the State of California.
- (b) District requires a minimum of a Class B and Class C-10 license be held by Provider and/or their subcontractors.
- (c) Electrical, geotechnical, civil, structural and other engineering designs and reports are to be stamped and signed by a licensed engineer.

3.2.2 Solar Photovoltaic Orientation and Shading

- (a) Solar Facility will have a minimum shade free window between the hours of 10:00AM and 2:00PM (solar time) on the winter solstice, to the extent feasible.
- (b) Orientation of fixed-tilt PV array(s) shall be optimized and in all cases with an azimuth between 180 and 270 degrees unless otherwise explicitly approved by District in writing (as applicable).
- (c) Provider shall provide PVSyst in PDF report and excel 8760 format at every stage of the design that shows that the Solar Facility design and installation will meet the Annual Production Estimate.

3.2.3 Site and General System Requirements

- (a) Inverters shall not be placed in locations subject to exposure to direct sunlight between the hours of 10:00AM and 4:00PM. Where inverters must be placed in locations that would be subject to direct exposure to sunlight during this window of time, they shall be provided with shade coverings or otherwise protected from continuous exposure to the sun.
- (b) Where applicable, the Project shall require a study, recommendations and stamp and sign off from a licensed structural engineer and a licensed geotechnical engineer.
- (c) Where the Solar Facility is a ground mounted installation, Provider shall clear and grade the Site substantially in accordance with the Site grading plans. All vegetation inside the array boundaries shall be permanently removed.
- (d) The low-end clearance of ground mounted PV arrays shall be a minimum of two feet (2') above grade.
- (e) Ground mounted PV arrays shall include sufficient drive aisles to maintain the equipment and perform PV module washing, including access for vehicles and cranes as needed to remove and replace equipment.
- (f) All roads shall be designed and installed for all weather access.
- (g) All equipment pads shall be protected by bollards if subject to vehicular traffic. Bollards shall be permanent unless removable bollards are required to facilitate access to equipment.
- (h) Provider shall provide erosion control, weed abatement, and security for the Site throughout construction. Provider's weed abatement obligations requirements are set forth more particularly in Section 8(b) of this Exhibit G.
- (i) Provider shall be responsible for creating and performing all requirements of a Storm Water Pollution Prevention Plan ("SWPPP"), dust control plan, pollution mitigation plan, and all other plans if required by all Governmental Authorities. At a minimum, any earthwork-related or fine grading activities are to be conducted at such times that minimize construction-related fugitive dust.
- (j) A subsurface drainage system shall be required to be installed to direct ground and surface water toward existing offsite drainage features at each Site. In all cases the design of the drainage for the Solar Facility shall prevent water being directed towards existing Site drainage and prevent water accumulation in any area of the Site.

- (k) Inverter pads, BESS equipment pads, disconnect switches and all other equipment which Provider determines is at risk for tampering shall be fenced. Fencing shall be eight feet (8') high with two inch (2") galvanized steel chain link fabric where in accordance with all local requirements.
- (l) Ground mounted solar PV arrays shall be fenced in accordance with the NEC, NESC and requirements of any Governmental Authority and shall include provisions for at least one locking gate. If adequate Site fencing or equivalent is not in place, the fencing around ground mounted solar PV installations shall provide for a sixteen foot (16') wide clearance to the PV modules to allow for vehicular access and to limit shading impact on the Solar Facility.
- (m) Locks for all gates and electrical enclosures to be provided by Provider but must be approved by District prior to procurement. All gates shall include provision for both District and Provider locks to allow for access by either entity.
- (n) The Provider will evaluate whether the Site is in a floodplain and take appropriate precautions to prevent water damage to the Project, including determining and installing the PV arrays, batteries, inverters, electrical enclosures and all other materials to be used in the Project at the appropriate height above grade to be above the 1-percent-annual-chance flood elevation.
- (o) Lighting requirements for PV array and other Project equipment locations shall be discussed with District during design, and any lighting locations and fixture specifications shall be mutually agreed upon.
- (p) An arc flash study shall be performed by Provider, from the System back to the existing electrical service board (not the entire Site). All required equipment labeling, fault current and coordination analysis, and recommendations for proper personal protective equipment (PPE) shall be followed in accordance with the results of the arc flash study.
- (q) Geotechnical studies, where required, must include soil corrosivity and thermal resistivity testing and evaluation. All work must include consideration for the results of the testing and evaluation.

3.2.4 Conduit and Wiring

- (a) All conductors shall be in conduit. Provider shall not direct bury conductors unless explicitly approved by District in writing. All conduits shall be installed according to the requirement of the NEC and all Governmental Authorities.
- (b) Buried conduit shall be PVC and shall be covered and encased per NEC requirements.
- (c) Any conduits installed over or under an existing water line will require red concrete encasement.
- (d) All below grade horizontal and vertical bends of PVC conduit shall use long radius elbows. Bending of straight PVC conduit to avoid installation of long radius elbows will not be allowed.
- (e) Vertical risers of buried or encased PVC conduit shall transition to the metallic conduit type specified below no higher than twelve inches (12") above grade or top of concrete. Any exposed PVC shall be Schedule 80. If transition to metallic conduit is installed as soon as or just before the conduit is no longer buried or encased, use the appropriate conduit adapter and wrap metallic conduit in 10mil corrosion protection tape where exposed to soil or concrete.
- (f) Where exiting from the ground, all conduits shall enter enclosures from below and be made watertight. Finish with a silicone sealing compound.
- (g) All above ground conduit shall be EMT where corrosion is not a concern, and Rigid Aluminum Conduit (RAC) where corrosion is a concern.

- (h) All conduits located on rooftops will be supported using UV resistant polyethylene foam or synthetic rubber unless explicitly approved by District in writing. Wood supports are not permitted.
- (i) All conductors 8 AWG or smaller shall be copper. Code compliant aluminum conductors may be used for conductors larger than 8 AWG. All wiring that interfaces with any of District's equipment must be copper.
- (j) All wiring used for grounding shall be copper.
- (k) Ground lugs shall be mechanical or irreversible crimp, rated for direct burial, listed to UL 467 and/or UL 2703 and suitable for use with copper conductors.
- (l) Unless otherwise approved by District in advance, PV modules shall be grounded with hardware listed to UL 2703. PV module grounding shall be in accordance with all requirements of the NEC and the Governmental Authority.
- (m) All wiring shall be minimally rated to handle the voltage and current of the designed system.
- (n) All wiring shall be listed and labeled by a Nationally Recognized Testing Laboratory ("*NRTL*") in accordance with Underwriters Laboratories standards for its purpose and location.
- (o) PV module string wire shall be UL listed PV Wire and be appropriately rated for UV exposure where required.
- (p) All DC wire shall be adequately supported by structural steel within the footprint of a single solar PV array. DC wire shall be in conduit when spanning a gap between adjacent solar PV arrays.
- (q) The Solar Facility shall be equipped with DC arc-fault protection in accordance with the NEC.
- (r) Where there are more than two DC strings in parallel on an MPPT, DC wiring shall be protected by overcurrent protection rated for DC circuits and marked by the manufacturer for use in PV systems. Fuses shall be listed and labeled by an NRTL in accordance with UL 2579.
- (s) All termination equipment shall be rated for the conductor type, temperature, current and voltage of the conductor being terminated.
- (t) Locking connectors shall mate with PV module terminations and shall be certified compatible by the manufacturer of the locking connector provided with the PV module.
- (u) All conductors used for communication will be shielded cable with a drain for RS-485 wiring.
- (v) Communications wiring shall be in separate conduits from the high voltage DC and AC wiring with sufficient separation to prevent interference.
- (w) Worst-case DC voltage drop shall be limited to 2.0% unless otherwise explicitly approved by District in writing. The circuit shall be defined as all wiring from the PV module connectors to the DC input terminals at the inverter. Provider shall account for all horizontal and vertical distances and all wire gauge transitions.
- (x) Worst-case AC voltage drop for an individual inverter shall be limited to 2.5% for the BESS and 3% for the Solar Facilities at maximum power, and weighted average AC voltage drop shall be limited to 3.0% at maximum power, unless otherwise explicitly approved by District in writing. The circuit shall be defined as all wiring from the inverter output to the Delivery Point. Provider shall account for all horizontal and vertical distances and all wire gauge transitions.

3.2.5 Electrical Tie-In

- (a) The Solar Production Meter and BESS Meter shall be identified on the preliminary and final drawings and shall be located as close as possible to the Delivery Point, and in all

cases on the Delivery Point side of all major electrical losses including transformers and long wire runs.

- (b) A Net Generation Output Meter (“*NGOM*”) shall be provided for each new Net Energy Metering (“*NEM*”) Solar Facility in accordance with the Distribution Utility requirements. Provider is responsible for all scope, costs and designs relating to any *NGOM*.
- (c) Should relocation of any circuit breakers be required to meet requirements of this Agreement, all scope, costs and designs are the responsibility of the Provider.

3.2.6 Structural

- (a) Structural engineers shall determine all code requirements and the Project shall be designed and installed in accordance with the latest edition of all applicable codes and standards.
- (b) Equipment pads shall be a minimum of six inches (6”) of concrete reinforced at twelve-inch (12”) intervals with #5 rebar unless otherwise directed by the structural engineer. Equipment pad layouts shall include adequate spacing to accommodate maintenance activities for all equipment. A housekeeping pad elevated three inches (3”) above the remaining pad surface will also be required.
- (c) Where electrical enclosures will be mounted vertically to PV array structural posts or other supports, two feet (2’) minimum ground clearance and appropriate working clearances as required per NEC shall be maintained. In no case shall equipment locations create shade on any PV array between the hours of 10:00AM and 4:00PM (solar time) on the winter solstice.
- (d) Structural engineers are to specify the grade of steel used in all support structures. Mill certifications showing the identification of the steel to be used on the Project and the quality thereof shall be provided to District. Mill certifications shall be checked by Provider prior to accepting delivery of any steel.

3.3 Engineering Design Packages and Project Execution Plan

Provider and its subcontractors (as applicable) shall prepare and submit to District for their review and approval all drawings, assessments, reports, specifications, and all other necessary documents setting forth in detail all requirements for the construction of the Project. Provider shall prepare Preliminary, 50%, 90% and 100% Engineering Design Packages as described herein. All engineering and installation drawings shall comply with current construction standards, codes and regulations, and adhere to all requirements of this Agreement. The system design will comply with all applicable laws and regulations. District approval of any of the submittals provided by Provider, including drawings, does not excuse the Provider from their responsibility to meet all safety requirements, applicable codes and standards requirements, requirements of all Governmental Authorities and the requirements of the Agreement including this Exhibit G.

Engineering Design Packages shall at a minimum contain the information as outlined below for each milestone.

3.3.1 Preliminary and 50% Engineering Design Packages

- (a) Design Drawings depicting and identifying at a minimum:
 - (i) Solar Facility PV array layout
 - (ii) Tilt and azimuth for all PV arrays
 - (iii) The proposed locations of all other major Solar Facility equipment including but not limited to electrical point of connection, disconnects, panelboards, inverters, meters and dataloggers

- (iv) The proposed locations of all major BESS equipment including but not limited to electrical point of connection, disconnects, transformers, panelboards, inverters, batteries, meters, controllers and dataloggers.
- (v) The locations of all major existing equipment, including but not limited to Distribution Utility transformer and meter, main electrical service switchgear, System electrical point(s) of connection, disconnects, panelboards, inverters, arrays, meters and dataloggers.
- (b) Product data sheets and copies of manufacturers' warranties for all major pieces of equipment.
- (c) Completed System Site Assessment Table in native and PDF formats.
- (d) PVSyst energy production modeling report in PDF format and 8760 output file in MS Excel format. The energy production model report and 8760 output files must be in the same format and use the same assumptions as those used to determine the inputs to this Agreement.
- (e) BESS system performance modeling report in 4x8760 output file in MS Excel format.

3.3.2 90% and 100% Engineering Design Packages

- (a) All information required above for the preliminary and 50% Engineering Design Packages, updated at each milestone.
- (b) A full set of design drawings as described in a subsequent section.
- (c) All required drawings, assessments and reports stamped and signed by an engineer licensed in the appropriate discipline – structural details shall not be stamped by an electrical engineer.
- (d) Full structural details of the PV array mounting system, BESS pad and anchorage, equipment support racks and anchorage, fencing design and associated calculations.
- (e) Microsoft Project or equivalent construction schedule (providing Gantt chart output) showing milestones, equipment order and delivery dates, and staffing requirements. Specific milestones such as conduit installation completion, material arrival dates, interconnection date, and commissioning timeline, shall be highlighted.
- (f) A list of those changes made from the original proposal with the reasons therefor.

The Engineering Design Packages will be reviewed by District. Comments shall be delivered to Provider within fifteen (15) business days of submission for review. Provider shall also be responsible for coordinating a review of the 90% drawings with the City of Palmdale and shall allow for thirty (30) days for that review. Ensuring that the Project complies with all requirements and will be installed to meet all requirements of this Agreement remains the sole responsibility of the Provider.

3.3.3 Project Execution Plan

A complete Project execution plan for each Site shall be provided for review, which shall at a minimum address the following:

- (a) Material storage location
- (b) Lay-down and layout yard location
- (c) Site office location
- (d) Access and mobilization
- (e) Crane locations and traffic control
- (f) Method of installation
- (g) Human resources and staffing
- (h) Communications
- (i) Anticipated Project risks

The Project execution plan shall be reviewed and approved by District prior to any work being performed on the Site. The Project execution plan shall be submitted as soon as reasonably possible, and no later than two (2) days after the 90% Engineering Design Package due date.

3.4 Design Drawings

A drawing summary list shall be maintained by the Engineer of Record for tracking drawings and revisions thereof over the design and construction period, and the list shall be provided to District if any consequential updates are made or as requested by District. All design drawing submittals shall be according to the following:

3.4.1 Format

- (a) All drawings shall include a title block which at a minimum contains the Project name, Site address, District logo, Provider's name, engineer's stamp, engineer's name and drawing revision table.
- (b) Any changes in the Engineering Design Packages from one District submittal to the next shall be clouded.
- (c) Redlines shall be maintained on a not more-than-weekly basis. As-built drawings shall be completed in a reasonable amount of time following the Governmental Authority final inspection and sign off.

3.4.2 Content

The descriptions of the sheets and sheet contents below shall be considered the minimum requirement, as applicable. Drawings will contain specified content as applicable, but the order and location may vary per sheet. Additional sheets and details shall be included as needed to describe the project in adequate detail for construction and permitting needs.

(a) Title Page

Information on the title page shall include, but not be limited to the following:

- (i) Location of the Site
- (ii) Amount of land area to be occupied by the Project, expressed in square feet or acres as appropriate
- (iii) Project directory including contact information for all engineers, designers and consultants
- (iv) Index of drawings
- (v) Applicable codes and standards list including most recent CEC/NEC
- (vi) A scope of work narrative description
- (vii) System size, which shall include kWDC, kW CEC-AC and kWAC for any Solar Facility, and kWAC and kWh for any BESS
- (viii) Interconnection type (NEM-PS, NEM-A, Rule 21)
- (ix) PV module manufacturer, part number and quantities
- (x) PV inverter manufacturer, part numbers and quantities
- (xi) PV module mounting hardware description (ballasted roof mount, ground mount, shade structure mount etc.)
- (xii) Battery manufacturer, part numbers and quantities
- (xiii) BESS inverter manufacturer, part numbers and quantities
- (xiv) All other information required by any Governmental Authority
- (xv) Benchmarking / survey control data as applicable

(b) Architectural Site Plan

Information on the site plan shall include, but not be limited to the following:

- (i) Property lines
- (ii) Required setbacks and/or yards
- (iii) Easements
- (iv) Existing buildings and structures
- (v) Proposed locations of major equipment
- (vi) Building code analysis justifying proposed equipment placement
- (vii) Separation distances
- (viii) Fire access requirements
- (ix) Modifications for ADA compliance

(c) Single Line Diagrams

The single line diagrams shall accurately depict the physical electrical connections (i.e. quantity, type, and size of conductors, quantity, size, and type of conduit) between all electrical equipment used in the system. Information on the single line diagrams shall include, but not be limited to the following items:

- (i) System size, which shall include kWDC, kW CEC-AC, and kWAC for any Solar Facility, and kWAC and kWh for any BESS
- (ii) Interconnection type (NEM-PS, NEM-A, Rule 21)
- (iii) PV module manufacturer, part number and quantities (proposed and existing if applicable)
- (iv) PV inverter manufacturer, part numbers and quantities (proposed and existing if applicable)
- (v) Battery manufacturer, part numbers and quantities
- (vi) BESS inverter manufacturer, part numbers and quantities
- (vii) Distribution utility transformer, including size
- (viii) Distribution utility meter, including meter number and SAID
- (ix) Main electrical service switchgear, including bus amperage, main service disconnect amperage, voltage rating and interrupt rating
- (x) Solar Facilities electrical point of connection, disconnects, panelboards, inverters, arrays, meters and dataloggers, if applicable
- (xi) System interconnection tie-in scheme
- (xii) All AC and DC disconnects including wiring and fusing within disconnects
- (xiii) All overcurrent protection device sizing
- (xiv) Switchgear, including bus amperage, main over current protection device (“OCPD”) amperage, voltage rating and interrupt rating
- (xv) Transformers, including kVA, primary and secondary voltages
- (xvi) PV modules, inverters and batteries
- (xvii) Number of PV modules per string
- (xviii) Number of PV strings for each inverter and/or combiner box
- (xix) String labels per array or subarray
- (xx) Net Generation Output Meter (where applicable), Solar Production Meter, BESS meter, Facility Load meter and any other meters
- (xxi) Wire type, conductor material, size and quantity used for each run
- (xxii) Conduit type, size and quantity of wires in each conduit for each run
- (xxiii) Total wire length for each run
- (xxiv) Complete electrical calculations, including voltage drop, OCPD and wiring ampacity, and PV string voltage
- (xxv) Monitoring data communications and power wiring
- (xxvi) Controls diagram including low voltage, low current and power wiring
- (xxvii) Security camera data communications and power wiring if applicable

(xxviii) Lighting, convenience outlets, and any auxiliary power circuit wiring and equipment

(xxix) Make and model of all major equipment

(d) Electrical Site Plan and Electrical Details

Information on the electrical layouts and details shall include, but not be limited to the following:

- (i) Plan view of locations of all electrical equipment shown on the single line diagrams described above
- (ii) Location of the point of interconnection
- (iii) Enlarged views of the BESS area, any other electrical equipment pads, and main electrical service area
- (iv) Elevation views of all electrical equipment
- (v) Locations of conduit runs
- (vi) Locations and sizing of spare conduits
- (vii) PV string map per array or subarray
- (viii) Safety label details (including, but not limited to, arc flash)

(e) Grounding Diagram

All electrical equipment shall be depicted, including their capacity/rating, manufacturer, part number, quantity, and reference designator where applicable. Diagram shall indicate equipment grounding connection points and grounding conductor size. Equipment shall include but not be limited to the following:

- (i) PV Modules
- (ii) PV Inverters
- (iii) Batteries
- (iv) BESS Inverters
- (v) Transformers
- (vi) Switchgear
- (vii) AC and DC disconnects
- (viii) Main electrical service switchgear
- (ix) Meters
- (x) Control and Monitoring equipment
- (xi) MET (Meteorological) Stations
- (xii) Distribution panelboards

(f) Structural and Civil Sheets

Information on structural and civil sheets shall include, but not be limited to the following:

- (i) Equipment pad structural details
- (ii) Equipment mounting rack structural details
- (iii) Equipment anchorage design
- (iv) Fence design and structural details
- (v) All civil work details

4. EQUIPMENT

The System is intended to be in operation for a minimum of twenty-five (25) years, which shall include at least one BESS replacement or augmentation, therefore, the life cycle costs (capital expenditures and operating and maintenance expenses) for all installations and systems must be considered in selection

criteria for all materials and equipment. Provider shall purchase and cause to be delivered to each Project Site all equipment and materials required for the Project and as described in District-approved final design engineering drawings, specifications and data sheets and as required to construct a fully functioning Project. Any proposed changes or substitutions must be presented to District in standard submittal format with detailed explanations and instructions for review, comment and approval. Minimum requirements for equipment are described below. District approval of any of the submittals provided by Provider, including drawings, does not excuse the Provider from their responsibility to meet all safety requirements, applicable codes and standards requirements, requirements of all Governmental Authorities and the requirements of the Agreement including this Exhibit G.

At the end of the life cycle of the BESS, Provider shall undertake commercially reasonable efforts to recycle all batteries used for the system. Additionally, Provider shall undertake commercially reasonable efforts to recycle solar PV modules at the end of the life cycle of the Solar Facilities as much as possible. Cost for materials to be recycled shall be borne solely by Provider.

4.1 Standards

All components shall be designed, manufactured, tested and listed in accordance with the latest applicable standards of NEMA, ANSI, NEC, IEC and UL. Provider shall verify listing and labeling of equipment by a NRTL prior to installation. In all cases NEC and Governmental Authority rules shall apply.

4.2 Factory Testing

Any equipment that is required to be factory tested to an applicable standard shall be accompanied by the results of those factory tests, and further those results will be submitted to District as part of the Final Binder.

4.3 Acceptance and Care

Equipment shall be stored, handled and installed in accordance with manufacturer's requirements. Material received shall be identified by serial number. A report recording make, model and serial numbers of the material and equipment received shall be prepared and shall be forwarded to District within ten (10) days of the material and equipment being received.

4.4 NEMA Rating

Enclosures mounted outdoors shall be rated a minimum of NEMA 3R. If any Site is within two (2) miles of any body of salt water or other potentially corrosive water, inverters and battery enclosures shall be NEMA 4X and all other enclosures exposed to the elements shall be NEMA 4X.

4.5 Nameplates and Labeling

All major equipment, panels, boxes, and associated equipment shall be clearly labeled. Reference ANSI Z535.4-2011 for guidelines describing suitable font sizes, words, colors and symbols for labels. Nameplates and map placards shall be engraved phenolic placards made of red stock with white lettering sized appropriately for the size and purpose of the label. Provider shall submit the proposed labels for approval prior to installation. The following minimum labeling shall be installed:

- A. Install engraved signs for instruction and warning identifying that the System is operational on the premises at appropriate locations and that there are potentially multiple power

sources on the premises – submit wording and location to District for approval. In all cases NEC and Distribution Utility requirements shall dictate.

- B. Install all required signage per NEC (including arc flash requirements per NEC Article 110).
- C. Install engraved phenolic placards identifying emergency disconnecting means.
- D. Provide identification of all solar PV DC power circuits on switches, combiner boxes and/or inverters. Clearly identify individual PV module strings within the equipment at which they terminate. Use appropriate wire color codes (i.e. red and black) for positive and negative conductors.
- E. PV modules must include serial numbers in such a position as to be easily visible after installation.

4.6 Products – Approved Manufacturers and General Product Requirements

Only products that meet the requirements below shall be used in the construction of the Project, unless otherwise explicitly approved in writing by District.

4.6.1 Approved PV Modules

Hanwha Q.PEAK DUO XL-G11.3 580W or equivalent.

4.6.2 Approved PV Module Manufacturer

Hanwha or equivalent.

District’s General Guidelines for PV modules

- Thin-film, concentrating PV, etc. PV technologies are not accepted by District.
- All PV modules must be included on any required rebate-related approved module list as well as on the California Energy Commission’s (“CEC”) List of Eligible Photovoltaic Modules.
- All PV modules must have anti-reflective (AR) glass surfaces.
- All PV modules used on the Project shall include a minimum twenty-five (25) year linear power output warranty and a minimum ten (10) year product warranty.
- Any PV modules to be installed on a rooftop shall have a Photovoltaic Module Fire Performance Type Classification by an NRTL of Type 1 or Type 2 unless explicitly approved by District in writing.
- All array layouts, PV module related submittals, and PV module data sheets must include cell and module efficiency ratings, and define the guaranteed production degradation over the warranted life of the module.
- Provider will provide flash test data for all PV modules to District in MS Excel format upon procurement of PV modules. District, at its sole discretion, may randomly select up to fifty (50) PV modules for delivery to a third-party for quality verification testing. The costs of such verification testing shall be the responsibility of District.

4.6.3 Approved Solar Facility Inverter Manufacturer

SMA or equivalent

District’s General Guidelines for Solar Facility Inverters

Central and string inverters with a maximum input voltage of 1,500VDC are allowed where in compliance with the NEC for ground mounted PV arrays. Microinverter solutions may be proposed. All inverters must be included on any required incentive-related approved inverter list as well as on the CEC's List of Eligible Inverters. Inverters must meet all Distribution Utility requirements. All inverters must have a minimum 10-year warranty.

Inverter Manufacturer Preventative Maintenance and Support Services

District requires preventative maintenance support services which may be provided by Provider or the inverter manufacturer, as well as comprehensive and highly responsive repair service offerings. In addition, District will be monitoring the inverters' performance remotely, and require that the inverters utilize an open interface and documented protocols for third party monitoring software.

4.6.4 Approved Mounting Hardware – Ground Mount

DuraTrack HZ or equivalent.

District's General Guidelines for PV Module Mounting Hardware for Ground Mounts

Ground mounted fixed tilt PV module mounting systems shall be NRTL listed to UL 2703. Ground mounted tracking systems shall be NRTL listed to UL 3703. The Approved PV Modules listed above shall be on the tested and approved PV module list maintained by the mounting system manufacturer to ensure compatibility with the mounting system's integrated grounding components.

District requires that all PV module mounting solution descriptions clearly identify the mounting hardware and any engineering services related to the mounting solution. Provider shall provide full mounting solution specifications, warranty details, etc.

4.6.5 Approved BESS Inverter Manufacturer

SYL, Delta, or equivalent.

District's General Guidelines for BESS Inverters

All BESS inverters must be included on any required incentive-related approved inverter list. Inverters must meet all Distribution Utility requirements. All inverters must have a minimum ten (10) year warranty.

Inverter Manufacturer Preventative Maintenance and Support Services

District requires preventative maintenance support services which may be provided by Provider or the inverter manufacturer, as well as comprehensive and highly responsive repair service offerings. In addition, District will be monitoring the inverters' performance remotely, and require that the inverters utilize an open interface and documented protocols for third party monitoring software.

4.6.6 Approved Battery Manufacturer

SYL or equivalent.

District's General Guidelines for Batteries

Lithium-ion battery chemistry is preferred. Lead acid battery chemistries are not acceptable. All batteries must have a minimum ten (10) year warranty.

Battery Manufacturer Preventative Maintenance and Support Services

District requires preventative maintenance support services which may be provided by Provider or the battery manufacturer, as well as comprehensive and highly responsive repair service offerings.

4.6.7 Approved Data Acquisition System (“DAS”)

AlsoEnergy or equivalent.

4.6.8 Performance Monitoring and Reporting Service Provider

AlsoEnergy or equivalent.

4.6.9 Inverter Monitoring Provider

AlsoEnergy or equivalent.

4.6.10 Approved PV Module Temperature Sensors

Campbell Scientific or equivalent.

4.6.11 Approved Ambient Temperature Sensors

or equivalent.

4.6.12 Approved Irradiance Sensors (Pyranometers)

Ingenieurburo or equivalent.

4.6.13 Approved Wind Speed and Direction Sensors

DAVIS or equivalent.

4.6.14 Approved Rain Sensor

AlsoEnergy or equivalent.

4.6.15 Facility Load Meters

Elkor, Accuenergy, or equivalent.

4.6.16 Critical Load Meters

Elkor, Accuenergy, or equivalent.

4.6.17 BESS Meter

Elkor, Accuenergy, or equivalent.

4.6.18 Solar Production Meter

Elkor, Accuenergy, or equivalent.

4.6.19 Approved Safety Switches

Eaton or equivalent.

4.6.20 Approved Grounding Devices

Wiley, IlSCO, or equivalent.

5. COMMUNICATIONS AND MONITORING SYSTEMS

Provider is responsible for providing and commissioning a fully functional remote access monitoring system which includes a user portal accessible via the internet. Any labor, communications devices, wiring and other materials shall be included in Provider's cost and scope. The monitoring system shall meet all of the requirements outlined in this Agreement.

Provider is responsible for the complete and fully functional installation and operation of the Supervisory Control and Data Acquisition ("SCADA") system. Any labor, communications devices, wiring and or other materials shall be included in Provider's cost and scope. The SCADA system shall meet all the requirements outlined in this Agreement.

5.1 Performance Monitoring & Reporting Service

Provider shall include Performance Monitoring and Reporting Service ("**PMRS**") as part of the SCADA for the term of the Agreement to monitor and collect data from the Facility Load Meter, Critical Load Meter, BESS Meter, Solar Production Meter, inverters, batteries, meteorological stations and all other data points applicable to the System operation. Provider shall be responsible for procuring, installing, and commissioning all SCADA equipment, and for entering into a contract with a third-party Performance Data Provider ("**PDP**") as required. The monitoring service requirements are as follows:

- A. Provider shall provide operator and administrator level training to District for using the PMRS software interface as part of commissioning activities.
- B. The PMRS software interface must allow for access via a link from District's website and must allow the users to view and download real-time and historical electricity usage, solar production, and BESS power flow data at each Project Site over a variety of timescales including but not limited to a minimum of a year of fifteen (15) minute interval data. Provider shall coordinate and obtain approval of all data points to be displayed on the public webpage with District prior to implementation.
- C. The PMRS software interface must allow District to programmatically download via an Application Program Interface ("**API**") the real-time and historical electricity usage, solar production, and BESS power flow data at each Project Site over a variety of timescales including a minimum of one (1) year of fifteen (15) minute interval data. The API must include the ability to reference most recent inverter, meter and alarm status readings.

5.2 Equipment and Components

Below is a list of the minimum equipment and components that must be included as part of the SCADA. All equipment shall be installed to equipment manufacturer's recommendations and best practices for the System.

A. Facility Load Meter(s)

Revenue grade energy meters shall be installed to measure the total (not net) energy usage, instantaneous demand, power factor, etc. at each main switchboard where the System is interconnected. The load side revenue grade energy meters shall be included as part of the PMRS system, send data through the PDP and be displayed on the PMRS software interface.

B. BESS Meter

Revenue grade energy meters shall be installed to monitor power and energy flows of the BESS at each Site. The BESS Meter shall be located within ten feet (10') of the Delivery Point unless an alternative location is agreed to in writing by District. The BESS Meter shall be included as part of the PMRS system, send data through the PDP and be displayed on the PMRS software interface.

C. Solar Production Meter

Revenue grade energy meters shall be installed to monitor power and energy production of any Solar Facility present at each Site. The Solar Production Meter shall be included as part of the PMRS system, send data through the PDP and be displayed on the PMRS software interface.

D. Datalogger/Internet Gateway

E. Inverter Monitoring

If inverters are not provided with communications as part of the standard package, then the communications option shall be ordered. Where various communication package options exist, those options shall be discussed with District prior to ordering.

F. PV Array Monitoring

If DC combiner boxes are installed within the array field and not integral to the PV inverters, DC monitoring shall be provided for each home run from the combiner boxes to the inverters.

G. Meteorological Stations

The Project will require installation of one meteorological station at a location determined by District and to include at least the following:

- One (1) K&Z SP Lite 2 or similar quality standard GHI pyranometer
- One (1) IMT reference cell for each POA sensor with an associated back of module temperature sensor installed at each unique azimuth and tilt of the arrays installed
- One (1) ambient temperature sensor
- One (1) wind speed and direction sensor
- One (1) dust sensor

Sensors shall be mounted away from shadows, reflective surfaces, and sources of artificial irradiation or any other factor that may influence measurement accuracy of the sensors. Pyranometers will be installed at the edge of the array.

The PV module temperature sensor data shall be linked to the predicted power calculation formula in the PMRS software interface along with the applicable plane of array irradiance data supplied by the pyranometer for each array.

The meteorological station must be connected to the PMRS so that weather data can be collected and downloaded along with the Solar Facilities production data.

All meteorological station equipment shall be calibrated and tested by the original equipment manufacturer or vendor prior to delivery to the Site and maintained through the Term per the manufacturer's requirements. All pyranometers shall be cleaned in the same manner and at the same time as a module washing is performed.

H. Protective Relays, Medium Voltage Circuit Breakers and Transformers

Status data shall be provided through the PMRS system.

I. External Device Communication

Provider must arrange for and provide a secure and reliable internet connection adequate to allow for uploads of all data points from the PMRS every fifteen (15) minutes at their sole cost. Provider shall provide this internet connection via a cellular modem with data service for the term of the Agreement. Provider shall make this information available to District through the PMRS system.

5.3 Remote Access Monitoring Portal

5.3.1 Power and Energy Data

Each Project Site's PMRS web portal should display the following minimum information over a variety of timescales:

- (a) BESS inverter instantaneous power (kW)
- (b) BESS battery state of charge (%)
- (c) BESS battery instantaneous energy remaining (kWh) [desirable not required]
- (d) Solar instantaneous power output (kW)
- (e) Solar energy production (kWh)
- (f) Facility entire instantaneous load without solar & BESS (kW)
- (g) Facility instantaneous load net solar (kW)
- (h) Facility instantaneous load net solar & BESS (kW)
- (i) Facility entire energy consumption (kWh)
- (j) Critical loads instantaneous load (kW)
- (k) Critical loads energy consumption (kWh)
- (l) Billing cycle peak demand without solar & BESS (kW)
- (m) Billing cycle peak demand reduction due to BESS (kW)
- (n) Billing cycle peak demand reduction due to solar & BESS (kW)
- (o) Billing cycle peak demand savings (\$) [desirable not required]

5.3.2 BESS Alarms

- (a) Provider will coordinate with District to provide alarms for the BESS that will ensure that both Provider and District are aware of issues with the operation of the BESS prior to Commercial Operation.

5.3.3 Solar Facility Alarms

Provider will coordinate with District to provide alarms for the Solar Facility that will ensure that both Provider and District are aware of issues with the operation of the BESS prior to Commercial Operation.

5.3.4 Solar Facility Analytics Pages

Each Solar Facility PMRS should have the following tabs configured in the monitoring analytics page:

- (a) Load Profile
 - (i) Solar Production Meter Power (kW)
 - (ii) BESS Meter Power (kW)
 - (iii) Facility Demand (kW)
 - (iv) Net Consumption (kW)

- (b) Inverter Output
Energy generation (kWh) per inverter. Each inverter shall have a unique identifier matching the naming convention in the As-Built drawings.

- (c) Predicted Power
 - (i) Solar Production Meter Power (kW)
 - (ii) Predicted Power (kW)

- (d) Inverter vs. Solar Production Meter Power
Power output per inverter displayed with the Solar Production Meter Power

5.3.5 Settings

Provider shall make best efforts to ensure that all System information should be filled out completely and correctly on the monitoring platform to match the As-Built drawings and allow for easy identification of equipment and other System information.

6. CONSTRUCTION

Provider is required to conduct all construction and construction management work for completion of the Project. Provider shall perform all work in accordance with generally accepted industry practices, all applicable laws, regulations, codes, rules, ordinances, Government Approvals and permitting requirements, equipment manufacturer's requirements, and quality control inspection protocols so that the System meets or exceeds (i) all requirements of applicable laws, Government Approvals and licenses; (ii) equipment manufacturer's installation specifications, and compliance with the terms and conditions of all applicable warranties and guarantees; (iii) complies with all requirements of the Interconnection Agreement; (iv) all established safety protocols for operation and maintenance, and labeling / marking requirements; (v) all requirements of the commissioning procedures and performance validation herein; (vi) all requirements for any applicable federal, state or other environmental or financial rebates and incentives. All work must be performed and supervised by skilled workers trained and experienced in the installation of the System in accordance with equipment manufacturers' installation requirements. Provider is encouraged to utilize local subcontractors and source materials and resources locally should they provide requisite qualifications and competitive advantages.

6.1 Site Safety and Security

The Provider shall be solely responsible for compliance with all applicable occupational safety and health standards, rules, regulations and orders established by local agencies, the State of California, and California Division of Occupational Safety and Health Construction Safety Regulations (Cal OSHA), including obtaining permits required by California Code of Regulations, Title 8, Section 341 and

341(a). In addition, Provider and all subcontractors shall comply with applicable provisions of Federal, State, and municipal safety, health, and sanitation statutes and codes. In the event there is a conflict between the provisions of the Safety and Health Regulations for Construction promulgated by the U.S. Department of Labor in Title 29 CFR Part 1926, OSHA, or Cal OSHA, the more stringent provision shall prevail.

Provider will develop a site-specific OSHA approved Site Safety and Security Plan for each Project Site and submit it to District for review and approval prior to the start of construction. The Site Safety and Security Plan shall include an evaluation and appropriate documentation of the safety record for all subcontractors that will be performing work on the Project, a traffic control plan, and an Injury and Illness Prevention Program plan. The Site Safety and Security Plan shall also include the location of emergency utility shutoffs and an evacuation plan. No work shall be performed on the Project prior to written confirmation that District has accepted the Site Safety and Security Plan.

A safety conference shall be scheduled prior to the start of construction to review the experience modification rating, the respective safety requirements, and to discuss implementation of all health and safety provisions related to this project. Representatives from the Provider, every subcontractor and District shall be present at the safety conference. Provider shall ensure District is informed of the safety conference at least five days in advance and provided the option to attend.

Following the commencement of work on the Project, safety meetings will be held once a week with all Provider and subcontractors' employees attending. Printed names will be taken of those attending the meeting. No individual will start work at any Project Site without having attended a safety briefing on the dangers and protocols of the Project Site. Records of this training will be kept and provided to District for review. No individual will operate a piece of equipment on which they have not had certification training. Certification shall be carried on the operator at all times.

Security of the Project Site(s) is the sole responsibility of Provider, including any security monitoring equipment, fencing or other precautions that Provider may deem reasonably necessary. District will not be liable for theft or damage of equipment or materials stored at the Project Site.

6.2 Access to and Use of Project Sites

District shall provide access and area at each Project Site for the performance of the work on the Project, including lay-down area and storage area. District will grant Provider access to each Project Site to perform all work associated with the Project and on-going Operation & Maintenance during regular business hours, or such other reasonable hours requested by Provider and approved by District in accordance with this Agreement. Access points to the Sites must be closely coordinated with District and approved in advance before construction begins. District will issue necessary keys to Provider to access Project Sites once all related requirements have been met. Provider shall return keys to District at any time upon request by District. Provider shall reimburse District for the cost of re-keying all of District's locks if keys are not returned to District.

Provider agrees not to bring, keep, or permit to be brought to, or kept at or near any Project Site, any Hazardous Substances, in excess of amounts permitted under Environmental Law, or materials which are prohibited by District or prohibited by the standard form of District's insurance policy. Provider agrees not to commit or suffer to be committed any waste upon the Project Sites.

Provider shall install signage at each front gate / Site entrance to identify the Project and the Provider's name and contact information upon District approval of all proposed signage. The Provider shall submit

a prototype of the construction signs to District for review and approval before posting the signs at the Site. After approval, actual sign placement and location shall be coordinated with District's Inspector.

6.3 Drawings

Provider shall maintain one complete Engineering Design Package at each Site including one full set of full-size plans marked to show any deviations that have been made from the approved plans, including but not limited to buried or concealed construction features or utilities which are revealed during the course of construction. Current as-built record drawings shall be accessible to District at all times during the construction period. They shall be reviewed with District at regular intervals. Upon completion and prior to final inspection of the Project, the Provider shall submit the complete As-Built Engineering Design Package to District for review and shall make such revisions or corrections as may be necessary for them to be a true, complete, and accurate record of the Project in the opinion of District.

6.4 Work-Time Constraints

Great care shall be taken to avoid interruptions to Site activities and neighboring properties. Construction activities shall take place between typical working hours of 7:00AM to 5:00PM, Monday through Thursday, excluding recognized holidays, if the work is taking place within the District boundary of operations with the exception of power shutdowns. Reasonable efforts must be taken to minimize disturbance to persons living or working nearby, and to the general public. All local ordinances shall be adhered to regarding noise limits. Deliveries shall take place outside high traffic times and must be coordinated with District's personnel. Preferred hours for deliveries are 7:00AM to 2:00PM, Monday through Thursday within the District boundary of operations. Provider shall manage construction activities around and with consideration to the other projects occurring at the same time where applicable. Provider will be required to provide necessary weekly updates of scheduled activities at each Site to District.

A shutdown plan must be provided to District at least one month in advance to allow for electrical shutdowns to be carefully coordinated with District's personnel. Final dates for shutdowns will be provided a minimum of two (2) weeks in advance. All interruptions in power shall be subject to District approval and must be coordinated to take place during a time period that will minimize disruptions to Site activities. This requirement will typically mean, and District reserves the right to request, that shutdowns shall occur on weekends or after working hours. All efforts must be taken to minimize the amount of time required to complete interconnections, in particular at all sites that involve water treatment or movement. Provider shall take commercially reasonable efforts to ensure that power shutdowns occur during the winter. If required, backup power will be provided by Provider's generators during shutdowns, at Provider's expense. Notice of all pending shutdowns shall be provided thirty (30) days in advance, followed by two (2) weeks in advance, followed by forty-eight (48) hours in advance.

6.5 General Requirements

6.5.1 Conduit and Wiring

- (a) Locations of all junction boxes shall be reviewed with District prior to start of construction.
- (b) No wire splicing shall be allowed.
- (c) All exposed wire shall be secured per code.
- (d) When terminating aluminum conductors, all terminations shall be brushed and coated with an oxide inhibitor.
- (e) Underground cabling shall have electrical warning tape installed approximately twelve (12") inches below finished grade in the backfill.

- (f) Provider shall use GPRS and potholing to survey for underground utilities and use best practices when boring or trenching, including hand digging near buried lines. Trenching or boring in potentially high-risk areas (gas lines) shall be coordinated with District.
- (g) The Provider shall carefully preserve all benchmarks, monuments, survey markers, and stakes and shall be solely responsible for resetting if required.
- (h) Provider shall ensure parasitic loads (lights, security cameras, etc.) are not installed on the same circuit as the Solar Production Meter and/or BESS Meter and are installed so that their load shall be included with the overall Site's Facility Load Meter measurement.
- (i) Provider shall confirm that the System is interconnected to the correct Distribution Utility meter at the Project Site by validating the meter and service account identification numbers (SAID) with the Distribution Utility.
- (j) All exposed wiring shall be properly rated for direct sun exposure.
- (k) Exposed wiring shall be restrained utilizing wire clips per NEC requirements and best practices to eliminate strain on PV module junction box connections, wire pinch points and wire kinks. Strain-relief devices shall be rated and labeled for exposure to UV (direct sunlight).
- (l) Conduit entry locations shall be made in manufacturer provided/specified locations only.
- (m) All ground conductors shall be protected from physical damage as specified in the NEC.
- (n) Grounding wire connections must be made at closest point possible between concrete and steel, sharp edges removed, and painted to match.
- (o) Power and data lines shall be located in separate conduits with appropriate separation to avoid interference.
- (p) All junction boxes, condolets, etc., are to be sealed with a silicone sealing compound and made watertight.
- (q) H-20 rated concrete handholes with cast iron or galvanized steel lids shall be used for all underground junction boxes unless District approves an alternative approach. Lids shall be bolted or welded in place with an appropriate permanent marking such as "ELEC" or "COMM" on the lid depending on the contents of the junction box.
- (r) Aboveground junction boxes must have tamperproof screws and shall not be placed in areas where water ponding is anticipated.

6.5.2 Equipment

- (a) Equipment shall be stored and handled in accordance with manufacturer's requirements.
- (b) Inverters and battery enclosures shall be placed away from all buildings where the operational noise would disturb the occupants.
- (c) Inverters and battery enclosures shall not be placed in locations where fences or other barriers would obstruct replaceable air filters or prevent access for regular service and cleaning.
- (d) All high voltage and high amperage equipment must be installed in secure, tamper-proof, and locked enclosures to prevent unauthorized tampering for safety and theft prevention.
- (e) Locks for all gates and enclosures to be provided by Provider but must be approved by District prior to procurement.
- (f) Safety labels are required for high voltage and high amperage equipment.
- (g) All enclosures shall be detailed as part of the punch list work to ensure that any scratches, etc. are properly covered with paint as appropriate.

- (h) PV modules shall have their serial numbers recorded.
- (i) Should Provider choose to install cameras as part of the overall security plan for any Site, camera selection and location shall be coordinated with District. Integration of any installed safety and security systems with the PMRS system shall be reviewed with District and options provided.

6.5.3 Site Work

- (a) It is the Provider's sole responsibility to ensure that all work on the Project complies with all federal, state, and local code requirements, all applicable industry codes and standards, and all other requirements in the Agreement including the requirements in this Exhibit G.
- (b) Temporary security fencing around construction areas shall be provided throughout construction, to be removed at end of construction.
- (c) Prior to the start of any work on Site, Provider shall take pre-construction videos and photographs of any and all areas that may be impacted as part of the Project construction and shall provide the pre-construction videos and photographs to District for review and reference.
- (d) Following the finish of construction, Provider shall take post-construction videos and photographs of all areas that were impacted as part of the Project construction and shall provide the post-construction videos and photographs to District for review and reference.
- (e) Provider is solely responsible for locating and avoiding all existing underground utilities and shall ensure the existing underground utilities and installations are not impacted by Project construction. In the event Provider damages or makes inoperable any underground or above ground utilities, it will be Provider's full responsibility to notify District immediately and make damaged/inoperable utilities whole and fully operational to District's standards and to District's satisfaction, at Provider's sole cost and expense.
- (f) Provider is responsible for the repair of any damage to the Site that is caused by Provider, reasonable wear and tear excepted, at their sole cost and expense. Provider shall assess the condition of all areas to be used in the construction of the System prior to construction and shall alert District if any such area cannot accommodate wear and tear caused by ordinary construction activities. In such event, Provider shall propose a reasonable remedy or remedies to such conditions for District's consideration. Provider is not responsible for existing conditions and shall repair damage to existing conditions.
- (g) Damage to District's facilities and/or the System shall be reported to District within twenty-four (24) hours with photographs.
- (h) All parking lot wheel stops that are damaged during construction shall be replaced at Provider's sole expense.
- (i) All areas within the limits of construction or otherwise impacted by construction of the Project shall be restored to pre-Project conditions at the Provider's sole cost and expense including but not limited to: fine grading, and rock and concrete spoils removal.
- (j) Provider will coordinate with District when boring or trenching is performed, when laydown areas are determined, when major shipments are planned, or any other activities that might impact District's operations.
- (k) Provider shall correctly torque all such equipment or assemblies requiring torque and mark torqued bolts to designate status of having been torqued. District or District's representative may at any time request a test of marked bolts. Failure of a bolt

- designated as torqued to show that torque may require all assemblies to be re-torqued in the presence of a third-party inspector – such inspector to be paid for by Provider.
- (l) Provider shall maintain a clean and workmanlike construction site. Loose debris and unsafe conditions shall not be tolerated at any time.
 - (m) Provider is responsible to obtain all necessary Site data, perform all required investigations and determine all Site data required for the design and construction of the System at their sole cost.
 - (n) Provider shall be responsible for the removal and disposal of all excess soil and construction related debris generated by Provider or subcontractors in accordance with Applicable Law.
 - (o) Appropriate safety signs are required to caution drivers for speed or path restrictions near equipment pads.
 - (p) Safety bollards or traffic pylons with reflective strips shall be installed where any part of the Project is adjacent to a road.
 - (q) Safety bollards or traffic pylons with reflective strips shall be installed at the corners of ground mounted PV arrays and around all electrical equipment pads.
 - (r) Signs and barricades shall be provided and maintained by Provider and shall be in accordance with jurisdictional regulations for accident prevention and in accordance with the Site Safety and Security Plan.
 - (s) Provider shall ensure to reasonable extent and availability of installation space that solar structures are built away from the line of sight of neighboring properties.
 - (t) Provider shall install a visual barrier between the Solar Facility and the neighboring properties.
 - (u) Provider shall remove trees that would cause shading and reduce production of PV arrays or are in direct path of construction. Provider shall mark each tree and review with District and Arborist prior to removal. Provider shall remove the tree stump, grind to eight inches (8”) below grade and provide a surface flush with surrounding grounds using the same material as the surrounding area.
 - (v) Provider shall remove light posts (including complete concrete bollards and rebar cages above and below grade) and other non-building fixtures that would cause shading and reduce production of PV arrays. Where light post removal is required, Provider shall mark each light post and fixture and review with District prior to removal. After removal of the light post, Provider shall electrically secure the termination point at ground level in an H-20 rated concrete handhole with cast iron or galvanized steel lid. Lids shall be bolted or welded in place with a permanent marking such as “ELEC” or “LIGHTING” on the lid. Provider shall use best efforts to remove the light posts and deliver to District at the Project Site in existing condition so District can re-install in other areas.
 - (w) Provider shall verify all required clearances in the field prior to construction and is solely responsible therefor.
 - (x) Entrances to parking lots must stay open during construction unless the parking lot is completely closed for construction of solar PV arrays. Any parking lot entrance closure shall be coordinated with District. In all instances fire access shall be maintained.
 - (y) Provider is responsible for providing drinking water and sanitation facilities for all workers.
 - (z) Temporary power for construction shall be arranged and paid for by Provider.
 - (aa) Provider must apply for fire hydrant meter permit and cover all expenses for construction water use where applicable.
 - (bb) All cut edges of galvanized strut or other support structure materials shall be cold galvanized.
 - (cc) Saw cut concrete shall be replaced joint to joint and match nearby area.

- (dd) Provider shall backfill all trenches with native material (removing all rocks) or slurry and compact to 90 percent minimum in all locations that are not subject to traffic and 95 percent minimum in locations that are subject to traffic.
- (ee) All asphalt cuts shall be made in square or rectangular cuts to avoid inconsistent repair work. Provider shall cover asphalt trenches with hot mix asphalt, roll for compaction, and cover the width of the trench with a slurry seal after the cure period. All repairs shall be made to match existing. Any repainting of striping required to return the Site to original or better conditions shall be the sole responsibility of the Provider.
- (ff) Provider shall reseed or provide sod for all areas where existing grass was damaged and repair to existing condition.
- (gg) If the District detects noticeable power interruptions or quality issues in District's electrical equipment after the installation of the Project, Provider shall work with District to conduct power quality testing and correct issues with the System as applicable.

7. **FINAL PROJECT CLOSEOUT**

7.1 **Closeout Activities**

Provider will perform the following tasks:

- Complete all unfinished work described on a punch list approved by District in a timely manner.
- Complete final clean-up of the Site. Clean-up shall include a thorough washing of the solar PV modules for the Solar Facility if required to pass performance testing. All PV module washing shall be completed in accordance with the PV module manufacturer's recommendations.
- Confirm minimum 7-day continuous operation for the entire system, all sub-systems, and ancillary equipment without downtime following the final commissioning.
- Assemble and provide District with the Final Binder in digital format containing all documents outlined below and all other required submittals.
- Provide trainings for District personnel on emergency shut-down procedures. Emergency shut-down procedure trainings shall be provided by Provider on an as-needed basis due to changes in District personnel, no more than once annually. Provider and District shall coordinate on agreeable times within ninety (90) days of request from District for additional emergency shut-down procedure trainings.

7.2 **Final Binder**

A complete set of Project documentation shall be provided to District in digital format at the finish of construction for record keeping purposes (the "***Final Binder***"). The Project documentation shall include, at a minimum, the following documents:

- Copy of Executed Agreement(s) and all amendments
- Copy of the Notice to Proceed
- Copies of all reports and studies completed, including but not limited to:
 - Underground Utility Surveys
 - Title Reports / ALTA Surveys
 - Geotechnical Studies
 - Environmental Studies

- Bore Logs including GPS location coordinates and depth dimensions for all Project underground utilities
- Glint and Glare Study
- Arc Flash / Coordination Study
- Final design drawings as approved by any Governmental Authorities having jurisdiction over the Project in PDF and site layout with approximate underground utility locations in AutoCAD
- Copy of all Governmental Approvals required for the Project to be constructed
- Copy of all Governmental Approvals required for the Project to be operational
- Letter to the Distribution Utility requesting final inspection in advance of Permission to Operate
- Completed Commissioning Report
- Permission to Operate Notice from the Distribution Utility
- All incentive related documents
- All final executed Distribution Utility Agreement(s) – Interconnection, special facilities, etc.
- As-built drawings in PDF and AutoCAD
- Equipment data sheets, installation & user manuals, and warranties for all major equipment including but not limited to PV modules, PV module mounting systems, inverters, batteries, transformers, controllers and monitoring systems
- Final System Site Assessment Table in PDF and MS Excel formats (one electronic)
- Final BESS system performance modeling report in 4x8760 output file in MS Excel format
- Final punch list showing proof of completion of all items
- Letter stating Commercial Operation Date achievement and date
- Contact Information for all key Provider personnel including:
 - Provider’s name
 - Provider’s main office mailing address, phone, fax, and email
 - Employer Identification Number (“*EIN*”)
 - Provider’s main contact person’s name, job title, mailing address, phone number, fax number, and email
 - Operations and Maintenance contact person’s name, job title, mailing address, phone number, fax number, and email
- Four (4) sets of keys to all locks, equipment, enclosures, fence gates and boxes
- Operations and Maintenance Manual including:
 - Overall system O&M documentation
 - O&M manual location and contact
 - Inverter startup and shutdown procedure for each type of inverter
- Monitoring System Information including:
 - Monitoring System hardware and internet portal specification sheets
 - Meter calibration records with serial numbers for all meters
 - Website access and operation instructions
 - List of public monitoring websites
 - IP addresses and login information of Acquisuite or equivalent
 - Network configuration documentation
 - Performance Data Provider contracts
- Site photographs of all items listed below (electronic version only):
 - PV Arrays
 - Batteries
 - Inverters
 - Combiner boxes
 - Transformers
 - Disconnects

- Panelboards/Switchgear
- Motorized circuit breakers
- Electrical point of connection to existing distribution equipment
- Distribution Utility Meter
- BESS Meter, Facility Load Meter, Critical Load Meter, Solar Production Meter and any other meters
- BESS controller
- Monitoring equipment including weather sensors if applicable

8. OPERATIONS AND MAINTENANCE

Provider shall be responsible for all operations and maintenance of the System in accordance with the Operations and Maintenance Agreement. The operations and maintenance shall include at a minimum:

- A. All preventative maintenance required to maintain all equipment warranties.
- B. Provider shall provide erosion control and weed abatement on an as-needed basis to minimize the impact of same on Solar Facility production. District may request Provider perform additional weed abatement, provided if weeds do not impact Solar Facility production, the cost of such weed control will be passed through to the District and District will reimburse Provider for same. .
- C. Ground mounted arrays shall include the application at the completion of construction and as required through the Term of this Agreement of a dust control polymer additive coating within the Solar Facility area to limit module soiling.
- D. Provider shall maintain one complete Engineering Design Package throughout the Term of the PPA and update with any changes made from the as-built drawings provided at the completion of construction.
- E. Provider shall take commercially reasonable measures to prevent the accumulation of soil on the PV modules that would otherwise reduce the Output below the guaranteed production levels. In the event that the aggregate metered Output from the Solar Facility is not at least 90% of the Annual Production Estimate in a given Contract Year and it is attributable to soiling, District retains the right to require Provider to conduct one (1) PV module washing after May 15th and prior to August 1st during the next Contract Year.
- F. All pyranometers shall be cleaned at the same time as, and with similar care, as the PV module washing.

9. CONTROLLING TERMS

In the event of any conflict or inconsistency between the terms of this **Exhibit G** and the PPA or Site Easement Agreement, the terms of the PPA or Site Easement Agreement, as applicable, shall govern.

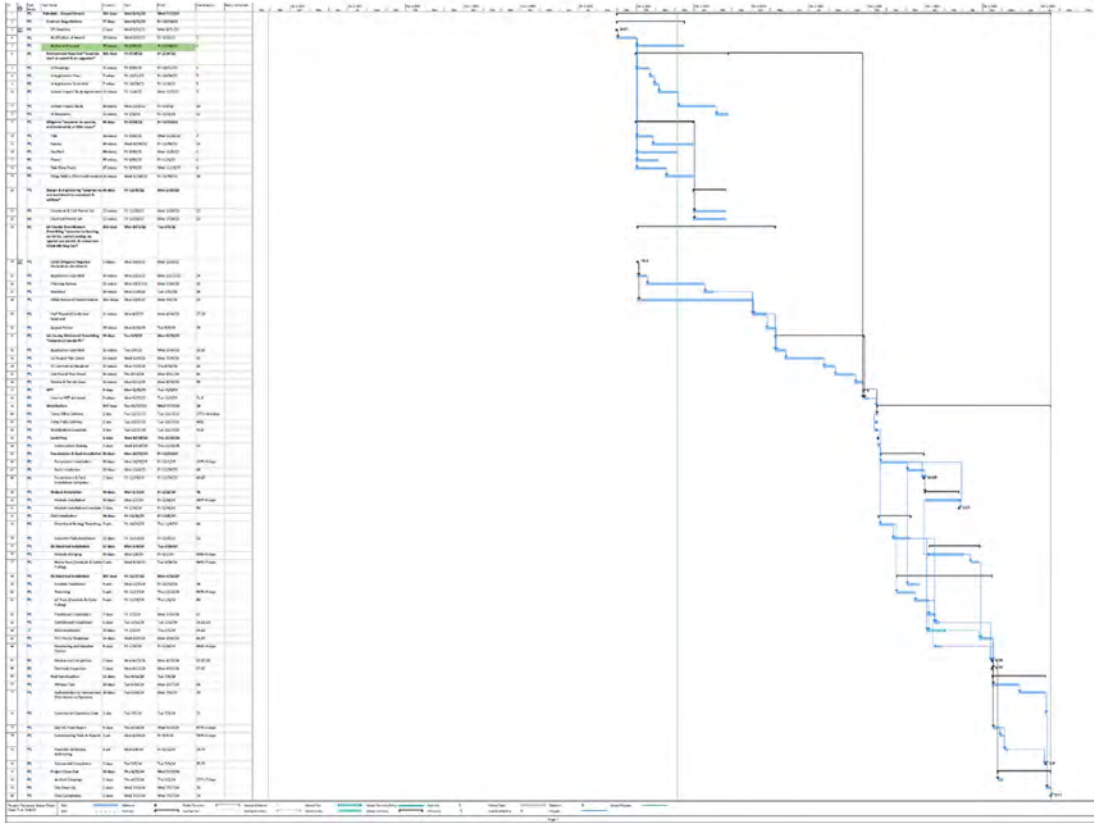
ATTACHMENT B
TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

SYSTEM SITE ASSESSMENT TABLE

ATTACHMENT C

TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

PROJECT SCHEDULE



Provider will develop, with input from District, a Project Schedule using Microsoft® Project or equivalent. Provider and District will establish a weekly construction meeting at which time the work of the previous week will be reviewed, and a three-week look-ahead schedule will be coordinated. The three-week look-ahead schedule shall be created in MS Excel® or like software and present the list of activities occurring at the Site on a daily basis.

The work on the Project shall be completed on or before the Commercial Operation Deadline.

The Project Schedule shall include, at a minimum, the following:

- 50%, 90% and 100% drawings due to District
- District review of 50%, 90%, 100% drawings
- Permit approval
- Procurement
- Site preparation
- Construction start
- Electrical & Mechanical completion

- Interconnection sign off
- Testing & commissioning
- Utility meter and rate switch completion
- Permission to Operate
- Commercial Operation Deadline

The Project Schedule shall not show more than 10% of the total activities as critical, and no activity shall have duration longer than thirty (30) days. The Project Schedule shall indicate the beginning and completion dates of all phases of construction and shall use the “critical path method” (“*CPM*”) for the planning and scheduling of all work required. The schedule will separately identify those milestones or events that must be completed before other portions of the work can be accomplished. The Project Schedule shall incorporate float for inclement weather and resulting muddy site conditions due to rain and shall also include any potential acceleration paths. Scheduled float for non-working rain-related days and resulting muddy site conditions shall be based upon the latest and nearest available data from acceptable data issued from the National Weather Service.

A monthly project schedule update shall be provided to accurately indicate the actual progress of the work against the baseline Project Schedule for the prior month, and the remaining planned completion of the work.

The scheduling is necessary for District’s adequate monitoring of the progress of the work. District may disapprove such a schedule and require modification to it if, in the opinion of District, adherence to the progress schedule will cause the work not to be completed in accordance with the Agreement. Provider shall adhere to any such modifications required by District. Between the monthly schedule updates, it is the obligation of the Provider to monitor the progress of the work against the current construction schedule activities, and to notify District in writing of all changed activity start dates and finish dates.

Provider will exchange scheduling information with Subcontractors and suppliers. Provider will order work, equipment and materials with sufficient lead time to avoid interruption of the work.

The Provider shall also, if requested by District, provide revised schedules within fifteen (15) days if, at any time, District considers the Commercial Operation Date to be in jeopardy. The revised schedule shall be designed to show how the Provider intends to accomplish the work to meet the original Commercial Operation Date. The form and method employed by the Provider shall be the same as for the original progress schedule. The Provider shall modify any portions of the schedule that become infeasible because of “activities behind schedule” or for any other valid reason. Provider will provide documents and justification for any schedule changes. An activity that cannot be completed by its original Commercial Operation Date shall be deemed to be behind schedule.

IF PROVIDER SUBMITS A REVISED SCHEDULE SHOWING AN EARLIER COMMERCIAL OPERATION DATE FOR THE PROJECT, DISTRICT’S ACCEPTANCE OF THIS REVISED SCHEDULE SHALL NOT ENTITLE PROVIDER TO ANY ADDITIONAL COMPENSATION OR CLAIM DUE TO ANY SUCH REVISED SCHEDULE.

ATTACHMENT D
TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

COMMISSIONING SCHEDULE

DSD - PV System Testing

MARCH 25, 2021 - REV 2.2

Revision Control

Rev	Date	Editor	Notes
1.0	08/27/2019	Brian Smith	Initial Release
1.1	06/17/2020	Brian Smith	Alignment to DOR
2.0	9/09/2020	Brian Smith	Consolidation of all testing into one document
2.1	3/8/2021	Brian Smith	Simplify & clarify procedures; Add MLPE info
2.2	3/25/2021	Brian Smith	Added Performance Testing; Other minor edits

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DSD – PV System Testing

Overview

Thorough testing during and at the completion of construction is necessary to ensure the project is constructed to a high standard of quality in materials and workmanship and is ready for safe energization and operation. Testing is an important component of system commissioning.

Testing ensures:

- Equipment is undamaged, configured and installed properly
- The system is ready for energization and will operate safely

Testing documentation becomes part of the project record and may be required by:

- Financiers To show project progress and quality
- Suppliers To show damaged equipment for warranty claims
- AHJ To show code requirements have been met and the system can be safely energized
- Engineering To assist with applying appropriate field modifications during construction
- O&M To help with equipment or performance issues that may arise during the project lifetime

Testing and visual inspections are done as soon as possible in the construction process, so any corrective actions can be quickly applied with minimal impact to project schedule or costs.

Safety Requirements

These safety notations are a generic overview of potential hazards and are provided only as a minimum requirement. There will always be additional factors to consider, specific to the actual conditions and equipment which require additional levels of protection. It is the responsibility of the qualified person performing the procedure to evaluate the actual hazards/conditions and apply appropriate mitigation and protection measures.

All testing technicians must comply with all NFPA 70E PPE requirements and follow all necessary LOTO procedures.

All project specific EHS rules and regulations shall apply to commissioning activities.

Technicians performing electrical and mechanical testing and inspection shall be fully trained and experienced in using the equipment and methods required to complete the testing. These individuals shall have a knowledge of the hazards and risks involved, be able to make good judgments regarding the required tasks and be capable of completing the testing tasks in a safe manner.

All electrical testing must be done on un-energized equipment unless the testing task specifically requires energization, in which case the equipment will be energized only for the minimum amount of time and energized at the lowest voltages and currents needed to properly complete the test.

The nature of energized testing is such that serious injury or death may result if specific safety measures are not taken. When testing any energized circuits, electrical hazards may include shock, arc-flash and arc-blast. It is strongly recommended that two or more technicians work as a team and have clear and consistent communications with each other. It is further recommended that both technicians be properly trained in and use applicable PPE, have training in relevant first-aid practices, including CPR and have prepared a safety response plan in the event of an accident.

Ensure all personnel working onsite have been notified that energized testing will be taking place, and that all non-essential personnel are to remain clear of all related equipment during the testing process. It is the responsibility of the qualified person performing the procedure to always evaluate the actual hazards and conditions and apply appropriate mitigation and protection measures.

Technicians shall use and become familiar with the latest drawings, equipment manuals, specifications and other documentation as needed to understand the equipment being tested and safely perform testing activities on that equipment or system.

Specifically related to Solar Photovoltaic equipment:

- Do not disconnect DC circuits (modules, inverters, combiners, rapid shut-down boxes, etc) while the circuit is under load unless a properly rated switch or other approved disconnecting means is used.
- Use extreme caution and proper PPE when disconnecting DC circuits while PV modules are exposed to sunlight as live voltages will be present.
- Modules and inverters can get hot, use caution when servicing equipment that has been exposed to direct sunlight for extended periods of time.

Follow all safety warnings posted on the equipment.

Use only tools that are properly insulated and approved for working on electrical installations.

Test Equipment

All test equipment shall be in good mechanical and electrical condition and suitable for the tests being performed. Accuracy of metering shall be appropriate for the test being performed.

Test instruments shall have been calibrated within the previous 12 months of the test date and the calibration date needs to be recorded on the test device per ANSI/NETA ATS-2017, Section 5.3.

A certificate of calibration will be attached to the applicable test reports showing the instrument manufacturer, model, serial number and calibration date.

Testing Reports, Forms & Notes

DSD requires proper and complete documentation of all testing activities. Test report forms for various tests are found in the Appendix of this document.

Test reports may be submitted in a different format than the ones provided herein but must contain all requested information. Test reports will not be accepted if information is missing or if they are not signed and dated by the technician doing the work. Each technician signs their name to certify that the data on the form is accurate to the best of their knowledge and that test equipment was operated properly to produce accurate results.

Submitted test forms and related documentation will be reviewed and evaluated by DSD prior to acceptance of the work completed.

Incomplete, unreadable, fraudulent, or out-of-range data will be rejected, pending further investigation and/or re-testing. Reasonable efforts to mediate minor discrepancies will be made. It is in everyone's best interests to

complete the testing process carefully, completely, and accurately. In the event a submitted testing form(s) is found to contain fraudulent data, all related commissioning work will be required to be repeated. Costs for repeated work are the responsibility of the company who submitted the form(s). *Persons responsible for submitting fraudulent forms will be barred from participating in future commissioning and testing activities on DSD projects.*

Testing Activities

A summary of DSD testing activities is shown in the following table. Testing will be allocated to the various responsible parties according to the Testing Division of Responsibilities (DOR).

1. Pre-Energized Testing		
<i>(* tests required for energization, as applicable to the project)</i>		
Test #	Test	Description
1.1	DC Insulation Resistance (Megger) *	Megger test all DC conductors
1.2	AC Insulation Resistance (Megger) *	Megger test all AC conductors
1.3	DC String Voc & Polarity *	Verify string labeling, polarity, fuses and measure Voc
1.4	DC Feeder *	Check and confirm output circuit polarity, fuses and Voc
1.5	IV String	Standard IV String Testing
1.6	Grounding System Inspection *	Inspect integrity of equipment grounding and GEC system
1.7	Ground Fault Primary Current Injection *	Test Main Breaker GFI per NEC 230.95(C)
1.8	Transformer (Liquid Filled & Dry) *	Verify oil content turns ratio, impedance, insulation resistance
1.9	MV Cable Insulation *	VLF Testing
1.10	MV Equipment *	Test all MV Switchgear
1.11	Relay Protection *	Ensure relay set-points accurate and proper relay functionality
1.12	Optical Fiber Cable	Verify integrity of cable, terminations
1.13	Cell Signal Strength	Document cell signal strength for DAS, metering
1.14	Other (1)	Reserved for future use
1.15	Other (2)	Reserved for future use
2. Energized Testing		
2.1	Curtailement / SCADA	Ensures Curtailement / SCADA meets design requirements
2.2	Battery Energy Storage System (BESS)	Per Manufacturer Specifications
2.3	Electrical IR Thermographic Survey	Find poor electrical connections or failing equipment
2.4	Drone Survey (IR, Other)	Find damaged modules
2.5	Other (1)	As needed
2.6	Other (2)	As needed
3. Performance Testing		
3.1	Performance Testing Procedures	To be expanded in more detail in the future
3.2	Other (1)	Reserved for future use

1 Pre-Energized Testing – Procedures and Descriptions

1.1 DC Insulation Resistance (Megger) Testing

Description:

Insulation resistance testing (IRT) of all DC conductors is conducted to verify insulation integrity.

Precautions:

Ensure all safety requirements specified in this document are met.
Do not test through any facility owned equipment.
Do not Megger test through the modules, optimizers or other module level power electronics (MLPE) devices.
Do not test when Surge Protective Devices (SPDs) are in the circuit.
Do not Megger test through any facility owned equipment.
Always consider equipment ratings when testing.

Test Timing:

After conductors are pulled and are in place prior to termination and energization.

Equipment:

Industry standard Megger test equipment.
Timer

Method:

Test all field installed DC conductors between the modules and inverter DC input terminals.
If applicable, test all field installed DC conductors for Energy Storage System equipment (ESS).
Conductors to be tested must be isolated from ground and disconnected from all power sources (de energized).

Perform insulation resistance test on each conductor with respect to ground and adjacent conductors as follows:
Pos to Neg, Pos to Gnd and Neg to Gnd.

Applied test voltages shall be per NETA ATS-2017 Table 100.1.

Minimum applied test voltage of 1000V for equipment rated from 480V to 2500V.

Test time: Stable reading for 60 seconds.

Pass/Fail Criteria:

Minimum test result will be 400 M-ohms.

Additionally, minimum acceptable reading is only considered with respect to all other conductors in the same raceway and of the same physical description-size/type/length. Any passing test deviating from those of similar circuits by more than 50% of the lowest value is to be retested and, if similar results are achieved, replaced with new conductors and retested.

Corrective actions will need to be taken for all failed conductors and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the megger test device.
2. Completely fill out and sign the following form:

1.1 DC IRT / Megger Test Form

Reference:

- IEC 62446-1: 6.7.3.2
- NETA ATS-2017 Table 100.1 & Table 100.14

1.2 AC Insulation Resistance (Megger) Testing

Description:

Insulation resistance testing (IRT) of all AC conductors between inverters and the point where the PV circuits connect to the 'grid' (POCC) is conducted to verify insulation integrity.

Precautions:

Ensure all safety requirements specified in this document are met.
Do not test through any facility owned equipment.
Always consider equipment ratings when testing.

Test Timing:

After conductors are pulled and are in place prior to termination.

Equipment:

Industry standard Megger test equipment.
Timer

Method:

Conductors to be tested must be isolated from ground and disconnected from all power sources (de energized).

Perform insulation resistance test on conductors as follows: A-B, B-C, A-C, A-N, B-N, C-N

Applied test voltages shall be per NETA ATS-2017 Table 100.1.

Minimum applied test voltage of 1000V for equipment rated from 480V to 2500V.

Test time: Stable reading for 60 seconds.

Pass/Fail Criteria:

Minimum test result will be 400 M-ohms.

Additionally, minimum acceptable reading is only considered with respect to all other conductors in the same raceway and of the same physical description-size/type/length. Any passing test deviating from those of similar circuits by more than 50% of the lowest value is to be retested and, if similar results are achieved, replaced with new conductors and retested.

Corrective actions will need to be taken for all failed conductors and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the megger test device.
2. Completely fill out and sign the following form:

1.2 AC IRT / Megger Test Form

Reference:

- NETA ATS-2017 7.3.2, Table 100.1 & Table 100.14

1.3 DC String Voc & Polarity Testing

Description:

String Commissioning is performed during construction and at other times during the PV system lifetime as needed to verify:

- The correct number of modules are wired in series.
- The correct string polarity and identification
- That all the modules in the string are functional and undamaged
- That the modules perform at the manufacturer's stated values, within measurement tolerance.

String testing on a newly installed system sets a baseline for the lifetime of the project.

Note: String I-V Curve Tracing will be covered in a separate test procedure.

Precautions:

Ensure all safety requirements specified in this document are met.

Ensure all DC fuses are removed or are in the open position and LOTO procedures are implemented as appropriate.

Test Timing:

After all DC string conductors are installed and have had DC IRT testing successfully performed.

After all DC string conductors are terminated at each end and accurately labeled.

Before any DC string fuses are closed.

1.3.1 For Strings WITHOUT Module Level Power Electronic Devices (MPLEs)

Equipment:

Use any of the following:

- Digital DC Voltmeter, Rated for circuit max voltage (1000 Vdc or 1500 Vdc as applicable), Minimum CAT III
- Seaward PV 210 Installation Test Kit w/ Solar Survey 200R



Method:

Ensure ALL the following are true prior to proceeding with this test:

- Have ≥ 400 W/m² POA stable irradiance; zero shading, minimal or no soiling on the array
- DC circuit grounding jumper is open (where applicable)
- Combiner disconnect is locked in the open position and tagged to prevent closing
- Combiner fuses are removed or open

1. Test the polarity of all DC conductors using suitable test equipment. Confirm that conductor identification and labeling matches tested polarity and that conductors are landed at the proper terminals in the equipment.
2. Measure and record Open Circuit voltage (Voc) using suitable test equipment. This should be done before closing any switches or fuses. Verify the proper number of strings are landed on each inverter MPPT. Compare the measured Voc value with the expected Voc value. The expected Voc value is calculated by taking the module Voc and multiplying by the number of modules in the string.

Record measured Voc values and polarity for each string
 Record conductor size, type and fuse rating for each string
 Record inverter information and configuration

Pass/Fail Criteria:

All string Voc values are within 5% of the expected temperature corrected string Voc value.
 All strings have proper polarity and insulation coloring (red=positive, black=negative)
 All strings are properly labeled.
 All strings are properly fused with the proper fuse rating.

Corrective actions will need to be taken for all failed string Voc values and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the test device.
2. Completely fill out and sign the following form:

1.3 DC String & Inverter Commissioning Form

1.3.2 For Strings WITH Module Level Power Electronic Devices (MPLEs)

Equipment:

Use a digital DC Voltmeter, rated for circuit max voltage (600 Vdc), Minimum CAT III

Method:

Ensure ALL the following are true prior to proceeding with this test:

- Have ≥ 400 W/m² POA stable irradiance; zero shading, minimal or no soiling on the array
- DC circuit grounding jumper is open (where applicable)
- Combiner disconnect is locked in the open position and tagged to prevent it from closing.
- Combiner fuses are removed or open.

- 1) Test the polarity of all DC conductors using suitable test equipment. Confirm that conductor identification and labeling matches tested polarity and that conductors are landed at the proper terminals in the equipment.
 - a. (Reference: IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.2)
- 2) Measure and record Open Circuit voltage (Voc) using suitable test equipment. This should be done before closing any switches or fuses. Verify the proper number of strings are landed on each inverter MPPT.
 - a. Compare the measured Voc value with the expected Voc value. The expected Voc value is calculated by taking the unenergized MLPE Voc and multiplying by the number of modules in the string.
 - b. (Reference: IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.4)
 - Tigo TS4-R-Fs should measure 0.6V at the output of each unit.
 - SMA TS4-R-Fs should measure 0.6V at the output of each unit (after it is attached to the solar module) when the inverter's SunSpec keep-alive signal is not present (before commissioning and activating SunSpec transmitter).
 - SolarEdge optimizers should measure 1.0V at the output of each optimizer.
 - Other devices TBD or per manufacturers documentation.

- 3) Once the system is energized and properly working, and if possible, string Vmp measurements can be reviewed through the inverter data available directly from the inverter or through the monitoring platform to verify expected string performance.

Record measured Voc values and polarity for each string
Record conductor size, type and fuse rating for each string
Record inverter information and configuration

Pass/Fail Criteria:

All string Voc values are equal to the output voltage of the MLPE multiplied by the number of MLPEs in the string. A small tolerance for voltage-drop on longer runs may be accepted.

All strings have proper polarity and insulation coloring (red=positive, black=negative)

All strings are properly labeled.

All strings are properly fused.

Corrective actions will need to be taken for all failed string Voc values and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the test device.
2. Completely fill out and sign the following form:

1.3 DC String & Inverter Commissioning Form

Reference:

IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.2 & Sec. 6.4

1.4 DC Feeder Testing

Description:

DC Feeder Testing refers to testing all DC conductors between the string termination point and the inverter DC input. Feeders can be arranged in various topologies and may pass through a DC recombiner. One or more DC Feeders may terminate in an inverter. DC Feeder commissioning is performed to provide:

- Confirmation of proper circuit voltages at each point between the string termination and the inverter.
- Confirmation of proper circuit polarity at each point between the string termination and the inverter.
- Confirmation of the integrity of the installed DC system components (equipment/cabling).
- Mapping/Recording of the DC circuit configuration for monitoring purposes.

Precautions:

Ensure all safety requirements specified in this document are met.

Ensure all DC fuses are removed or are in the open position and LOTO procedures are implemented as appropriate.

Test Timing:

After all DC conductors are installed and have had DC IRT testing successfully performed.

After all DC string conductors are terminated and are accurately labeled at each end.

After DC String Testing is completed, approved, and accepted.

After all DC Combiners are installed, terminated, and labeled.

Equipment:

Use a digital DC Voltmeter, rated for the maximum circuit voltage (up to 1500 Vdc), Minimum CAT III

Method:

Ensure ALL the following are true prior to proceeding with this test:

- Insulation resistance testing (IRT) of all DC conductors is completed, approved, and accepted.
- Have ≥ 400 W/m² POA stable irradiance; zero shading, minimal or no soiling on the array
- All combiner output switches/breakers are open and secured with a LOTO system.
- All DC string conductors to combiners are connected and are energized with fuses in place.
- All DC conductors from inverters or combiners to recombiners are in place and able to be energized from the combiner output switch.
- All recombiner input fuses are removed or input breakers are open.
- The recombiner output OCPD or switch is open and secured with a LOTO system.
- The DC circuit grounding jumper is open (where applicable)

The following testing must be performed in a controlled, systematic order. To avoid any potential reverse polarity or wiring issues that could lead to equipment damage or personal injury, each individual recombiner input circuit is to be energized separately, test results recorded, and then de-energized prior to moving to the next input circuit.

Using two technicians, with open, clear and consistent communication between them, Technician 1 will energize the first input circuit via the string combiner disconnect switch. Technician 2 will take the required polarity and Voc readings at the recombiner output and record the results.

Once measurements are recorded, Technician 1 will then de-energize the input circuit, re-apply the LOTO device, and move onto the next combiner. Repeat the above until all input circuits have been tested and verified individually.

Test each input fuse for continuity if the recombiner input circuits are protected with fuses.
Leave all DC circuit switches in the open or de-energized position with LOTO system devices installed.

Pass/Fail Criteria:

The measured circuit Voc values accurately reflect the DC circuit design voltage (Voc), and are within 5% of the expected temperature corrected Voc value.

All input circuits have the proper polarity and insulation coloring (red=positive, black=negative)

All input circuits are properly labeled.

All fuses (if any) are tested for continuity and have the proper rating.

Corrective actions will need to be taken for all failed circuit values and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the test device.
2. Completely fill out and sign the following form:

1.4 DC Feeder Testing Form

Reference:

IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.2 & 6.4

1.5 String IV Testing

Description:

I-V String Trace testing is an electrical test for verifying modules are wired correctly and performing properly. The I-V Tracer measures current and power as a function of voltage. Measured results are compared to the expected results and abnormal findings can help with troubleshooting efforts. Data collected is used as a baseline for future array testing efforts.

Precautions:

Ensure all safety requirements specified in this document are met.
Ensure all DC fuses are removed or are in the open position and LOTO procedures are implemented as appropriate.

Test Timing:

After all DC string conductors are installed, terminated, and accurately labeled.
May be done immediately after successfully completing the DC String Voc & Polarity Testing.
May be deferred to a different time when environmental or seasonal conditions are more favorable in meeting testing requirements.

Equipment:

Use the Solmetric PV1000 or Solmetric PV1500 I-V Curve tracer devices with the Solmetric SolSensor.
Laptop with the latest version of the Solmetric PV Analyzer software already installed.
The Seaward PV210 testing unit may be used with permission from DSD.



Method:

Perform I-V String Trace testing on every string in the array (except those connected to MLPE devices such as SolarEdge Optimizers, AMPT optimizers, Rapid Shutdown Devices, etc.)

Along with the manufacturer instructions for using the Solmetric I-V Tracer, ensure the following points are also followed:

- Create the Solmetric (*.PVAPX) configuration file before testing to match the module type and wiring configuration of the array. There needs to be a unique PVAPX file for array containing strings with a unique tilt & azimuth.
- The PV String circuits shall be tested with the inverter(s) disconnected, shut down and locked out according to the LOTO procedure for the site.
- No PV string circuits shall be opened under load.
- Modules should be clean and shade free during the testing.
- Conduct the test under full sun with an irradiance of **at least 500 W/m²** and stable sky conditions (no cirrus clouds or fast-moving clouds near sun) within the time period of six (6) hours centered about solar noon.
- The SolSensor shall be mounted with the same field of view, at the same elevation as the modules and shall not be shaded. If the PV modules are mounted on trackers, the Sol-Sensor shall be mounted such that it tracks with the PV modules.
- The temperature sensor location shall be on a cell approximately equidistant from the center of the module and the edge of the module.
- For each string perform the curve trace following the manufacturer's instructions for a curve of at least ten (10) current-voltage data points (one hundred (100) data points is preferred).

During testing, pay particular attention to the shape of each curve being displayed. It should have the following general characteristics:

- A 'horizontal leg' with slight downward slope
- A 'downward leg' approaching vertical
- A smooth bend or 'knee' between the horizontal and vertical portions

Variations in the curve shape indicate the need for further investigation and are to be documented. Variations include:

- Steps or notches in the curve
- Low current
- Low voltage
- Rounder knee

The contractor can perform any corrective action needed for the string, so the curve trace is well shaped with appropriate values, then retest the string prior to finalizing the testing effort and report.

Any discrepancies or failures shall be noted in the Commissioning Test Report, rectified and re-tested.

Pass/Fail Criteria:

DSD Commissioning will analyze the PVAPX file and provide feedback for any corrective actions or retesting efforts.

The following objectives are to be met:

- IV curves of all strings should be well-formed indicating no string issues or shading.
- String Voc is within 5% of expected values as determined from the PV module manufacturer's data sheet, as adjusted to STC conditions using the temperature coefficient for open-circuit voltage.
- The string open-circuit voltage is within 5% of the average open-circuit voltage from each String in the same combiner box.

Deliverables:

Provide all Raw *.PVAPX data files, properly labeled. (If the Seaward PV 210 is authorized, provide the raw *.SOLCRV file(s) and the *.CSV output file.)

Provide Solmetric Excel file and report.

Provide a report describing in detail any discrepancies or unusual findings.

- There is no testing 'report' in the Appendix to complete for this testing effort.

Reference:

IEC 62446-1, Edition 1.1, 2018-08, Sec. 7.2

1.6 Grounding System Inspection

Description:

The equipment grounding conductor (EGC) provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. (NEC 2017 100) The integrity of the ground-fault current path conducts fault current back to the energy source and is essential for the operation of OCPDs in the circuit which protect life and property.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

After all phase, neutral and equipment grounding conductors are installed and properly torqued.

If applicable to the PV project, after grounding electrodes and grounding electrode conductors are properly installed.

Equipment:

None

Method:

1. Inspect all Equipment Grounding Conductors (EGC) between the point of grid interconnection (POI) and all electrical components of the PV system to ensure that:
 - Every bolted connection is properly torqued to manufacturer specs with torque marks applied.
 - Compression lugs are properly installed on conductors.
 - All metallic raceways, cable trays, metal enclosures, and equipment (inverters, transformers, racking, etc) are bonded with a continuous path to the Grounding Electrode Conductor (GEC)
 - All grounding components, connectors, fittings, clamps, etc are listed and suitable for the environment.
2. For Medium Voltage (MV) equipment, ensure and certify that:
 - Surge arrestors and MV equipment are grounded.
 - MV Cable shielding is grounded.
 - The ground ring and grounding electrodes are properly installed.
 - All grounding components, connectors, fittings, clamps, etc are listed and suitable for the environment.
3. All grounding systems, connections and equipment match the project drawings and meet NEC requirements.

Pass/Fail Criteria:

1. The contractor will certify in writing that the entire grounding and bonding system for the project:
 - Has been inspected,
 - Is installed per the project drawings, and
 - Meets the requirements of the applicable version of the NEC.

Deliverables:

1. Completely fill out and sign the following form:
1.6 Grounding System Inspection Certification Form

Reference:

NETA ATS-2017 7.13

IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.1

1.7 Ground Fault Primary Current Injection Testing

Description:

Primary current injection testing is suitable for testing main PV system service equipment breakers 1000A or greater with GFI functionality. A current is injected directly on the primary side of the breaker to measure if it will trip or fail, and how long the current is live before the circuit is broken.

Protective settings will be provided from arc fault and coordination studies done by others.

Testing is to be done in accordance with the intent of ANSI/NETA-ATS Section 7.6.1.1, and as required by 2017 NEC 230.95(C).

Neutral-Ground Resistance is measured to ensure the Ground Fault mechanism will operate as expected.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Test after switchgear is set in place, but before conductors are landed on main breaker lugs.

Equipment:

Use a high-quality calibrated Primary Injection Test Set.

Method:

Follow test set and NETA recommended procedures for Primary Injection testing.

Test the resistance between the neutral and ground bus bars in the switchgear per 2017 NEC 230.95(C).

Remove the Neutral-Ground bonding jumper and apply a voltage. Measure resistance from Neutral to Ground.

Pass/Fail Criteria:

Breaker should trip according to programmed trip settings. Ground fault pickup values shall be as specified, and trip characteristics shall not exceed manufacturer's published time-current tolerance band.

Neutral-Ground Resistance $\geq 1 \text{ M}\Omega$

Deliverables:

For each breaker tested, completely fill out and submit a test report including project name, address, testing company, technician and all relevant details pertaining to the test method and results.

Reference:

2017 NEC 230.95(C).

ANSI/NETA-ATS Section 7.6.1.1)

1.8 Transformer Testing

1.8.1 Liquid-Filled Transformers

Description:

This testing section applies to all liquid filled transformers.

Transformer testing ensures the electrical characteristics are well understood, the transformer is ready for energizing, and creates a baseline set of data.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Test after transformer is set in place, but before conductors are landed on bushings.

Equipment:

Use high-quality calibrated equipment required for and consistent with the testing being done.

Method:

Perform the following testing according to NETA ATS-2017 7.2.2 (B):

- 1) Compare equipment nameplate data with the drawings and specifications.
- 2) Inspect for physical damage, proper installation, anchorage, and grounding.
- 3) Clean all bushing and insulator surfaces.
- 4) Check the dielectric liquid in tank and bushings for proper level and for leaks.
- 5) Verify that the final tap setting is as specified.
- 6) Insulation resistance tests, winding to winding and winding to ground. Applied voltages shall be per Table 100.5 (below).
- 7) Turns-ratio tests at specified tap positions. Verification that winding polarities are in accordance with nameplate.
- 8) Remove a sample of insulating liquid per ASTM D 923 and test for:
 - a. Dielectric breakdown voltage: ASTM D 877 and/or ASTM D 1816
 - b. Color: ANSI/ASTM D 1500
 - c. Visual Condition: ASTM D 1524
 - d. Water in liquid: ASTM D 1533
 - e. Dissolved-gas analysis (DGA): ANSI/IEEE C57.104 or ASTM D 3612

Pass/Fail Criteria:

As outlined in NETA ATS-2017 7.2.2

Deliverables:

For each transformer tested, completely fill out and submit a testing report showing transformer information, items tested, results, and certify readiness for energization.

Reference:

ANSI/NETA-ATS Section 7.2.2

NETA ATS-2017

TABLE 100.5
Transformer Insulation Resistance
Acceptance Testing

Transformer Coil Rating Type in Volts	Minimum DC Test Voltage	Recommended Minimum Insulation Resistance in Megohms	
		Liquid Filled	Dry
0 - 600	1000	100	500
601 - 5000	2500	1000	5000
Greater than 5000	5000	5000	25000

In the absence of consensus standards, the NETA Standards Review Council suggests the above representative values.

See Table 100.14 for temperature correction factors.

NOTE: Since insulation resistance depends on insulation rating (kV) and winding capacity (kVA), values obtained should be compared to manufacturer's published data.

1.8.2 Dry-Type Air-Cooled Transformers

Description:

This section applies to all dry-type air-cooled transformers.

Transformer testing ensures the electrical characteristics are well understood, the transformer is ready for energizing, and creates a baseline set of data.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Test after transformer is set in place, but before conductors are landed on bushings.

Equipment:

Use high-quality calibrated equipment required for and consistent with the testing being done.

Method:

Perform the following testing according to NETA ATS-2017 7.2.1.2 (B):

- 1) Insulation resistance tests, winding to winding and winding to ground. Applied voltages shall be per Table 100.5 (below).

Pass/Fail Criteria:

As outlined in NETA ATS-2017 7.2.1.2

Deliverables:

For each transformer tested, completely fill out and submit a testing report showing transformer information, items tested, results, and certifying readiness for energization.

Reference:

ANSI/NETA-ATS Section 7.2.1

NETA ATS-2017

TABLE 100.5
Transformer Insulation Resistance
Acceptance Testing

Transformer Coil Rating Type in Volts	Minimum DC Test Voltage	Recommended Minimum Insulation Resistance in Megohms	
		Liquid Filled	Dry
0 - 600	1000	100	500
601 - 5000	2500	1000	5000
Greater than 5000	5000	5000	25000

In the absence of consensus standards, the NETA Standards Review Council suggests the above representative values.

See Table 100.14 for temperature correction factors.

NOTE: Since insulation resistance depends on insulation rating (kV) and winding capacity (kVA), values obtained should be compared to manufacturer's published data.

1.9 MV Cable Insulation Testing

Description:

VLF Dielectric Withstand testing is performed on MV cables to determine the effectiveness of the insulation and the ability to perform safely under expected operating conditions. The insulation under test must withstand a specified applied voltage that is higher than the service voltage across the insulation for a specified period without breakdown of the insulation. VLF (Very Low Frequency) testing applies sinusoidal wave shapes at frequency ranges of 0.01 Hz to 0.1 Hz and is non-destructive to good insulation.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Testing is done after conductors are installed and terminated, but before terminations are connected to equipment.

Equipment:

Good quality calibrated VLF test equipment typical for the testing activities.

Method:

VLF Testing shall be performed on ALL Medium Voltage Cables as outlined in NETA ATS-2017 7.3.3.B

- 1) Perform an insulation-resistance test utilizing a megohmmeter with a voltage of at least 2500 volts or manufacturer's recommended parameters. Individually test each conductor with all other conductors and shields grounded. Test duration shall be one minute.
- 2) Perform a shield-continuity test on each power cable by ohmmeter method.
- 3) Perform an acceptance test on cables, including terminations before the cable system is placed into service. In accordance with IEEE Std. 400.2-2013, testing will be performed by means of Very low frequency (VLF) test set.
- 4) Test voltages shall not exceed 80 percent of cable manufacturer's factory test value, or the maximum test voltages as listed in either IEEE Standard 400.2 Appendix 5 or NETA ATS Table 100.6.4.
- 5) Insure that the input voltage to the test set is regulated.
- 6) Record wet and dry bulb temperatures or relative humidity and temperatures.
- 7) Test each conductor individually with all other conductors grounded. Ground all shields.
- 8) Ensure that the maximum test voltage does not exceed the limits for terminators specified in ANSI/IEEE 48, IEEE 386, or manufacturer's specifications.
- 9) Raise the conductor to the specified maximum test voltage and hold for 15 minutes.
- 10) Apply grounds for a time period adequate to drain all insulation stored charge.

Pass/Fail Criteria:

Pass/fail is per the applicable IEEE standards or NETA procedures.

Deliverables:

Testing entity can provide their own report showing project name, technician name, test voltage, circuits tested, results, and pass/fail status.

Reference:

NETA ATS-2017 7.3.3.B

1.10 MV Equipment Testing

Description:

Depending on the project, various types of MV equipment may be included for testing. Which specific items and the extent of testing on each piece of equipment will be up to the discretion of the PM and engineering groups.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Testing is done after MV equipment is installed and terminated, but before terminations are connected to equipment.

Equipment:

Good quality calibrated test equipment typical for the testing activities.

Method:

The applicable NETA testing procedures for the particular piece of equipment under test will be used unless otherwise indicated.

Pass/Fail Criteria:

Pass/fail is per the applicable NETA procedures.

Deliverables:

Testing entity can provide their own report showing project name, technician name, test voltage, equipment tested, results, and pass/fail status.

Reference:

NETA ATS-2017 7.5.1

1.11 Relay Protection Testing

Description:

Relay testing ensures the relay is properly programmed to meet safety and circuit protection parameters specified by a utility or project engineer.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Testing is done after the relay, CT's, PT's and controlled devices (OCPD) are installed and can be made functional. This testing may be done as part of a Utility Witness test.

Equipment:

Good quality calibrated test equipment typical for relay testing activities.

Method:

Check the functional operation of each protection element specified in the protection scheme. Verify the logic programmed into the relay. Ensure the clock is set on the relay to local standard time.

Pass/Fail Criteria:

Protection element settings and functionality must agree with the provided engineering and/or utility specifications.

Deliverables:

Provide a PDF report showing project name, technician name, equipment tested, serial number, element test results, and pass/fail status for each tested element.

Provide the 'as-left' relay (*.rdb – SEL or equivalent) file with the report.

Reference:

- NETA ATS-2017 7.9.2

1.12 Optical Fiber Cable Testing

Description:

When installed, optical fiber cable needs to be tested to ensure satisfactory installation and data transmission without undue signal degradation. Testing to “IEC 61280-4-1 Fibre-optic communication subsystem test procedures” is preferred.

Precautions:

Ensure all safety requirements specified in this document are met.
Ensure all industry standard safety precautions applicable to working with fiber optic cables are followed.

Test Timing:

Testing is done after optical fiber cable is installed and terminated.

Equipment:

Good quality calibrated industry standard test equipment typical for the testing activities.

Method:

The applicable industry standard testing procedures for the optical fiber cable under test will be used including:

1. Continuity Testing – Determine that the fiber routing and/or polarization is correct and matches documentation.
2. End-to-End Insertion Loss - Use an OLTS power meter and source. Test singlemode cables using TIA-526-7, and multimode cables by using TIA-526-14. Total loss shall be less than the calculated maximum loss for the cable based on appropriate standards.
3. OTDR testing – May be needed to verify cable installation, splice performance and troubleshoot any problems.

Pass/Fail Criteria:

Pass/fail is per the applicable NETA procedures.

Deliverables:

The testing entity provides their own report showing project name, technician name, test method, equipment tested, results, and pass/fail status.

Reference:

TIA-526-14 – Multimode fiber testing
TIA-526-7 – Singlemode fiber testing
NECA/FOA 301-2016, Section 7

1.13 Cell Signal Strength Testing

Description:

Some utility meters can communicate data through a cellular data signal. The DAS system will also need a cellular data signal for data communications. This test is conducted well in advance of construction and helps determine the cellular signal strength at the location where the meter or DAS equipment will eventually be located.

Precautions:

Ensure all safety requirements specified in this document are met.

Scope:

A cell phone will be used to conduct this test.

The test needs to be completed at each location on the site where a cellular data modem will be located (either for metering or DAS equipment).

Test Timing:

During an initial site visit well in advance of ordering DAS and other metering equipment requiring communications.

Equipment:

Cell phones from different carriers (Verizon & AT&T) having 4G LTE capabilities, GPS, and a mapping app showing current location against satellite mapping imagery background. An app or handheld GPS unit showing location (lat/lon) is also required.

Method:

At the desired meter or DAS location, and using a cell phone mapping app, turn location services (GPS) on and switch to satellite imagery mode. Type in the project address so a pin for the address is displayed as well as the current location. Capture a screenshot by pressing the home and power buttons at the same time (or according to the phone's instructions). Save the captured screenshot image and submit.

Repeat with a cell phone from the other carrier capturing images from both Verizon & AT&T phones at each proposed DAS location.

Pass/Fail Criteria:

The cell signal strength for the particular cellular carrier should display 3 or more bars to pass.

Deliverables:

1. Completely fill out and sign the following form:
1.13 Cell Signal Strength Test Report

1.14 Other Testing (1)

Reserved for future revisions.

1.15 Other Testing (2)

Reserved for future revisions.

2 Energized Testing – Procedures and Descriptions

2.1 Curtailment / SCADA

Description:

When a project has a Curtailment system or other SCADA controls in place to meet certain operational or safety criteria, testing will be coordinated between the equipment provider and project engineers to ensure objectives are met.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

After the system is connected to the grid and can be energized.

Equipment:

As determined by the party contractor implementing the Curtailment System.

Method:

Under the direction of the project engineer and the contractor implementing the Curtailment System.

Pass/Fail Criteria:

As determined project engineer and the contractor implementing the Curtailment System.

Deliverables:

2.2 BESS (Battery Energy Storage System)

Description:

When a project has a BESS installed to meet certain operational, energy or cost saving goals, testing will be coordinated between the equipment provider and project engineers to ensure objectives are met.

2.3 Electrical IR Thermographic Survey

Description:

Thermographic testing of electrical equipment is used to detect poor conductor terminations, inadequate insulation or other problems in energized electrical equipment. An IR survey provided a baseline for future inspections. Thermographic testing to 'ASTM E 1934-99a Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography' is preferred.

Safety:

Observe all safety precautions listed in the General Testing and Commissioning Instructions section of this document.

Follow NFPA 70E requirements for PPE when working near energized equipment

Always consider equipment ratings when testing.

Scope:

Test all energized electrical equipment components and conductor terminations to establish proper installation and operation.

Test Timing:

Testing is done after equipment is energized and operating at a thermal steady state. A trained technician will determine acceptable testing conditions for optimal results.

Equipment:

A camera should be selected that has high resolution and good thermal sensitivity and accuracy. The operator should be trained in selecting the proper equipment and taking images in the proper conditions.

Method:

A trained technician will take an IR photo survey of electrical equipment in the project. Areas of focus will be conductor terminations, OCPD devices, and other areas where a failure would lead to serious damage of life or property.

Pass/Fail Criteria:

The experience of the technician in taking, processing and interpreting IR images is relied upon to identify items of concern.

Results Form:

The testing entity can provide their own report showing project name, technician name, equipment used, visible and IR images of the items being examined, and commentary on findings.

2.4 Drone Survey

Description:

When there is a concern with project performance, a drone survey to identify module, or string issues will be coordinated between the survey provider and project team.

2.5 Other Testing (1)

Reserved for future revisions.

2.6 Other Testing (2)

Reserved for future revisions.

3. Performance Testing

3.1 Performance Testing Procedures

Description:

Performance Testing assesses whether the total output of the completed PV system is consistent with equipment specifications and system design.

Scope:

Performance Test analysis shall include (1) measuring the total AC output of the PV system, and (2) determining the expected result of such measurement based on the as-built performance model for the system.

Unless circumstances make it impossible to do so, the Performance Test should specifically measure real power output of the system under typical unconstrained operating conditions (called the Reporting Conditions) in accordance with ASTM E2848-13. In this case, the Performance Test may also be referred to as a Capacity Test. Unconstrained operating conditions means system output is not limited by inverter clipping, curtailment signals, shading of panels other than row-to-row shading, snow cover, or excessive soiling.

If weather, shading, system design, or a combination of these factors make completing a Capacity Test following the methodology described below within one month of the System becoming fully operational impossible, an alternate test procedure may be used to satisfy the Performance Testing requirement. In such a case, the alternate test procedure must still compare measured total AC output to expectations based on the as-built performance model for the system, but total AC output may be characterized in terms of real power output during unconstrained operation under specific reporting conditions, in terms of Performance Ratio, or in terms of energy yield over a period of time.

Timing:

The Test Period for the Performance Test shall begin once the following preconditions have been met:

- the PV system is fully energized.
- the data acquisition system is accurately collecting all data points required for analysis (system power, plane-of-array irradiance, ambient temperature, wind speed, and the output of each inverter)
- there are periods of the day for which the system is producing power under unconstrained conditions.
- irradiance sensors must be clean or no more soiled than the solar panels.

The test period shall last a minimum of 3 days and no more than 4 weeks.

Equipment:

All data required for the Performance Test should be accessible from the DAS equipment and associated meters and sensors provided with the PV system.

Plane-of-array irradiance shall be measured with temperature-compensated photovoltaic reference cells with rated accuracy of $\pm 2.5\%$ or better and spectral and incident angle response characteristics that are approximately matched to those of the Plant's PV modules, or with Class A pyranometers per ISO 9060:2018 ("Secondary Standard" under ISO 9060:1990).

3.1.1 Capacity Test Method

The Capacity Test shall be performed in accordance with ASTM E2848-13 and ASTM E2939-13 with the following clarifications:

- In what follows, the terms “photovoltaic system power, P ”, “plane-of-array irradiance, E ”, and “reporting conditions” have the meanings as defined in ASTM E2848-13
- The photovoltaic system power, P , shall be taken to be the AC power at the revenue meter.
- **Multiple POIs:** If the PV system supplies multiple points of interconnect, each with a dedicated revenue meter, either a single capacity test may be performed for the whole system, in which case the photovoltaic system power, P , shall be the sum of AC power across all revenue meters, or multiple capacity tests may be performed – one for each revenue meter.
- **Soiling:** The level of soiling on modules during capacity measurement may not exceed that which would reduce system output by more than 5%. Furthermore, irradiance sensors used for Capacity Test analysis must be at least as clean as the solar modules. The Expected Capacity at Reporting Conditions is to be calculated on the presumption that either both irradiance sensors and modules are clean or that irradiance sensor readings are fractionally impacted by soiling to the same extent as system output.
- **Multiple array planes:** If the PV system comprises multiple array planes, the plane-of-array irradiance, E , shall be the average of plane-of-array irradiance for each array plane weighted by the nominal DC capacity of each array plane. This is consistent with the value PVsyst assigns to the output parameter *GlobInc*.
- **Bifacial modules:** If the PV system is comprised of bifacial modules, the methodology of ASTM E2848-13 and E2939-13 shall be modified as proposed in NREL conference paper NREL/CP-5K00-73982. If the system contains both monofacial and bifacial modules, the calculation of total irradiance as indicated by Equation 4 of that paper shall be further modified by multiplying the term accounting for the rear-side contribution by the fraction of the total DC system size that is from bifacial modules.

Steps

a. Prepare Test Plan

- Modify as-built performance model as appropriate:
 - If the performance model includes soiling losses in excess of 5% for the month of the year in which the Test Period will occur, change soiling losses to a low value (e.g. 0.8%) or zero. This is to reflect the expectation that the system will be free of snow and relatively clean during the Test Period.
 - Optionally, set unavailability to zero (alternatively, periods of unavailability may be addressed by filtering affected data points)
- Generate hourly model data.
 - Hourly model data should at a minimum contain the following PVsyst parameters: *E_Grid*, *GlobInc*, *T_Amb*, *WindVel*, *IL_Pmin*, *IL_Vmin*, *IL_Pmax*, *IL_Vmax*, *FIAMGI*, *FSIgI*, and *FShdBm*
 - If reference cells are to be used for measuring plane-of-array irradiance hourly values of global in-plane irradiance should be reduced with post processing to account for the incident angle response and soiling impact on reference cell readings. The incident angle response of the reference cell may be assumed to be the same as that of the modules, in which case it is easily accounted for by using the product $GlobInc * FIAMGI$ for the modeled value of plane-of-array irradiance, E . If the modified model includes soiling losses and the reference cell output is expected to be impacted by soiling to the same degree as system output will be impacted by soiling during the Test Period (a reasonable assumption if the reference cell was last cleaned at the same time as modules and soiling is relatively light and uniform) account for the modeled soiling by further multiplying by *FSIgI* (i.e. use $GlobInc * FIAMGI * FSIgI$ for the modeled value of plane-of-array irradiance, E).
- Filter hourly model data
 - Use only model data for the month of the year in which the Test Period will occur.

- Filter out datapoints for which IL_Pmin , IL_Vmin , IL_Pmax , or IL_Vmax are non-zero as times when inverters are not max power point tracking.
 - Filter out datapoints for which $FShdBm < 0.99$ as times when shades losses are significant.
 - Exclude data for which the plane-of-array irradiance differs from the reporting conditions irradiance, E_{RC} , by more than 20%
- iv. Determine Reporting Conditions and Expected Capacity following the guidance of E2939-13.
 - Reporting Conditions irradiance, E_{RC} , is approximately (within 25 W/m^2) the value that exceeds 60% of all filtered plane-of-array irradiance values. Note that since E_{RC} is both used in filtering criteria and depends on filtering, it may be necessary to iterate the process of filtering and finding the value that exceeds 60% of all filtered values until a suitable value is found.
 - Reporting Conditions temperature, T_{RC} , is the mean ambient temperature rounded to the nearest whole number.
 - Reporting Conditions wind speed, v_{RC} , is the mean wind speed rounded to the nearest whole number.
 - v. Document the analysis used to determine Reporting Conditions and the Expected Capacity and include
 - the minimum reporting requirements of ASTM E2939-13
 - the actual or expected Test Period dates
- b. Prepare System for Test**
- i. Clean irradiance sensors and modules if necessary
 - Sensors used for measuring plane-of-array irradiance must be cleaned prior to the Test Period if either they were last cleaned more than a month earlier than modules were last cleaned or if they are notably more soiled than modules.
 - Both modules and irradiance sensors should be cleaned if the amount of soiling is estimated to be sufficient to reduce system output by more than 5%. Modules must not be cleaned without also cleaning irradiance sensors.
 - ii. Disable curtailment and battery charging/discharging features of the System that would prevent collection of usable data.
- c. Measure Capacity**
- i. **Collect Data**
 - Collect data until a minimum of 50 fifteen-minute intervals (or 12.5 operating hours) of data that pass all filter criteria are available for regression analysis.
 - ii. **Determine measured capacity by applying the regression methodology of ASTM E2848-13**
 - Be sure to filter for irradiance, inverter clipping, unstable conditions, and shading.
 - iii. **Document the analysis used to determine the Measured Capacity and include**
 - the minimum reporting requirements of ASTM E2848-13
 - A chart of photovoltaic system power, P , versus plane-of-array irradiance, E , for both all intervals during the test period and the post-filtering intervals used for regression analysis.

1.1.2 Alternate Test Method

An alternate test method may be based on any of the following:

- A modification to the capacity test method described above.
- A series of capacity tests, each for a different part of the system, that when combined provide an assessment of the entire system.

- a test based on the test protocol outlined in Technical Report NREL/TP-5200-57991, *Weather-Corrected Performance Ratio*
- An energy yield test for which measured meteorological data during the Test Period are provided as inputs to the as-built performance model for the system.

If an alternate test method is to be used to satisfy the Performance Testing requirement, a test plan describing details of the alternate test method must be submitted to the purchaser of the PV system and written notification must be received from the purchaser that such test plan is acceptable. The system purchaser shall not withhold notification of acceptance if reasonable engineering judgement would conclude that the proposed test plan would allow comparison of measured total system output to expectations based on the as-built performance model with at least +/- 5% sensitivity.

Pass/Fail Criteria (Either Method):

The measured total AC output of the system must, to within the margin of uncertainty, meet or exceed the expected AC output less any contract margin.

Deliverables (Either Method):

- Test Plan
- Model data used to determine Reporting Conditions and the Expected Capacity in electronic form.
- Test Report documenting analysis of field data.
- Measured Test Period field data in electronic form

References:

- ASTM E2848-13, *Standard Test Method for Reporting Photovoltaic Non-Concentrator System Performance*
- ASTM E2939-13, *Standard Practice for Determining Reporting Condition and Expected Capacity for Photovoltaic Non-concentrator Systems*
- Waters, Deline, Kemnitz, and Webber, *Suggested Modifications for Bifacial Capacity Testing*, 46th IEEE Photovoltaic Specialists Conference, June 2019 (NREL/CP-5K00-73982 October 2019)
- Technical Report NREL/TP-5200-57991, *Weather-Corrected Performance Ratio*

3.2 Other Testing (1)

Reserved for future revisions.

ATTACHMENT E
TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

NOTICE TO PROCEED TEMPLATE

<DISTRICT LETTERHEAD>

Date: <DATE>

To: <PROVIDER CONTACT NAME>
<TITLE>
<COMPANY>
<ADDRESS>
<FAX NUMBER>
<PHONE NUMBER>
<EMAIL>

Subject: **POWER PURCHASE AGREEMENT** for [SITE NAME]

<CONTACT NAME>,

You are hereby authorized to proceed *based on the successful completion of the Conditions Precedent* in the above referenced Agreement beginning <DATE>. Subject to the terms of the Agreement, the date for completion of the project shall be no later than <DATE>.

Sincerely,

<DISTRICT NAME>
<TITLE>
<ENTITY>
<ADDRESS>
<FAX NUMBER>
<PHONE NUMBER>
<EMAIL>

CC: <CC NAME>
<TITLE>
<COMPANY>
<ADDRESS>
<FAX NUMBER>
<PHONE NUMBER>
<EMAIL>

<MORE CCs IF DESIRED>

Exhibit H – BESS Guarantee

- 1) **BESS Services.** Starting on the first day of the first full utility billing cycle following the Commercial Operation Date (the “BESS Services Commencement Date”) and extending for the term of the Agreement (the “BESS Term”), Provider shall provide (or cause its subcontractor(s) to provide) the following services to the District (collectively, the “BESS Services”):
 - a. Turnkey installation of an approximately 573 kWh lithium-ion battery energy storage system and associated communications, dispatch, and metering equipment (collectively, the “BESS Unit”).
 - b. the operation or performance of repairs to, and maintenance of, the BESS, provided that repairs and maintenance resulting from the negligent acts or omissions of District or its subcontractors or guests shall be at District’s cost except to the extent such damage is covered by property or other insurance Provider is required to maintain under this Agreement (but excluding any applicable deductible not to exceed \$10,000 per incident of damage, which shall be Provider’s sole cost and expense).
 - c. real-time, remote cycling of the BESS (charging, discharging or otherwise using the BESS), for the purpose of optimizing the BESS’s ability to avoid electricity costs incurred by District within each utility billing period.

District agrees and acknowledges that, during a single billing period within the BESS Term, typically (but not always) between the 11th and 15th year following the Commercial Operation Date, Provider may suspend the BESS Services to enable replenishment or replacement of the BESS (the “BESS Replacement Period”), and such suspension shall not be deemed a breach by Provider of its obligations herein. District shall not be required to pay Provider the BESS Rate for the BESS Replacement Period unless such replacement is necessary due to the negligent acts or omissions of District.

- 2) **District’s Responsibilities.** District agrees and acknowledges as follows:
 - a. **Protection of Confidential Information of BESS Contractor.** The District shall protect the information provided by subcontractors used by Provider with respect to the BESS or BESS Services (collectively, the “BESS Contractor”) in accordance with Section 20 of this Agreement.
 - b. **Notify Provider of changes to Required Utility Tariff or Billing Period Schedules.** The BESS will be calibrated to Required Utility Tariff specific time-of-use periods and prices for the applicable periods. In addition, the BESS metering equipment will be calibrated to target utility cost reductions within each discrete billing cycle with specific start and end dates defined by the utility under pre-determined schedules which is anticipated (but not guaranteed) to be thirty (30) days (“Billing Period Schedule”). District will promptly notify Provider of any changes to the Required Utility Tariff or Billing Period Schedule, in order for Provider to enable optimal performance of the BESS.
 - c. **BESS Replacement Period Shutdown.** If a Distribution Utility shutdown is required to enable the BESS re-integration during the BESS Replacement Period, Provider shall work with District and the Distribution Utility to coordinate that shutdown.
 - d. **Software Access and Uses.** District shall not: (i) modify or alter any software provided by Provider as part of the BESS Services (including, without limitation, any monitoring application (“Monitoring App”) (collectively, “BESS Software”), (ii) distribute, sell, resell, sublicense, lease, rent, loan, or otherwise transfer the Monitoring App, to any third party, or use BESS Software for the benefit of any third party, (iii) reverse engineer, de-compile, disassemble, or otherwise attempt to derive (x) source code for BESS Software or (y) from use of BESS Software, access Confidential Information of Provider, (iv) use BESS Software in order to build a competitive product or service, (v) use any automated process or service to access Provider’s Confidential Information through BESS Software, (vi) use any unauthorized means to modify or reroute, or attempt to modify or reroute, BESS Software, (vii) damage, disable or impair BESS Software or the network(s) connected to BESS Software, or (viii) provide or create links on public websites that allow third parties to use BESS Software. District will not pass through the costs of any increases in Provider’s costs of obtaining and maintaining the BESS Software (including, without limitation, in connection with a change in the provider of such BESS Software).

3) **Conditions Precedent**

- a. **BESS Unit Performance Guarantee.** Provider shall ensure that that the BESS Bill Savings during the True-Up Periods, as defined below, will be greater than, or equal to the “Guaranteed Savings Amount” as stated below (the “BESS Unit Performance Guarantee”).

Required Utility Tariff	Baseline Period	Guaranteed Savings Amount Each 12 month True-up Period
TOU-8-D-CPP	July 11, 2021 – July 10, 2022	\$35,467

- b. **True-Up Period.** Provider will calculate the BESS Bill Savings at the completion of each True-Up Period. The initial True-Up Period shall commence on the BESS Services Commencement Date and continue for twelve (12) months thereafter.
- c. **Cure.** In the event the BESS fails to achieve the BESS Unit Performance Guarantee for any given True-Up Period (which failure shall in no event be deemed a breach by Provider of any covenant, representation or warranty herein), Provider subject to the terms herein shall, within ninety (90) days of the last day of such True-Up Period, pay to District an amount equal to the positive difference between the Guaranteed Savings Amount and the BESS Bill Savings. For clarity, Provider’s liability with respect to any such failure shall not exceed an amount equal to the Guaranteed Savings Amount effective for the True-Up Period in which the liability occurs.
- d. **Conditions.** Certain events outside of Provider’s control may adversely affect District’s BESS Bill Savings. If any of the following events (i)-(iii) occur at any time after BESS Services Commencement Date and such events adversely affect District’s BESS Bill Savings, Provider may, upon notice to District, revise the Guaranteed Savings Amount. Such revision, if any, shall be (i) commensurate with the event(s) adversely affecting District’s BESS Bill Savings and (ii) determined by Provider or its subcontractors (x) running a new savings simulation using the updated load, tariff, and other relevant inputs and (y) using the same ratios and percentages to set the revised Guaranteed Savings Amount as were used to set the original Guaranteed Savings Amount.
- i. The Site’s electrical pricing schedule or rate plan (collectively “Utility Tariff”), as indicated on District’s utility bill, is not the Required Utility Tariff listed in the first table of this Section 5 above, whether voluntary or involuntary.
 - ii. A Material Change in Gross Electric Load Profile.
 - iii. A Material Change in Required Utility Tariff.
- e. **Provider Systems Failure.** This BESS Unit Performance Guarantee will be subject to reasonable and proportionate revision (including reasonable and proportionate suspension) if the BESS is unavailable or unable to perform for longer than sixty (60) days and (i) such failure is not due to (x) an action or inaction on the part of Provider or its respective subcontractors and (ii) such failure affects Provider’s ability to provide the BESS Unit Performance Guarantee to District (a “Performance Guaranty Event”). In the event of such failure, the District will not owe the Provider for the BESS Rate concurrent with any period that the Provider is excused from the BESS Unit Performance Guarantee, other than for failures arising from the breach, misconduct, or negligence of the District.
- f. **Defined Terms in the BESS Unit Performance Guarantee.** The following defined terms are only applicable to the BESS Unit Performance Guarantee.
- i. **Baseline Period** means the twelve (12) full utility billing periods as detailed in the first table of this Section 3 above, prior to the Commercial Operation Date.
 - ii. **BESS Bill Savings** means the savings realized directly on District’s bill from the Distribution Utility that are attributable to the BESS operation. For the avoidance of doubt, BESS Bill Savings will include: demand charge management, utility time of use energy arbitrage, and coincident peak or installed capacity tag mitigation.
 - iii. **Gross Electric Load Profile** means the electric load profile of the Site, before accounting for the effect of the BESS Services on the Site. Any power generated from on-site generation equipment at the Site, including solar, fuel cells, or generators is counted as part of the Gross Electric Load Profile.
 - iv. **Load Duration Curve** means the standard method of measuring and visualizing the volatility of a given load profile used across the electric industry. The Site’s Load Duration

Curve over a given period of time is constructed by plotting the Site’s load values on the vertical axis in descending order of magnitude against the percent of time (on the horizontal axis) that the load values are exceeded. For the purposes of constructing the Site’s Load Duration Curve, load is measured as average load over each fifteen (15) minute interval. An example of the Load Duration Curve is provided below; this table does not correspond to actual District data and is provided for illustrative purposes only.

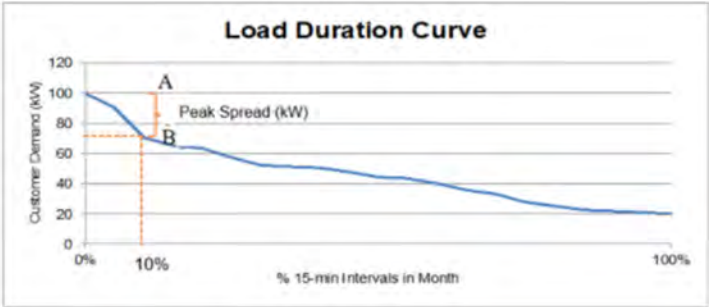
v. **Material Change in Gross Electric Load Profile** is determined as follows: Provider will calculate the Solar Facility’s Peak Spreads on the Site’s Gross Electric Load Profiles for the Baseline Period net of the Solar Facility’s estimated hourly production pursuant to the PVSystem attached hereto as Exhibit J (“PVSystem Report”). Commencing on the Commercial Operation Date, Provider will calculate the Peak Spread on the Site’s Gross Electric Load Profile for every full utility billing period for each month during the twelve (12) month period during the BESS Term (each twelve (12) month period a “Comparison Period”). Provider will compare the Peak Spread for each full utility billing period in a Comparison Period to the Peak Spread of its corresponding full utility billing period in the Baseline Period net of the Solar Facility’s estimated hourly production pursuant to the PVSystem Report to calculate the decrease in Peak Spread for each of the twelve (12) full utility billing periods, expressed as a percentage of the Peak Spread in the Baseline Period net of the Solar Facility’s estimated hourly production pursuant to the PVSystem Report (“Peak Spread Decrease”). A Material Change in Load Profile has occurred if the average Peak Spread Decrease for any Comparison Period is greater than ten percent (10%).

vi. **Material Change in Required Utility Tariff** occurs if, at any point in time, the price for the most expensive kilowatt of demand at the Site on the rate plan that the Utility offers to the District has decreased by an amount that is greater than ten percent (10%) of the most expensive kilowatt of demand as measured during the corresponding Baseline Period.

vii. **Material Interval** means any interval in which a new maximum demand level is set.

viii. **Peak Spread** means the kW (or Customer Demand) change between a Site’s maximum load as compared to ten percent (10%) on the horizontal axis. Peak Spreads are measured during each month of the twelve (12) full utility billing periods and are utilized in calculating a material Change in Gross Electric Load Profile. Over one full utility billing period, let

1. A = Site’s maximum load
2. B = The point on the Site’s Load Duration Curve, in kW, that corresponds to 10% on the horizontal axis.
3. For this utility bill period, the Peak Spread = A – B.



g. **Required Distribution Utility Tariff** means the Distribution Utility Tariff that is required by Section 3 of this Exhibit H. In the case where District’s Distribution Utility Tariff is not the Required Utility Tariff, Provider will assist District in changing to the Required Distribution Utility Tariff on or by the Commercial Operation Date of the System.

Exhibit I – Form of Site Easement Agreement

SOLAR POWER EASEMENT AGREEMENT
(Palmdale Water District 6MG Tank)

This Solar Power Easement Agreement (this “**Agreement**”) is effective as of the ___ day of _____, 2022 (“**Effective Date**”), by and between Palmdale Water District, (“**Grantor**”) and East Avenue South Solar Project 2022, LLC, a Delaware limited liability company (“**Grantee**”). Grantor and Grantee are collectively referred to herein as “**Parties**” and individually as a “**Party**.”

RECITALS

WHEREAS, Grantor is the fee owner of approximately _____ acres of land located at [ADDRESS, CITY, CA ZIP], as more particularly described in **Exhibit A** (the “**Property**”).

WHEREAS, Grantor desires to reduce its energy costs as well as its dependence on fossil fuel electric generating resources and to promote the generation and storage of electricity from solar photovoltaic and battery energy storage facilities; and

WHEREAS, Government Code section 4217.10 *et seq.* provides that public agencies may enter into agreements, including but not limited to, lease agreements, for real property upon which alternative energy facilities may be constructed so that the public agency may purchase the energy generated from the facilities constructed on the real property under a power purchase agreement; and

WHEREAS, the governing body of Grantor has made those findings required by Section 4217.12 of the Government Code that: (i) the anticipated cost to Grantor for electrical energy services provided by the solar photovoltaic and battery energy storage system under this Agreement will be less than the anticipated marginal cost to Grantor of electrical energy that would have been consumed by Grantor in the absence of those purchases and (ii) the difference, if any, between the fair market value of the right to access and occupy the real property subject to this Agreement and related payments under this Agreement, if any, is anticipated to be offset by below-market energy purchases or other benefits provided under this Agreement; and

WHEREAS, Grantor desires to obtain a portion of the power required to run its facilities from a ground-mounted photovoltaic generating system having an approximate generating capacity of 1,224.96 kW (DC) and more particularly described on Exhibit F of the PPA (as hereinafter defined) (such system, together with all interconnection facilities and other equipment related thereto, the “**System**”) to be installed, constructed, interconnected, owned and operated on a portion of the Property as shown on **Exhibit B** attached hereto (hereinafter defined as the “**Easement Area**”).

A. Grantee desires to develop the System on the Easement Area and, in furtherance of that desire, Grantee has entered into a Solar Power Purchase Agreement dated of even date herewith (“**PPA**”) whereby Grantee and the Grantor have agreed to the terms for the installation, maintenance, ownership, and operation of the System in the Easement Area.

WHEREAS, Grantor desires to grant to Grantee the Easement (as hereinafter defined) in the Easement Area for the sole purpose of accessing Grantor’s property to develop, construct, install, operate, maintain and repair, and remove the System; and Grantee desires to obtain the Easement in the Easement Area, subject to the terms and conditions set forth in this Agreement.

AGREEMENT

Now therefore, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Grantor and Grantee hereby agree as follows:

1. **Grant of Easement; Term.** Subject to the terms of this Agreement, Grantor hereby grants and conveys to Grantee, its successors and assigns, a non-exclusive easement (the "**Easement**") on, over, across and under the Easement Area for the Intended Use (as hereinafter defined), together with a right of access across the Property for the purposes of exercising its rights hereunder (as further set forth in Section 2.2 hereof), commencing on the Effective Date and continuing until one hundred eighty (180) days following the expiration or earlier termination of the PPA (including any extensions or renewals thereof) (the "**Term**"). Upon the expiration or earlier termination of the Term, Grantee shall remove the System in accordance with (including within the time period set forth in) Section 3 of the PPA.

2. **Use/Access.**

2.1. **Use.** Grantee may use the Easement Area to install, construct, interconnect, operate, own, maintain, upgrade, repair, replace and remove the System, for such other uses as are reasonably and customarily related to such activities, and to undertake such other activities as may be set forth in Section 18 of the PPA ("**Intended Use**"). The Intended Use may include structural elements to physically support equipment, including vertical support poles, carports, concrete or similar anchors or plugs, and mounting hardware used to attach solar modules and other components at the Easement Area. Grantee may, at its sole cost and expense, periodically inspect, clean, maintain, repair and replace the System at times reasonably determined by Grantee to be necessary or desirable. All electrical output generated by the System shall be subject to the terms and conditions contained in the PPA.

2.2. **Access.** Grantee shall also have the right of ingress and egress over and across the Property for the purpose of exercising the rights set forth herein consistent with and not in excess of the PPA, including, but not limited to, access to (a) receive, unload, store, warehouse and protect all materials, tools and equipment in the Easement Area, as needed; (b) use the Easement Area and adjoining portions of the Property during construction of the System as lay down areas only to the extent necessary to carry out construction activities and removal obligations; (c) provide, install, inspect and maintain through or under the Easement Area during the Term of this Agreement such cables, electric lines, ducts, transformers, fencing and other or other ancillary equipment or apparatus consistent with and not in excess of the PPA as may, in the opinion of Grantee, be necessary or desirable for connecting the System to or for the benefit of Grantee's electrical system or the local utility's distribution system; (d) provide a non-exclusive easement over the Property for ingress and egress to and from the Easement Area for Grantee and its employees, agents, contractors and subcontractors, at all times during the Term of this Agreement (the foregoing, collectively, the "**Access Easements**").

2.3. **Insolation.** Grantor further grants to Grantee the sole and exclusive easement and right to evaluate, develop, capture, use and convert all solar energy resources found on, about,

over, across and at the Easement Area, including the sole and exclusive right to the free and unobstructed Insolation and flow of solar energy resources on, about, over and across the Property to the System (“**Solar Development Easement**”). Without limiting the foregoing or Section 13.B. of the PPA, Grantee shall have the right to remove, trim, prune, top or otherwise control the growth of any tree, shrub, plant or other vegetation on the Property to the extent it obstructs or Insolation to the Easement Area. Grantor agrees that Insolation and the Solar Development Easement are essential to the Intended Use and a material inducement to Grantee in entering into this Agreement.

3. **Consideration.** The consideration given by Grantee for this grant of Easement is the set of obligations under the PPA, which are conditioned upon this grant. The Parties hereby agree and acknowledge that good and sufficient consideration is given for and in this Agreement for all covenants, terms and conditions herein and related hereto.

4. **Grant of Other Rights.** Grantor shall not grant any licenses, easements, leases or rights of way, whether recorded or unrecorded, which could be reasonably expected to interfere with Grantee’s use of the Easement Area to develop, design, construct, install, own, operate, maintain or remove the System or otherwise engage in any Intended Use of the Easement Area.

5. **Operation, Maintenance and Repair.**

5.1. Grantee will own, operate, maintain and repair the System during the Term of this Agreement in accordance with the PPA. Grantee shall provide reasonable notice to Grantor prior to any maintenance and repair activities that could be reasonably expected to materially interfere with Grantor’s operations at the Property (other than the Easement Area), provided that in the event Grantee needs emergency access after regular business hours, Grantor shall provide immediate access to the Property. All work performed by Grantee in connection with the installation, operation, maintenance and repair of the System shall be performed in accordance with the PPA.

5.2. Grantor shall not make any alterations or repairs to the Property which would be reasonably expected to adversely affect the operation and maintenance of the System without Grantee's prior written consent. If Grantor wishes to make such alterations or repairs, Grantor shall give prior written notice to Grantee, setting forth the work to be undertaken (except for emergency repairs, for which notice may be given within 24-hours), and give Grantee the opportunity to advise Grantor in making such alterations or repairs in a manner that avoids damage and/or adverse effects to the System and operation and maintenance thereof. Notwithstanding any such advice from Grantee, Grantor shall be responsible for all damage to the System resulting from such alterations or repairs and caused by Grantor's or its agents’, contractors’, subcontractors’, vendors’, or employees’ acts or omissions or breach of this Agreement or the PPA. To the extent that temporary disconnection or removal of the System is necessary for Grantor to perform such alterations or repairs, such removal and any replacement of the System after completion of Grantor's alterations and repairs, shall be done by Grantee or its contractors at Grantor's cost, and Grantor shall pay Grantee the District Suspension Rate if such suspension exceeds the suspension time allowed in the PPA. All of

Grantor's alterations and repairs shall be done in a good and workmanlike manner and in compliance with all Applicable Laws.

6. **Credits, Rebates and Incentives.** Throughout the Term, Grantor shall be the owner of all Green Attributes and Grantee shall be the owner of all Environmental Financial Incentives, in accordance with the PPA, which is incorporated herein by reference.

7. **Ownership of the System.** As further set forth in the PPA, which is incorporated herein by reference, the System and all alterations, additions, improvements or installations made thereto by Grantee and all personal property of Grantee used in connection with the installation, operation and maintenance of the System, electric lines, ducts or other apparatus related to the System are, and shall be and remain, the personal property of Grantee ("**Grantee's Property**"). In no event shall any Grantee's Property be deemed a fixture, nor shall Grantor, nor anyone claiming by, through or under Grantor (including, but not limited to, any present or future mortgagee of Grantor) have any rights in or to the Grantee's Property at any time. Ownership of Grantee's Property at the end of the Term or earlier termination of this Agreement shall be in accordance with the terms and conditions of the PPA.

8. **Grantor's Representations and Obligations.**

8.1. Grantor represents and warrants that (i) the execution and delivery by Grantor of this Agreement and the performance by it of its obligations hereunder have been duly and validly authorized by all necessary action on behalf of Grantor, including compliance with all procurement laws, rules and ordinances applicable to Grantor, (ii) this Agreement has been duly and validly executed and delivered by Grantor and constitutes the legal, valid and binding obligation of Grantor enforceable against it in accordance with its terms (iii) Grantor has good and marketable fee simple title to the Property, and (iv) to the best of Grantor's knowledge, there are no liens, covenants, restrictions, rights of way, easements or other encumbrances affecting the Property that could be reasonably expected to prevent, limit or adversely affect the Intended Use.

8.2. Grantor covenants that Grantee shall at all times during the Term peaceably and quietly have, hold and enjoy the Easement Area without hindrance or disturbance of any kind by Grantor or any person claiming by, through or under Grantor.

8.3. Except as disclosed by Grantor to Grantee, to the best of its knowledge, there are no Hazardous Substances that exist in the areas on or near the portion of the Property where Grantee or its subcontractors will undertake to install, operate, maintain, or repair the System.

8.4. In no event shall Grantor cause or permit the Property (i) any structure or facility to be erected within the Easement Area or elsewhere on the Property, or (ii) the growth of foliage, in each case that might be reasonably expected to interfere with or cause or permit any interference with the System, electric lines, ducts, or other apparatus related to the System, or the insolation of the System.

8.5. Grantor at its sole cost and expense shall materially comply with all applicable federal, state and local laws, rules, regulations and ordinances relating to the ownership and occupancy of the Property.

9. Grantee's Representations and Obligations

9.1. Grantee represents and warrants that (i) the execution and delivery by Grantee of this Agreement and the performance by it of its obligations hereunder have been duly and validly authorized by all necessary action on behalf of Grantee, including compliance with all procurement laws, rules and ordinances applicable to Grantee, and (ii) this Agreement has been duly and validly executed and delivered by Grantee and constitutes the legal, valid and binding obligation of Grantor enforceable against it in accordance with its terms

9.2. Grantee at its sole cost and expense, shall materially comply with all applicable federal, state and local laws, rules, regulations and ordinances, including without limitation all environmental and occupational, health and safety requirements relating to Grantee's use or occupancy of the Property and the operation and maintenance of the System.

10. Default; Remedies.

10.1. Grantee Default. In the event Grantee is in default of any of the terms and conditions of this Agreement, and such breach is not cured within thirty (30) days following written notice by Grantor to cure the default (unless by the nature of such default a longer period to cure is required, in which event Grantee shall not be in default if it commences to cure the default within thirty (30) days of receipt of notice from Grantor and diligently proceeds to cure the default thereafter) (hereinafter "**Event of Default by Grantee**"), then so long as such Event of Default of Grantee is continuing, without limitation of Grantor's other rights and remedies at law or equity, Grantor may terminate this Agreement by written notice to Grantee, such termination to be effective on the date set forth in such notice. Upon termination of this Agreement, Grantee shall remove the System in accordance with (including within the time period set forth in) the PPA.

10.2. Grantor Default. A failure by Grantor to perform or comply with any of the terms and conditions of this Agreement may be considered an event of default by Grantor under this Agreement (hereinafter "**Event of Default by Grantor**"). If an Event of Default by Grantor occurs, Grantee shall notify Grantor in writing of such default. Grantor shall have forty-five (45) days following written notice by Grantee to cure the default. If an Event of Default by Grantor has not been cured within such period, Grantee shall have the right to terminate this Agreement in accordance with the terms and conditions contained in the PPA.

11. Indemnification; Limitation of Liability.

11.1. Indemnification. Subject to the limitations herein, and except with respect to environmental claims pursuant to Section 10.2. below, at all times during the Term of this Agreement, the Parties will indemnify each other in the same manner and to the extent as provided in the PPA, which is incorporated herein by reference.

11.2. Environmental Indemnification. Grantee shall indemnify, defend and hold harmless all of Grantor's Indemnified Parties from and against all Indemnity Claims arising out of or relating to the existence at, on, above, below or near the Property of any Hazardous Substance (as defined in the PPA) to the extent deposited, spilled or otherwise caused by Grantee or any of its officers, employees, contractors, subcontractors, or agents. Grantor shall indemnify, defend and hold harmless all of Grantee's Indemnified Parties from and against all Indemnity Claims arising out of or relating to the existence at, on, above, below or near the Property of any Hazardous Substance, except to the extent deposited, spilled or otherwise caused by Grantee or any of its officers, employees, contractors, subcontractors or agents. Each Party shall promptly notify the other Party if it becomes aware of any Hazardous Substance on or about the Property generally or any deposit, spill or release of any Hazardous Substance. Without limitation of the foregoing, if Grantor fails to remediate or remove any Hazardous Substance that it is required to remediate or remove pursuant to the foregoing, then Grantee may suspend construction or operation of the System until such time as Grantor has remediated or removed such Hazardous Substance in accordance with Applicable Laws.

11.3. No Consequential Damages. EXCEPT WITH RESPECT TO PAYMENT OF TERMINATION VALUES, THE DISTRICT SUSPENSION RATE OR IN CONNECTION WITH THIRD-PARTY INDEMNIFICATION CLAIMS, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY SPECIAL, PUNITIVE, EXEMPLARY, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR THE PPA.

11.4. Actual Damages. Grantee's aggregate liability under this Agreement and the PPA arising out of or in connection with the performance or non-performance of this Agreement shall not exceed the amounts provided in Section 17(D) of the PPA. The provisions of this Section 10.3 shall apply whether such liability arises in contract, tort (including negligence), strict liability or otherwise. Any action against Grantee must be brought within one (1) year after the cause of action accrues.

11.5. Waiver of Jury Trial. TO THE EXTENT ENFORCEABLE UNDER APPLICABLE LAW, EACH PARTY HEREBY KNOWINGLY, VOLUNTARILY, AND INTENTIONALLY WAIVES ANY RIGHTS THEY MAY HAVE TO A TRIAL BY JURY, AND INSTEAD AGREE TO A BENCH TRIAL, IN RESPECT OF ANY LITIGATION BASED HEREON, OR ARISING OUT OF, UNDER, OR IN CONNECTION WITH, THIS AGREEMENT OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN), OR ACTIONS OF EITHER PARTY. THIS PROVISION IS A MATERIAL INDUCMENT FOR GRANTEE TO ENTER INTO THIS AGREEMENT.

12. Insurance. At all times following the Effective Date, the Parties shall maintain the insurance required under the PPA, which requirements are incorporated herein by reference.

13. Defined Terms; Incorporation of Select PPA Terms. Capitalized terms used in this Agreement shall have the meanings ascribed to them herein. Capitalized terms used in this Agreement but not defined herein shall have the meaning ascribed to them in the PPA. Except as

otherwise expressly provided in this Agreement, the terms, provisions, and conditions contained in the PPA that are expressly incorporated in this Agreement (including defined terms) are made a part hereof as if herein set forth at length, Grantor being substituted for “District” under the PPA, Grantee being substituted for “Provider” under the PPA, and this Agreement being substituted for “Agreement” under the PPA. Notwithstanding the foregoing, unless expressly incorporated herein, the terms and provisions of the PPA are not made a part hereof and neither Party shall be hereby bound by or obligated to perform any of its respective obligations under and pursuant to such provisions of the PPA, unless such obligations also independently arise under this Agreement without regard to the existence of the PPA. Notwithstanding any other provision of this Agreement, the terms, provisions, and conditions contained in the PPA that are expressly incorporated in this Agreement (including defined terms) shall survive the expiration or termination of the PPA.

14. **Force Majeure.** If either Party is rendered wholly or partly unable to timely perform its obligations under this Agreement because of a Force Majeure event, that Party shall be excused from the performance affected by the Force Majeure event (but only to the extent so affected) and the time for performing such excused obligations shall be extended as reasonably necessary (but of no greater scope and of no longer duration than is required by the Force Majeure event); provided, the Party affected by such Force Majeure event uses all reasonable efforts to mitigate or remedy its inability to perform as soon as reasonably possible.

15. **Run with the Land.** The burdens and benefits of this Agreement shall run with the land and shall bind and inure to the benefit of the parties hereto, the successors in title of Grantor in and to the Property, and the successors and assigns of Grantee and Grantee’s employees, agents and contractors.

16. **Notices.** Any notice required or permitted to be given hereunder by one party to the other shall be in writing and shall be delivered in the same manner as, and to the same address for the Party to be notified as specified in, Section 22.B. of the PPA, which is incorporated herein by reference.

17. **Amendments; Governing Law; Severability.** This Agreement may not be amended except by written document signed by the then current owner of the Property and Grantee. This Agreement shall be governed and construed in accordance with the laws of the State of California without regard to its conflict of laws principles. Any dispute or proceeding arising under this Agreement shall be resolved as set forth in Section 15 of the PPA and may be joined with any action arising under the PPA having a common set of facts or circumstances, provided that any matter arising hereunder that is required by applicable law to be determined by or adjudicated in a court of law shall be brought in the state or federal courts sitting in the California County in which the Property is located. The illegality, invalidity or unenforceability of any provision of this Agreement shall not affect the legality, validity or enforceability of any other provision of this Agreement. In the event either Party brings an action arising under this Agreement or any provisions contained herein, then the Party that substantially prevails in such action shall be entitled to recover from the non-prevailing Party, in addition to all other remedies or damages as limited herein, reasonable attorneys’ fees and costs of court incurred in such action.

18. **Casualty; Condemnation.**

18.1. In the event that the System is materially damaged or destroyed by casualty of any kind, other than by Grantee's gross negligence or willful misconduct, Grantee may determine whether and to what extent to repair and restore the System and shall notify Grantor of such determination within ninety (90) days following the relevant event. If Grantee determines not to repair or restore the System such that it is not capable of regular, safe and commercially viable operation at the Easement Area, then Grantee's notice to Grantor may include its election to terminate this Agreement as of a date specified in such notice. Following such termination, Grantee shall remove the System as set forth in Section 3 of the PPA.

18.2. If the Property or Grantor's building or facilities thereon are materially damaged or destroyed by casualty of any kind, other than by Grantor's gross negligence or willful misconduct, such that the operation of the System and/or Grantor's ability to accept the electric energy produced by the System are materially impaired or prevented, Grantor shall promptly repair and restore the Property, building or facility, as applicable to its pre-existing condition; provided, however, Grantor may elect not to so repair and restore, in which case Grantor shall pay to Grantee the applicable Termination Value as set forth in the PPA and all other costs previously accrued but unpaid under this Agreement and the PPA, and thereupon terminate this Agreement.

18.3. Upon receipt by either Grantor or Grantee of notice of any proceedings for the taking or condemnation of all or a portion of the Property (a "**Taking**"), the Party receiving such notice shall promptly give notice thereof to the other Party and such other Party may also appear in such proceeding. In the event of a permanent Taking of the fee title to or of control of all or substantially all of the Easement Area, this Agreement shall terminate as of the effective date of such Taking. In the event of a Taking of less than all or substantially all of the Easement Area, Grantee shall reasonably determine, in its sole discretion, whether the continued use and occupancy of the remainder of the Easement Area is or can reasonably be made to be safe, economically viable, structurally sound and otherwise feasible for the Intended Use. In the event of a Taking, Grantor and Grantee shall be entitled to receive and retain such separate awards and portions of lump sum awards as may be allocated to their respective interests in any condemnation proceedings. If the condemning authority does not make separate awards, the award will be allocated on a proportionate value basis. If the Parties are unable to agree as to such proportion, then each Party shall select a recognized and neutral independent appraiser experienced in the appraisal of real estate and solar power facilities who shall determine the allocation. The cost of the appraiser shall be borne equally by the Parties. Nothing herein shall limit the rights of either Party to participate in such condemnation proceedings or seek specific compensation from a condemning authority.

19. **Taxes.** The Parties shall pay all real and personal property taxes as and to the extent set forth in Section 16 of the PPA.

20. **Recordation.** Grantor shall execute and deliver to Grantee a memorandum, substantially in form set forth in Exhibit D, for recordation in the land records of the County Recorder's Office of Los Angeles County, California to evidence the easements granted hereunder within ten (10) days following written request therefor.

21. **Assignment.** The Parties may sell, assign, collaterally assign or otherwise transfer their respective rights under this Agreement to the same extent as and subject to the terms set forth in Section 19 of the PPA.
22. **Financing Party Accommodations.** Grantee may collaterally assign, pledge, mortgage or grant a security interest and/or otherwise encumber its rights, title and/or interest in this Agreement in favor of any financing party to the same extent as and subject to the terms set forth in Section 19 of the PPA. Grantor shall cooperate with Grantee and provide such estoppels, consents and other documents, all to the same extent as and subject to the terms set forth in Section 19 of the PPA.
23. **Subordination and Non-Disturbance.** If Grantor has granted one or more mortgages, deeds of trust or other security instrument (collectively, the “**Mortgages**”, individually, a “**Mortgage**”) that encumber some or all of the Grantor’s Property to certain persons (each such person, a “**Mortgagee**”), then, for each Mortgage, Grantor will obtain from the Mortgagee within thirty (30) days of Grantee’s request, a reasonable and customary subordination and non-disturbance among Grantor, such Mortgagee and Grantee pursuant to which (a) Grantee confirms that this Agreement is subordinated to the Mortgage granted to such Mortgagee and the Grantee will attorn to such Mortgagee in the event that the Mortgagee acquires title to the Property and (b) such Mortgagee shall honor this Agreement, that the Agreement shall remain in full force and effect and shall not be terminated and Grantee shall be permitted to exercise all of its rights and remedies hereunder, including in the event of foreclosure under the Mortgage to which such Mortgagee is a party.
24. **Confidentiality.** Information made available by one Party to the other Party pursuant to this Agreement shall be subject to the provisions of the PPA relating to Confidential Information, incorporated herein by reference.
25. **Non-Waiver.** Unless otherwise expressly provided in this Agreement, no waiver by Grantor or Grantee of any provision hereof shall be deemed to have been made unless expressed in writing and signed by Grantor or Grantee, as the case may be. No delay or omission in the exercise of any right or remedy accruing to Grantor or Grantee, as the case may be, upon any breach under this Agreement shall impair such right or remedy or be construed as a waiver of any such breach theretofore or thereafter occurring. The waiver by Grantor or Grantee of any breach of any term, covenant or condition herein stated shall not be deemed to be a waiver of any other term, covenant or condition.
26. **Captions.** Section titles or captions contained in this Agreement are inserted as a matter of convenience and for reference only, and in no way define, limit, extend or describe the scope of this Agreement.
27. **Exhibits.** All Exhibits attached hereto shall be incorporated herein by reference as if set out herein in full.
28. **Entire Agreement.** This Agreement, together with all exhibits attached hereto or mentioned herein, shall constitute the entire Agreement between the parties and may not be amended, modified or terminated except by a writing signed by the Parties hereto. This Agreement

and the Exhibits hereto wholly supersede any and all oral statements, representations or agreements made by the Parties to this Agreement. This Agreement shall become binding when executed by Grantor and Grantee.

29. **Construction of Agreement.** This Agreement is the product of negotiations between the Parties and shall not be construed as being drafted by one Party as opposed to the other.

30. **Counterparts.** This Agreement may be executed by the parties hereto in separate counterparts, each of which when so executed and delivered shall be an original, but all such counterparts shall together constitute but one and the same instrument.

31. **Further Assurances.** Grantor and Grantee each agree to execute and deliver such other documents and instruments, and to take such other actions, as may commercially reasonably be required and which may be necessary to effectuate the agreements set forth in this Agreement; provided, however, that such additional documents, instruments or actions do not impose upon either Grantor or Grantee any obligations, duties, liabilities or responsibilities which are not expressly provided for in this Agreement.

TO HAVE AND TO HOLD the above-described Easement, together with all and singular, the rights and appurtenances thereto in anywise belonging, unto Grantee, its successors and assigns, forever. Grantor does hereby bind itself, its successors and assigns, to warrant and forever defend, all and singular, the said Easement, subject to all matters now of record affecting the Property, unto Grantee, its successors and assigns, against every person whomsoever lawfully claiming or to claim the same or any part thereof, by, through or under Grantor, but not otherwise.

[Signature pages follow]

Executed to be effective as of the Effective Date.

Grantor:

Palmdale Water District

By: _____

Name: _____

Title: _____

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California)
County of _____)

On _____ before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

My Commission Expires: _____

Grantee:

East Avenue South Solar Project 2022, LLC

By: _____

Name: Erik Schiemann

Title: President

THE STATE OF NEW YORK §
 §
COUNTY OF SCHENECTADY §

This instrument was acknowledged before me on _____, 2022, by Erik Schiemann, President of East Avenue South Solar Project 2022, LLC a Delaware limited liability company, on behalf of said limited liability company.

Notary Public, State of _____
Printed Name: _____
My commission expires: _____

EXHIBIT A

Legal Description of Real Property

[TO BE INSERTED]

To be provided at contract execution

EXHIBIT B

Depiction of the Easement Area

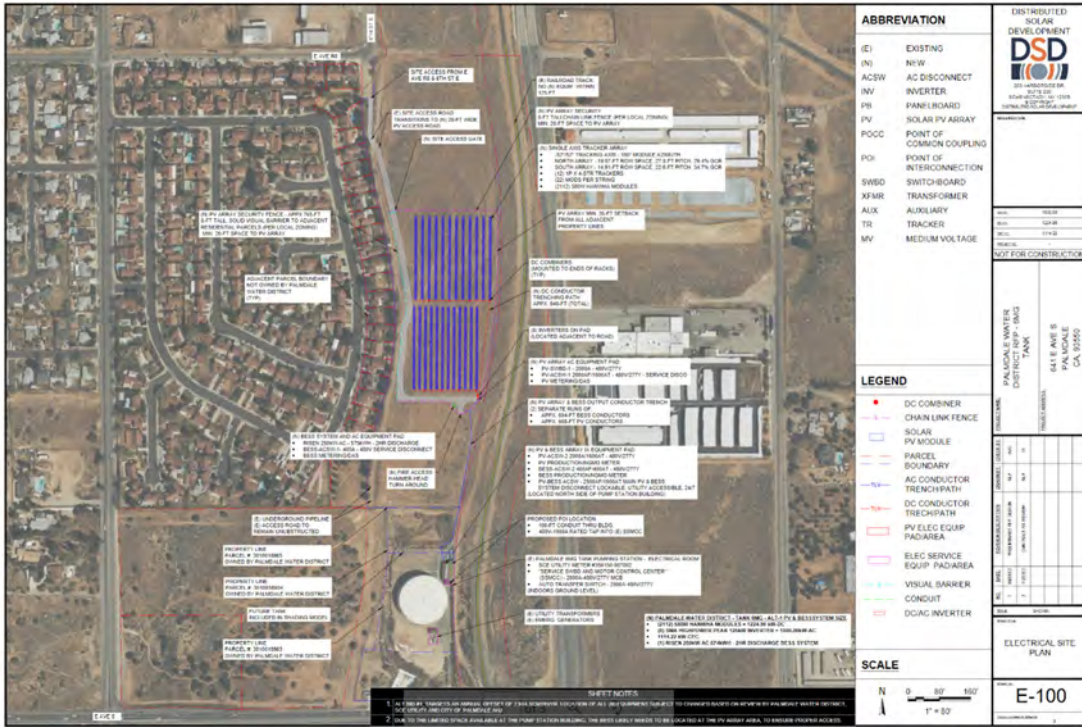


EXHIBIT C

Form of Memorandum of Easement

Memorandum of Easement

**RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:**

[SPACE ABOVE THIS LINE FOR RECORDER'S USE.]

STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

MEMORANDUM OF SOLAR POWER EASEMENT AGREEMENT

THIS MEMORANDUM OF SOLAR POWER EASEMENT AGREEMENT (this "**Memorandum**") is made and entered into as of [REDACTED], 2022, by and between Palmdale Water District ("Grantor") and East Avenue South Solar Project 2022, LLC, a Delaware limited liability company, with a place of business at 1 River Road, Schenectady, New York 12345 ("**Grantee**"). Grantor and Grantee are referred to collectively herein as the "**Parties**".

- A. Grantor and Grantee have entered into a Solar Power Easement Agreement dated [REDACTED] (the "**Agreement**") pursuant to which Grantor granted to Grantee an non-exclusive easement for the installation, maintenance, operation, inspection, repair and replacement of certain photovoltaic systems and related cables, electrical lines, ducts, transformers and other equipment, on, over, across and under the "Easement Area" on the real property described in **Schedule A**, which Easement Area is shown in **Schedule B** attached hereto and incorporated herein by reference, together with the right of ingress and egress to and from the Easement Area described in the Agreement.
- B. The term of the Agreement commenced on the date of the Agreement and shall continue until one hundred eighty (180) days following the expiration or earlier termination of the PPA (as defined in the Agreement). The PPA commenced on the date of the Agreement and, unless earlier terminated according to its terms, the PPA shall expire on the date which is twenty-five

(25) years after the Commercial Operation Date (as defined in the PPA) unless extended for up to an additional ten (10) years in accordance with the terms of the PPA.

- C. The Parties have executed this Memorandum, which is to be recorded in order that third parties may have notice of the interests of Grantee in the Easement Area and of the existence of the Agreement and of certain easement rights granted to Grantee in the Easement Area pursuant to the Agreement.
- D. In the event of any conflict between this Memorandum and the Agreement, the Agreement shall govern. This Memorandum does not alter, amend, modify or change the Agreement in any respect and is executed by the Parties hereto solely for the purpose of recordation in the real property records of the counties, districts, boroughs and parishes in which the Easement Area is located to give notice of, and to confirm, the Agreement and all of its terms to the same extent as if all such terms were fully set forth herein. All capitalized terms used in this Agreement but not defined herein shall have the meanings ascribed to such terms in the Agreement. This Memorandum may be executed in multiple counterparts, each of which shall be deemed to be an original and all of which together shall comprise but a single instrument.

[Signature page follows]

IN WITNESS WHEREOF, Grantor and Grantee have executed this Memorandum as of the day and year first above written.

Grantor:

Palmdale Water District

By: _____

Name: _____

Title: _____

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California)
County of _____)

On _____ before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

My Commission Expires: _____

Grantee:

East Avenue South Solar Project 2022, LLC

By: _____

Name: Erik Schiemann

Title: President

THE STATE OF NEW YORK §
 §
COUNTY OF SCHENECTADY §

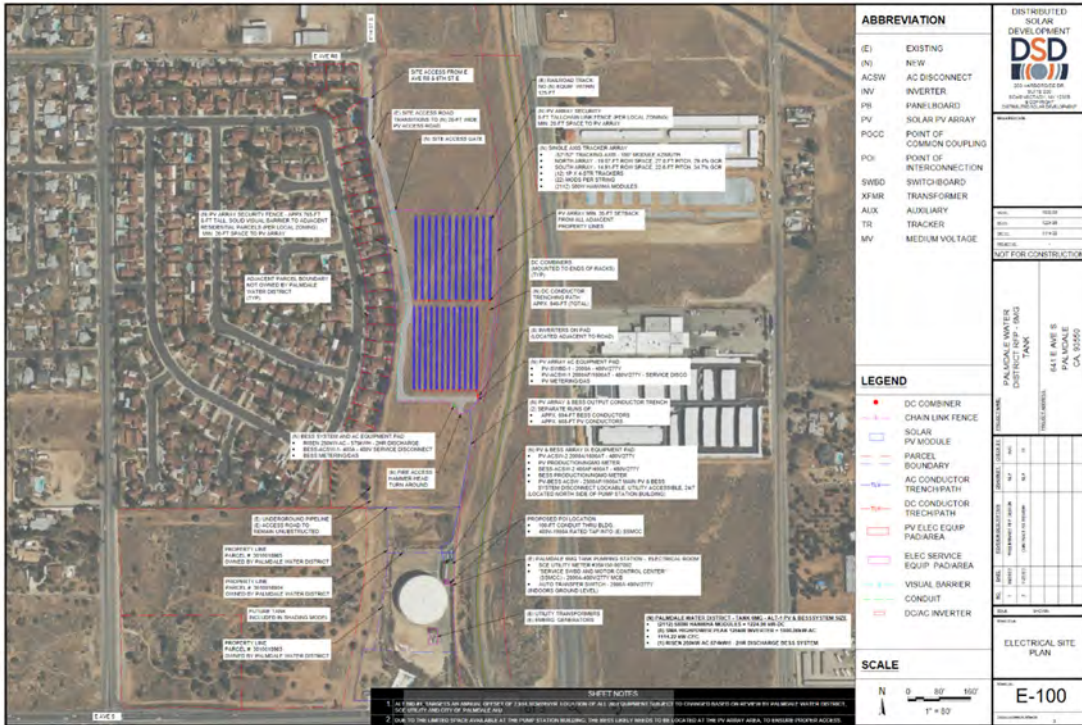
This instrument was acknowledged before me on _____, 2022, by Erik Schiemann, President of East Avenue South Solar Project 2022, LLC, a Delaware limited liability company, on behalf of said limited liability company.

Notary Public, State of _____
Printed Name: _____
My commission expires: _____

Schedule A

To be provided at contract execution

Schedule B



SHEET NOTES

- ALL SYMBOLS SHALL BE SHOWN, EXCEPT OF THE INFORMATION LOCATION OF ALL THE EQUIPMENT SUBJECT TO CHANGE BASED ON THE FIELD SURVEY DATA.
- THE NUMBER OF THE SHEET SHALL BE SHOWN AT THE TOP RIGHT CORNER OF THE SHEET.

Exhibit J – PVSYST Report

PVsyst - Simulation report

Grid-Connected System

Project: Palmdale Water District - Tank 6MG

Variant: TKR_Contract_V1.0_20221122

Single-Axis Tracker Array

System power: 1225 kWp

V3.6_Palmdale 6MG Tank - United States

Nick Pasco





Project: Palmdale Water District - Tank 6MG

Variant: TKR_Contract_V1.0_20221122

PVsyst V7.2.21

VC4, Simulation date:
22/11/22 15:21
with v7.2.21

Distributed Solar Development

Project summary

Geographical Site V3.6_Palmdale 6MG Tank United States	Situation Latitude 34.55 °N Longitude -118.15 °W Altitude 967 m Time zone UTC-8	Project settings Albedo 0.20
Meteo data V3.6_Palmdale 6MG Tank Solar Anywhere, satellite data, SUNY model - TMY		

System summary

Grid-Connected System	Single-Axis Tracker Array	Near Shadings
PV Field Orientation Orientation Tracking plane, horizontal N-S axis Axis azimuth 0 °	Tracking algorithm Astronomic calculation Backtracking activated	According to strings Electrical effect 100 %
System information PV Array Nb. of modules 2112 units Pnom total 1225 kWp	Inverters Nb. of units 8 units Pnom total 1000 kWac Pnom ratio 1.225	
User's needs Unlimited load (grid)		

Results summary

Produced Energy 2915892 kWh/year	Specific production 2380 kWh/kWp/year	Perf. Ratio PR 82.21 %
----------------------------------	---------------------------------------	------------------------

Table of contents

Cover page	1
Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Horizon definition	5
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9
P50 - P90 evaluation	10



PVsyst V7.2.21

VC4, Simulation date:
22/11/22 15:21
with v7.2.21

Distributed Solar Development

General parameters

Grid-Connected System

PV Field Orientation

Orientation
Tracking plane, horizontal N-S axis
Axis azimuth 0 °

Models used

Transposition Perez
Diffuse Imported
Circumsolar separate

Horizon

Average Height 2.0 °

Bifacial system

Model 2D Calculation
unlimited trackers

Bifacial model geometry

Tracker Spacing 7.38 m
Tracker width 2.42 m
GCR 32.8 %
Axis height above ground 1.87 m

Single-Axis Tracker Array

Tracking algorithm
Astronomic calculation
Backtracking activated

Near Shadings

According to strings
Electrical effect 100 %

Backtracking array

Nb. of trackers 24 units

Sizes

Tracker Spacing 7.38 m
Collector width 2.42 m
Ground Cov. Ratio (GCR) 32.8 %
Phi min / max. +/- 52.0 °

Backtracking strategy

Phi limits +/- 70.8 °
Backtracking pitch 6.96 m
Backtracking width 2.42 m

User's needs

Unlimited load (grid)

Bifacial model definitions

Ground albedo average 0.19
Bifaciality factor 70 %
Rear shading factor 7.8 %
Rear mismatch loss 2.4 %
Shed transparent fraction 0.0 %

Monthly ground albedo values

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.19

PV Array Characteristics

PV module

Manufacturer Hanwha Q Cells
Model Q.PEAK DUO XL-G11.3 580/BFG
(Custom parameters definition)
Unit Nom. Power 580 Wp
Number of PV modules 2112 units
Nominal (STC) 1225 kWp
Modules 96 Strings x 22 In series
At operating cond. (50°C)
Pmpp 1121 kWp
U mpp 903 V
I mpp 1241 A

Inverter

Manufacturer SMA
Model Sunny Highpower PEAK3 SHP125-US (480Vac)
(Custom parameters definition)
Unit Nom. Power 125 kWac
Number of inverters 8 units
Total power 1000 kWac
Operating voltage 684-1500 V
Pnom ratio (DC:AC) 1.22



Project: Palmdale Water District - Tank 6MG

Variant: TKR_Contract_V1.0_20221122

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Distributed Solar Development

PV Array Characteristics

Total PV power		Total inverter power	
Nominal (STC)	1225 kWp	Total power	1000 kWac
Total	2112 modules	Number of inverters	8 units
Module area	5786 m ²	Pnom ratio	1.22
Cell area	5337 m ²		

Array losses

Array Soiling Losses

Average loss Fraction 6.4 %

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0.8%	0.8%	2.3%	3.8%	5.3%	6.8%	8.3%	9.8%	11.3%	12.8%	14.3%	0.8%

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 4.0 mΩ
Loss Fraction 0.5 % at STC

LID - Light Induced Degradation

Loss Fraction 1.0 %

Module Quality Loss

Loss Fraction -0.2 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

IAM loss factor

Incidence effect (IAM): User defined profile

0°	20°	30°	40°	50°	60°	70°	80°	90°
1.000	1.000	1.000	1.000	1.000	1.000	0.950	0.750	0.000

AC wiring losses

Inv. output line up to injection point

Inverter voltage 480 Vac tri
Loss Fraction 2.00 % at STC
Inverter: Sunny Highpower PEAK3 SHP125-US (480Vac)
Wire section (8 Inv.) Alu 8 x 3 x 240 mm²
Average wires length 235 m



Project: Palmdale Water District - Tank 6MG

Variant: TKR_Contract_V1.0_20221122

PVsyst V7.2.21

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Distributed Solar Development

Horizon definition

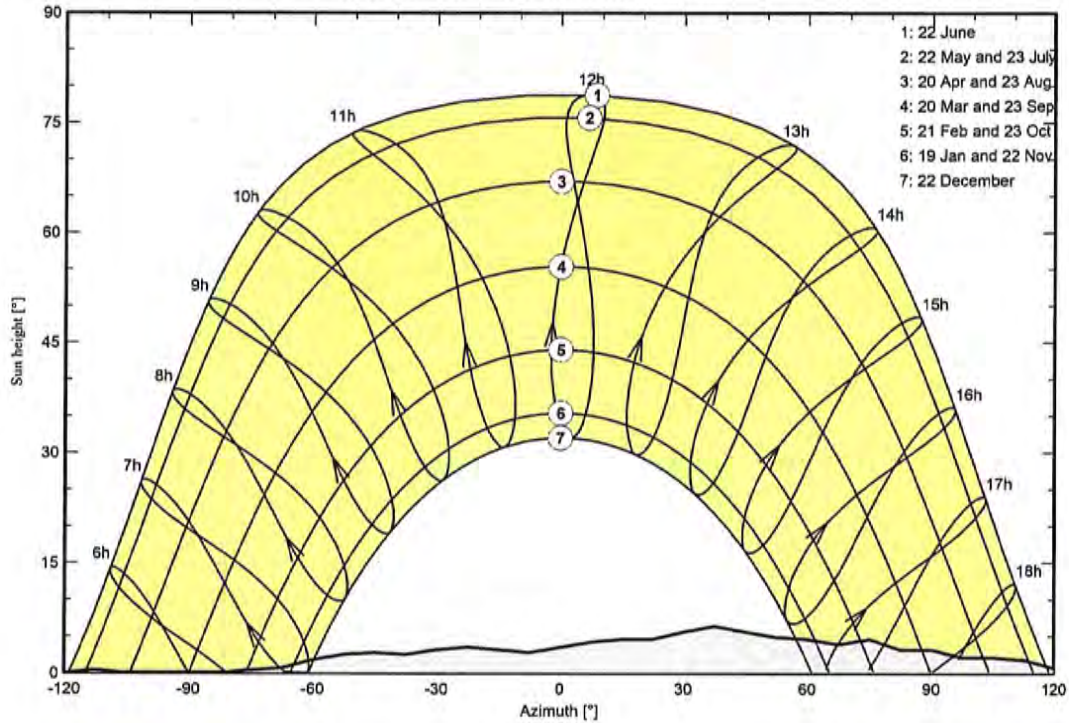
CSV horizon file, lat:34.565279, lng:-118.116916, exported by solargis.info at 2

Average Height	2.0 °	Albedo Factor	0.85
Diffuse Factor	0.97	Albedo Fraction	100 %

Horizon profile

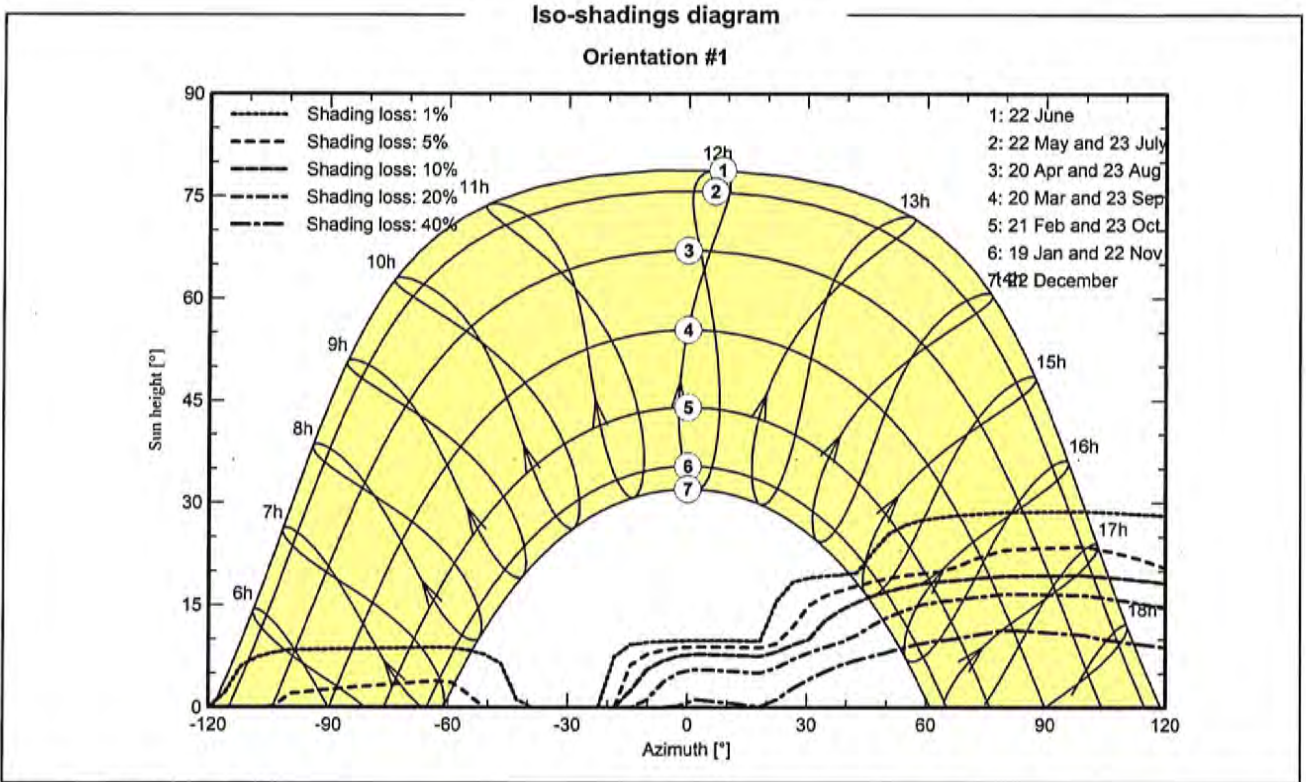
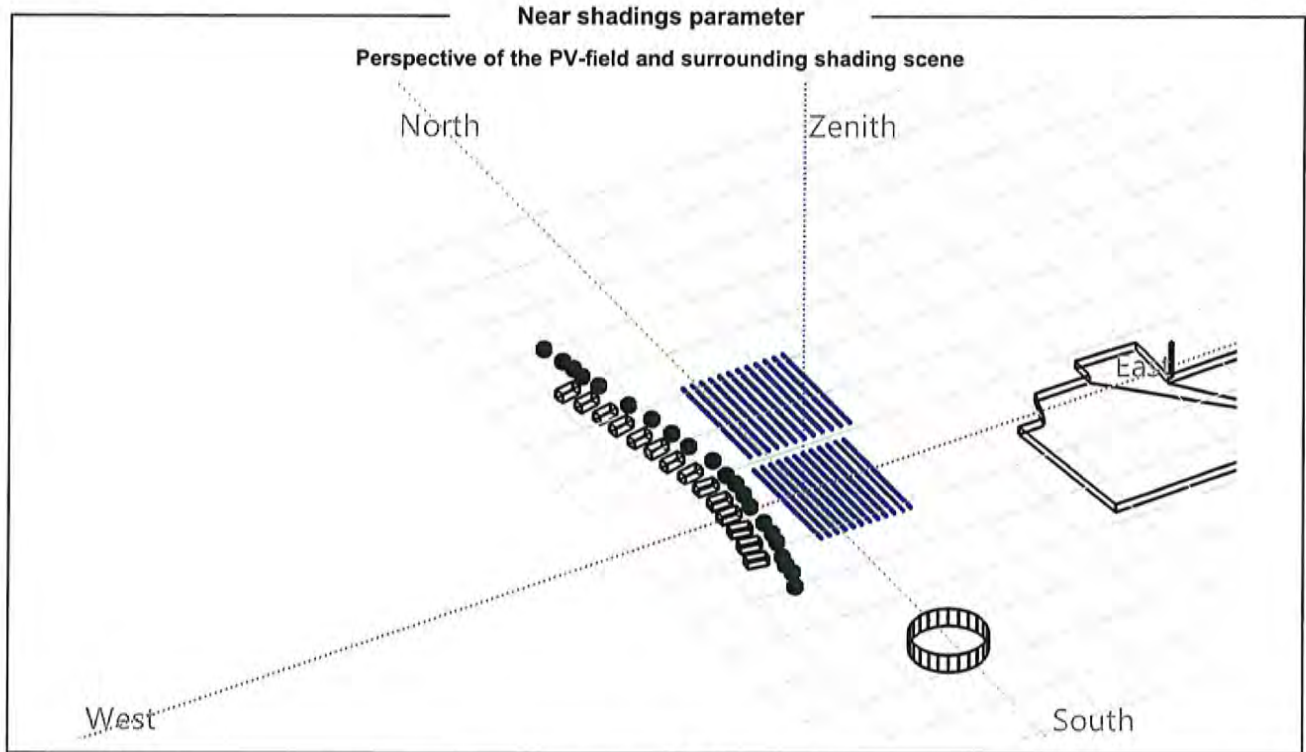
Azimuth [°]	-180	-120	-113	-105	-83	-75	-68	-60	-53	-45	-38	-30
Height [°]	0.0	0.0	0.4	0.0	0.0	0.4	0.7	1.8	2.5	2.8	2.5	3.2
Azimuth [°]	-23	-15	-8	0	8	15	23	30	38	45	53	60
Height [°]	3.5	3.2	2.8	3.5	4.2	4.6	4.6	5.6	6.4	5.6	4.9	4.6
Azimuth [°]	68	75	83	90	98	105	113	120	143	150	158	173
Height [°]	3.9	4.6	3.2	3.2	2.1	2.1	1.8	0.7	0.7	1.1	0.4	0.4

Sun Paths (Height / Azimuth diagram)





Distributed Solar Development





Project: Palmdale Water District - Tank 6MG

Variant: TKR_Contract_V1.0_20221122

PVsyst V7.2.21

VC4, Simulation date:
22/11/22 15:21
with v7.2.21

Distributed Solar Development

Main results

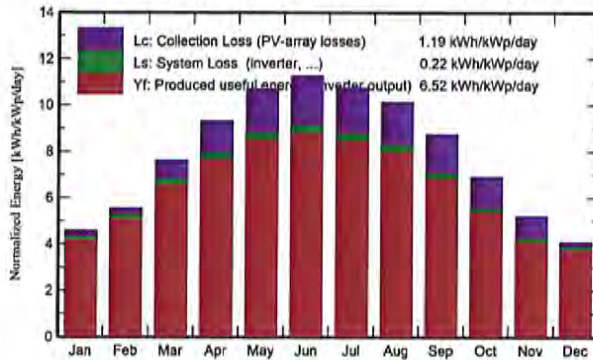
System Production

Produced Energy 2915892 kWh/year

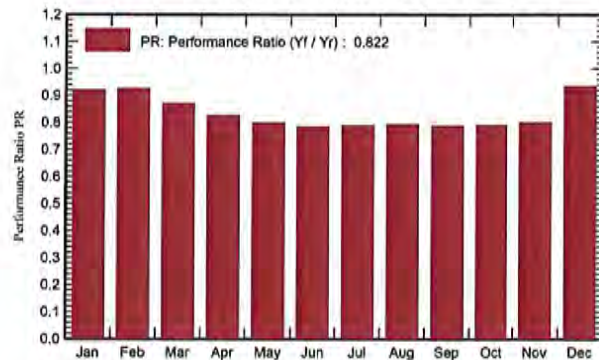
Specific production
Performance Ratio PR

2380 kWh/kWp/year
82.21 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	100.7	28.95	8.60	143.2	136.7	166413	161606	0.921
February	114.0	36.01	9.24	155.9	150.4	182729	177019	0.927
March	173.2	48.89	12.81	236.7	225.3	261444	252596	0.871
April	209.7	55.41	12.96	280.2	264.1	294191	283968	0.827
May	248.4	54.96	19.46	332.2	308.6	337006	325264	0.799
June	254.5	51.58	23.79	338.6	309.4	337161	325503	0.785
July	250.7	56.63	26.10	334.1	300.2	334929	323531	0.791
August	230.7	39.33	23.46	314.4	278.5	316464	305653	0.794
September	189.2	38.11	22.70	262.3	227.8	262342	253858	0.790
October	151.9	32.54	18.07	214.2	182.0	214040	207636	0.791
November	110.5	27.42	12.82	156.7	130.5	157856	153615	0.800
December	91.0	26.93	8.70	127.1	122.1	149779	145645	0.935
Year	2124.4	496.75	16.60	2895.6	2635.7	3014353	2915892	0.822

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		



Project: Palmdale Water District - Tank 6MG

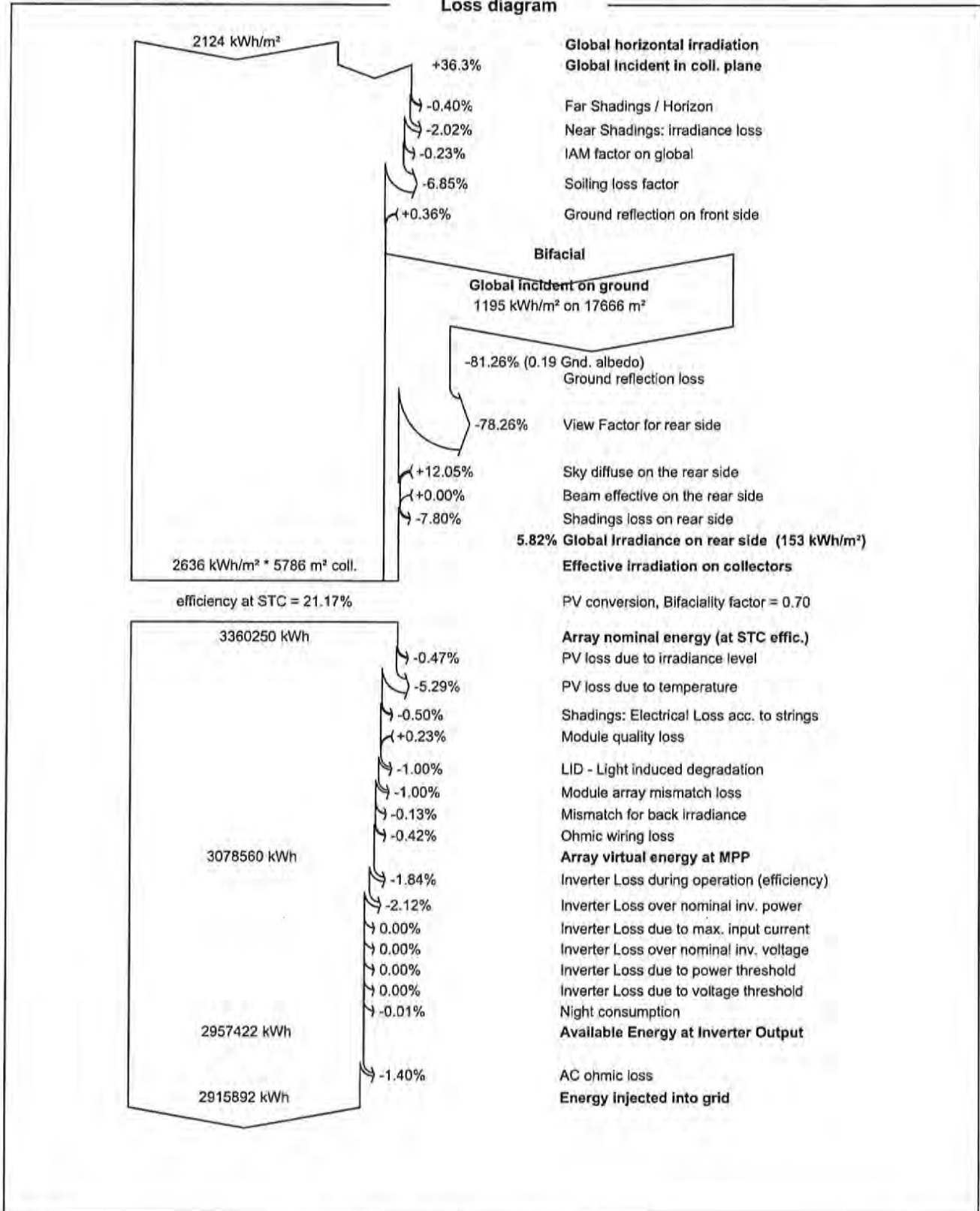
Variant: TKR_Contract_V1.0_20221122

PVsyst V7.2.21

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with v7.2.21

Distributed Solar Development

Loss diagram



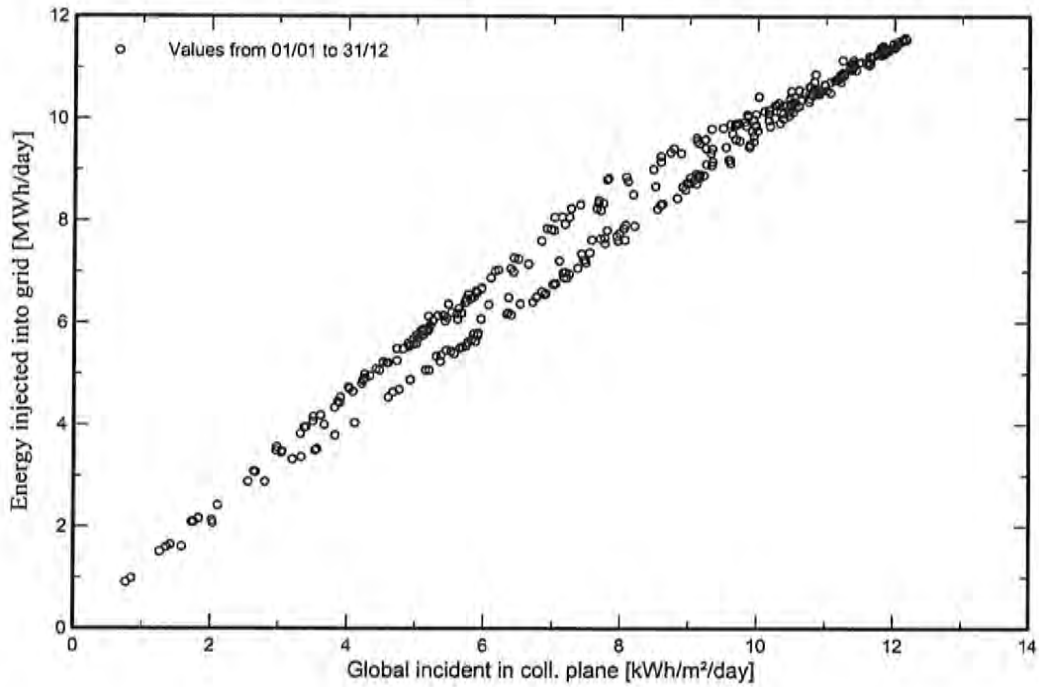


PVsyst V7.2.21
VC4, Simulation date:
22/11/22 15:21
with v7.2.21

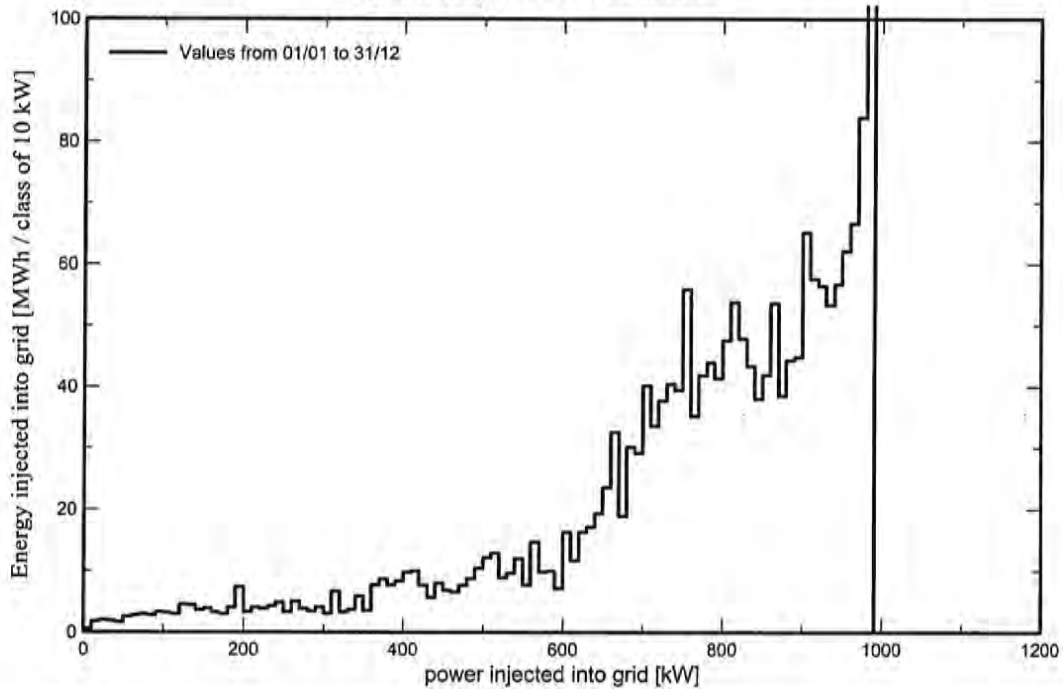
Distributed Solar Development

Special graphs

Daily Input/Output diagram



System Output Power Distribution





Project: Palmdale Water District - Tank 6MG

Variant: TKR_Contract_V1.0_20221122

PVsyst V7.2.21

VC4, Simulation date:
22/11/22 15:21
with v7.2.21

Distributed Solar Development

P50 - P90 evaluation

Meteo data

SourceSolar Anywhere, satellite data, SUNY model
Kind TMY, multi-year
Year-to-year variability(Variance) 2.5 %
Specified Deviation
Climate change 0.0 %

Global variability (meteo + system)

Variability (Quadratic sum) 3.1 %

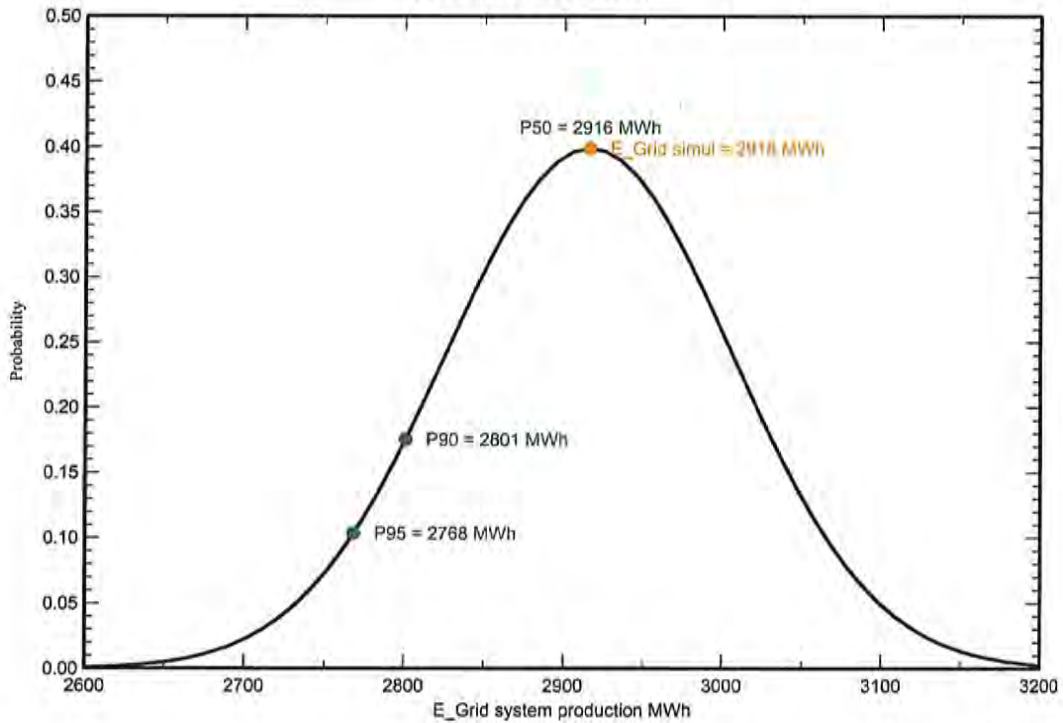
Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %

Annual production probability

Variability	90 MWh
P50	2916 MWh
P90	2801 MWh
P95	2768 MWh

Probability distribution



POWER PURCHASE AGREEMENT

by and between

East Avenue Q Solar Project 2022, LLC

and

Palmdale Water District

dated

_____, 2022

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POWER PURCHASE AGREEMENT

This Power Purchase Agreement (“**Agreement**” or “**PPA**”) is made and entered into as of this 12th day of December, 2022, (“**Effective Date**”), between East Avenue Q Solar Project 2022, LLC (“**Provider**”), and the Palmdale Water District (“**District**”). District and Provider are collectively referred to herein as “**Parties**” and individually as “**Party**.”

RECITALS

WHEREAS, Provider is in the business of installing and operating solar photovoltaic and battery energy storage facilities and selling electric energy generated from such facilities;

WHEREAS, Government Code section 4217.10 *et seq.* provides that public agencies may enter into agreements, including but not limited to, lease agreements, for real property upon which alternative energy facilities may be constructed so that the public agency may purchase the energy generated from the facilities constructed on the real property under a power purchase agreement; and

WHEREAS, the governing body of District has made those findings required by Section 4217.12 of the Government Code that: (i) the anticipated cost to District for electrical energy services provided by the solar photovoltaic and battery energy storage system under this Agreement will be less than the anticipated marginal cost to District of electrical energy that would have been consumed by District in the absence of those purchases and (ii) the difference, if any, between the fair market value of the right to access and occupy the real property subject to this Agreement and related payments under this Agreement, if any, is anticipated to be offset by below-market energy purchases or other benefits provided under this Agreement; and

WHEREAS, District desires to reduce its energy costs as well as its dependence on fossil fuel electric generating resources and to promote the generation and storage of electricity from solar photovoltaic and battery energy storage facilities; and

WHEREAS, Provider desires to design, install, own, maintain, and operate a solar photovoltaic and battery energy storage system including all solar photovoltaic panels and equipment components of the solar photovoltaic system (a “**Solar Facility**”) and the battery energy storage system and all equipment components (the “**BESS**”) (collectively the “**System**”) on the real property (the “**Site**”) owned by the District, and Provider shall sell the output from the Solar Facility and provide services from the BESS to District at those rates set forth herein (collectively the “**Project**”); and

WHEREAS, Provider has developed an ownership and financing structure for the System, which facilitates the use of certain tax incentives, and accelerated depreciation to reduce the expected investment returns of its investors, and which benefits District by offering a competitive Power Price, as defined herein; and

WHEREAS, District desires to provide Provider an easement for the sole purpose of accessing District’s property to install, operate, maintain and repair the System; and

WHEREAS, as part of this PPA and in consideration of the easement, Provider and District intend that Provider would obtain title, an ownership interest, and retain all financial incentives and tax benefits generated by the System and associated with the development of the System, including the installation, ownership and operation of the System and the sale of energy and services from the System to District.

NOW, THEREFORE, in consideration of the promises and the mutual benefits from the covenants hereinafter set forth, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound, Provider and District hereby agree as follows:

AGREEMENT

1. Definitions.

Capitalized terms used in this Agreement shall have the meanings ascribed to them herein or in the attached Exhibit A.

2. Term.

A. Term. The Term of this Agreement shall commence upon the Effective Date and terminate automatically on the Expiration Date (“**Initial Term**”), unless terminated earlier as provided herein. The Parties may mutually agree to renew this Agreement for up to two (2) five-year renewal terms (“**Renewal Term**”). The Initial Term and all subsequent Renewal Terms are referred to collectively as “**Term**.” This Agreement shall terminate automatically and concurrently with any termination of the Site Easement provided by this Agreement.

3. Removal of System.

A. Removal of System. Within one hundred eighty (180) Days of the expiration or any termination of this Agreement (unless District has: (i) purchased the System under the terms of this Agreement, including, without limitation, all applicable requirements under Article 5, below; or (ii) otherwise consented in writing to allowing the System to remain installed on the Site), Provider shall, in coordination with District and, except as otherwise provided herein, at Provider’s sole cost and expense, remove the System from the Site. Provider shall bear the cost of any required storage of the System, if necessary, during Provider’s removal of the System.

B. Removal and Site Restoration. Removal of the System shall include all installed equipment, including, but not limited to, the System and all tangible and structural support materials, as well as all appurtenant equipment, above and below ground (except for empty conduits). Provider shall additionally restore the Site to a condition substantially similar to the pre-installation condition of the Site, excluding ordinary wear and tear, through reasonable efforts. Provider’s restoration of the Site shall include, but is not limited to, any refinishing, landscaping, hardscaping, painting or other finish work, and cleaning. Provider shall undertake any repairs

necessary as a result of such removal and restoration. The Parties shall reasonably coordinate all such removal, restoration, storage and transportation activities and dates.

C. Failure to Remove. If Provider fails to comply with this Section 3 and remove the System and restore the Site as required within such one-hundred and eighty (180) day period, District shall have the right, but not the obligation, to remove the System and restore the Site and charge Provider for the reasonable costs incurred by District, which cost shall include, the reasonable value of administrative time and resources as reasonably documented. The Parties shall reasonably coordinate all such removal and pick-up activities. In the event that the Provider does not remove the System as specified herein, District shall also have the option of allowing the System to remain in place and Provider shall transfer title to the System to the District and the District shall become the beneficial owner of the System at no cost to the District including without limitation fees related to termination or default and with no further obligations or liability of Provider other than for liabilities accrued prior to the date of transfer of ownership. This Section shall not be interpreted to limit District's other available lawful remedies.

4. Purchase and Sale of Output and BESS Services.

A. Purchase and Sale of Output. Beginning on the Commercial Operation Date and through the remainder of the Term, Provider agrees to sell and District agrees to buy all Output from the Solar Facility at the applicable Power Price as set forth in Exhibit B, and BESS Services at the applicable BESS Rate, as set forth in Exhibit C. District shall have no obligation to pay for Output delivered from the Solar Facility or BESS Services after the expiration date of this Agreement or the early termination thereof.

B. Cost Reimbursement. The Parties acknowledge that District will incur costs associated with this Project including amounts payable by District to third-party engineers, consultants, legal counsel, inspectors, and other costs related to the District's undertaking of the Project ("**Development Costs**"). The Power Price set forth in Exhibit B includes consideration for reimbursement of Development Costs in the amount of \$678,215 which shall be paid by Provider to District based on the following schedule:

- 1) 50% of the Development Costs within fifteen (15) days of the Notice to Proceed;
and
- 2) 50% of the Development Costs within fifteen (15) days of the Commercial Operation Date.

C. Adjustment to Power Price. The Parties acknowledge that the Power Price set forth in Exhibit B is based on assumptions by Provider regarding the items outlined below. The Provider shall be solely responsible for ensuring compliance with applicable legal requirements of all Federal Investment Tax Credit ("**ITC**") incentives necessary to achieve their assumed ITC rate. Provider assumes the risk that Provider may not achieve their assumed ITC incentive rate. Notwithstanding the foregoing, the Parties acknowledge that the Power Price shall be adjusted, if (and only if) the assumptions provided in this Section 4(C) are inaccurate, as follows:

- 1) Distribution Utility Upgrades Adder: Provider assumed that the total cost to be paid to the Distribution Utility in connection with the Distribution Utility Upgrades would be \$250,000. If the actual cost reasonably incurred by Provider for Distribution Utility Upgrades exceeds \$250,000, then a proportionate increase of the Power Price in an amount of \$0.0001/kWh for each additional \$10,000 increase in cost will be required. Provider will notify the District of the actual Distribution Utility Upgrade costs within five (5) Days of receipt from the Distribution Utility, and in all cases, prior to District acceptance of any such changes as contemplated under Sections 6(A) or satisfaction of the District's Conditions Precedent under Section 6(B). If the Power Price increases in an amount in excess of \$0.0015/kWh ("**Distribution Utility Upgrade Cap**") as a result of Distribution Utility Upgrades the Parties will engage in good faith negotiations to adjust the Power Price or System specifications to accommodate the actual Distribution Utility Upgrade costs for a period of thirty (30) days after Provider provides such notice. If the Parties, in good faith, fail to reach agreement on an amendment to this Agreement regarding such adjustments within a thirty (30) day period, Provider may (i) terminate this Agreement which termination shall not comprise a default under this Agreement, nor shall such termination result in any further liability to either Party including, without limitation, any default provision which would otherwise require payment of the Termination Value; or (ii) elect to proceed with the Power Price equal to the Distribution Utility Upgrade Cap. If the actual cost reasonably incurred by Provider for Distribution Utility Upgrades is less than \$250,000, District shall be entitled to a proportionate decrease of the Power Price in an amount of \$0.0001/kWh per \$10,000 decrease in cost. Provider shall work diligently with District to minimize the costs for Distribution Utility Upgrades at all points of the Project.

- 2) District Equipment Adder. Provider assumed that the total cost to Provider for District owned equipment upgrades would be \$58,500 ("Assumed District Upgrade Costs"). If the actual costs incurred by Provider for District owned equipment upgrade costs ("**District Upgrade Costs**") exceeds the Assumed District Upgrade Costs, then a proportionate increase to the Power price in an amount of \$0.0001/kWh for each additional \$10,000 increase in cost will be required. Provider will notify District of the actual District Upgrade Costs within five (5) Days of receipt of a firm bid for such costs, and in all cases, prior to District acceptance of any such changes as contemplated under Sections 6(A) or satisfaction of the District's Conditions Precedent under Section 6(B). If the Power Price increases in an amount in excess of \$0.0005/kWh ("**District Upgrade Costs Cap**") as a result of District Upgrade Costs, the Parties will engage in good faith negotiations to adjust the Power Price or System specifications to accommodate the actual District equipment upgrade requirement costs for a period of thirty (30) days after Provider provides such notice. If the Parties, in good faith, fail to reach agreement on an amendment to this Agreement regarding such adjustments within a thirty (30) day period, Provider may (i) terminate this Agreement which termination shall not comprise a default under this Agreement, nor shall such termination result in any further liability to either Party including, without limitation, any default provision which would otherwise require payment of the Termination Value; or (ii) elect to

proceed with the Power Price equal to the District Equipment Upgrade Requirements Cap. If the actual cost reasonably incurred by Provider for District Upgrade Costs is less than \$58,500, District shall be entitled to a proportionate decrease of the Power Price in an amount of \$0.0001/kWh per \$10,000 decrease in cost. Provider shall work diligently with District to minimize the costs for District Upgrade Costs at all points of the Project.

- 3) Solar Facility Federal Investment Tax Credit Domestic Content Adder. Within two (2) months of the applicable Governmental Authority issuing final guidance regarding the eligibility requirements for the ITC 10% adder related to meeting domestic content requirements (“**Solar Facility ITC Domestic Content Adder**”), Provider shall provide District with their determination on the Project eligibility. If the Project is eligible for the Solar Facility ITC Domestic Content Adder, District shall be entitled to a decrease of the Power Price by \$0.0103/kWh for each additional \$477,203 increase in the net benefit to the Project of the Solar Facility ITC Domestic Content Adder, taking into account any additional work, requirements, or costs incurred by Provider in qualifying for the Solar Facility ITC Domestic Content Adder. Provider shall pursue the Solar Facility ITC Domestic Content Adder diligently in good faith; provided, however, Provider shall not be required to pursue the Solar Facility ITC Domestic Content Adder if Provider reasonably determines that the Solar Facility ITC Domestic Content Adder will provide no or marginal net benefit to the Project. If an additional EPC cost to Provider is identified, then Provider shall provide written confirmation of the additional EPC cost and the resulting impact to the Power Price.
- 4) Reserved.
- 5) Solar Facility Federal Investment Tax Credit Low Income Adder. Within two (2) months of the applicable Governmental Authority issuing final guidance regarding the eligibility requirements for the ITC 10% adder related to meeting the low-income siting requirements, (“**Solar Facility ITC Low Income Adder**”), Provider shall apply to the applicable Governmental Authority for determination on Project eligibility. Within one (1) month of response from the applicable Governmental Authority, Provider shall notify the District in writing of the Project eligibility for the Solar Facility ITC Low Income Adder. If the Project is eligible for the Solar Facility ITC Low Income Adder, District shall be entitled to a decrease of the Power Price by \$0.0103/kWh. Provider shall pursue the Solar Facility ITC Low Income Adder diligently in good faith.
- 6) Reserved.

D. Provider’s Solar Facility Output Guarantee. Commencing with the third (3rd) Contract Year after the Commercial Operation Date of the System, and for each subsequent three Contract Year Period thereafter during the Initial Term, the aggregate metered Output from the Solar Facility for the previous Contract Year (the “**Measurement Period**”) shall be at least ninety-five percent (95%) of the Annual Production Estimate for such Measurement Period for the Solar Facility as defined in Exhibit B (“**Output Guarantee**”); provided, the Output Guarantee for any

Measurement Period will be reduced by the estimated generation of the Solar Facility that would have been generated during such Measurement Period, but was not generated, due to one or more of the following causes: (i) an Outage; (ii) the actions or omissions of the Distribution Utility or the request or direction of the Distribution Utility; (iii) a Force Majeure event; (iv) new soiling in excess of what is shown in the production modeling completed by the Provider and as shown in Exhibit J or shading sources, which, in each case, shall include only sources not in existence or otherwise discoverable as of the Effective Date, or preventable by Provider pursuant to its obligations under this Agreement, affecting the Solar Facility after the Commercial Operation Date overshadowing or otherwise blocking access or sunlight to the Solar Facility on or at the Site; (v) a breach of this Agreement by District; or (vi) Temporary Suspension by District.

If the Output delivered by the Solar Facility during any Measurement Period does not equal or exceed the Output Guarantee for such Measurement Period, Provider shall include in its next invoice to District (and in the final invoice for any credit owed for the final Contract Year) a credit for the Energy Shortfall Amount. Alternatively, District has the option to request that the Energy Shortfall Amount be paid by check independently of an invoice. Payment of the Energy Shortfall Amount, whether by credit or check, shall be the District's sole and exclusive remedy for Provider's failure to achieve the Output Guarantee for a Measurement Period.

E. Provider's BESS Guarantee. Commencing with the first (1st) Contract Year after the Commercial Operation Date of the System, and for each Contract Year thereafter during the Initial Term, Provider shall provide District with a BESS Guarantee pursuant to the terms of **Exhibit H.**

F. Resale of Output. If at any time during the term of this Agreement, the District reduces its consumption requirements for Output or BESS Output or District otherwise determines that the Distribution Utility or any other purchaser is willing to purchase Output or BESS Output from the System, District, at its option, may sell Output or BESS Output to the Distribution Utility or any other purchaser. If applicable and required by law, District may also request that Provider enter into negotiations with District to pursue a third-party sale agreement. Upon such request, Provider and District shall negotiate in good faith regarding the terms and conditions of the third-party sale agreement. The District shall reimburse Provider for any out-of-pocket expenses in connection with such actions and Provider shall not incur further liability with respect to such actions.

G. Net Metering, Credits and Storage of Output. Nothing in this Agreement shall limit District's ability during the term of this Agreement to participate in or otherwise take advantage of any current or future program or technology which may enable District to store Output or BESS Output at any Site or to export Output or BESS Output to any other site or to the Distribution Utility for any available energy credits, offsets, or revenue. District will give reasonable notice to Provider of its intention to undertake any such project or program and will coordinate with the Provider to ensure that the System, the terms and conditions of this Agreement and all associated warranties are reasonably preserved. The District shall reimburse Provider for any out-of-pocket expenses in connection with such actions and Provider shall not incur further liability with respect to such actions.

H. Grid Services Programs. From time to time, Provider or District may identify demand response or similar grid services programs, whereby the BESS can help meet demands of the electrical grid, or improve its reliability, by charging or discharging the BESS (or agreeing to make the BESS available for charging or discharging) for which the Provider is eligible to participate (collectively, a “**Grid Services Program**”). Provider shall only enroll the BESS in any Grid Services Program upon written agreement from the District. Nothing in this paragraph shall prohibit the District from notifying Provider of Grid Services Programs the District is eligible to participate in, and Provider shall undertake reasonable efforts to determine, in its sole discretion, whether to participate in such Grid Services Program. The District shall reimburse Provider for any out-of-pocket expenses in connection with such actions.

I. Outages. Provider may suspend delivery of Output or BESS Output as reasonably necessary for testing, maintaining, replacing and repairing the System, or in response to any Distribution Utility directive or dispatch order (an “**Outage**”). Provider shall take all steps necessary to minimize the duration and scope of any such Outage. In the event that an Outage is caused or prolonged by Provider’s negligent act or omission, Provider shall compensate District for the difference between the total electricity cost to the District for the applicable period of outage caused or prolonged by Provider’s negligent act or omission and the Power Price for each 15 minute interval that the Power Price is less than the electricity cost to the District. In such event, District shall provide Provider with evidence of the pricing for such applicable periods in the form of Distribution Utility bills during the outage period of the pricing for such applicable periods, and Provider shall provide the calculation and supporting documentation for determining these amounts, to the reasonable satisfaction of District. Except as set forth herein, District waives claims related to District’s costs of purchasing energy to replace what would have been produced by the System but for such Outages, along within any associated net metering, or similar, benefits.

If an Outage occurs under this Section and a payment is due from Provider to District, Provider shall include in its next invoice(s) to District (and in the final invoice for any credit owed for the final Contract Year) a credit for the difference between the electricity cost to the District for the applicable period.

J. Distribution Utility Electric Service. District may take parallel energy services from Distribution Utility.

5. Design, Construction, Operation & Maintenance.

A. All Provisions in this Article 5 shall apply to all activities of Provider undertaken in relation to the design, construction, installation, maintenance, repair, and operation of the System(s) throughout the Term of this Agreement.

B. Provider’s Contractor and Consultants. Provider shall ensure that any party contracting with Provider for any engineering, procurement, design, installation or construction of the System shall possess sufficient knowledge, experience, expertise, licensing, registration, and financial capacity and creditworthiness necessary for satisfactory completion of Provider’s obligations under this Agreement. The contractor performing the construction work on the Project shall possess a Class B and C-10 California Contractor State License, be a registered public works contractor in accordance with Labor Code Section 1725.5, and all other required licenses for

performing work under this Agreement, prior to performing any work on the Project. Provider represents and warrants that it has the financial capacity, creditworthiness and bonding sufficient to satisfy all of Provider's obligations under this Agreement, including, but not limited to, any instance of default or other failure by Provider's contractor(s) to complete the work required to satisfy Provider's obligations in this Agreement. Prior to contracting with any such party, Provider shall obtain and review the qualification of such party and complete any necessary background check or fingerprinting required by law or District. Provider shall further procure from the contractor performance and payment bonds and any other assurances as Provider deems reasonably necessary to secure contractor's timely completion of the Project.

C. Permits. Provider shall be solely responsible for ensuring that the System is constructed in compliance with all applicable laws, regulations and Permits, and in accordance with the standards set by any governmental program providing funding for the System, including, but not limited to, all improvements, conditions and mitigation measures required for compliance with the California Environmental Quality Act ("CEQA"). Except as otherwise provided herein, Provider shall, at Provider's sole cost and expense, obtain from all Governmental Authorities having jurisdiction over the Project, all necessary Governmental Approvals and other Permits and approvals required for the installation, operation and maintenance of the System, including, but not limited to fire safety, California Occupational Safety and Health Administration ("Cal/OSHA"), utility interconnection, right-of-way permits, easement agreements and other related requirements.

To the extent action is required by District, District shall, upon the request of Provider, use reasonable efforts to assist Provider in obtaining and retaining Permits, licenses, releases and other approvals necessary for the design, construction, engineering, installation, operation and maintenance of the System. Provider shall reimburse District for costs reasonably incurred by District in assisting the Provider under this Section. Except as otherwise provided herein, Provider shall be responsible for all costs, expenses and improvements to the extent required to obtain or comply with any permits, Government Approvals or other requirement under state or federal law made necessary as a result of the System installation, operation and maintenance. Specifically, the Provider is required to obtain and submit all documents to close out the Project with the Governmental Authorities having jurisdiction over the Project. In addition to stamped and approved plans, Provider shall provide any required installation compliance confirmation letter(s) to any applicable Governmental Authorities.

D. Inspections. Provider and District shall work together reasonably to mutually select any company that performs inspections of the materials and equipment for the design, engineering, procurement, construction or installation of the Systems, including, but not limited to, any inspections to verify the Systems' compliance with the Applicable Law. In the event of disagreement between Provider and District regarding selection of the aforementioned inspection company, the District shall select the company.

E. Notice of Output Interruptions. Each Party shall notify the other Party as soon as reasonably practicable following its discovery of any material malfunction of any System or interruption in the supply of electricity from any System. Each Party shall designate and advise the other Party of personnel to be notified in the event of such a malfunction or interruption.

Provider shall correct, or cause to be corrected, the conditions that caused the malfunction or interruption as soon as reasonably practicable. However, in no event shall Provider's response to investigate the problem and initiate appropriate corrective action be greater than two (2) business days following receipt of notice or upon discovery of such malfunction or interruption. In addition, Provider shall remotely monitor the System on a daily basis for the presence of alarm conditions and general performance utilizing the data acquisition systems and monitoring systems installed by the Provider at the Site, as described in Exhibit G.

F. Site Operations. Except in the event of an emergency, in order to prevent any unreasonable disturbance or interruption of District activities, Provider shall accommodate the District's normal operations schedule and scope of activities conducted on the Site during construction and on-going operation of the System pursuant to this Agreement. In the event of an emergency, comprising an imminent threat to the health and safety of persons and/or imminent threat of damage to or destruction of property, the District may take any and all actions to ensure safety of persons and property or comply with a compulsory demand of a competent Governmental Authority in the event of an emergency, including, without limitation, disconnection or shut-down of any System(s) in accordance with the training provided by Provider to District pursuant to Section 7.1 of Exhibit G ("Training"), incorporated herein by this reference; provided, the District shall be responsible for and shall indemnify, defend, and hold harmless Provider for any damage to or destruction of property, including, but not limited to, the System, and any damage or injury to persons, including, but not limited to, anyone acting for or on behalf of District who received the Training, in connection with the foregoing which fails to conform to the Training, and shall pay Provider an amount equal to the District Suspension Rate for the amount of time, if any, the System is not in Commercial Operation beyond the period of time necessary for the emergency due to damage to the System.

G. Operation and Maintenance of System. Provider shall be responsible for all operations, maintenance, and repair of the System, except to the extent that any maintenance or repair is made necessary by the sole or active negligent acts or omissions or willful misconduct of District. All maintenance, repairs and operations, shall be conducted in the manner set forth in this Agreement, and Provider shall reasonably accommodate and cooperate with District to ensure the District's activities, facility uses, and scheduling requirements are not unreasonably impeded. Provider's repair work responsibilities shall include, but are not limited to, any repair required as a result of damage caused by the Provider or its contractors, subcontractors or vendors, to the District's facilities within a period of five (5) years following the date the damage was discovered or reasonably should have been discovered by the District. Except to the extent of the District's active negligence or material breach of this Agreement, Provider is responsible for repairs and/or replacement of system components that are damaged from vandalism, theft or criminal activity.

H. Prevailing Wages. This Project is subject to compliance with the prevailing wage provisions of the California Labor Code and the prevailing wage rate determinations of the Department of Industrial Relations. These rates are on file at District's main office or may be obtained online at <http://www.dir.ca.gov/dlsr>. A copy of these rates shall be posted at the job site by Provider. Provider and all contractors and subcontractor(s) under it, shall comply with all applicable Labor Code provisions, which include, but are not limited to the payment of not less than the required prevailing rates to all workers employed by them in the execution of this PPA

and the employment of apprentices. Provider hereby agrees to indemnify and hold harmless District, their officials, officers, agents, employees and authorized volunteers from and against any and all claims, demands, losses or liabilities of any kind or nature which District, their officials, officers, agents, employees and authorized volunteers may sustain or incur for noncompliance with any applicable Labor Code provisions arising out of or in connection with the Project.

(a) Wages.

(i) Pursuant to the provisions of Article 2 (commencing at Section 1770), Chapter 1, Part 7, Division 2 of the Labor Code of California, the governing body of District has ascertained the general prevailing rate of per diem wages in the locality in which this public work is to be performed for each craft, classification, or type of workmen needed to execute the Agreement.

(ii) Per Diem wages shall be deemed to include employer payments for health and welfare, pension, vacation, travel time and subsistence pay as provided in Labor Code § 1773.1 apprenticeship or other training programs authorized by Labor Code § 3093, and similar purposes when the term “per diem wages” is used herein.

(iii) Each worker needed to execute the Work must be paid travel and subsistence payments as defined in the applicable collective bargaining agreements in accordance with Labor Code § 1773.1.

(iv) Holiday and overtime work when permitted by law shall be paid for at a rate of at least one and one-half times the above specified rate of per diem wages, unless otherwise specified.

(v) Each worker in work on the System on District’s Property shall be paid not less than the prevailing wage rate, regardless of any contractual relationship which may be alleged to exist between Provider, or any subcontractors of Provider, and such workers.

(vi) Provider shall, as a penalty to the District, forfeit an amount as determined by the Labor Commissioner pursuant to Labor Code § 1775 for each calendar day, or portion thereof, for each worker paid less than the prevailing rate as determined by the director for such work or craft in which such worker is employed for any public work done under the contract by him or by any subcontractor under him. The difference between such prevailing wage rate and the amount paid to each worker for each calendar day or portion thereof, for which each worker was paid less than the prevailing wage rate, shall be paid to each worker by Provider.

(vii) Any worker employed to perform work on the System which is not covered by any classification available in the District office, shall be paid not less than the minimum rate of wages specified for the classification which most nearly corresponds with work to be performed by him, and that minimum wage rate shall be retroactive to the time of initial employment of the person in the classification.

(b) Record Of Wages Paid: Inspection. Pursuant to Labor Code § 1776, Provider stipulates to the following:

(i) Provider and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the Project. Such records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information of such forms. The payroll records may consist of payroll data that are maintained as computer records, if printouts contain the same information as the forms provided by the division and the printouts are verified as specified in subdivision (a) of Labor Code § 1776.

(ii) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of Provider, or Provider's subcontractors, on the following basis:

(iii) A certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his or her authorized representative.

(iv) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished to a representative of the District, and to the Division of Labor Standards Enforcement, and Division of Apprenticeship Standards of the Department of Industrial Relations.

(v) A certified copy of all payroll records enumerated in subdivision (a) shall be made available to the public for inspection or copies thereof. However, a request by the public shall be made through either the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to the above, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Provider, subcontractors, and the entity through which the request was made. The public shall not be given access to such records at the principal office of Provider or Provider's subcontractors.

(vi) Provider shall file, or caused to be filed, a certified copy of the records enumerated in subdivision (a) with the entity that requested such records within ten (10) days after receipt of the written request.

(vii) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency, by the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of Provider or subcontractors performing the work shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual's name and social security number. Notwithstanding any other provision of law, agencies that are included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the

Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided non-redacted copies of certified payroll records.

(viii) Provider shall inform the District of the location of the records enumerated under subdivision (a), including the street address, city, and county, and shall, within five (5) working days, provide a notice of a change of location and address.

(ix) In the event of noncompliance with the requirements of this Section, Provider shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Provider must comply with this Section. Should noncompliance still be evident after such 10-day period, Provider shall pay a penalty in the amount prescribed by statute to the District for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from the progress payment then due.

(x) The responsibility for compliance with this Section shall rest upon Provider.

(c) Hours Of Work.

(i) As provided in Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, Provider stipulates that eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by Provider or by the work or upon any part of the work contemplated by this contract is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, work performed on the District's Property by employees or subcontractors of Provider in excess of eight (8) hours per day and forty (40) hours during any one week upon this public work shall be permitted compensation of all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

(ii) Provider shall pay to the District a penalty in the amount prescribed by statute for each worker employed in the execution of these Construction Provisions by Provider or by any Subcontractor for each calendar day during which such workman is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one calendar week in violation of the provisions of Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation to the worker so employed by Provider is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

(iii) Any work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to District, unless otherwise agreed to by the parties.

(iv) Construction work under the Construction Provisions shall be accomplished on a schedule consistent with the normal and reasonable practices of Provider and in compliance with applicable ordinances.

(d) Apprentices.

(i) All apprentices employed by Provider to perform services under these Construction Provisions shall be paid the standard wage paid to apprentices under the regulation of the craft or trade at which that apprentice is employed, and shall be employed only at the work of the craft or trade in which that apprentice is registered. Only apprentices, as defined in Labor Code § 3077, who are in training under apprenticeship standards and written apprenticeship agreements under Chapter 4 (commencing at Section 3070), Division 3 of the Labor Code, are eligible to be employed under these Construction Provisions. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprenticeship agreements under which that apprentice is training.

(ii) When Provider to whom the work under these Construction Provisions is awarded by the District or any Subcontractor under Provider, in performing any of the work under the Construction Provisions, employs workers in any apprenticeable craft or trade, Provider and Subcontractor shall apply to the joint apprenticeship committee administering the apprenticeship standards of the craft or trade in the area of the Site of the public work, for a certificate approving Provider or Subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, approval as established by the joint apprenticeship committee or committees shall be subject to the approval of the Administrator of Apprenticeship. Provider or Subcontractors shall not be required to submit individual applications for approval to local joint apprenticeship committees provided they are already covered by the local apprenticeship standards. The ratio of work performed by apprentices to journeymen, who shall be employed in the craft or trade on the public work, may be the ratio stipulated in the apprenticeship standards under which the joint apprenticeship committee operates, but in no case shall the ratio be less than one hour of apprentice work for each five (5) hours of labor performed by a journeyman, except as otherwise provided in Section 1777.5 of the Labor Code. However, the minimum ratio for the land surveyor classification shall not be less than one apprentice for each five journeymen.

(iii) “Apprenticeable craft or trade” as used in Labor Code § 1777.5 and this Article, means a craft or trade determined as an apprenticeable occupation in accordance with rules and regulations prescribed by the Apprenticeship Council.

(iv) Provider, or any Subcontractor which, in performing any of the work under this contract, employs journeymen or apprentices in any apprenticeable craft or trade and which is not contributing to a fund or funds to administer and conduct the apprenticeship programming of any craft or trade in the area of the Site of the public work, to which fund or funds other Providers in the area of the Site of the public work are contributing, shall contribute to the fund or funds in each craft or trade in which that Provider employs journeymen or apprentices on the public work in the same amount or upon the same basis and in the same manner as other Providers do, but where the trust fund administrators are unable to accept the funds, Providers not signatory to the trust agreement shall pay like amount to the California Apprenticeship Council. Provider or Subcontractor may add the amount of such contributions in computing their bid for the contract. The Division of Labor Standards Enforcement is authorized to enforce the payment of the contributions to the fund or funds as set forth in Labor Code § 227.

(v) The responsibility of compliance with Labor Code § 1777.5 and this Article for all apprenticeable occupations is with Provider.

(vi) The interpretation and enforcement of Sections 1777.5 and 1777.7 of the Labor Code shall be in accordance with the rules and procedures of the California Apprenticeship Council.

I. Community Workforce Agreement. Provider shall acknowledge, accept and adhere to the terms of the Community Workforce Agreement by and between District and the Los Angeles/Orange Counties Building and Construction Trades Council and the Signatory Craft Councils and Unions provided in the Bid Documents. “Bid Documents” refers to all of the documents included in the solicitation of bids for the Project.

J. Safety Precautions and Programs. Provider shall ensure that its contractor and subcontractors performing work on the Site comply with the following safety precautions.

- a. Provider's contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the construction and installation of the Systems, for maintaining all safety and health conditions on each site and for ensuring against and/or correcting any hazardous conditions on the site.
- b. Certain work may be ongoing at the time employees are onsite; therefore, Provider's contractor shall take precautions to prevent injury and access to staff and shall comply with the District's guidelines for onsite safety. Material storage and vehicle access and parking shall be subject to District approval.
- c. The use of alcohol, drugs, or tobacco will not be permitted on District property. Workers employed by Provider's contractor or subcontractors shall have no contact with employees. All workers will present themselves with appropriate language, actions and work wear while on construction site.
- d. Provider's contractor shall designate a responsible member of its organization at the Site whose duty shall be the prevention of accidents and overall jobsite safety for contractor/subcontractor employees and visitors.

K. Conduct of Project Construction, Installation, Alteration, Operation, Repair, Maintenance and Removal. Throughout the Term of this Agreement, all work of construction, installation, alteration, operation, repair, maintenance and removal of the Projects shall conform with the following:

- a. Provider shall not leave debris under, in, or about the Site, but shall promptly remove same from the Site and dispose of it in a lawful manner.
- b. Provider shall remove rubbish and debris on a daily basis during the period of its activities at the Site.
- c. When performing activities at the Site Provider shall enclose the working area with temporary fencing. Provider shall coordinate with District's designated contact to

develop a mutually agreeable schedule for any activity at the Site to mitigate any inconvenience to or disruption of staff in their regular activities and to otherwise eliminate any substantial interference with normal operations of the Site.

- d. Provide fencing and/or demarcations around any shrubs or trees indicated to be preserved, sufficient to protect such foliage from substantial damage that might ordinarily occur during activities of the kind undertaken by Provider at the Site.
 - e. Deliver personnel, tools, equipment and materials to the work area over route(s) reasonably designated by the District, provided that District ensures that Provider shall have all access rights necessary to use such designated routes.
 - f. Take commercially reasonable measures to mitigate objectionable dust, noise, or other disturbances as necessary to ensure Provider's activities do not result in substantial interference with or disruption of regular Site activities and normal operations of the Site.
 - g. Confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits or the reasonable directions of the District, not unreasonably encumber Site or overload any structure with materials, enforce all reasonable instructions of the District regarding signs, advertising, fires, and smoking and require that all workers comply with all District's regulations while on the Site.
 - h. Upon completion activities on the Site, Provider shall remove temporary utilities, fencing, barricades, planking, sanitary facilities and all similar temporary facilities from Site.
 - i. Provider shall remain strictly liable to District for all damages to District's property caused or contributed to by Provider, its employees and/or agents and shall, upon written demand by District, restore all District property damaged by Provider, its employees and/or agents to substantially the condition in which it was prior to said damage occurring at the sole cost and expense of Provider.
- L. Unexpected Conditions. If, after Provider has conducted reasonable due diligence and inspection of the Site on which the System will be located, Provider incurs material delays or material additional costs to re-design, construct, install or maintain the System due to (i) unforeseen subsurface conditions that materially differ from those that could reasonably be expected to be encountered by an experienced and prudent solar developer or should reasonably have been identified by an experienced and prudent solar developer as part of developer's due diligence), (ii) Hazardous Substances at the Site, or (iii) the inaccuracy of any information provided by the District and relied upon by Provider which information Provider did not, nor reasonably could have, discovered through reasonable due diligence and inspection of actual conditions, then the Parties shall negotiate in good faith an equitable adjustment to the pricing, schedule and other terms of this Agreement. If the Parties are unable to mutually agree on such an equitable adjustment within thirty (30) days, the Provider may terminate this Agreement and the Site Easement upon ten (10) day's

written notice to the District without any cost or liability other than its removal obligations hereunder. For the avoidance of doubt, “material additional costs” related to unforeseen subsurface conditions includes, but is not limited to, if driven support posts are unable to achieve required embedment depth due to refusal, resulting in the need to use an alternative foundation design for more than half of the foundations to be installed.

- a. "Hazardous Substance" means any chemical, waste or other substance (i) which now or hereafter becomes defined as or included in the definition of "hazardous substances," "hazardous wastes," "hazardous materials," "extremely hazardous wastes," "restricted hazardous wastes", "toxic substances," "toxic pollutants," "pollution," "pollutants," "regulated substances," or words of similar import under any Environmental Laws, (ii) which is declared to be hazardous, toxic, or polluting by any Governmental Authority, (iii) exposure to which is now or hereafter prohibited, limited or regulated by any Governmental Authority, (iv) the storage, use, handling, disposal or release of which is restricted or regulated by any Governmental Authority, or (v) for which remediation or cleanup is required by any Governmental Authority.
- b. "Environmental Law" means any applicable federal, state, municipal or local law, statute, rule, regulation, ordinance, code, judgment, decree or decision implementing any of the foregoing by any Governmental Authority relating to (i) the protection of the air, water, land or natural resources or (ii) the generation, use, handling, treatment, storage, disposal and transportation of Hazardous Substances.

6. Commercial Operation Date; Conditions Precedent; Notice to Proceed.

A. Provider’s Conditions Precedent to Construction. Provider’s obligations to install the System and sell electric energy generated by the System to the District are conditioned on the completion of the following conditions to Provider and District’s satisfaction, which Provider shall exercise diligent effort to achieve, (“**Provider’s Construction Conditions Precedent**”) within eight (8) months of the Effective Date:

- 1) Provider shall have completed all design and engineering of the System(s) in accordance with the requirements of Article 5, above, including, without limitation, having obtained all necessary approvals, permits and entitlements precedent to construction or installation.
- 2) Provider shall submit to District certificates of insurance and endorsements demonstrating compliance with the requirements defined in Section 17 of this Agreement and carriage of workers’ compensation insurance.
- 3) Provider shall submit to District the certificates in a form provided by District regarding compliance with, tobacco use and drug use.
- 4) Provider shall submit to District a fully executed copy of any and all contracts entered into for the engineering, procurement and/or construction of the System.

- 5) Provider shall submit an interconnection application to the Distribution Utility and undertake all commercially reasonable efforts to assess the capacity of the Distribution Utility facilities, including but not limited to, the applicable transformer(s) and conductor(s) and provide a written assessment of such to District.
- 6) Provider shall submit to District for approval a 90% completed design of the System, a detailed construction and installation schedule and a detailed project safety plan. Provider's construction and installation schedule shall include start and completion dates for all categories of work on the Site, including but not limited to pre-construction activities, installation of major equipment and anticipated Site deliveries and all required submittal and procurement documentation.
- 7) Reserved.
- 8) Provider shall obtain or cause to be obtained all necessary Permits, entitlements, contracts and agreements required for the installation, operation and maintenance of the System and the sale and delivery of Output to District.
- 9) Provider shall have received the Site Easement and any additional documents required thereunder duly executed and delivered by the District and any applicable third parties.
- 10) Provider shall have received results, reasonably satisfactory to Provider, of a recent search of the District's jurisdiction of all encumbrances and real property filings that have been made with respect to the Site.
- 11) Provider shall have received:
 - a. District's approval of all material changes, if any, within thirty (30) days following District's receipt of same, provided that such thirty (30) day period shall be extended (but not beyond sixty (60) days) if and to the extent reasonably necessary for District to provide approval, to the System specifications provided in the Agreement and required by (a) Provider, (b) the Utility, or (c) a Governmental Authority; provided, in the case of (a), such material changes shall be in accordance with good solar PV and battery energy storage industry practices.
 - b. Proof of insurance for all insurance required to be maintained by the District under this Agreement.
 - c. Written confirmation from any person holding any encumbrance or title impairment over the Site or any portion thereof, that such person will recognize Provider's rights to the System under this Agreement.

B. District's Conditions Precedent to Construction. The District's obligations under this Agreement are conditioned on the completion of the following conditions ("**District's Conditions Precedent**"):

- a. Within one hundred and twenty (120) days after the Effective Date, District shall have received from Provider all documentation provided pursuant to Section 6(A)(2), (3), (4), (5), (6), (10) and (11).
- b. Within seven (7) months of the Effective Date, the District shall have received from Provider all documentation and relevant requests related to Section 6(A)(11).
- c. Within eight (8) months of the Effective Date, District shall have:
 - i. Granted approval of all material changes, if any, to the System specifications provided in the Agreement and required by (a) Provider, (b) the Utility, or (c) a Governmental Authority; provided, in the case of (a), such material changes shall be in accordance with good solar PV and battery energy storage industry practices.
 - ii. Received from Provider Proof of insurance for all insurance required to be maintained by Provider under this Agreement.
 - iii. Written confirmation from any person holding any encumbrance or title impairment over the Site or any portion thereof, that such person will recognize Provider's rights to the System under this Agreement.
 - iv. District shall have received evidence that Provider has obtained and secured sufficient financing to fund Provider's obligations under this Agreement. Such evidence shall include a signed letter from the Provider describing its intent and commitment to finance the project.

C. Completion of Condition Precedent to Construction; Termination. If Provider is unable to timely complete any of the Provider's Construction Conditions Precedent (1) through (11) above by the "**Conditions Precedent Deadline**" (eight (8) months after the Effective Date), as such period may be extended on a day-for-day basis for Force Majeure events, Utility, Governmental Authority or District delays, in each case, which Provider is diligently pursuing, District may, but is not required to, either (i) waive Provider's obligations to provide documentation under Section 6(A)1, 2, 3, 4, 6, 8, or 11; (ii) extend such requirements in a written notice to Provider, or (iii) solely with respect to Provider's failure to achieve Provider's Construction Conditions Precedent 1, 2, 3, 4, 5, 6, and 8, terminate this Agreement without triggering the default provisions of this Agreement, including, but not limited to any default provision requiring payment of the Termination Value, nor shall any such termination subject District to any liability; notwithstanding the foregoing, Provider may (a) waive its obligations solely with regard to Sections 6(A)9 and 11(b) in a written notice to the District; or (b) subject to Provider providing District documentation of its diligent efforts to achieve and solely with regard to Sections 1, 5, 8, 9, 10, and 11, terminate this Agreement without triggering the default provisions of this Agreement, nor shall any such termination subject Provider to any liability. Upon Provider's timely satisfaction of all Construction Conditions Precedent and written confirmation from Provider of the same, District shall issue a notice to proceed to Provider ("**Notice to**

Proceed”) within ten (10) business days, informing Provider that it may commence the construction of the System on the Site. Provider shall not proceed with construction of the System until it has received the Notice to Proceed. Provider shall promptly provide District with copies of all forms, documents and communications received or generated by Provider in connection with this Agreement.

D. Construction; Commercial Operation. Promptly upon receipt of the Notice to Proceed from District, Provider shall commence construction of the System, subject to Exhibit G, and shall cause complete installation and start-up of Commercial Operation thereof on or before March 14, 2024 (the “**Commercial Operation Deadline**”). Prior to declaring Commercial Operation, Provider shall achieve the following:

- 1) Effect the execution, in coordination with District, of all agreements required for interconnection of the System with the Distribution Utility, including, without limitation, the Interconnection Agreement and net metering agreement if applicable; and
- 2) Ensure that all necessary connections and equipment are installed in compliance with all applicable codes and standards, and that Provider has procured or caused the complete installation of all necessary equipment and protection devices to enable delivery of Output and BESS Output from the Delivery Point to District’s facilities.
- 3) Obtain or cause to be obtained all necessary Permits, entitlements, contracts and agreements required for the operation and maintenance of the System and the sale and delivery of Output and BESS Output to District.
- 4) Provide written confirmation that (i) all required commissioning has been completed; (ii) District and its agents have been provided access to the monitoring data for the System at the level required by this Agreement; and (iii) the System has been operating at full capacity for at least seven (7) calendar days.

E. Commercial Operation. The “**Commercial Operation Date**” shall be the date on which Provider accurately notifies District of the fact that the System is mechanically and electrically complete and operational and providing Output and BESS Output through the Meter(s) to the Delivery Point under approved and executed Distribution Utility Interconnection Agreement and that Provider has met all of the requirements in Section 6(C) above. Provider shall cause the Commercial Operation Date to occur on or before the Commercial Operation Deadline.

Except in the event of delays unforeseeable to an experienced solar developer caused by any third-party, Governmental Authority, or District delays, or Force Majeure events, which Provider could not mitigate through diligent efforts, Provider shall be solely liable to District for any delay by Provider or Provider’s contractor(s) in completing the work, including any costs of District associated with impacts to the Site or a delay in the Commercial Operation Date.

If Commercial Operation has not commenced on or before the thirtieth (30th) day following the Commercial Operation Deadline, District may, but shall not be required to, assess

Delay Liquidated Damages against Provider in an amount equal to five hundred dollars (\$500) per Day. If Commercial Operation has not commenced on or before the one hundred and twentieth (120th) day following the Commercial Operation Deadline, District may, but shall not be required to, terminate this Agreement without triggering the default provisions of this Agreement as to District or any other District liability, including any default provision which would otherwise require payment of the Termination Value; provided, the District shall not be permitted to terminate this Agreement so long as Provider timely remits to the District Delay Liquidated Damages and the deadline has not lapsed for District eligibility in the net energy metering tariff established by Public Utilities Commission of the State of California in Decision 16-01-044 (NEM 2.0), applicable as of the Effective Date of this Agreement.

Liquidated damages may also be applied to compensate District for undue delays in the completion of punch list items, Final Binder, site clean-up, demobilization, and miscellaneous contractual obligations after Commercial Operation has been achieved. The cost to District for administration, inspection, mileage, and other similar items would be extremely difficult to determine. For that reason, additional liquidated damages, known as Administrative Delay Liquidated Damages shall be imposed in the amount of \$500 per day, effective thirty (30) days after Commercial Operation has been achieved. Charges will be assessed until District agrees that all outstanding work has been completed.

F. Extension of Commercial Operation Deadline. Provider may request in writing an extension of the Commercial Operation Deadline. At the time of the request, Provider shall present District in writing with the reason for delay, confirmation that Commercial Operation shall commence within the requested extension time as well as valid and persuasive evidence demonstrating that the delay in achieving the Commercial Operation Deadline could not have been reasonably avoided by Provider. Provider's written request must also state the date on which Provider reasonably believes Commercial Operation will be achieved following such extension. The approval of the request will be at the sole discretion of District and if approved by District, Provider shall pay to District a non-refundable extension fee of \$350 per day for each day of the extended time period. To the extent that Provider fails to meet the Commercial Operation Deadline as extended by District pursuant to this Section, District shall have the options to terminate or assess liquidated damages as set forth in subsection D above.

7. Ownership of System, Output, Green Attributes and Environmental Financial Incentives.

A. Ownership of System. Title to the System shall remain with Provider during the Term unless and until District exercises its option to purchase the System as set forth herein. None of the System, including, but not limited to any components thereof may be sold, leased, assigned, mortgaged, pledged or otherwise alienated or encumbered by District. District shall not cause or permit the System or any part thereof to become subject to any lien, encumbrance, pledge, levy or attachment arising by, under or through District. Provider shall bear all risk of loss with respect to the System, except for losses arising from the negligence or willful acts or omissions by District, or their agents or employees. Provider shall be solely responsible for the System operation and maintenance in compliance with all applicable laws, regulations and Permits. Provider shall not be responsible for the cost or expense of any maintenance required as a direct result of District's negligence or willful misconduct.

B. Ownership of Output, Green Attributes and Environmental Financial Incentives. Provider is the exclusive owner of any Environmental Financial Incentives associated with the construction, ownership and operation of the System. District will assign its interest (if any) in all such credits and other financial incentives to Provider. District is the exclusive owner of, and may assign or sell in its sole discretion, all Green Attributes, including, but not limited to, Renewable Energy Certificates (“**REC**”), and REC Reporting Rights, attributable to the System and the Output or BESS Output therefrom. Without additional charge to District, Provider shall take and bear the reasonable costs of all steps necessary to secure and perfect District’s interest in the Green Attributes, including, but not limited to, registering the RECs with WREGIS. The Parties agree to subsequently negotiate in good faith the ownership of any additional benefit or incentive associated with this Agreement which did not exist at the time this Agreement was entered into.

8. **Payment.**

A. Monthly Invoices. Provider shall provide an invoice for the System to District on a monthly basis, by the 15th day of each calendar month following the Commercial Operation Date of the System. Each invoice will set forth (i) the Output delivered in the preceding month, (ii) the Power Price for such month, (iii) the total amount to be paid by District to Provider for Output delivered in the preceding month, (iv) the BESS Output delivered in the preceding month, (v) the BESS Rate for such month, (vi) the year and month of the PPA term, (vii) Annual Production Estimate for the relevant year as set forth in Exhibit B, (viii) running total of Annual Production Estimate for the relevant year as set forth in Exhibit B versus cumulated actual Output for the relevant year, (ix) running total of BESS Guarantee for the relevant year as set forth in Exhibit C versus cumulated actual BESS Output for the relevant year (x) and any applicable offsets or credits to such invoice amounts.

B. Due Date. All payment of invoices shall be in U.S. Dollars and paid by wire transfer, check, or automated check handling (ACH) payment delivered to Provider at the address specified herein within thirty (30) Days of the date the invoice is received by District (“**Due Date**”). If the Due Date is a weekend or a bank holiday, payment will be due the next following business day. District shall, for a period of time not to exceed thirty (30) days from the Due Date of Provider’s invoice, be excused for any delay in payment due to delays in processing.

C. Payment Disputes. In the event a Party disputes all or a portion of an invoice, or any other claim or adjustment arises, such disputes shall be resolved pursuant to Section 15.

9. **Purchase Option.**

A. Purchase of System. Unless District is in default of its obligations under this Agreement, District shall have the option to purchase all of Provider’s right, title, and interest in and to the System on the sixth (6th), tenth (10th), and fifteenth (15th) anniversary of the Commercial Operation Date or upon expiration of the Term hereof (“**Purchase Option**”). If District wishes to exercise its Purchase Option, it must provide notice to Provider at least ninety (90) Days in advance of any such anniversary or the expiration of the Term. The purchase price shall be the greater of (i) the Fair Market Value, as defined under this Agreement, of the System as of the applicable anniversary date or the expiration of the Term or (ii) the applicable Purchase Option Price indicated

in Exhibit E. Upon the exercise of the Purchase Option and Provider's receipt of all amounts then owing by District under this Agreement, the Parties will execute all documents necessary for the purchase and sale of the System, including but not limited to, the delivery of the purchase price, the transfer of title to the System, and to the extent transferable, the remaining period, if any, on all warranties and Environmental Financial Incentives and Green Attributes for the System to District. Provider shall remove any encumbrances placed or allowed on the System by Provider. On the date on which Provider transfers title to the System to District in accordance with this Section, this Agreement shall terminate without default or penalty to District or Provider other than for then current liabilities.

B. Fair Market Value. For the purposes of this Agreement and the Site Easement Agreement, the "**Fair Market Value**" of the System shall be the value thereof as determined by a nationally recognized independent appraiser selected by the Parties, with experience and expertise in the solar photovoltaic and battery energy storage industry to value such equipment. The Fair Market Value of the System shall be based upon an amount that would be paid in an arm's length, free market transaction, for cash, between an informed, willing seller and an informed willing buyer, neither of whom is under compulsion to complete the transaction, taking into account the age and condition, and performance of the System, provided that installed equipment shall be valued on an installed basis, shall not be valued as scrap if it is functioning and in good condition, and its fair market value in continued use for the Term and in including the costs of removal, shipping and reinstallation, as a cost credit against the value of the System. The valuation of the System shall take into account the present valuation of all associated future income streams expected to arise from the operation of the System for the remaining useful life of the System, including but not limited to the expected price of electricity, Green Attributes and Environmental Financial Incentives, and factoring in future avoided costs and expenses associated with the System and assuming the System is able to generate revenue for the then-remaining term of the Agreement at a price equal to the then-applicable energy rate and thereafter for the remaining useful life of the System at a price equal to the then fair market energy price for energy. The valuation made by the appraiser shall be binding on the Parties in the absence of fraud or manifest error. The costs of the appraisal shall be borne by the Parties equally. If the Parties are unable to agree on the selection of an appraiser, such appraiser shall be selected by the two appraiser firms proposed by each Party.

10. Early Termination.

A. Provider's Early Termination Rights. Provider shall have the right, but not the obligation, to terminate this Agreement without triggering the default provisions of this Agreement or any liability under this Agreement prior to expiration of its Term upon the occurrence of:

- 1) An unstayed order of a court or administrative agency, or a change in state or federal law or regulation, imposing a material cost, regulation or other requirement upon the sale of Output or BESS Output which precludes the Provider from providing Output or BESS Output pursuant to this Agreement. Such termination shall be conditioned upon Provider's proof of the financial impossibility and violation of Provider's System financial arrangement to the reasonable satisfaction of District.

- 2) Condemnation, destruction, or other material damage to the Site that results in the termination of the Site Easement to such Site.

In the event Provider exercises its right under this Section, District may elect to either (i) purchase the System pursuant to Section 9 as of the time of Provider's notice; or (ii) require Provider to remove the System within one hundred eighty (180) days at Provider's sole cost and expense and restore the Site as required in Section 3.

B. District's Early Termination Rights. After the sixth (6th) year of the Term, if District ceases to conduct operations at or vacates a Site, District may, upon payment to Provider of the Termination Value, without further penalty hereunder, terminate this Agreement, which termination shall not constitute an event of default. Provider shall remove the System at the Site in accordance with Section 3.

11. Output and BESS Output Specifications Delivery.

A. Output Specifications. Provider shall ensure that all energy generated and / or discharged by the System conforms to Distribution Utility specifications for energy being generated and / or discharged and delivered to the Sites' electric distribution systems, which shall include the installation of proper power conditioning and safety equipment, submittal of necessary specifications, coordination of Distribution Utility testing and verification, and all related costs.

B. BESS Operation Requirements. Provider shall cooperate and coordinate with District to operate the BESS with the following characteristics:

- 1) BESS shall charge one hundred percent (100%) from the solar PV system and be capable of getting NEM credits for exported energy.
- 2) BESS shall prioritize operations in the following order:
 - a. Demand Reduction
 - b. Maximize savings from energy arbitrage
 - c. Maximize revenue from Grid Services Programs

Provider shall coordinate with District as requested to revise the priority of operations for the BESS.

C. Transfer of Output. Provider shall be responsible for the delivery of Output and BESS Output to the Delivery Point. Provider shall undertake all commercially reasonable efforts to assess the capacity of the Distribution Utility transformer(s) and conductor(s). Except as otherwise provided in Section 4(c), to the extent any subsequent upgrade to such facilities is required and not performed and funded by the Distribution Utility, the Provider shall cause such upgrades to be completed at its sole cost and expense. Title and risk of loss of the Output and BESS Output shall pass from Provider to District upon delivery of the Output and BESS Output from the Delivery Point to District. To the extent applicable to the Project, prior to the start of construction of the System, Provider shall use commercially reasonable efforts to assist with District's selection of equipment installations on District's side of any Delivery Point.

D. Relocation. On or after the sixth (6th) anniversary of the Commercial Operation Date, District may, at its option, require that the System be permanently relocated, either on the existing Site or to another site of District's choosing, at a location with at least equal insolation to the existing Site and reasonably acceptable to both Parties (the "**Relocation Site**"). District shall give Provider at least sixty (60) calendar Days' notice of District's need to move or relocate the System. Following agreement on a Relocation Site, the Parties will amend this Agreement to memorialize the required changes in the definition of "**Site.**"

District shall pay the reasonable costs arising in connection with the relocation of the System, including removal costs, necessary storage costs, re-installation, re-commissioning costs, and any applicable interconnection fees, provided that Provider provides District with information detailed herein below in a timely manner. District shall additionally compensate Provider for any revenue during the period in which energy cannot be generated and delivered to District from the System being relocated, at District Suspension Rate, as defined below, prorated as needed to apply on a daily basis. District shall also execute such consents or releases reasonably required by Provider or Provider's financing Parties in connection with the relocation. Within thirty (30) Days of agreement on a Relocation Site, Provider will provide District with a calculation of the estimated time required for such relocation, and the total anticipated amount of lost revenues and additional costs to be incurred by Provider as a result of such relocation. District will have twenty (20) Days to review the calculation and make, in writing, any objections to the calculation. Provider shall make all commercially reasonable efforts to achieve the relocation of the System in the estimated time and for the estimated cost provided to District. All additional time and / or costs shall require advance written approval of District.

If an acceptable Relocation Site cannot be located, this Agreement shall terminate with respect to the Site, upon Provider's thirty (30) Days' written notice. In the event that an acceptable Relocation Site cannot be agreed upon, District shall pay Provider an amount equal to the Termination Value. In the event of a termination occurring under this Section, Provider shall remove the System and restore the Site in accordance with Section 3, at no additional cost to District.

E. Temporary Suspension by District. Notwithstanding any other provision of this Agreement, District shall have the right, upon written notice to Provider, to temporarily suspend operations and Output and / or BESS Output for any reason. District shall have the right, upon written notice to Provider, to temporarily render the System non-operational for up to forty-eight (48) hours per year without penalty or charge by Provider; provided no more than twelve (12) hours shall occur during the hours of 9AM to 3PM local time. For avoidance of doubt, an event of Force Majeure shall not comprise a temporary suspension by District under this section. If District requires temporary suspension of the System for more than forty eight (48) hours in a given year, District shall pay to Provider an amount, prorated as necessary, equal to the amount of the monthly payment for power purchased pursuant to this Agreement for the same month(s) (or portion thereof) in the preceding twelve (12) months, or for the average of the entire period the System has been in Commercial Operation if less than twelve (12) months, for the period of time during which the System is not in Commercial Operation in excess of forty eight (48) hours ("**District Suspension Rate**") due to the temporary suspension by District; provided, in no event

shall Provider be obligated to suspend operations and Output from the BESS or System for more than ninety (90) days in any Contract Year.

F. Temporary Suspension by Provider. Provider shall have the right, upon written notice to District, to temporarily render the System non-operational for up to forty-eight (48) hours per year without penalty or charge by District. If Provider renders the System non-operational for a period in excess of forty-eight (48) hours, Provider shall pay to District a monthly payment (prorated as needed) equal to the difference between the cost to District of purchasing energy from the Distribution Utility during the System's period of non-operation and the average monthly cost of power purchased under this Agreement for the preceding twelve (12) months, or for the entire period the System have been in Commercial Operation if less than twelve (12) months, for the period of time during which the System are non-operational.

If an Outage occurs under this Section and a payment is due from Provider to District, Provider shall include in its next invoice(s) to District (and in the final invoice for any credit owed for the final Contract Year) a credit for the difference between the electricity cost as provided by the Distribution Utility to District for the applicable period.

G. Change in Conditions. If District requests an increase in the Output or BESS Output delivered to the Delivery Point, the Parties agree to use good faith efforts to increase such capacity. If Provider and District are not able to reach an agreement for such additional Output or BESS Output, District may, at its sole discretion, obtain the services of a third party for such purposes, provided that such additional third party provided services and any site easement shall not interfere with Provider's right, title and interest in the System under this Agreement.

H. Performance and Payment Bonds. Provider to shall deliver to District evidence that the prime contractor performing the construction and installation services of the Systems maintains payment and performance bonding in favor of the Provider and meeting the following requirements, which shall be provided to the District prior to the commencement of construction on any Site:

- a. Performance Bond. A bond issued by a corporate surety authorized to issue surety insurance in California, in a form commonly used for such purposes, in an amount equal to one hundred percent (100%) of the Provider's construction contract price payable under the contract securing the faithful performance of the contractor of its contract with Provider; and
- b. Payment Bond. A bond issued by a corporate surety authorized to issue surety insurance in California, in a form commonly used for such purposes, in an amount equal to one hundred percent (100%) of Provider's construction contract payable under the contract securing the payment of all claims for the performance of labor or services on, or the furnishing of materials for, the performance of the contract.
- c. All bonds shall be provided by a corporate surety authorized and admitted to transact business in California and shall be in the form provided by District.

I. Prior to commencing any portion of the work on the Project, the Provider, and / or its Contractors, as applicable, shall apply for and furnish District with separate payment and performance bonds for such work which shall cover 100% faithful performance of and payment of all obligations arising under this Agreement and / or guaranteeing the payment in full of all claims for labor performed and materials supplied for the Work. All bonds shall be provided by a corporate surety authorized and admitted to transact business in California. All bonds shall be submitted on forms subject to District's reasonable approval. To the extent available, the bonds shall provide that no change or alteration of the Agreement, extensions of time, or modifications of the time or terms, will release the surety. If the Provider, and / or its Contractors, as applicable, fails to furnish the required bond, District may terminate the Agreement for cause without resulting in any default of District.

J. Provider shall make no alteration to the System after the Commercial Operation Date intended or reasonably anticipated to permanently increase the nameplate capacity, Output, or BESS Output of the System without express written approval by District. Notwithstanding the foregoing, Provider may alter the System's nameplate capacity on a temporary basis when performing maintenance and repair activities provided that Provider returns the System's nameplate capacity to that as of the Effective Date upon the completion of such activities.

12. Metering.

A. Meter. Provider shall provide and maintain standard revenue grade meters and an electronic data acquisition system at the Delivery Point (each a "**Meter**", collectively "**Meters**") to individually measure the actual amount of electricity supplied to District by each of the Solar Facility and the BESS on a continuous basis. Meters shall be installed and maintained at Provider's sole expense and shall be located in close proximity to the Delivery Point and in all cases on the Distribution Utility side of all Provider owned transformers and other electrical losses.

B. Meter Testing. Provider shall arrange for all Meters to be tested and calibrated prior to Commercial Operation and as recommended by the meter manufacturer. In the event Provider's identifies more than a two percent (2%) deviation in Solar Facility or BESS performance between what is being measured by the relevant Meter and the output monitoring platform, Provider shall notify the District of such deviations and shall be responsible for testing and calibrating Meters as required to resolve the deviation. The calibration shall be conducted by independent third parties who are qualified to conduct such tests. Provider shall bear all costs and expenses associated with Meter calibration. District shall be notified ten (10) Days in advance of such tests and shall have a right to be present during such tests. Provider shall provide District with the detailed results of all Meter tests.

In addition, the Meters shall be inspected and tested for accuracy at such other times as District may reasonably request, but in no event more than once every one (1) year period. District shall bear the cost of the additionally requested Meter testing, unless such test shows that a Meter was inaccurate by more than two percent (2%), in which case the Provider shall bear the Meter testing costs. The tests shall be conducted by independent third parties who are qualified to conduct such tests. District shall be notified ten (10) Days in advance of such tests and shall have a right to be present during such tests. Provider shall provide District with the detailed results of all Meter tests.

C. Cost of Meter Repair. If the Meter testing demonstrates that a Meter was operating outside of its allowable calibration (+/- 2%), then the Provider will pay for the cost of the repairs, or replacement, necessary to restore a Meter to proper working order. If a Meter is found to be inaccurate by more than two percent (2%), Invoices from the prior six (6) months, or from the last time such Meter was registering accurately, whichever is less, shall be adjusted in accordance with Section 8, except that District shall not be obligated to pay interest on any amount found to be due because Meter was operating outside of its allowable calibration (+/- 2%). Provider shall submit any request for an adjustment to District no later than two (2) months after Meter testing had been performed, and District shall not be obligated to pay any adjustment for a prior fiscal year that was not submitted to District within two months after Meter testing was performed. District may withhold payments to Provider if a Meter has registered production in excess of 2% of the Output or BESS Output delivered to District and Provider fails to provide District with the appropriate payment pursuant to Section 8 for the amount which District overpaid to Provider as a result of the Meter being outside of the established calibration range.

D. Meter Data. Provider shall gather and maintain the data from a Meter, including but not limited to interval data registered at least once every fifteen (15) minutes (the “**Meter Data**”) and shall make such Meter Data available to District or maintain the Meter Data such that District can access the Meter Data remotely through a secure internet site or such other remote access as the Parties mutually agree to.

E. Meter Data Audit. District shall have the right to audit the Invoices and/or the Meter Data once per calendar year. If the audit reveals that District has been overcharged by more than two percent (2%), Provider shall bear the cost of such audit, but in all other cases District shall bear the cost of such audit.

F. Maintenance of Meter Data. The Parties shall maintain all records related to Invoices and Meter Data for a period of the greater of (i) forty-eight (48) months from the date of such Invoice or Meter Data, or (ii) as otherwise required by law. Such records shall be available for audit as described in above.

13. Representations, Warranties and Covenants.

A. Authorization and Enforceability. Each Party represents to the other Party as of the Effective Date that: (i) such Party is duly organized, validly existing and in good standing under the laws of the state of its formation; (ii) the execution and delivery by such Party of, and the performance of its obligations under, this Agreement has been duly authorized by all necessary action, does not and will not require any further consent or approval of any other Person, and does not contravene any provision of, or constitute a default under such Party’s organizational documents, any indenture, mortgage or other material agreement binding on such Party or any valid order of any court, or regulatory agency or other body having authority to which such Party is subject; (iii) this Agreement constitutes the legal and valid obligation of such Party, enforceable against such Party in accordance with its terms, except as may be limited by bankruptcy, reorganization, insolvency, bank moratorium or similar laws relating to or affecting creditors’ rights generally and general principles of equity, whether such enforceability is considered in a proceeding in equity or at law; and (iv) such Party has obtained all permits, licenses, authorizations,

consents, and approvals required by any Governmental Authority or other third party and necessary for such Party to own its assets, carry on its business and to execute and deliver this Agreement; and such Party is in compliance with all laws (including environmental laws) that relate to this Agreement in all material respects to the best of the Party's knowledge with due inquiry.

B. Insolation. District agrees that access to sunlight (“**Insolation**”) is essential to Provider's ability to provide the projected Output and is a material inducement to Provider in entering into this Agreement. Accordingly, District shall not permit any interference with Insolation available to the System. If District becomes aware of any potential development, foliage or trees, or other activity on adjacent or nearby properties that will diminish the Insolation to the System, District shall advise Provider of such information and reasonably cooperate with Provider in reasonable measures taken by Provider in an attempt to preserve existing levels of Insolation upon the System.

C. Notice of Damage. Each Party shall promptly notify the other Party of any matters it is aware of pertaining to any damage to or loss of the use of the System or that could reasonably be expected to adversely affect the System.

14. Default and Remedies.

A. Events of Default. In the event of a Party's breach of any performance obligation hereunder or breach of any representation, warranty, covenant or material term of this Agreement, the non-defaulting Party shall provide the defaulting Party with written notice of the default, which notice shall describe the default in reasonable detail. Following the date of receipt of written notice of default, the defaulting Party shall have thirty (30) Days to cure any payment default and forty-five (45) Days to cure any other breach or default described in this Agreement.

B. Event of Default. In addition to the foregoing, with respect to a Party, there shall be an event of default (each an “**Event of Default**”) if:

- 1) such Party fails to timely pay any amount due, other than an amount that is subject to a good faith dispute;
- 2) such Party concedes in writing to its inability to pay its debts generally as they become due;
- 3) such Party files a petition seeking reorganization or arrangement under the federal bankruptcy laws or any other applicable law or statute of the United States of America or any State, City or territory thereof;
- 4) such Party makes an assignment for the benefit of creditors in connection with bankruptcy proceedings;
- 5) such Party consents to the appointment of a receiver of the whole or any substantial part of its assets;

- 6) such Party has a petition in bankruptcy filed against it, and such petition is not dismissed within sixty (60) Days after the filing thereof;
- 7) a court of competent jurisdiction enters an order, judgment, or decree appointing a receiver of the whole or any substantial part of such Party's assets, and such order, judgment or decree is not vacated or set aside or stayed within sixty (60) Days from the date of entry thereof;
- 8) under the provisions of any other law for the relief or aid of debtors, any court of competent jurisdiction shall assume custody or control of the whole or any substantial part of such Party's assets and such custody or control is not terminated or stayed within sixty (60) Days from the date of assumption of such custody or control;
- 9) such Party ceased its legal existence or ceases doing business or otherwise dissolves;
- 10) such Party breaches a material term of this Agreement;
- 11) the District ceases to conduct business operations at the Site and fails to provide Provider an alternative location under the Relocation option in Section 11(D);
- 12) such Party breaches a material term of the relevant Easement.

C. Provider Remedies. If an event of default by District under Sections 14(A) or 14(B) has occurred and is continuing, then following the expiration of any applicable cure period, Provider may at its discretion: (i) suspend performance under this Agreement, (ii) seek specific performance from a court of appropriate jurisdiction pursuant, and/or (iii) terminate this Agreement, and as Provider's sole and exclusive remedy in connection with such termination, require District to pay to Provider as liquidated damages, and not as a penalty, the Termination Value for the System, Provider's reasonable and documented costs for System removal, and any and all amounts then owed Provider for Output or BESS Output delivered to District as of the date of such termination pursuant to this Agreement. In the event of such termination, Provider shall remove the System in accordance with Section 3.

D. District Remedies. If an event of default by Provider under Sections 14(A) or 14(B) has occurred and is continuing, then following the expiration of any applicable cure period, District may at its discretion: (i) suspend performance under this Agreement, (ii) seek damages or specific performance from a court of appropriate jurisdiction, and/or (iii) terminate this Agreement. In the event that District terminates this Agreement pursuant to this Section, District may elect to either (i) purchase the System pursuant to Section 9 as of the time of the event of default; or (ii) require Provider to remove the System within one hundred eighty (180) Days at Provider's sole cost and expense and restore the Site as required in Section 3.

15. Dispute Resolution.

The Parties agree to make a good faith attempt to resolve any and all controversies, claims, disagreements, or disputes between the Parties arising out of or related to this Agreement (“**Dispute**”). In the event of any Dispute, either Party may give notice of the dispute to the other Party. In the event a Party Disputes all or a portion of an invoice or other payment, the disputing Party shall timely pay any undisputed portion of such amount due. The Parties shall first use good faith, reasonable, diligent efforts to resolve the dispute within ninety (90) Days from the date of such notice. If the Parties do not resolve their dispute within ninety (90) Days of notice, then the Parties may, upon mutual agreement, submit to mediation before a mutually agreed upon mediator. In the event the dispute is not resolved through mediation, the Parties may pursue their legal rights through any other legally permissible means. If a Dispute, or any portion thereof, remains unresolved after applicable dispute resolution requirements, the Provider shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Provider’s right to bring a civil action against District. For purposes of those provisions, the running of the time within which a claim must be presented to District shall be tolled from the time the Provider submits its written Dispute until the time the Dispute is denied, including any time utilized by any applicable meet and confer process. Pending resolution of the dispute, Provider and its subcontractors shall continue to perform the Work under the Agreement and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement of District.

16. Taxes; Liens.

A. Taxes. Provider shall pay any income taxes imposed on Provider due to the sale of energy under this Agreement. District shall pay all real property taxes and assessments applicable to the Site. This Agreement may result in the creation of a possessory interest (Rev. & Tax. Code § 107.6). If such a possessory interest is vested in Provider, Provider may be subjected to the payment of personal property taxes levied on such interest in the System. Provider shall be responsible for the payment of, and shall pay before becoming delinquent, all taxes, assessments, fees, or other charges assessed or levied upon Provider, the Project and the System. Provider further agrees to prevent such taxes, assessments, fees, or other charges from giving rise to any lien against the Site or any improvement located on or within the Site. Nothing herein contained shall be deemed to prevent or prohibit Provider from contesting the validity or amount of any such tax, assessment, or fee in the manner authorized by law. Provider shall be responsible for payment of any personal property taxes, possessory interest taxes, permit fees, business license fees and any and all fees and charges of any nature levied against the System and operations of Provider at any time. If bills for taxes on the System are received by District, District shall remit such bills to Provider.

B. Liens. Provider shall not directly or indirectly cause, create, incur, assume or suffer to exist any liens on or with respect to the Site or District’s interest therein. If Provider breaches its obligations under this Section, it shall immediately notify District in writing, shall promptly cause such lien to be discharged and released of record without cost to District, and shall defend and indemnify District against all costs and expenses (including reasonable attorneys' fees and court costs at trial and on appeal) incurred in discharging and releasing such lien.

17. Liability and Indemnity; Insurance.

A. Indemnity. To the fullest extent provided for by law, each Party (“**Indemnifying Party**”) agrees to indemnify, defend and hold harmless the other Party, its directors, officers, employees, and agents (each, an “**Indemnified Party**”) from and against any and all third-party claims, including demands, actions, damages, loss, costs, expenses, and reasonable attorney’s fees (collectively, “**Indemnity Claims**”), arising out of or resulting from any breach, negligent act, error or omission or intentional misconduct by the Indemnifying Party or its trustees, directors, officers, employees, contractors, subcontractors or agents under the terms of this Agreement; provided, however, that the Indemnifying Party will not have any obligation to indemnify the Indemnified Party from or against any Indemnity Claims to the extent caused by, resulting from, relating to or arising out of the negligence or intentional misconduct of an Indemnified Party or any of its directors, officers, employees or agents.

If an Indemnified Party determines that it is entitled to defense and indemnification under this Section, such Indemnified Party shall promptly notify the Indemnifying Party in writing of the Indemnity Claim and provide all reasonably necessary or useful information, and authority to settle and/or defend Indemnity Claim. Defense and indemnification provided by the Indemnifying Party under this Section shall be provided with legal counsel reasonably agreed to by the Indemnified Party. No settlement that would impose costs or expense upon the Indemnified Party shall be made without such Party’s written consent.

B. Insurance.

- 1) Provider Insurance. At all times during the term of the PPA, and any necessary extension thereof for removal of the System from the Site, and for one year after such removal for any and all “claims made” type policies, Provider and all of its sub-contractors, shall obtain, maintain and keep in full force and effect the following insurance for coverage of all obligations and associated activities under this Agreement, including but not limited to the use and occupancy of the Site, the business operated by the District thereon, and the construction, installation, operation, maintenance and repair of the System, in the amounts, and with the conditions required, as set forth herein. Each policy required in (b)(c)(d) below shall include an additional insured endorsement in favor of District with an additional insured endorsement for both ongoing and completed operations as it pertains to (b) and shall include an endorsement specifying that such coverage is primary and non-contributory as to any other coverage available to the additional insured. Provider shall, within thirty (30) days of the Effective Date of this Agreement and annually thereafter or as requested by District, provide certificates of insurance and endorsements demonstrating compliance with the requirements of this Section.
 - a. Workers’ Compensation Insurance for Provider’s employees to the extent of statutory limits and Occupational Disease and Employer’s Liability Insurance for not less than \$1,000,000 per occurrence.
 - b. Commercial General Liability Insurance with a \$1,000,000 per occurrence and \$2,000,000 aggregate limit of liability for Bodily Injury, Personal and

Advertising Injury and Property Damage Liability, including coverage for Contractual Liability and Products and Completed Operations Liability.

- c. Automobile Liability Insurance with limits not less than: Bodily Injury coverage at \$1,000,000 each accident, and Property Damage coverage at \$1,000,000 each accident.
- d. Excess Liability Insurance in an aggregate amount of not less than \$2,000,000 providing greater limits of insurance to Provider's Employer's Liability, Commercial General Liability and Automobile Liability Insurance which also shall not be more restrictive than coverage provided by these policies.
- e. Builder's Risk/Installation Floater Insurance in a sufficient amount to protect Provider's property, materials, tools and other financial interests on the Project.
- f. Professional Liability Insurance with limits not less than \$1,000,000 per claim, with a two-year tail.

2) District Insurance. District shall maintain and covenants that it shall maintain during the Term (i) insurance sufficient to insure it against loss or destruction of the Site, including losses occasioned by operation of the System, and (ii) general liability insurance including bodily injury, property damage, contractual and personal injury. Notwithstanding the foregoing, District reserves the right to self-insure.

3) RESERVED.

4) Subcontractor Insurance. Provider shall require and verify that all of its subcontractors maintain insurance meeting the requirements of Section 17(B)(1) except Section 17(B)(1)(e) and except as to Section 17(B)(1)(f) which shall only be required of subcontractors providing professional services.

C. No Consequential Damages. EXCEPT WITH RESPECT TO PAYMENT OF DISTRICT TERMINATION VALUES, DISTRICT SUSPENSION RATE, PROVIDER PAYMENTS UNDER THE OUTPUT GUARANTEE OR BESS GUARANTEE, OR IN CONNECTION WITH THIRD-PARTY INDEMNIFICATION CLAIMS, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY SPECIAL, PUNITIVE, EXEMPLARY, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT.

D. Actual Damages. Provider's aggregate liability under this Agreement and the Site Easement arising out of or in connection with the performance or non-performance of this Agreement and the Site Easement shall not exceed an amount equal to \$3,200,000 (the "Liability Cap"); provided that (i) the Liability Cap shall not apply in connection with third-party claims subject to indemnification hereunder, and (ii) any losses, damages or claims that are covered by

Provider's insurance, as set forth in Section 17(B)(1), required to be maintained pursuant to this Agreement shall be limited to the greater of the insurance coverage limits set forth herein or the Liability Cap. The provisions of this Section 17(D) shall apply whether such liability arises in contract, tort (including negligence), strict liability or otherwise.

E. TO THE EXTENT ENFORCEABLE UNDER APPLICABLE LAW, EACH PARTY HEREBY KNOWINGLY, VOLUNTARILY, AND INTENTIONALLY WAIVES ANY RIGHTS THEY MAY HAVE TO A TRIAL BY JURY, AND INSTEAD AGREE TO A BENCH TRIAL, IN RESPECT OF ANY LITIGATION BASED HEREON, OR ARISING OUT OF, UNDER, OR IN CONNECTION WITH, THIS AGREEMENT OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN), OR ACTIONS OF EITHER PARTY. THIS PROVISION IS A MATERIAL INDUCEMENT FOR PROVIDER TO ENTER INTO THIS AGREEMENT.

18. Site Easement.

District shall grant to Provider an easement for the sole purpose of access to, on, over, under and across the Site for the purposes of undertaking the work required by Provider under this Agreement, including: installing, constructing, inspecting, operating, owning, maintaining, accessing, repairing, removing and replacing the System (the "**Site Easement**"). Prior to commencing any portion of the work on the Project at the Site, Provider shall obtain a signed and notarized original copy of an easement agreement for the Site suitable for recording, substantially in the form attached hereto as Exhibit I (the "**Site Easement Agreement**"). During the period of time between and including the date of the Notice to Proceed and the Commercial Operation Date, the Site Easement shall include, subject to the scheduling and activity needs of District, the reasonably necessary use of District's Site for the reasonably necessary construction and installation activities under this Agreement, including, but not limited to, staging areas. District shall have no liability whatsoever in connection with property or equipment of Provider or Provider's contractor(s), subcontractors or vendors. The Site Easement term shall continue until the date that is one hundred eighty (180) days following the date of expiration or termination of this Agreement. Provider shall notify District prior to entering the Site except in situations where there is imminent risk of damage to persons or property.

19. Assignment; Cooperation with Financing.

A. Assignment by Provider. Except as expressly provided in this Agreement, Provider may not sell, transfer, or assign its rights under this Agreement or any right, interest, or obligation therein (collectively, an "**Assignment**"), until at least twenty four (24) months have expired following the Commercial Operation Date, and only upon the prior written consent of District, which consent may not be unreasonably withheld, conditioned or delayed, provided that any assignee possesses all required skills, knowledge, expertise, experience, and financial capacity and creditworthiness necessary to perform Provider's obligations under this Agreement, and assumes in writing the obligations of Provider under this Agreement. Provider shall provide District with no less than sixty (60) Days' notice of the request to transfer ownership of the Project. Notice shall identify the party purchasing the Project and provide sufficient detail of the proposed owner for District to evaluate the new owner. Notice shall include, but not be limited to, the following details of the proposed owner: Experience with PPAs and current portfolio; Past two years of financials;

Proof of insurance, meeting District requirements and naming District; Confirmation of operations and maintenance provider and outline of operations and maintenance program if different from existing; Details and example of annual report and invoicing; and Confirmation that all terms under this Agreement and any related documents and agreements will be performed. Notwithstanding the foregoing, Provider may, without the prior written consent of District, (i) assign, mortgage, transfer, pledge or otherwise collaterally assign its interests in this Agreement and the System to any entity through which Provider is obtaining financing or capital for the System, or (ii) assign this Agreement to an affiliate or subsidiary of Provider which is controlled by Provider or under common control with Provider. This Agreement shall be binding on and inure to the benefit of the successors and permitted assignees.

B. Collateral Assignment by Provider for Financing Purposes. In the event Provider assigns its rights under this Agreement as security in connection with any financing transaction entered into by Provider, Provider may mortgage or grant a security interest in this Agreement and the System, and may collaterally assign this Agreement and the System to any mortgagees or holders of security interests, including their successors or assigns (hereinafter collectively referred to as “**Secured Parties**”), provided that any such collateral assignment of this Agreement by Provider shall not release Provider from its obligations or liabilities under this Agreement. District agrees to not unreasonably withhold, condition or delay its compliance with any reasonable request that District execute any consent, estoppel agreement or other documents related to such financing transaction as may reasonably be required by such Secured Parties, provided that Provider will reimburse District for the legal fees and costs incurred by such assignment.

C. Assignment by District. Except as otherwise provided in this Agreement, District may assign its rights under this Agreement only upon the prior written consent of Provider, which consent may not be unreasonably withheld, conditioned or delayed; provided that any such assignee (i) is of equal or greater creditworthiness than District and (ii) assumes in writing the obligations of District under this Agreement. Notwithstanding the foregoing, District may assign its rights under this Agreement without Provider’s consent to any Person succeeding to all or substantially all of the assets, including without limitation real property rights to the Site, of District of equal or greater creditworthiness than District, and provided, further, that any such transferee or assignee assumes in writing the obligations of District under this Agreement.

20. Confidentiality; Publicity.

A. Confidential Information. Any financial, statistical, personal, technical and other data and information relating to a Party’s operations which are made available to the other Party in order to carry out this Agreement shall be reasonably protected by such other Party from unauthorized use, except to the extent that disclosure thereof is required to comply with applicable law, including but not limited to the California Public Records Act and the Brown Act. The disclosing Party shall identify all confidential data and information at the time it is provided in writing, including by conspicuously marking each such document as “Confidential.” Confidentiality does not apply to information, which is known to a receiving Party from other sources, which is otherwise publicly available, or which is required to be disclosed pursuant to an order or requirements of a regulatory body or a court.

- a. Confidential Information shall comprise that which Provider identifies as confidential in accordance with Applicable Law, including the California Public Records Act, California Government Code § 6250-6270 (“CPRA”), such as, for example only, trade secrets.
- b. The Parties agree and acknowledge that this Agreement, and each document incorporated herein, is a public record subject to public disclosure, and shall be publicly disclosed in conjunction with any actions by District’s Governing Board related to approval or ratification hereof, including, without limitation, consideration during a public hearing as required under Government Code section 4217.12. Notwithstanding the preceding sentence, for avoidance of doubt, documents related to this Agreement but not incorporated herein, including, without limitation, plans and specifications for the Systems, shall not be subject to this section. For such other and further documents related to this Agreement but not incorporated herein, the District shall provide Provider the notice contemplated in Section 20(A)(d) and, otherwise, shall exercise its reasonable discretion in good faith in determining whether such document(s) is subject to and/or exempt from disclosure without further liability to Provider.
- c. District shall not be liable to Provider for any disclosure made in its reasonable determination and in good faith compliance with applicable provisions of the CPRA, and Provider will be solely responsible for and shall solely bear all costs and expenses related to or arising from litigation costs if Provider chooses to pursue enforcement of its rights under the CPRA, and, in any event the District is subject to any third-party liability, including, without limitation, attorneys’ fees incurred related to any action arising from Provider’s efforts to prevent public disclosure of documents, Provider shall reimburse District for all reasonable costs and expenses related to or arising from litigation related to this Article 20 in which District is reasonably compelled to engage.
- d. To the extent the District receives a request for the release of any information related to this Agreement, the District shall give Provider reasonable notice of same and provide Provider a reasonable amount of time to identify any Confidential Information contained therein, if any, and to substantiate the confidentiality of same, subject to District’s obligations under law.

B. Disclosure. Other than under the REC Reporting Rights and except as may be required by applicable law, including but not limited to, the California Public Records Act, the Brown Act, or as otherwise identified above, neither Party shall make any disclosure of any designated confidential information related to this Agreement without the specific prior written approval from the other of the content to be disclosed and the form in which it is disclosed, except for such disclosures to the Parties’ financing sources, creditors, beneficiaries, partners, members, officers, employees, agents, consultants, attorneys, accountants and exchange facilitators as may be necessary to permit each Party to perform its obligations hereunder and as required to comply with applicable laws or rules of any exchange upon which a Party’s shares may be traded. Notwithstanding the foregoing, nothing contained herein shall be deemed to restrict or prohibit

District from complying with applicable law regarding disclosure of information, including but not limited to the California Public Records Act and the Brown Act.

C. Publicity. The Parties share a common desire to generate favorable publicity regarding the System and their association with it. The Parties agree that they may, from time to time, issue press releases regarding the System and that they shall reasonably cooperate with each other in connection with the issuance of such releases. Each Party agrees that it shall not issue any press release regarding the System without the prior written approval from the other of the content to be disclosed and the form in which it is disclosed, and each Party agrees not to unduly withhold, condition or delay any such approval. In addition, the Parties hereby agree that (i) the District may publicize that it is serving as a “solar host” for the System; (ii) Provider may publicize that it is serving as the developer, owner and/or operator of the System; and (iii) District, and Provider may display photographs of the System and disclose the nameplate capacity rating of the as-built System in its advertising and promotional materials, provided that any such materials identify the District as the solar host, and Provider as the owner, operator and developer, of the System and all information shall be consistent with this Agreement. Without limitation of the foregoing, Provider agrees to share with District, in digital format, any photographs and other schematics taken by Provider of the Site and the System, and further agrees that District may use such photographs and other schematics for the purpose of marketing and promoting their operations.

Nothing herein shall limit in any way, to any extent the right of individual persons, including, without limitation, members of District’s Governing Board, from exercising their right to free speech in relation to this Agreement and any subject matter hereof, within the constraints of Applicable Law. Nothing herein shall compel either Party to make statements beyond its sole, reasonable, good faith discretion.

21. Legal Effect and Status of Agreement.

A. District Not Operator. Neither District nor any Party related to District shall have the right or be deemed to operate the System for purposes of Section 7701(e)(4)(A)(i) of the Internal Revenue Code.

B. Burdens/Benefits of System Ownership. Notwithstanding any provision to the contrary under this Agreement, neither District nor any Party related to District shall (i) bear or be deemed to bear any significant financial burden if there is nonperformance by Provider under this Agreement, as the phrase “any significant financial burden if there is nonperformance” is used in Section 7701(e)(4)(A)(ii) of the Internal Revenue Code; or (ii) be deemed to receive any significant financial benefit if the operating costs of the System are less than the standard of performance and/or operation set forth in this Agreement, as the phrase “significant financial benefit if the operating costs of such facility are less than the standards of performance or operation” is used in Section 7701(e)(4)(A)(iii) of the Internal Revenue Code.

C. No Capital Lease; Forward Contract. The Parties acknowledge and agree that for accounting or tax purposes, this Agreement is not and shall not be construed as a capital lease and, pursuant to Section 7701(e)(3) of the Internal Revenue Code, this Agreement is and shall be treated

by each Party as a service contract for the sale to District of electric energy produced at an alternative energy System. Each of the Parties agrees that it will not dispute that (i) the transaction contemplated by this Agreement constitutes a “forward contract” within the meaning of the United States Bankruptcy Code and (ii) each Party is a “forward contract merchant” within the meaning of the United States Bankruptcy Code.

22. Miscellaneous.

A. Amendments. This Agreement may be amended only in a writing signed by both Provider and District or their respective successors in interest.

B. Notices. Any notice required or permitted to be given in writing under this Agreement shall be mailed by certified mail, postage prepaid, return receipt requested, or sent by overnight courier service, or personally delivered to a representative of the receiving Party, or sent by facsimile or email (provided an identical notice is also sent simultaneously by mail, overnight courier, or personal delivery as otherwise provided in this Section). All such communications shall be mailed, sent or delivered, addressed to the Party for whom it is intended, at its address set forth below. A Party may change its address by providing written notice to the other Party in accordance with this Section.

If to District:

Palmdale Water District
Attention: Adam Ly
2029 East Avenue Q
Palmdale, CA 93550
Phone: 661-456-1062
Facsimile: 661-947-8604
Email: aly@palmdalewater.org

If to Provider:

c/o Distributed Solar Development
Attention: Erik Schiemann
200 Harborside Drive, Suite 200
Schenectady NY 12305
Phone: 518 742 6863
Facsimile: N/A
Email: erik.schiemann@dsdrenewables.com

Copy of notices to:

Jennifer Gerrard, General Counsel
200 Harborside Drive, Suite 200
Schenectady NY 12305
Email: jennifer.gerrard@dsdrenewables.com

C. Non-Waiver. The failure, delay or forbearance by either Party to exercise any of its rights or remedies under this Agreement or to provide written notice of any default to a defaulting Party, will not constitute a waiver of such rights or remedies. No Party will be deemed to have waived any right or remedy unless it has made such waiver specifically in writing. The waiver by either Party of any default or breach of any term, condition or provision herein contained shall not be deemed to be a waiver of any subsequent breach of the same term, condition or provision, or any other term, condition or provision contained herein.

D. No Set-Off. Except as otherwise set forth herein, each Party hereby waives all rights to set-offs of amounts due hereunder. The Parties agree that all amounts due hereunder are independent obligations and shall be made without set-off for other amounts due or owed hereunder.

E. Intellectual Property. Nothing in this Agreement shall be construed to convey to District an easement or other right to trademarks, copyrights, technology or other intellectual property of Provider.

F. Severability. Should any provision of this Agreement for any reason be declared invalid or unenforceable by final and non-appealable order of any court or regulatory body having jurisdiction, such decision shall not affect the validity of the remaining portions, and the remaining portions shall remain in full force and effect as if this Agreement had been executed without the invalid portion.

G. Survival. Any provision of this Agreement that expressly or by implication comes into or remains in full force following the termination or expiration of this Agreement shall survive the termination or expiration of this Agreement.

H. Headings. The headings in this Agreement are solely for convenience and ease of reference and shall have no effect in interpreting the meaning of any provision of this Agreement.

I. Choice of Law. This Agreement shall be construed in accordance with the laws of the State of California (without regard to its conflict of laws principles). The venue for any dispute arising out of or relating to this Agreement shall be in the California County in which the System is located.

J. Binding Effect. This Agreement and its rights, privileges, duties and obligations shall inure to the benefit of and be binding upon each of the Parties hereto, together with their respective successors and permitted assigns.

K. No Partnership. This Agreement is not intended, and shall not be construed, to create any association, joint venture, agency relationship or partnership between the Parties or to impose any such obligation or liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act as or be an agent or representative of, or otherwise bind, the other Party.

L. No Third-Party Beneficiaries. This Agreement is solely for the benefit of the Parties hereto and no right or cause of action shall accrue by reason hereof for the benefit of any third party not a party hereto, other than the Indemnitees and any Secured Parties.

M. Counterparts. This Agreement may be executed in counterparts, which shall together constitute one and the same agreement. Electronic, facsimile or copies of signature pages shall have the same force and effect as originals.

N. Further Assurances. Upon the receipt of a written request from a Party, each Party shall execute or cause to be executed such additional documents, instruments, estoppels and assurances, and take such additional actions, as are reasonably necessary and desirable to carry out the terms and intent hereof, including but not limited to an Interconnection Agreement. Neither Party shall unreasonably withhold, condition or delay its compliance with any reasonable request made pursuant to this Section.

O. Entire Agreement. This instrument and the documents referenced herein represent the full and complete agreement between the Parties hereto with respect to the subject matter contained herein and supersedes all prior written or oral agreements between said Parties with respect to said subject matter.

IN WITNESS WHEREOF, the Parties have executed this Agreement on the Effective Date.

DISTRICT:

Palmdale Water District

By: _____

Name: Dennis LaMoreaux

Title: CEO/General Manager

PROVIDER:

East Avenue Q Solar Project 2022, LLC

By: _____

Name: Erik Schiemann

Title: President

Exhibit A – Definitions

1. “Annual Production Estimate” shall mean, for the Solar Facility, the estimated energy production for a Contract Year as set forth in Exhibit B.
2. “Applicable Law” shall mean, with respect to any person, any law, statute, rule, regulation, ordinance, treaty, order, decree, judgment, decision, holding, injunction, registration, license, guideline, Governmental Approval, consent or requirement of any Governmental Authority having jurisdiction over such person or its property, as any of the foregoing may be amended from time-to-time, and any corresponding provisions of any successor to the foregoing, together any rules or regulations promulgated under such successor.
3. “Assignment” shall have the meaning as defined in Section 19(A).
4. “Authorities Having Jurisdiction” shall mean the governmental organization, office or individual responsible for approving equipment, an installation or a procedure.
5. “Battery Energy Storage System” (or “BESS”) shall mean an energy storage system with the minimum nameplate power and energy capacity as shown in Exhibit F.
6. “BESS Energy Shortfall Amount” shall mean an amount equal to the product of: (i) the BESS Guarantee Rate, multiplied by (ii) the number of hours that one hundred percent (100%) of the nameplate power capacity of the BESS was not available during the Measurement Period.
7. “BESS Output” shall mean the total quantity of all actual electrical energy discharged by the BESS as measured in kWhac by a Meter installed in close proximity to the Delivery Point. Output does not include the Green Attributes, Environmental Financial Incentives, RECs or REC Reporting Rights.
8. “BESS Services” shall mean generating electricity bill cost savings for District through storage and discharge of electrical energy on and from the BESS in accordance with Section 11(B).
9. “BESS Guarantee Rate” means as defined in Exhibit C.
10. “Commercial Operation” shall mean that (i) the Project is operating and able to produce and deliver Energy to District pursuant to the terms of this Agreement; (ii) Provider has received all local, state and federal Permits and other approvals as may be required by Law for the construction, operation and maintenance of the Project, including approvals, if any, required under the California Environmental Quality Act for the Project and related interconnection facilities.
11. “Commercial Operation Date” shall mean the date on which Provider achieves Commercial Operation for the Project.
12. “Commercial Operation Deadline” shall have that meaning as set forth in Section 6(C) of this Agreement.

13. Conditions Precedent Deadline” shall have that meaning as set forth in Section 6(B) of the Agreement.
14. Contract Year” shall mean a period of twelve (12) consecutive months (except in the case of the first Contract Year which may be shorter) with the first Contract Year commencing on the Commercial Operation Date and each subsequent Contract Year commencing on the anniversary of the first day of the first month following the Commercial Operation Date.
15. Days” shall mean calendar days, unless otherwise specified.
16. Delay Liquidated Damages” shall mean the daily rate payable by the Provider to District for unexcused delays past the Commercial Operation Deadline as outlined in Section 6(C).
17. Delivery Point” shall mean the Energy delivery point within Site’s electrical system on District’s side of the Site’s Distribution Utility meter, as designated by the physical interface of the System with the Site’s electrical system.
18. Distribution Utility” shall mean Southern California Edison.
19. Distribution Utility Upgrades” shall mean that scope of work and associated costs that the Distribution Utility requires on the Distribution Utility side of the Distribution Utility meter in order for the System to interconnect to the Distribution Utility system.
20. Energy” shall mean electrical energy measured in kWhac.
21. Energy Shortfall Amount” shall mean an amount equal to the product of: (i) the Output Guarantee Rate, multiplied by (ii) the difference between the delivered Output for such Measurement Period and the Output Guarantee for such Measurement Period.
22. Environmental Financial Incentives” shall mean each of the following financial rebates and incentives that is in effect as of the Effective Date: (i) investment tax credits associated with the development, construction, ownership or operation of the System, accelerated depreciation, and other financial incentives in the form of credits, reductions or allowances associated with the System that may be applied to reduce any state or federal income taxation obligation, and (ii) the right to claim federal income tax credits under Sections 26 or 48 of the Internal Revenue Code or any state tax law or income tax deductions with respect to the System under the Internal Revenue Code or any state tax law. Environmental Financial Incentives do not include Green Attributes.
23. Expiration Date” shall mean the last day of the month that follows the twenty-fifth (25th) annual anniversary of the Commercial Operation Date.
24. Force Majeure” shall mean any event or circumstances beyond the reasonable control of and without the fault or negligence of the Party claiming Force Majeure, which cannot reasonably be avoided, mitigated or cured through the reasonable and diligent efforts of the Party claiming

Force Majeure. It shall include, without limitation, interruption or delay of the construction of the System or failure or interruption of the production, delivery or acceptance of electricity due to: (i) natural phenomena, such as storms, hurricanes, floods, lightning, volcanic eruptions and earthquakes; (ii) explosions or fires arising from lightning or other causes unrelated to the acts or omissions of the Party seeking to be excused from performance; (iii) acts of war or public disorders, civil disturbances or riots, insurrection, sabotage, epidemic, terrorist acts, or rebellion; (iv) action or inaction by a Governmental Authority which, by compulsion or prohibition, prevents a Party from performing, or causes a Party to take action that would comprise a breach of any covenant, term or condition of this Agreement; and (v) the inability of one of the Parties, despite its reasonable efforts, to obtain, in a timely manner, any Permit necessary to enable the affected Party to fulfill its obligations in accordance with this Agreement, provided that the delay or non-obtaining of such Permit is not attributable to the Party in question and that such Party has exercised due diligence to obtain such Permit. Force Majeure will not be based on (i) District's inability to use Energy purchased hereunder, (ii) Provider's ability to sell Energy at a price greater than the price of Energy under this Agreement, or (iii) District's involuntary shutting down or closing of the facilities located at the Property. Economic hardship of either Party shall not constitute Force Majeure.

25. "Governmental Authority" shall mean the government of the United States of America, any other nation or any political subdivision thereof, whether state or local, and any agency, authority, instrumentality, regulatory body, court, central bank or other entity exercising executive, legislative, judicial, taxing, regulatory or administrative powers or functions of or pertaining to government (including any supra-national body exercising such powers or functions, such as the European Union or the European Central Bank).
26. "Governmental Approvals" shall mean any notices to, reports or other filings to be made with, or any consents, registrations, permits or authorizations to be obtained from, any Governmental Authority.
27. "Green Attributes" shall mean any and all credits, benefits, emissions reductions, offsets and allowances, howsoever entitled, attributable to the generation of Output from the System, and its displacement of conventional energy generation, that is in effect as of the Effective Date or may come into effect in the future. Green Attributes include but are not limited to Renewable Energy Certificates, as well as: (i) any avoided emissions of pollutants to the air, soil or water such as sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO) and other pollutants; (ii) any avoided emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride and other greenhouse gases (GHGs) that have been determined by the United Nations Intergovernmental Panel on Climate Change, or otherwise by law, to contribute to the actual or potential threat of altering the Earth's climate by trapping heat in the atmosphere; and (iii) the reporting rights to these avoided emissions, such as REC Reporting Rights. Green Attributes do not include (i) any energy, capacity, reliability or other power attributes from the System, (ii) Environmental Financial Incentives, (iii) fuel-related subsidies or "tipping fees" that may be paid to Provider to accept certain fuels, or local subsidies received by the generator for the destruction of particular preexisting pollutants or the promotion of local environmental benefits or (iv)

emission reduction credits encumbered or used by the System for compliance with local, state or federal operating and/or air quality Permits.

28. “Insolation” shall mean the amount of solar energy measured in watts per square meter (W/m²) falling on a particular location during a specific time, as published by the National Renewable Energy Laboratory.
29. “Interconnection Agreement” shall mean an agreement entered into by and between District and the Distribution Utility which agreement shall provide for (i) each System to be interconnected with the Distribution Utility’s electricity distribution system, (ii) for energy to flow from each System to such system and (iii) for energy to flow from such system to the Site, as applicable, under the provisions of all applicable Distribution Utility’s tariffs.
30. “Internal Revenue Code” shall mean the Internal Revenue Code of 1986, as amended.
31. “kWac” shall mean kilowatt alternating current.
32. “kWdc” shall mean kilowatt direct current.
33. “kWhac” shall mean kilowatt-hour alternating current.
34. “Notice to Proceed” shall mean as defined in Section 6(B).
35. “Outage” shall mean as defined in Section 4(F).
36. “Output” shall mean the total quantity of all actual electrical power generated by the Solar Facilities as measured by a Meter in close proximity to the Delivery Point measured in kWhac. Output does not include the Green Attributes, Environmental Financial Incentives, RECs or REC Reporting Rights.
37. “Output Guarantee Rate” shall mean as defined in Exhibit B.
38. “Parallel Energy Services” shall mean to remain interconnected to and receive grid services.
39. “Permits” shall mean all government permits and approvals, regulatory or otherwise required for the construction, installation, completion and operation of the System.
40. “Person” shall mean any individual, corporation, partnership, joint venture, association, joint stock company, trust, trustee, estate, limited liability company, unincorporated organization, real estate investment trust, government or any agency or political subdivision thereof, or any other form of entity.
41. “Power Price” shall mean the per kWhac rate(s) as set forth on Exhibit B

42. “Provider’s Construction Conditions Precedent” and “District’s Construction Conditions Precedent” shall have that meaning as set forth in Section 6(A) and 6(B) of the Agreement, respectively.
43. “Project” shall have that meaning as set forth in the Recitals of this Agreement.
44. “RECs” or “Renewable Energy Certificates” shall mean renewable energy certificates related to and representing Green Attributes (also known as green tags, renewable energy credits, or tradable renewable certificates), which are tradable environmental commodities in the United States and represent 1 megawatt-hour (MWh) of electricity generated from an eligible renewable energy resource. These certificates can be sold and traded and the owner of the REC can claim to have purchased renewable energy.
45. “REC Reporting Rights” shall mean the right of a REC purchaser to report the ownership of accumulated RECs in compliance with federal or state law, if applicable, and to a federal or state agency or any other Party at the REC purchaser’s discretion, and include without limitation those REC Reporting Rights accruing under Section 1605(b) of the Energy Policy Act of 1992 and any present or future federal, state, or local law, regulation or bill, and international or foreign emissions trading program.
46. “Supervisory Control and Data Acquisition” or “SCADA” shall mean the system that monitors, communicates with, and controls devices throughout the System.
47. “Site” shall mean the portion of District’s real property on which a System is to be located pursuant to this Agreement. See Exhibit F for additional details.
48. “Solar Facility” means each solar photovoltaic generation plant, together with all necessary inverters, ancillary equipment with a target installation size expressed in kWdc and kWac as shown in Exhibit F to be installed at the Site.
49. “Termination Value” shall equal the amount shown in Exhibit D for each Contract Year.

Exhibit B – Power Price and Output Guarantee Rate

Contract Period, Months	Contract Year	Power Price		Annual Production Estimate (kWh)	Output Guarantee Rate	
1-12	1	\$0.0554	/kWhac	4,504,694	\$0.1086	/kWhac
13-24	2	\$0.0554	/kWhac	4,482,171		/kWhac
25-36	3	\$0.0554	/kWhac	4,459,760		/kWhac
37-48	4	\$0.0554	/kWhac	4,437,461	\$0.1187	/kWhac
49-60	5	\$0.0554	/kWhac	4,415,274		/kWhac
61-72	6	\$0.0554	/kWhac	4,393,197		/kWhac
73-84	7	\$0.0554	/kWhac	4,371,231	\$0.1297	/kWhac
85-96	8	\$0.0554	/kWhac	4,349,375		/kWhac
97-108	9	\$0.0554	/kWhac	4,327,628		/kWhac
109-120	10	\$0.0554	/kWhac	4,305,990	\$0.1417	/kWhac
121-132	11	\$0.0554	/kWhac	4,284,460		/kWhac
133-144	12	\$0.0554	/kWhac	4,263,038		/kWhac
145-156	13	\$0.0554	/kWhac	4,241,723	\$0.1548	/kWhac
157-168	14	\$0.0554	/kWhac	4,220,514		/kWhac
169-180	15	\$0.0554	/kWhac	4,199,411		/kWhac
181-192	16	\$0.0554	/kWhac	4,178,414	\$0.1692	/kWhac
193-204	17	\$0.0554	/kWhac	4,157,522		/kWhac
205-216	18	\$0.0554	/kWhac	4,136,735		/kWhac
217-228	19	\$0.0554	/kWhac	4,116,051	\$0.1849	/kWhac
229-240	20	\$0.0554	/kWhac	4,095,471		/kWhac
241-252	21	\$0.0554	/kWhac	4,074,993		/kWhac
253-264	22	\$0.0554	/kWhac	4,054,618	\$0.2020	/kWhac
265-276	23	\$0.0554	/kWhac	4,034,345		/kWhac
277-288	24	\$0.0554	/kWhac	4,014,174		/kWhac
289-300	25	\$0.0554	/kWhac	3,994,103	\$0.2208	/kWhac

Exhibit C – BESS Rate

Reserved.

Exhibit D – Termination Values

Contract Period, Months	Contract Year	Termination Value
1-12	1	\$5,765,078
13-24	2	\$4,952,021
25-36	3	\$4,157,147
37-48	4	\$3,484,082
49-60	5	\$2,855,156
61-72	6	\$2,237,649
73-84	7	\$2,135,822
85-96	8	\$1,904,495
97-108	9	\$1,838,320
109-120	10	\$1,768,832
121-132	11	\$1,695,776
133-144	12	\$1,646,126
145-156	13	\$1,592,014
157-168	14	\$1,535,596
169-180	15	\$1,476,697
181-192	16	\$1,390,380
193-204	17	\$1,299,215
205-216	18	\$1,202,825
217-228	19	\$1,100,804
229-240	20	\$992,716
241-252	21	\$878,360
253-264	22	\$760,056
265-276	23	\$635,419
277-288	24	\$502,961
289-300	25	\$362,072

Exhibit E – Purchase Option Price

End of Contract Year	Purchase Option Price
6	\$2,237,649
10	\$1,768,832
15	\$1,476,697
25	\$362,072

Exhibit G – General Conditions and Technical Specifications

[ATTACHED BEHIND THIS COVER PAGE]

EXHIBIT G

GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

This EXHIBIT G is a summary of the scope of work and is not all inclusive of terms and conditions of the Agreement.

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1. PROJECT OVERVIEW

As set forth in detail below, and except as otherwise provided herein or in that certain Power Purchase Agreement (“PPA”) and Site Easement Agreement, Provider shall be responsible for supplying, at Provider’s sole cost, all expertise, labor and materials necessary to construct, install, commission, own, and operate the System, including but not limited to: planning, permitting, designing, engineering, procuring, delivering, installing, constructing, interconnecting, commissioning, owning, and operating. Access to the Project Sites of the System shall be subject to approval of District.

Provider shall be solely responsible for all work required to complete the Project including but not limited to: (a) project management including design, engineering, submittals, construction, interconnection, commissioning and Distribution Utility sign off; (b) procurement of all materials and equipment; (c) design and engineering including civil, structural, electrical, seismic and wind loading requirements and fire protection requirements; (d) permitting and environmental compliance with the current version of all applicable codes and standards; (e) Distribution Utility interconnection requirements compliance; (f) Site preparations including but not limited to grubbing, clearing, grading, roads, dust control, drainage requirements, construction wastewater and storm water disposal, removing excess debris, all final Site preparation, and all other requirements set forth in the Agreement; (g) meters, monitoring, and Data Acquisition System (“DAS”) and weather station; (h) production analysis and performance guarantee for the Solar Facilities and performance analysis and savings guarantee for the BESS; (i) conformance to manufacturers’ installation requirements and warranty terms; (j) acceptance testing, commissioning, interconnection signoff and Permission to Operate (“PTO”) by the Distribution Utility; (k) construction closeout including punch list, as-built drawings and documents package, PV module washing and Site cleanup; (l) operation and maintenance for the term of the PPA; (m) Site security requirements; (n) safety plans and measures per District approval. In addition to these general responsibilities, the Provider shall be responsible for all additional requirements as set forth in this Agreement and all Exhibits and Attachments, including but not limited to this Exhibit G – General Conditions and Technical Specifications.

Provider shall also be responsible for providing District with copies of Provider’s Operations and Maintenance (“O&M”) manuals, testing reports, start-up procedures, warranties, guarantees, and commissioning reports corresponding to the Project, each of which shall be evaluated as to whether such documentation comprises Confidential Information, as defined in the PPA. Provider shall execute all of its obligations in a manner which reasonably minimizes interference and inconvenience to District. Provider shall regularly report status of Provider’s execution of its obligations under this Agreement to District.

2. GENERAL REQUIREMENTS

2.1 Project Management

Provider shall own and operate the Project and is responsible for overall safety on each Project Site. Provider shall conduct all project management activities required to complete the Project, including coordination efforts with District’s representative, the Distribution Utility, inspectors, permitting agencies, suppliers, subcontractors, Provider’s office, field Project staff and any other third parties that are involved in or impacted by the Project. The installation must be “turn-key,” requiring a minimum level of supervision and project management by District, including all materials, equipment and labor, completed and commissioned per the specifications and general conditions contained herein. Except as otherwise provided in the PPA, all Distribution Utility related interconnection work, fees, and installations necessary to make the System operational will be the sole responsibility of the Provider in accordance with any requirements of the Distribution Utility.

2.2 District Project Objectives

District requires that Provider perform each of the following in accordance with the Agreement:

- A. Ensure that construction activities and Project installation and operation are performed safely, comply with all applicable laws, and do not result in any unreasonably adverse effect on District staff, existing District facilities, Site power quality, Site data systems or daily operations at any Project Site throughout the life cycle of the installation. Provider shall undertake commercially reasonable efforts to prevent unreasonably adverse effects on surrounding persons and property to the extent within Provider's knowledge. Manage construction and operation activities so that they minimally disrupt the calendar of operations at each Project Site.
- B. Create a definitive scope of work and project schedule for the Project and manage the entire Project, including but not limited to contracts, design, engineering, permitting, approvals, procurement, pre-construction, Distribution Utility interconnection, installation, testing, commissioning, performance validation, and on-going maintenance and operation in accordance with this Agreement. Ensure work is completed when needed to meet Project deadlines.
- C. Design and implement Solar Facilities to obtain projected net savings and cash flow over the term of the PPA using proven technology that complies with the terms and conditions of the PPA and complies with all relevant codes and regulations.
- D. Subject to Section 2.6, design and implement BESS to be capable of providing Backup Power and to provide net savings using proven technology that complies with all relevant codes and regulations.
- E. Design and implement the System sized in compliance with the Utility's applicable rate structure, energy consumption, and load profiles for each Project Site, and in compliance with all applicable Distribution Utility requirements. Undertake reasonable efforts to ensure that the System is designed and installed to avoid/minimize Distribution Utility upgrades and that such costs are avoided/minimized throughout the entire Project.
- F. Ensure that the Project meets all identified financial and environmental incentive requirements and deadlines. Should additional incentives be identified, Provider will work with District to ensure that the deadlines can be achieved in order to allow for the incentive to be wrapped into the Project.
- G. Ensure that all Project design and construction activities are coordinated with Site facility operations and/or construction activities and are in compliance with Site provided written work rules, safety requirements, and specifications at all times.

2.3 Communication Protocol

Throughout the entire Project timeline, the representative selected by District will be Provider's main source of contact regarding any and all Project related issues. At all times between the release date of the Request for Proposals and Commercial Operation, Provider shall include District's representative in all communications with District. Unless otherwise stated, District's representative will act as a liaison, facilitator and intermediary between Provider and District.

Unless otherwise stated in the Agreement Documents and subject to change by District, the Parties shall meet bi-weekly during the design phase of the Project and weekly during the construction phase

of the Project to, among other things, review work performed to date and to be performed. Provider shall organize the meeting, prepare, and distribute meeting notes. Meeting minutes shall include a three-week look-ahead schedule, RFI log, Change Order log and Submittal Log with two week look-ahead priority list(s). Meeting minutes shall be updated during the meeting and distributed at the end of the meeting. District shall have five business days after District's receipt of such minutes to object to them in writing and provide corrections in writing. A quorum of meeting attendees will be named at the first meeting but may be modified as necessary by District. The named quorum shall be in attendance in all Project meetings. A pre-construction meeting shall be held prior to any work being performed on the Site with all required parties.

2.4 Solar Facility Sizing

It is the sole responsibility of the Provider to ensure that the sizing of the total installed system capacity per Project Site (kWDC / kWAC) achieves the Annual Production Estimate as closely as practical for each Project Site. The total installed system capacity per Project Site shall not increase or decrease the Annual Production Estimate without prior written approval of District.

2.5 BESS Sizing

It is the sole responsibility of the Provider to ensure that the sizing of the total installed BESS capacity (kW and kWh) provides identified electricity bill savings for the District.

2.6 Microgrid Configuration

The BESS equipment installed as part of this Project shall not provide backup power.

2.7 Incentives

Provider shall be responsible for preparing and submitting to all applicable agencies, all applications, proof of progress submittals, claim forms and documentation necessary for any environmental or financial incentives and rebates, including but not limited to, the Self Generation Incentive Program ("SGIP"). To the extent action is required by District, District shall, upon request of Provider, use reasonable efforts to assist Provider in obtaining and retaining the SGIP incentive. District shall have the opportunity to review, comment on, and approve all such applications and documentation prior to submission by Provider. Provider has incorporated into their BESS Rate an SGIP incentive in the amount of \$0. Should an SGIP incentive become available, the Provider shall adjust their BESS Rate accordingly. Provider shall bear all risk of loss with respect to the SGIP incentive, except for losses arising from the negligence or willful acts or omissions by District, or their agents or employees.

2.8 Physical Site Investigation & Project Feasibility Assessment

Provider shall read and become knowledgeable with all documentation available relevant to the Project and visit the Project Sites to assess its conditions and logistics, including but not limited to all Distribution Utility interconnection related requirements. Provider shall conduct feasibility and configuration assessments, environmental assessments, and all other inspections of the Project Sites to determine that the Project Sites can support the installation and interconnection of the System. Provider must visit the Project Sites to ascertain Site conditions, accuracy of provided drawings and feasibility of design. Provider shall be solely responsible to ensure that each Project Site's soil conditions and terrains are favorable for Project construction.

Although District may provide historical information regarding the Project Sites, District makes no representation as to the accuracy of the information about the Project Sites provided in the RFP package or otherwise, including data, drawings and reports developed by third parties. Except as otherwise provided in the Agreement with respect to information provided by the District, Provider shall rely solely on its own due diligence to discover and confirm existing conditions at the Project Sites. Provider shall report any discovered and previously unknown Site conditions of a substantial nature to District within five (5) days of discovery.

Provider shall be solely responsible for ensuring the existing Project Sites' electrical distribution equipment, including but not limited to the main service switchgear and Distribution Utility transformer, will support the interconnection of the System. Except as otherwise provided in the PPA, Provider is responsible for all scope, costs and designs relating to upgrades to the existing electrical system required to accommodate the System installation and interconnection, and has included these upgrades in its scope, costs, and design drawings.

Provider shall confirm that each System will be interconnected to the correct meter at each Project Site by validating the meter and service account identification numbers (SAID) with the Distribution Utility.

District operates under several environmental permits issued by various agencies. To the extent that District has provided such a permit to Provider in advance of the Effective Date, and due to an action, inaction, or negligence by Provider, District becomes subject to non-compliance penalties, the cost of such penalties shall be borne by Provider.

Provider shall identify, if any, third-party Site assessments that are required and be responsible for obtaining all required studies at their sole cost and expense. Except as otherwise provided herein or in the PPA or Site Easement Agreement, Provider shall assume any and all costs and risks associated with physical Project Site conditions, real estate constraints and environmental Site assessment.

Reports which may be required to be obtained by Provider at Provider's judgment (unless otherwise noted below) and at the Provider's sole cost include, but are not limited to:

- Structural Report
- Geotechnical Report
- Title Reports / ALTA Surveys
- Boundary Surveys
- Topographic Surveys
- Underground Utility Survey
- Glint and Glare Study
- Arc Flash Study / Coordination Study from the System back to the existing electrical service board, not the full Site (must be completed)
- Site Electrical Service Assessments
- Environmental Studies

These reports must be obtained when requested by District or any other Governmental Authority having jurisdiction.

2.9 Permitting, Codes, Regulatory Compliance

Provider shall obtain, oversee and adhere to all required permissions for Project construction and operation by obtaining approvals from all Governmental Authorities having jurisdiction over the

Project, including, but not limited to: the permitting agency, the Distribution Utility, incentive authorities, the California Energy Commission (“CEC”), County of Los Angeles fire department, California Occupational Safety and Health Administration (“Cal OSHA”), right-of-way permits, easement agreements and other codes and best practices. Specifically, the Provider shall obtain and submit all documents to achieve and maintain permission to operate with all required Governmental Authorities. In addition to stamped and approved plans, Provider shall provide District with installation compliance confirmation letters from all authorities having jurisdiction within five (5) days of receipt.

2.10 Compliance with The California Environmental Quality Act (“CEQA”)

Provider agrees to coordinate its work on the Project with that of any CEQA consultant(s) retained by District, to provide any reasonably available information such as current elevations and schematic drawings for use in CEQA compliance documents, and to incorporate any mitigation measures adopted by District prior to the Execution Date into the Project design at no additional cost to District.

2.11 Procurement

Provider shall procure all equipment and services required for Project design, construction, commissioning, system monitoring, warranties, operation and maintenance, as described in this Agreement and as shown in District-approved final design engineering drawings, specifications and data sheets. Any proposed changes or substitutions must be presented to District in standard submittal format with detailed explanations and instructions for review, comment and approval. District approval of any of the submittals provided by Provider, including drawings, does not excuse the Provider from their responsibility to meet all safety requirements, applicable codes and standards requirements, requirements of all Governmental Authorities and the requirements of the Agreement including this Exhibit G.

2.12 Construction

Provider shall conduct all construction and construction management work per the Project scope, schedule and per the requirements of this Agreement. Any proposed changes that represent a deviation from scope or schedule must immediately be brought to District’s attention for review. All work must be performed and supervised by skilled workers trained and experienced in the installation of the System in accordance with equipment manufacturers’ installation requirements. Provider shall effectively manage the schedule and coordinate construction activities around District’s maintenance activities and other construction projects where applicable.

2.13 Commissioning

Provider shall conduct all activities required for proper testing and commissioning of the System and any related installations/systems. Commissioning will include testing of all systems to ensure proper operations per the design standards and testing parameters. Provider is required to verify that the (i) the System is functioning as expected within acceptable parameters and as designed at a nameplate capacity; (ii) the Solar Facility is capable of producing the amount of energy expected in the first year of the Annual Production Estimate, when adjusted for actual weather conditions; and (iii) and meets expected performance requirements described within the Agreement. Provider shall manage all necessary final inspections with all Governmental Authorities having jurisdiction over the Project, the Distribution Utility, District representatives, and any other required inspectors. Provider shall also be responsible for completing the Commissioning Schedule and submitting it to District for review and approval. Provider will notify District no less than five (5) days prior to the commencement of any testing and/or inspections and District and/or its representative will have the right to observe all such

tests and/or inspections. As part of the commissioning activities, Provider must confirm that no negative impacts are experienced by existing facilities that connect or interface with the new installations and systems and shall be solely responsible for resolving all issues that arise.

2.14 Distribution Utility Interconnection

Except as otherwise provided herein or in the PPA, Provider is responsible for coordinating and implementing all requirements related to the interconnection of the System with the Distribution Utility, which shall include Distribution Utility provided and installed facilities and District Site facilities, at Provider's sole cost and expense. Provider will coordinate with the Distribution Utility and District to meet all milestones for the Project required by any Interconnection Agreement. Provider is responsible for compliance with all milestones, including payment milestones to the Distribution Utility for design and installation services provided by the Distribution Utility. Provider shall be responsible for obtaining written Permission to Operate for the System from the Distribution Utility and activate the system to begin operating in compliance with this Agreement. In addition, Provider shall be responsible for all on-going terms, obligations and costs described in the Interconnection Agreement, and any other necessary permit signoffs from any Governmental Authorities having jurisdiction over the Project, to operate the System in parallel with the Distribution Utility grid.

Provider shall also be responsible for coordinating the desired rate tariff changes with the Distribution Utility for the System. Desired rate tariffs for each Distribution Utility meter are defined in the Site Assessment Tables. Provider will be responsible for ensuring that the System meets the requirements for inclusion in the desired rate tariffs and will promptly inform District if there is any discrepancy between such requirements and the specifications for the System set forth in this Agreement. Rate changes shall occur as soon as possible following Permission to Operate. Provider shall be responsible for ensuring that the rate tariff change has taken place for each Distribution Utility meter and providing confirmation of the rate tariff change to District.

2.15 Completion Ceremony and District Public Affair Support

Provider will coordinate a ribbon cutting ceremony at one District location at a mutually agreed time at no additional cost to District, including coordination on a press release. Provider will also support the District with materials throughout the project as required to support District public outreach.

2.16 Display Kiosks / Public Data Access

Provider shall provide a public webpage to be made available through a link on District's existing website and one (1) 42" monitor or television will be delivered to District at project completion. Provider shall coordinate and obtain approval of all data points to be displayed on the public webpage and monitor with District prior to implementation. District shall install mounting bracket, provide WiFi connection, and be responsible for IT and firewall.

2.17 Criminal Background Check

Provider shall provide criminal background checks for any person who will be accessing the District Sites, outside of the fenced construction area.

3. ENGINEERING AND DESIGN REQUIREMENTS

Provider shall, at its own cost and expense, (i) design, prepare and cause to be sealed all drawings and Engineering Design Packages, perform engineering studies and estimates and attend meetings as may be

required (or arrange for design and engineering pursuant to a subcontract executed in accordance with this Agreement), for the construction of the Project and interfaces required by the Distribution Utility including, without limitation, sizing of equipment, communication systems and components, preparing specifications and calculations for equipment and material to be included in the Project, completing all work in accordance with this Agreement, providing administration and other services and items required to complete and deliver to District and Distribution Utility the design and Engineering Design Packages, calculations, studies, and drawings necessary to construct a fully integrated and operational Project, and (ii) provide services, attend meetings and prepare all necessary documents and permit applications required to obtain all Governmental Approvals, including, without limitation, coordinating with the Governmental Authorities, the Distribution Utility and other agencies regarding Governmental Approvals necessary for the completion of the Project, completing the permitting process beginning from the permit application through to final approval and receipt of all Applicable Permits, all in accordance with this Agreement and its Exhibits, Applicable Law, Governmental Approvals, District Requirements, Distribution Utility requirements, Engineering Design Packages, industry standards, the actual condition of the Project Sites and all requirements to be sufficient, complete and adequate in all aspects to enable the Solar Facilities to achieve the Annual Production Estimate and a minimum twenty-five (25) year design life, and enable the BESS to achieve minimum twenty-five (25) year design life.

3.1 Design Codes

The Project shall be designed and installed in accordance with the latest edition of all applicable codes, standards, and recommendations of the following agencies:

- ACI – American Concrete Institute
- AISC – American Institute of Steel Construction
- ANSI – American National Standards Institute.
- ASCE – American Society of Civil Engineers
- ASME – American Society of Mechanical Engineers
- ASTM – American Society for Testing and Materials
- CAL OSHA – California Occupational Safety and Health Administration
- CBC – California Building Code
- CEC – California Electrical Code
- CFC – California Fire Code
- CSI – California Solar Initiative
- Distribution Utility Manuals and Standards
- ETL – Electrical Testing Laboratories
- IAEE – International Association of Electrical Inspectors
- ICEA – Insulated Cable Engineer's Association
- IEEE – Institute of Electrical and Electronic Engineers
- IPMVP – International Performance Measurements and Verification Protocol
- NEC – National Electrical Code
- NEMA – National Electrical Manufacturers Association
- NESC – National Electrical Safety Code
- NETA – National Electrical Testing Association
- NFPA – National Fire Protection Association codes, including but not limited to
 - NFPA 101 – Life Safety Code
 - NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems
- UL – Underwriters Laboratories

3.2 General Requirements

3.2.1 Licensing

- (a) In all cases, engineers are to be properly licensed by the State of California.
- (b) District requires a minimum of a Class B and Class C-10 license be held by Provider and/or their subcontractors.
- (c) Electrical, geotechnical, civil, structural and other engineering designs and reports are to be stamped and signed by a licensed engineer.

3.2.2 Solar Photovoltaic Orientation and Shading

- (a) Solar Facility will have a minimum shade free window between the hours of 10:00AM and 2:00PM (solar time) on the winter solstice, to the extent feasible.
- (b) Orientation of fixed-tilt PV array(s) shall be optimized and in all cases with an azimuth between 180 and 270 degrees unless otherwise explicitly approved by District in writing (as applicable).
- (c) Provider shall provide PVSyst in PDF report and excel 8760 format at every stage of the design that shows that the Solar Facility design and installation will meet the Annual Production Estimate.

3.2.3 Site and General System Requirements

- (a) Inverters shall not be placed in locations subject to exposure to direct sunlight between the hours of 10:00AM and 4:00PM. Where inverters must be placed in locations that would be subject to direct exposure to sunlight during this window of time, they shall be provided with shade coverings or otherwise protected from continuous exposure to the sun.
- (b) Where applicable, the Project shall require a study, recommendations and stamp and sign off from a licensed structural engineer and a licensed geotechnical engineer.
- (c) Where the Solar Facility is a ground mounted installation, Provider shall clear and grade the Site substantially in accordance with the Site grading plans. All vegetation inside the array boundaries shall be permanently removed.
- (d) The low-end clearance of ground mounted PV arrays shall be a minimum of two feet (2') above grade.
- (e) Ground mounted PV arrays shall include sufficient drive aisles to maintain the equipment and perform PV module washing, including access for vehicles and cranes as needed to remove and replace equipment.
- (f) All roads shall be designed and installed for all weather access.
- (g) All equipment pads shall be protected by bollards if subject to vehicular traffic. Bollards shall be permanent unless removable bollards are required to facilitate access to equipment.
- (h) Provider shall provide erosion control, weed abatement, and security for the Site throughout construction. Provider's weed abatement obligations requirements are set forth more particularly in Section 8(b) of this Exhibit G.
- (i) Provider shall be responsible for creating and performing all requirements of a Storm Water Pollution Prevention Plan ("SWPPP"), dust control plan, pollution mitigation plan, and all other plans if required by all Governmental Authorities. At a minimum, any earthwork-related or fine grading activities are to be conducted at such times that minimize construction-related fugitive dust.
- (j) A subsurface drainage system shall be required to be installed to direct ground and surface water toward existing offsite drainage features at each Site. In all cases the design of the drainage for the Solar Facility shall prevent water being directed towards existing Site drainage and prevent water accumulation in any area of the Site.

- (k) Inverter pads, BESS equipment pads, disconnect switches and all other equipment which Provider determines is at risk for tampering shall be fenced. Fencing shall be eight feet (8') high with two inch (2") galvanized steel chain link fabric where in accordance with all local requirements.
- (l) Ground mounted solar PV arrays shall be fenced in accordance with the NEC, NESC and requirements of any Governmental Authority and shall include provisions for at least one locking gate. If adequate Site fencing or equivalent is not in place, the fencing around ground mounted solar PV installations shall provide for a sixteen foot (16') wide clearance to the PV modules to allow for vehicular access and to limit shading impact on the Solar Facility.
- (m) Locks for all gates and electrical enclosures to be provided by Provider but must be approved by District prior to procurement. All gates shall include provision for both District and Provider locks to allow for access by either entity.
- (n) The Provider will evaluate whether the Site is in a floodplain and take appropriate precautions to prevent water damage to the Project, including determining and installing the PV arrays, batteries, inverters, electrical enclosures and all other materials to be used in the Project at the appropriate height above grade to be above the 1-percent-annual-chance flood elevation.
- (o) Lighting requirements for PV array and other Project equipment locations shall be discussed with District during design, and any lighting locations and fixture specifications shall be mutually agreed upon.
- (p) An arc flash study shall be performed by Provider, from the System back to the existing electrical service board (not the entire Site). All required equipment labeling, fault current and coordination analysis, and recommendations for proper personal protective equipment (PPE) shall be followed in accordance with the results of the arc flash study.
- (q) Geotechnical studies, where required, must include soil corrosivity and thermal resistivity testing and evaluation. All work must include consideration for the results of the testing and evaluation.

3.2.4 Conduit and Wiring

- (a) All conductors shall be in conduit. Provider shall not direct bury conductors unless explicitly approved by District in writing. All conduits shall be installed according to the requirement of the NEC and all Governmental Authorities.
- (b) Buried conduit shall be PVC and shall be covered and encased per NEC requirements.
- (c) Any conduits installed over or under an existing water line will require red concrete encasement.
- (d) All below grade horizontal and vertical bends of PVC conduit shall use long radius elbows. Bending of straight PVC conduit to avoid installation of long radius elbows will not be allowed.
- (e) Vertical risers of buried or encased PVC conduit shall transition to the metallic conduit type specified below no higher than twelve inches (12") above grade or top of concrete. Any exposed PVC shall be Schedule 80. If transition to metallic conduit is installed as soon as or just before the conduit is no longer buried or encased, use the appropriate conduit adapter and wrap metallic conduit in 10mil corrosion protection tape where exposed to soil or concrete.
- (f) Where exiting from the ground, all conduits shall enter enclosures from below and be made watertight. Finish with a silicone sealing compound.
- (g) All above ground conduit shall be EMT where corrosion is not a concern, and Rigid Aluminum Conduit (RAC) where corrosion is a concern.

- (h) All conduits located on rooftops will be supported using UV resistant polyethylene foam or synthetic rubber unless explicitly approved by District in writing. Wood supports are not permitted.
- (i) All conductors 8 AWG or smaller shall be copper. Code compliant aluminum conductors may be used for conductors larger than 8 AWG. All wiring that interfaces with any of District's equipment must be copper.
- (j) All wiring used for grounding shall be copper.
- (k) Ground lugs shall be mechanical or irreversible crimp, rated for direct burial, listed to UL 467 and/or UL 2703 and suitable for use with copper conductors.
- (l) Unless otherwise approved by District in advance, PV modules shall be grounded with hardware listed to UL 2703. PV module grounding shall be in accordance with all requirements of the NEC and the Governmental Authority.
- (m) All wiring shall be minimally rated to handle the voltage and current of the designed system.
- (n) All wiring shall be listed and labeled by a Nationally Recognized Testing Laboratory ("*NRTL*") in accordance with Underwriters Laboratories standards for its purpose and location.
- (o) PV module string wire shall be UL listed PV Wire and be appropriately rated for UV exposure where required.
- (p) All DC wire shall be adequately supported by structural steel within the footprint of a single solar PV array. DC wire shall be in conduit when spanning a gap between adjacent solar PV arrays.
- (q) The Solar Facility shall be equipped with DC arc-fault protection in accordance with the NEC.
- (r) Where there are more than two DC strings in parallel on an MPPT, DC wiring shall be protected by overcurrent protection rated for DC circuits and marked by the manufacturer for use in PV systems. Fuses shall be listed and labeled by an NRTL in accordance with UL 2579.
- (s) All termination equipment shall be rated for the conductor type, temperature, current and voltage of the conductor being terminated.
- (t) Locking connectors shall mate with PV module terminations and shall be certified compatible by the manufacturer of the locking connector provided with the PV module.
- (u) All conductors used for communication will be shielded cable with a drain for RS-485 wiring.
- (v) Communications wiring shall be in separate conduits from the high voltage DC and AC wiring with sufficient separation to prevent interference.
- (w) Worst-case DC voltage drop shall be limited to 2.0% unless otherwise explicitly approved by District in writing. The circuit shall be defined as all wiring from the PV module connectors to the DC input terminals at the inverter. Provider shall account for all horizontal and vertical distances and all wire gauge transitions.
- (x) Worst-case AC voltage drop for an individual inverter shall be limited to 2.5% for the BESS and 3% for the Solar Facilities at maximum power, and weighted average AC voltage drop shall be limited to 3.0% at maximum power, unless otherwise explicitly approved by District in writing. The circuit shall be defined as all wiring from the inverter output to the Delivery Point. Provider shall account for all horizontal and vertical distances and all wire gauge transitions.

3.2.5 Electrical Tie-In

- (a) The Solar Production Meter and BESS Meter shall be identified on the preliminary and final drawings and shall be located as close as possible to the Delivery Point, and in all

cases on the Delivery Point side of all major electrical losses including transformers and long wire runs.

- (b) Not applicable
- (c) Should relocation of any circuit breakers be required to meet requirements of this Agreement, all scope, costs and designs are the responsibility of the Provider.

3.2.6 Structural

- (a) Structural engineers shall determine all code requirements and the Project shall be designed and installed in accordance with the latest edition of all applicable codes and standards.
- (b) Equipment pads shall be a minimum of six inches (6”) of concrete reinforced at twelve-inch (12”) intervals with #5 rebar unless otherwise directed by the structural engineer. Equipment pad layouts shall include adequate spacing to accommodate maintenance activities for all equipment. A housekeeping pad elevated three inches (3”) above the remaining pad surface will also be required.
- (c) Where electrical enclosures will be mounted vertically to PV array structural posts or other supports, two feet (2’) minimum ground clearance and appropriate working clearances as required per NEC shall be maintained. In no case shall equipment locations create shade on any PV array between the hours of 10:00AM and 4:00PM (solar time) on the winter solstice.
- (d) Structural engineers are to specify the grade of steel used in all support structures. Mill certifications showing the identification of the steel to be used on the Project and the quality thereof shall be provided to District. Mill certifications shall be checked by Provider prior to accepting delivery of any steel.

3.3 Engineering Design Packages and Project Execution Plan

Provider and its subcontractors (as applicable) shall prepare and submit to District for their review and approval all drawings, assessments, reports, specifications, and all other necessary documents setting forth in detail all requirements for the construction of the Project. Provider shall prepare Preliminary, 50%, 90% and 100% Engineering Design Packages as described herein. All engineering and installation drawings shall comply with current construction standards, codes and regulations, and adhere to all requirements of this Agreement. The system design will comply with all applicable laws and regulations. District approval of any of the submittals provided by Provider, including drawings, does not excuse the Provider from their responsibility to meet all safety requirements, applicable codes and standards requirements, requirements of all Governmental Authorities and the requirements of the Agreement including this Exhibit G.

Engineering Design Packages shall at a minimum contain the information as outlined below for each milestone.

3.3.1 Preliminary and 50% Engineering Design Packages

- (a) Design Drawings depicting and identifying at a minimum:
 - (i) Solar Facility PV array layout
 - (ii) Tilt and azimuth for all PV arrays
 - (iii) The proposed locations of all other major Solar Facility equipment including but not limited to electrical point of connection, disconnects, panelboards, inverters, meters and dataloggers
 - (iv) The proposed locations of all major BESS equipment including but not limited to electrical point of connection, disconnects, transformers, panelboards, inverters, batteries, meters, controllers and dataloggers.

- (v) The locations of all major existing equipment, including but not limited to Distribution Utility transformer and meter, main electrical service switchgear, System electrical point(s) of connection, disconnects, panelboards, inverters, arrays, meters and dataloggers.
- (b) Product data sheets and copies of manufacturers' warranties for all major pieces of equipment.
- (c) Completed System Site Assessment Table in native and PDF formats.
- (d) PVSyst energy production modeling report in PDF format and 8760 output file in MS Excel format. The energy production model report and 8760 output files must be in the same format and use the same assumptions as those used to determine the inputs to this Agreement.
- (e) BESS system performance modeling report in 4x8760 output file in MS Excel format.

3.3.2 90% and 100% Engineering Design Packages

- (a) All information required above for the preliminary and 50% Engineering Design Packages, updated at each milestone.
- (b) A full set of design drawings as described in a subsequent section.
- (c) All required drawings, assessments and reports stamped and signed by an engineer licensed in the appropriate discipline – structural details shall not be stamped by an electrical engineer.
- (d) Full structural details of the PV array mounting system, BESS pad and anchorage, equipment support racks and anchorage, fencing design and associated calculations.
- (e) Microsoft Project or equivalent construction schedule (providing Gantt chart output) showing milestones, equipment order and delivery dates, and staffing requirements. Specific milestones such as conduit installation completion, material arrival dates, interconnection date, and commissioning timeline, shall be highlighted.
- (f) A list of those changes made from the original proposal with the reasons therefor.

The Engineering Design Packages will be reviewed by District. Comments shall be delivered to Provider within fifteen (15) business days of submission for review. Provider shall also be responsible for coordinating a review of the 90% drawings with the City of Palmdale and shall allow for thirty (30) days for that review. Ensuring that the Project complies with all requirements and will be installed to meet all requirements of this Agreement remains the sole responsibility of the Provider.

3.3.3 Project Execution Plan

A complete Project execution plan for each Site shall be provided for review, which shall at a minimum address the following:

- (a) Material storage location
- (b) Lay-down and layout yard location
- (c) Site office location
- (d) Access and mobilization
- (e) Crane locations and traffic control
- (f) Method of installation
- (g) Human resources and staffing
- (h) Communications
- (i) Anticipated Project risks

The Project execution plan shall be reviewed and approved by District prior to any work being performed on the Site. The Project execution plan shall be submitted as soon as reasonably possible, and no later than two (2) days after the 90% Engineering Design Package due date.

3.4 Design Drawings

A drawing summary list shall be maintained by the Engineer of Record for tracking drawings and revisions thereof over the design and construction period, and the list shall be provided to District if any consequential updates are made or as requested by District. All design drawing submittals shall be according to the following:

3.4.1 Format

- (a) All drawings shall include a title block which at a minimum contains the Project name, Site address, District logo, Provider's name, engineer's stamp, engineer's name and drawing revision table.
- (b) Any changes in the Engineering Design Packages from one District submittal to the next shall be clouded.
- (c) Redlines shall be maintained on a not more-than-weekly basis. As-built drawings shall be completed in a reasonable amount of time following the Governmental Authority final inspection and sign off.

3.4.2 Content

The descriptions of the sheets and sheet contents below shall be considered the minimum requirement, as applicable. Drawings will contain specified content as applicable, but the order and location may vary per sheet. Additional sheets and details shall be included as needed to describe the project in adequate detail for construction and permitting needs.

(a) Title Page

Information on the title page shall include, but not be limited to the following:

- (i) Location of the Site
- (ii) Amount of land area to be occupied by the Project, expressed in square feet or acres as appropriate
- (iii) Project directory including contact information for all engineers, designers and consultants
- (iv) Index of drawings
- (v) Applicable codes and standards list including most recent CEC/NEC
- (vi) A scope of work narrative description
- (vii) System size, which shall include kWDC, kW CEC-AC and kWAC for any Solar Facility, and kWAC and kWh for any BESS
- (viii) Interconnection type (NEM-PS, NEM-A, Rule 21)
- (ix) PV module manufacturer, part number and quantities
- (x) PV inverter manufacturer, part numbers and quantities
- (xi) PV module mounting hardware description (ballasted roof mount, ground mount, shade structure mount etc.)
- (xii) Battery manufacturer, part numbers and quantities
- (xiii) BESS inverter manufacturer, part numbers and quantities
- (xiv) All other information required by any Governmental Authority
- (xv) Benchmarking / survey control data as applicable

(b) Architectural Site Plan

Information on the site plan shall include, but not be limited to the following:

- (i) Property lines
- (ii) Required setbacks and/or yards
- (iii) Easements
- (iv) Existing buildings and structures

- (v) Proposed locations of major equipment
- (vi) Building code analysis justifying proposed equipment placement
- (vii) Separation distances
- (viii) Fire access requirements
- (ix) Modifications for ADA compliance

(c) Single Line Diagrams

The single line diagrams shall accurately depict the physical electrical connections (i.e. quantity, type, and size of conductors, quantity, size, and type of conduit) between all electrical equipment used in the system. Information on the single line diagrams shall include, but not be limited to the following items:

- (i) System size, which shall include kWDC, kW CEC-AC, and kWAC for any Solar Facility, and kWAC and kWh for any BESS
- (ii) Interconnection type (NEM-PS, NEM-A, Rule 21)
- (iii) PV module manufacturer, part number and quantities (proposed and existing if applicable)
- (iv) PV inverter manufacturer, part numbers and quantities (proposed and existing if applicable)
- (v) Battery manufacturer, part numbers and quantities
- (vi) BESS inverter manufacturer, part numbers and quantities
- (vii) Distribution utility transformer, including size
- (viii) Distribution utility meter, including meter number and SAID
- (ix) Main electrical service switchgear, including bus amperage, main service disconnect amperage, voltage rating and interrupt rating
- (x) Solar Facilities electrical point of connection, disconnects, panelboards, inverters, arrays, meters and dataloggers, if applicable
- (xi) System interconnection tie-in scheme
- (xii) All AC and DC disconnects including wiring and fusing within disconnects
- (xiii) All overcurrent protection device sizing
- (xiv) Switchgear, including bus amperage, main over current protection device (“OCPD”) amperage, voltage rating and interrupt rating
- (xv) Transformers, including kVA, primary and secondary voltages
- (xvi) PV modules, inverters and batteries
- (xvii) Number of PV modules per string
- (xviii) Number of PV strings for each inverter and/or combiner box
- (xix) String labels per array or subarray
- (xx) Net Generation Output Meter (where applicable), Solar Production Meter, BESS meter, Facility Load meter and any other meters
- (xxi) Wire type, conductor material, size and quantity used for each run
- (xxii) Conduit type, size and quantity of wires in each conduit for each run
- (xxiii) Total wire length for each run
- (xxiv) Complete electrical calculations, including voltage drop, OCPD and wiring ampacity, and PV string voltage
- (xxv) Monitoring data communications and power wiring
- (xxvi) Controls diagram including low voltage, low current and power wiring
- (xxvii) Security camera data communications and power wiring if applicable
- (xxviii) Lighting, convenience outlets, and any auxiliary power circuit wiring and equipment
- (xxix) Make and model of all major equipment

(d) Electrical Site Plan and Electrical Details

Information on the electrical layouts and details shall include, but not be limited to the following:

- (i) Plan view of locations of all electrical equipment shown on the single line diagrams described above
- (ii) Location of the point of interconnection
- (iii) Enlarged views of the BESS area, any other electrical equipment pads, and main electrical service area
- (iv) Elevation views of all electrical equipment
- (v) Locations of conduit runs
- (vi) Locations and sizing of spare conduits
- (vii) PV string map per array or subarray
- (viii) Safety label details (including, but not limited to, arc flash)

(e) Grounding Diagram

All electrical equipment shall be depicted, including their capacity/rating, manufacturer, part number, quantity, and reference designator where applicable. Diagram shall indicate equipment grounding connection points and grounding conductor size. Equipment shall include but not be limited to the following:

- (i) PV Modules
- (ii) PV Inverters
- (iii) Batteries
- (iv) BESS Inverters
- (v) Transformers
- (vi) Switchgear
- (vii) AC and DC disconnects
- (viii) Main electrical service switchgear
- (ix) Meters
- (x) Control and Monitoring equipment
- (xi) MET (Meteorological) Stations
- (xii) Distribution panelboards

(f) Structural and Civil Sheets

Information on structural and civil sheets shall include, but not be limited to the following:

- (i) Equipment pad structural details
- (ii) Equipment mounting rack structural details
- (iii) Equipment anchorage design
- (iv) Fence design and structural details
- (v) All civil work details

4. EQUIPMENT

The System is intended to be in operation for a minimum of twenty-five (25) years, which shall include at least one BESS replacement or augmentation, therefore, the life cycle costs (capital expenditures and operating and maintenance expenses) for all installations and systems must be considered in selection criteria for all materials and equipment. Provider shall purchase and cause to be delivered to each Project Site all equipment and materials required for the Project and as described in District-approved final design engineering drawings, specifications and data sheets and as required to construct a fully functioning Project. Any proposed changes or substitutions must be presented to District in standard submittal format with detailed explanations and instructions for review, comment and approval. Minimum requirements for

equipment are described below. District approval of any of the submittals provided by Provider, including drawings, does not excuse the Provider from their responsibility to meet all safety requirements, applicable codes and standards requirements, requirements of all Governmental Authorities and the requirements of the Agreement including this Exhibit G.

At the end of the life cycle of the BESS, Provider shall undertake commercially reasonable efforts to recycle all batteries used for the system. Additionally, Provider shall undertake commercially reasonable efforts to recycle solar PV modules at the end of the life cycle of the Solar Facilities as much as possible. Cost for materials to be recycled shall be borne solely by Provider.

4.1 Standards

All components shall be designed, manufactured, tested and listed in accordance with the latest applicable standards of NEMA, ANSI, NEC, IEC and UL. Provider shall verify listing and labeling of equipment by a NRTL prior to installation. In all cases NEC and Governmental Authority rules shall apply.

4.2 Factory Testing

Any equipment that is required to be factory tested to an applicable standard shall be accompanied by the results of those factory tests, and further those results will be submitted to District as part of the Final Binder.

4.3 Acceptance and Care

Equipment shall be stored, handled and installed in accordance with manufacturer's requirements. Material received shall be identified by serial number. A report recording make, model and serial numbers of the material and equipment received shall be prepared and shall be forwarded to District within ten (10) days of the material and equipment being received.

4.4 NEMA Rating

Enclosures mounted outdoors shall be rated a minimum of NEMA 3R. If any Site is within two (2) miles of any body of salt water or other potentially corrosive water, inverters and battery enclosures shall be NEMA 4X and all other enclosures exposed to the elements shall be NEMA 4X.

4.5 Nameplates and Labeling

All major equipment, panels, boxes, and associated equipment shall be clearly labeled. Reference ANSI Z535.4-2011 for guidelines describing suitable font sizes, words, colors and symbols for labels. Nameplates and map placards shall be engraved phenolic placards made of red stock with white lettering sized appropriately for the size and purpose of the label. Provider shall submit the proposed labels for approval prior to installation. The following minimum labeling shall be installed:

- A. Install engraved signs for instruction and warning identifying that the System is operational on the premises at appropriate locations and that there are potentially multiple power sources on the premises – submit wording and location to District for approval. In all cases NEC and Distribution Utility requirements shall dictate.
- B. Install all required signage per NEC (including arc flash requirements per NEC Article 110).
- C. Install engraved phenolic placards identifying emergency disconnecting means.

- D. Provide identification of all solar PV DC power circuits on switches, combiner boxes and/or inverters. Clearly identify individual PV module strings within the equipment at which they terminate. Use appropriate wire color codes (i.e. red and black) for positive and negative conductors.
- E. PV modules must include serial numbers in such a position as to be easily visible after installation.

4.6 Products – Approved Manufacturers and General Product Requirements

Only products that meet the requirements below shall be used in the construction of the Project, unless otherwise explicitly approved in writing by District.

4.6.1 Approved PV Modules

Hanwha Q.PEAK DUO XL-G11.3 580W or equivalent.

4.6.2 Approved PV Module Manufacturer

Hanwha or equivalent.

District’s General Guidelines for PV modules

- Thin-film, concentrating PV, etc. PV technologies are not accepted by District.
- All PV modules must be included on any required rebate-related approved module list as well as on the California Energy Commission’s (“CEC”) List of Eligible Photovoltaic Modules.
- All PV modules must have anti-reflective (AR) glass surfaces.
- All PV modules used on the Project shall include a minimum twenty-five (25) year linear power output warranty and a minimum ten (10) year product warranty.
- Any PV modules to be installed on a rooftop shall have a Photovoltaic Module Fire Performance Type Classification by an NRTL of Type 1 or Type 2 unless explicitly approved by District in writing.
- All array layouts, PV module related submittals, and PV module data sheets must include cell and module efficiency ratings, and define the guaranteed production degradation over the warranted life of the module.
- Provider will provide flash test data for all PV modules to District in MS Excel format upon procurement of PV modules. District, at its sole discretion, may randomly select up to fifty (50) PV modules for delivery to a third-party for quality verification testing. The costs of such verification testing shall be the responsibility of District.

4.6.3 Approved Solar Facility Inverter Manufacturer

SMA or equivalent

District’s General Guidelines for Solar Facility Inverters

Central and string inverters with a maximum input voltage of 1,500VDC are allowed where in compliance with the NEC for ground mounted PV arrays. Microinverter solutions may be proposed. All inverters must be included on any required incentive-related approved inverter list as well as on the CEC’s List of Eligible Inverters.

Inverters must meet all Distribution Utility requirements. All inverters must have a minimum 10-year warranty.

Inverter Manufacturer Preventative Maintenance and Support Services

District requires preventative maintenance support services which may be provided by Provider or the inverter manufacturer, as well as comprehensive and highly responsive repair service offerings. In addition, District will be monitoring the inverters' performance remotely, and require that the inverters utilize an open interface and documented protocols for third party monitoring software.

4.6.4 Approved Mounting Hardware – Ground Mount

DuraTrack HZ or equivalent.

District's General Guidelines for PV Module Mounting Hardware for Ground Mounts

Ground mounted fixed tilt PV module mounting systems shall be NRTL listed to UL 2703. Ground mounted tracking systems shall be NRTL listed to UL 3703. The Approved PV Modules listed above shall be on the tested and approved PV module list maintained by the mounting system manufacturer to ensure compatibility with the mounting system's integrated grounding components.

District requires that all PV module mounting solution descriptions clearly identify the mounting hardware and any engineering services related to the mounting solution. Provider shall provide full mounting solution specifications, warranty details, etc.

4.6.5 Approved BESS Inverter Manufacturer

Not applicable.

District's General Guidelines for BESS Inverters

All BESS inverters must be included on any required incentive-related approved inverter list. Inverters must meet all Distribution Utility requirements. All inverters must have a minimum ten (10) year warranty.

Inverter Manufacturer Preventative Maintenance and Support Services

District requires preventative maintenance support services which may be provided by Provider or the inverter manufacturer, as well as comprehensive and highly responsive repair service offerings. In addition, District will be monitoring the inverters' performance remotely, and require that the inverters utilize an open interface and documented protocols for third party monitoring software.

4.6.6 Approved Battery Manufacturer

Not applicable.

District's General Guidelines for Batteries

Lithium-ion battery chemistry is preferred. Lead acid battery chemistries are not acceptable. All batteries must have a minimum ten (10) year warranty.

Battery Manufacturer Preventative Maintenance and Support Services

District requires preventative maintenance support services which may be provided by Provider or the battery manufacturer, as well as comprehensive and highly responsive repair service offerings.

4.6.7 Approved Data Acquisition System (“DAS”)

AlsoEnergy or equivalent.

4.6.8 Performance Monitoring and Reporting Service Provider

AlsoEnergy or equivalent.

4.6.9 Inverter Monitoring Provider

AlsoEnergy or equivalent.

4.6.10 Approved PV Module Temperature Sensors

Campbell Scientific or equivalent.

4.6.11 Approved Ambient Temperature Sensors

or equivalent.

4.6.12 Approved Irradiance Sensors (Pyranometers)

Ingenieurburo or equivalent.

4.6.13 Approved Wind Speed and Direction Sensors

DAVIS or equivalent.

4.6.14 Approved Rain Sensor

AlsoEnergy or equivalent.

4.6.15 Facility Load Meters

Elkor, Accuenergy, or equivalent.

4.6.16 Critical Load Meters

Elkor, Accuenergy, or equivalent.

4.6.17 BESS Meter

Not applicable

4.6.18 Solar Production Meter

Elkor, Accuenergy, or equivalent.

4.6.19 Approved Safety Switches

Eaton or equivalent.

4.6.20 Approved Grounding Devices

Wiley, IlSCO, or equivalent.

5. COMMUNICATIONS AND MONITORING SYSTEMS

Provider is responsible for providing and commissioning a fully functional remote access monitoring system which includes a user portal accessible via the internet. Any labor, communications devices, wiring and other materials shall be included in Provider's cost and scope. The monitoring system shall meet all of the requirements outlined in this Agreement.

Provider is responsible for the complete and fully functional installation and operation of the Supervisory Control and Data Acquisition ("SCADA") system. Any labor, communications devices, wiring and or other materials shall be included in Provider's cost and scope. The SCADA system shall meet all the requirements outlined in this Agreement.

5.1 Performance Monitoring & Reporting Service

Provider shall include Performance Monitoring and Reporting Service ("**PMRS**") as part of the SCADA for the term of the Agreement to monitor and collect data from the Facility Load Meter, Critical Load Meter, BESS Meter, Solar Production Meter, inverters, batteries, meteorological stations and all other data points applicable to the System operation. Provider shall be responsible for procuring, installing, and commissioning all SCADA equipment, and for entering into a contract with a third-party Performance Data Provider ("**PDP**") as required. The monitoring service requirements are as follows:

- A. Provider shall provide operator and administrator level training to District for using the PMRS software interface as part of commissioning activities.
- B. The PMRS software interface must allow for access via a link from District's website and must allow the users to view and download real-time and historical electricity usage, solar production, and BESS power flow data at each Project Site over a variety of timescales including but not limited to a minimum of a year of fifteen (15) minute interval data. Provider shall coordinate and obtain approval of all data points to be displayed on the public webpage with District prior to implementation.
- C. The PMRS software interface must allow District to programmatically download via an Application Program Interface ("**API**") the real-time and historical electricity usage, solar production, and BESS power flow data at each Project Site over a variety of timescales including a minimum of one (1) year of fifteen (15) minute interval data. The API must include the ability to reference most recent inverter, meter and alarm status readings.

5.2 Equipment and Components

Below is a list of the minimum equipment and components that must be included as part of the SCADA. All equipment shall be installed to equipment manufacturer's recommendations and best practices for the System.

A. Facility Load Meter(s)

Revenue grade energy meters shall be installed to measure the total (not net) energy usage, instantaneous demand, power factor, etc. at each main switchboard where the System is interconnected. The load side revenue grade energy meters shall be included as part of the PMRS system, send data through the PDP and be displayed on the PMRS software interface.

B. BESS Meter

Revenue grade energy meters shall be installed to monitor power and energy flows of the BESS at each Site. The BESS Meter shall be located within ten feet (10') of the Delivery Point unless an alternative location is agreed to in writing by District. The BESS Meter shall be included as part of the PMRS system, send data through the PDP and be displayed on the PMRS software interface.

C. Solar Production Meter

Revenue grade energy meters shall be installed to monitor power and energy production of any Solar Facility present at each Site. The Solar Production Meter shall be included as part of the PMRS system, send data through the PDP and be displayed on the PMRS software interface.

D. Datalogger/Internet Gateway

E. Inverter Monitoring

If inverters are not provided with communications as part of the standard package, then the communications option shall be ordered. Where various communication package options exist, those options shall be discussed with District prior to ordering.

F. PV Array Monitoring

If DC combiner boxes are installed within the array field and not integral to the PV inverters, DC monitoring shall be provided for each home run from the combiner boxes to the inverters.

G. Meteorological Stations

The Project will require installation of one meteorological station at a location determined by District and to include at least the following:

- One (1) K&Z SP Lite 2 or similar quality standard GHI pyranometer
- One (1) IMT reference cell for each POA sensor with an associated back of module temperature sensor installed at each unique azimuth and tilt of the arrays installed
- One (1) ambient temperature sensor
- One (1) wind speed and direction sensor
- One (1) dust sensor

Sensors shall be mounted away from shadows, reflective surfaces, and sources of artificial irradiation or any other factor that may influence measurement accuracy of the sensors. Pyranometers will be installed at the edge of the array.

The PV module temperature sensor data shall be linked to the predicted power calculation formula in the PMRS software interface along with the applicable plane of array irradiance data supplied by the pyranometer for each array.

The meteorological station must be connected to the PMRS so that weather data can be collected and downloaded along with the Solar Facilities production data.

All meteorological station equipment shall be calibrated and tested by the original equipment manufacturer or vendor prior to delivery to the Site and maintained through the Term per the manufacturer's requirements. All pyranometers shall be cleaned in the same manner and at the same time as a module washing is performed.

H. Protective Relays, Medium Voltage Circuit Breakers and Transformers

Status data shall be provided through the PMRS system.

I. External Device Communication

Provider must arrange for and provide a secure and reliable internet connection adequate to allow for uploads of all data points from the PMRS every fifteen (15) minutes at their sole cost. Provider shall provide this internet connection via a cellular modem with data service for the term of the Agreement. Provider shall make this information available to District through the PMRS system.

5.3 Remote Access Monitoring Portal

5.3.1 Power and Energy Data

Each Project Site's PMRS web portal should display the following minimum information over a variety of timescales:

- (a) BESS inverter instantaneous power (kW)
- (b) BESS battery state of charge (%)
- (c) BESS battery instantaneous energy remaining (kWh) [desirable not required]
- (d) Solar instantaneous power output (kW)
- (e) Solar energy production (kWh)
- (f) Facility entire instantaneous load without solar & BESS (kW)
- (g) Facility instantaneous load net solar (kW)
- (h) Facility instantaneous load net solar & BESS (kW)
- (i) Facility entire energy consumption (kWh)
- (j) Critical loads instantaneous load (kW)
- (k) Critical loads energy consumption (kWh)
- (l) Billing cycle peak demand without solar & BESS (kW)
- (m) Billing cycle peak demand reduction due to BESS (kW)
- (n) Billing cycle peak demand reduction due to solar & BESS (kW)
- (o) Billing cycle peak demand savings (\$) [desirable not required]

5.3.2 BESS Alarms

- (a) Provider will coordinate with District to provide alarms for the BESS that will ensure that both Provider and District are aware of issues with the operation of the BESS prior to Commercial Operation.

5.3.3 Solar Facility Alarms

Provider will coordinate with District to provide alarms for the Solar Facility that will ensure that both Provider and District are aware of issues with the operation of the BESS prior to Commercial Operation.

5.3.4 Solar Facility Analytics Pages

Each Solar Facility PMRS should have the following tabs configured in the monitoring analytics page:

- (a) Load Profile
 - (i) Solar Production Meter Power (kW)
 - (ii) BESS Meter Power (kW)
 - (iii) Facility Demand (kW)
 - (iv) Net Consumption (kW)

- (b) Inverter Output
Energy generation (kWh) per inverter. Each inverter shall have a unique identifier matching the naming convention in the As-Built drawings.

- (c) Predicted Power
 - (i) Solar Production Meter Power (kW)
 - (ii) Predicted Power (kW)

- (d) Inverter vs. Solar Production Meter Power
Power output per inverter displayed with the Solar Production Meter Power

5.3.5 Settings

Provider shall make best efforts to ensure that all System information should be filled out completely and correctly on the monitoring platform to match the As-Built drawings and allow for easy identification of equipment and other System information.

6. CONSTRUCTION

Provider is required to conduct all construction and construction management work for completion of the Project. Provider shall perform all work in accordance with generally accepted industry practices, all applicable laws, regulations, codes, rules, ordinances, Government Approvals and permitting requirements, equipment manufacturer's requirements, and quality control inspection protocols so that the System meets or exceeds (i) all requirements of applicable laws, Government Approvals and licenses; (ii) equipment manufacturer's installation specifications, and compliance with the terms and conditions of all applicable warranties and guarantees; (iii) complies with all requirements of the Interconnection Agreement; (iv) all established safety protocols for operation and maintenance, and labeling / marking requirements; (v) all requirements of the commissioning procedures and performance validation herein; (vi) all requirements for any applicable federal, state or other environmental or financial rebates and incentives. All work must be performed and supervised by skilled workers trained and experienced in the installation of the System in accordance with equipment manufacturers' installation requirements. Provider is encouraged to utilize local subcontractors and source materials and resources locally should they provide requisite qualifications and competitive advantages.

6.1 Site Safety and Security

The Provider shall be solely responsible for compliance with all applicable occupational safety and health standards, rules, regulations and orders established by local agencies, the State of California, and California Division of Occupational Safety and Health Construction Safety Regulations (Cal OSHA), including obtaining permits required by California Code of Regulations, Title 8, Section 341 and

341(a). In addition, Provider and all subcontractors shall comply with applicable provisions of Federal, State, and municipal safety, health, and sanitation statutes and codes. In the event there is a conflict between the provisions of the Safety and Health Regulations for Construction promulgated by the U.S. Department of Labor in Title 29 CFR Part 1926, OSHA, or Cal OSHA, the more stringent provision shall prevail.

Provider will develop a site-specific OSHA approved Site Safety and Security Plan for each Project Site and submit it to District for review and approval prior to the start of construction. The Site Safety and Security Plan shall include an evaluation and appropriate documentation of the safety record for all subcontractors that will be performing work on the Project, a traffic control plan, and an Injury and Illness Prevention Program plan. The Site Safety and Security Plan shall also include the location of emergency utility shutoffs and an evacuation plan. No work shall be performed on the Project prior to written confirmation that District has accepted the Site Safety and Security Plan.

A safety conference shall be scheduled prior to the start of construction to review the experience modification rating, the respective safety requirements, and to discuss implementation of all health and safety provisions related to this project. Representatives from the Provider, every subcontractor and District shall be present at the safety conference. Provider shall ensure District is informed of the safety conference at least five days in advance and provided the option to attend.

Following the commencement of work on the Project, safety meetings will be held once a week with all Provider and subcontractors' employees attending. Printed names will be taken of those attending the meeting. No individual will start work at any Project Site without having attended a safety briefing on the dangers and protocols of the Project Site. Records of this training will be kept and provided to District for review. No individual will operate a piece of equipment on which they have not had certification training. Certification shall be carried on the operator at all times.

Security of the Project Site(s) is the sole responsibility of Provider, including any security monitoring equipment, fencing or other precautions that Provider may deem reasonably necessary. District will not be liable for theft or damage of equipment or materials stored at the Project Site.

6.2 Access to and Use of Project Sites

District shall provide access and area at each Project Site for the performance of the work on the Project, including lay-down area and storage area. District will grant Provider access to each Project Site to perform all work associated with the Project and on-going Operation & Maintenance during regular business hours, or such other reasonable hours requested by Provider and approved by District in accordance with this Agreement. Access points to the Sites must be closely coordinated with District and approved in advance before construction begins. District will issue necessary keys to Provider to access Project Sites once all related requirements have been met. Provider shall return keys to District at any time upon request by District. Provider shall reimburse District for the cost of re-keying all of District's locks if keys are not returned to District.

Provider agrees not to bring, keep, or permit to be brought to, or kept at or near any Project Site, any Hazardous Substances, in excess of amounts permitted under Environmental Law, or materials which are prohibited by District or prohibited by the standard form of District's insurance policy. Provider agrees not to commit or suffer to be committed any waste upon the Project Sites.

Provider shall install signage at each front gate / Site entrance to identify the Project and the Provider's name and contact information upon District approval of all proposed signage. The Provider shall submit

a prototype of the construction signs to District for review and approval before posting the signs at the Site. After approval, actual sign placement and location shall be coordinated with District's Inspector.

6.3 Drawings

Provider shall maintain one complete Engineering Design Package at each Site including one full set of full-size plans marked to show any deviations that have been made from the approved plans, including but not limited to buried or concealed construction features or utilities which are revealed during the course of construction. Current as-built record drawings shall be accessible to District at all times during the construction period. They shall be reviewed with District at regular intervals. Upon completion and prior to final inspection of the Project, the Provider shall submit the complete As-Built Engineering Design Package to District for review and shall make such revisions or corrections as may be necessary for them to be a true, complete, and accurate record of the Project in the opinion of District.

6.4 Work-Time Constraints

Great care shall be taken to avoid interruptions to Site activities and neighboring properties. Construction activities shall take place between typical working hours of 7:00AM to 5:00PM, Monday through Thursday, excluding recognized holidays, if the work is taking place within the District boundary of operations with the exception of power shutdowns. Reasonable efforts must be taken to minimize disturbance to persons living or working nearby, and to the general public. All local ordinances shall be adhered to regarding noise limits. Deliveries shall take place outside high traffic times and must be coordinated with District's personnel. Preferred hours for deliveries are 7:00AM to 2:00PM, Monday through Thursday within the District boundary of operations. Provider shall manage construction activities around and with consideration to the other projects occurring at the same time where applicable. Provider will be required to provide necessary weekly updates of scheduled activities at each Site to District.

A shutdown plan must be provided to District at least one month in advance to allow for electrical shutdowns to be carefully coordinated with District's personnel. Final dates for shutdowns will be provided a minimum of two (2) weeks in advance. All interruptions in power shall be subject to District approval and must be coordinated to take place during a time period that will minimize disruptions to Site activities. This requirement will typically mean, and District reserves the right to request, that shutdowns shall occur on weekends or after working hours. All efforts must be taken to minimize the amount of time required to complete interconnections, in particular at all sites that involve water treatment or movement. Provider shall take commercially reasonable efforts to ensure that power shutdowns occur during the winter. If required, backup power will be provided by Provider's generators during shutdowns, at Provider's expense. Notice of all pending shutdowns shall be provided thirty (30) days in advance, followed by two (2) weeks in advance, followed by forty-eight (48) hours in advance.

6.5 General Requirements

6.5.1 Conduit and Wiring

- (a) Locations of all junction boxes shall be reviewed with District prior to start of construction.
- (b) No wire splicing shall be allowed.
- (c) All exposed wire shall be secured per code.
- (d) When terminating aluminum conductors, all terminations shall be brushed and coated with an oxide inhibitor.
- (e) Underground cabling shall have electrical warning tape installed approximately twelve (12") inches below finished grade in the backfill.

- (f) Provider shall use GPRS and potholing to survey for underground utilities and use best practices when boring or trenching, including hand digging near buried lines. Trenching or boring in potentially high-risk areas (gas lines) shall be coordinated with District.
- (g) The Provider shall carefully preserve all benchmarks, monuments, survey markers, and stakes and shall be solely responsible for resetting if required.
- (h) Provider shall ensure parasitic loads (lights, security cameras, etc.) are not installed on the same circuit as the Solar Production Meter and/or BESS Meter and are installed so that their load shall be included with the overall Site's Facility Load Meter measurement.
- (i) Provider shall confirm that the System is interconnected to the correct Distribution Utility meter at the Project Site by validating the meter and service account identification numbers (SAID) with the Distribution Utility.
- (j) All exposed wiring shall be properly rated for direct sun exposure.
- (k) Exposed wiring shall be restrained utilizing wire clips per NEC requirements and best practices to eliminate strain on PV module junction box connections, wire pinch points and wire kinks. Strain-relief devices shall be rated and labeled for exposure to UV (direct sunlight).
- (l) Conduit entry locations shall be made in manufacturer provided/specified locations only.
- (m) All ground conductors shall be protected from physical damage as specified in the NEC.
- (n) Grounding wire connections must be made at closest point possible between concrete and steel, sharp edges removed, and painted to match.
- (o) Power and data lines shall be located in separate conduits with appropriate separation to avoid interference.
- (p) All junction boxes, condolets, etc., are to be sealed with a silicone sealing compound and made watertight.
- (q) H-20 rated concrete handholes with cast iron or galvanized steel lids shall be used for all underground junction boxes unless District approves an alternative approach. Lids shall be bolted or welded in place with an appropriate permanent marking such as "ELEC" or "COMM" on the lid depending on the contents of the junction box.
- (r) Aboveground junction boxes must have tamperproof screws and shall not be placed in areas where water ponding is anticipated.

6.5.2 Equipment

- (a) Equipment shall be stored and handled in accordance with manufacturer's requirements.
- (b) Inverters and battery enclosures shall be placed away from all buildings where the operational noise would disturb the occupants.
- (c) Inverters and battery enclosures shall not be placed in locations where fences or other barriers would obstruct replaceable air filters or prevent access for regular service and cleaning.
- (d) All high voltage and high amperage equipment must be installed in secure, tamper-proof, and locked enclosures to prevent unauthorized tampering for safety and theft prevention.
- (e) Locks for all gates and enclosures to be provided by Provider but must be approved by District prior to procurement.
- (f) Safety labels are required for high voltage and high amperage equipment.
- (g) All enclosures shall be detailed as part of the punch list work to ensure that any scratches, etc. are properly covered with paint as appropriate.

- (h) PV modules shall have their serial numbers recorded.
- (i) Should Provider choose to install cameras as part of the overall security plan for any Site, camera selection and location shall be coordinated with District. Integration of any installed safety and security systems with the PMRS system shall be reviewed with District and options provided.

6.5.3 Site Work

- (a) It is the Provider's sole responsibility to ensure that all work on the Project complies with all federal, state, and local code requirements, all applicable industry codes and standards, and all other requirements in the Agreement including the requirements in this Exhibit G.
- (b) Temporary security fencing around construction areas shall be provided throughout construction, to be removed at end of construction.
- (c) Prior to the start of any work on Site, Provider shall take pre-construction videos and photographs of any and all areas that may be impacted as part of the Project construction and shall provide the pre-construction videos and photographs to District for review and reference.
- (d) Following the finish of construction, Provider shall take post-construction videos and photographs of all areas that were impacted as part of the Project construction and shall provide the post-construction videos and photographs to District for review and reference.
- (e) Provider is solely responsible for locating and avoiding all existing underground utilities and shall ensure the existing underground utilities and installations are not impacted by Project construction. In the event Provider damages or makes inoperable any underground or above ground utilities, it will be Provider's full responsibility to notify District immediately and make damaged/inoperable utilities whole and fully operational to District's standards and to District's satisfaction, at Provider's sole cost and expense.
- (f) Provider is responsible for the repair of any damage to the Site that is caused by Provider, reasonable wear and tear excepted, at their sole cost and expense. Provider shall assess the condition of all areas to be used in the construction of the System prior to construction and shall alert District if any such area cannot accommodate wear and tear caused by ordinary construction activities. In such event, Provider shall propose a reasonable remedy or remedies to such conditions for District's consideration. Provider is not responsible for existing conditions and shall repair damage to existing conditions.
- (g) Damage to District's facilities and/or the System shall be reported to District within twenty-four (24) hours with photographs.
- (h) All parking lot wheel stops that are damaged during construction shall be replaced at Provider's sole expense.
- (i) All areas within the limits of construction or otherwise impacted by construction of the Project shall be restored to pre-Project conditions at the Provider's sole cost and expense including but not limited to: fine grading, and rock and concrete spoils removal.
- (j) Provider will coordinate with District when boring or trenching is performed, when laydown areas are determined, when major shipments are planned, or any other activities that might impact District's operations.
- (k) Provider shall correctly torque all such equipment or assemblies requiring torque and mark torqued bolts to designate status of having been torqued. District or District's representative may at any time request a test of marked bolts. Failure of a bolt

- designated as torqued to show that torque may require all assemblies to be re-torqued in the presence of a third-party inspector – such inspector to be paid for by Provider.
- (l) Provider shall maintain a clean and workmanlike construction site. Loose debris and unsafe conditions shall not be tolerated at any time.
 - (m) Provider is responsible to obtain all necessary Site data, perform all required investigations and determine all Site data required for the design and construction of the System at their sole cost.
 - (n) Provider shall be responsible for the removal and disposal of all excess soil and construction related debris generated by Provider or subcontractors in accordance with Applicable Law.
 - (o) Appropriate safety signs are required to caution drivers for speed or path restrictions near equipment pads.
 - (p) Safety bollards or traffic pylons with reflective strips shall be installed where any part of the Project is adjacent to a road.
 - (q) Safety bollards or traffic pylons with reflective strips shall be installed at the corners of ground mounted PV arrays and around all electrical equipment pads.
 - (r) Signs and barricades shall be provided and maintained by Provider and shall be in accordance with jurisdictional regulations for accident prevention and in accordance with the Site Safety and Security Plan.
 - (s) Provider shall ensure to reasonable extent and availability of installation space that solar structures are built away from the line of sight of neighboring properties.
 - (t) Not applicable
 - (u) Provider shall remove trees that would cause shading and reduce production of PV arrays or are in direct path of construction. Provider shall mark each tree and review with District and Arborist prior to removal. Provider shall remove the tree stump, grind to eight inches (8”) below grade and provide a surface flush with surrounding grounds using the same material as the surrounding area.
 - (v) Provider shall remove light posts (including complete concrete bollards and rebar cages above and below grade) and other non-building fixtures that would cause shading and reduce production of PV arrays. Where light post removal is required, Provider shall mark each light post and fixture and review with District prior to removal. After removal of the light post, Provider shall electrically secure the termination point at ground level in an H-20 rated concrete handhole with cast iron or galvanized steel lid. Lids shall be bolted or welded in place with a permanent marking such as “ELEC” or “LIGHTING” on the lid. Provider shall use best efforts to remove the light posts and deliver to District at the Project Site in existing condition so District can re-install in other areas.
 - (w) Provider shall verify all required clearances in the field prior to construction and is solely responsible therefor.
 - (x) Entrances to parking lots must stay open during construction unless the parking lot is completely closed for construction of solar PV arrays. Any parking lot entrance closure shall be coordinated with District. In all instances fire access shall be maintained.
 - (y) Provider is responsible for providing drinking water and sanitation facilities for all workers.
 - (z) Temporary power for construction shall be arranged and paid for by Provider.
 - (aa) Provider must apply for fire hydrant meter permit and cover all expenses for construction water use where applicable.
 - (bb) All cut edges of galvanized strut or other support structure materials shall be cold galvanized.
 - (cc) Saw cut concrete shall be replaced joint to joint and match nearby area.

- (dd) Provider shall backfill all trenches with native material (removing all rocks) or slurry and compact to 90 percent minimum in all locations that are not subject to traffic and 95 percent minimum in locations that are subject to traffic.
- (ee) All asphalt cuts shall be made in square or rectangular cuts to avoid inconsistent repair work. Provider shall cover asphalt trenches with hot mix asphalt, roll for compaction, and cover the width of the trench with a slurry seal after the cure period. All repairs shall be made to match existing. Any repainting of striping required to return the Site to original or better conditions shall be the sole responsibility of the Provider.
- (ff) Provider shall reseed or provide sod for all areas where existing grass was damaged and repair to existing condition.
- (gg) If the District detects noticeable power interruptions or quality issues in District's electrical equipment after the installation of the Project, Provider shall work with District to conduct power quality testing and correct issues with the System as applicable.

7. **FINAL PROJECT CLOSEOUT**

7.1 **Closeout Activities**

Provider will perform the following tasks:

- Complete all unfinished work described on a punch list approved by District in a timely manner.
- Complete final clean-up of the Site. Clean-up shall include a thorough washing of the solar PV modules for the Solar Facility if required to pass performance testing. All PV module washing shall be completed in accordance with the PV module manufacturer's recommendations.
- Confirm minimum 7-day continuous operation for the entire system, all sub-systems, and ancillary equipment without downtime following the final commissioning.
- Assemble and provide District with the Final Binder in digital format containing all documents outlined below and all other required submittals.
- Provide trainings for District personnel on emergency shut-down procedures. Emergency shut-down procedure trainings shall be provided by Provider on an as-needed basis due to changes in District personnel, no more than once annually. Provider and District shall coordinate on agreeable times within ninety (90) days of request from District for additional emergency shut-down procedure trainings.

7.2 **Final Binder**

A complete set of Project documentation shall be provided to District in digital format at the finish of construction for record keeping purposes (the "***Final Binder***"). The Project documentation shall include, at a minimum, the following documents:

- Copy of Executed Agreement(s) and all amendments
- Copy of the Notice to Proceed
- Copies of all reports and studies completed, including but not limited to:
 - Underground Utility Surveys
 - Title Reports / ALTA Surveys
 - Geotechnical Studies
 - Environmental Studies

- Bore Logs including GPS location coordinates and depth dimensions for all Project underground utilities
- Glint and Glare Study
- Arc Flash / Coordination Study
- Final design drawings as approved by any Governmental Authorities having jurisdiction over the Project in PDF and site layout with approximate underground utility locations in AutoCAD
- Copy of all Governmental Approvals required for the Project to be constructed
- Copy of all Governmental Approvals required for the Project to be operational
- Letter to the Distribution Utility requesting final inspection in advance of Permission to Operate
- Completed Commissioning Report
- Permission to Operate Notice from the Distribution Utility
- All incentive related documents
- All final executed Distribution Utility Agreement(s) – Interconnection, special facilities, etc.
- As-built drawings in PDF and AutoCAD
- Equipment data sheets, installation & user manuals, and warranties for all major equipment including but not limited to PV modules, PV module mounting systems, inverters, batteries, transformers, controllers and monitoring systems
- Final System Site Assessment Table in PDF and MS Excel formats (one electronic)
- Final BESS system performance modeling report in 4x8760 output file in MS Excel format
- Final punch list showing proof of completion of all items
- Letter stating Commercial Operation Date achievement and date
- Contact Information for all key Provider personnel including:
 - Provider’s name
 - Provider’s main office mailing address, phone, fax, and email
 - Employer Identification Number (“*EIN*”)
 - Provider’s main contact person’s name, job title, mailing address, phone number, fax number, and email
 - Operations and Maintenance contact person’s name, job title, mailing address, phone number, fax number, and email
- Four (4) sets of keys to all locks, equipment, enclosures, fence gates and boxes
- Operations and Maintenance Manual including:
 - Overall system O&M documentation
 - O&M manual location and contact
 - Inverter startup and shutdown procedure for each type of inverter
- Monitoring System Information including:
 - Monitoring System hardware and internet portal specification sheets
 - Meter calibration records with serial numbers for all meters
 - Website access and operation instructions
 - List of public monitoring websites
 - IP addresses and login information of Acquisuite or equivalent
 - Network configuration documentation
 - Performance Data Provider contracts
- Site photographs of all items listed below (electronic version only):
 - PV Arrays
 - Batteries
 - Inverters
 - Combiner boxes
 - Transformers
 - Disconnects

- Panelboards/Switchgear
- Motorized circuit breakers
- Electrical point of connection to existing distribution equipment
- Distribution Utility Meter
- BESS Meter, Facility Load Meter, Critical Load Meter, Solar Production Meter and any other meters
- BESS controller
- Monitoring equipment including weather sensors if applicable

8. OPERATIONS AND MAINTENANCE

Provider shall be responsible for all operations and maintenance of the System in accordance with the Operations and Maintenance Agreement. The operations and maintenance shall include at a minimum:

- A. All preventative maintenance required to maintain all equipment warranties.
- B. Provider shall provide erosion control and weed abatement on an as-needed basis to minimize the impact of same on Solar Facility production. District may request Provider perform additional weed abatement, provided if weeds do not impact Solar Facility production, the cost of such weed control will be passed through to the District and District will reimburse Provider for same. .
- C. Ground mounted arrays shall include the application at the completion of construction and as required through the Term of this Agreement of a dust control polymer additive coating within the Solar Facility area to limit module soiling.
- D. Provider shall maintain one complete Engineering Design Package throughout the Term of the PPA and update with any changes made from the as-built drawings provided at the completion of construction.
- E. Provider shall take commercially reasonable measures to prevent the accumulation of soil on the PV modules that would otherwise reduce the Output below the guaranteed production levels. In the event that the aggregate metered Output from the Solar Facility is not at least 90% of the Annual Production Estimate in a given Contract Year and it is attributable to soiling, District retains the right to require Provider to conduct one (1) PV module washing after May 15th and prior to August 1st during the next Contract Year.
- F. All pyranometers shall be cleaned at the same time as, and with similar care, as the PV module washing.

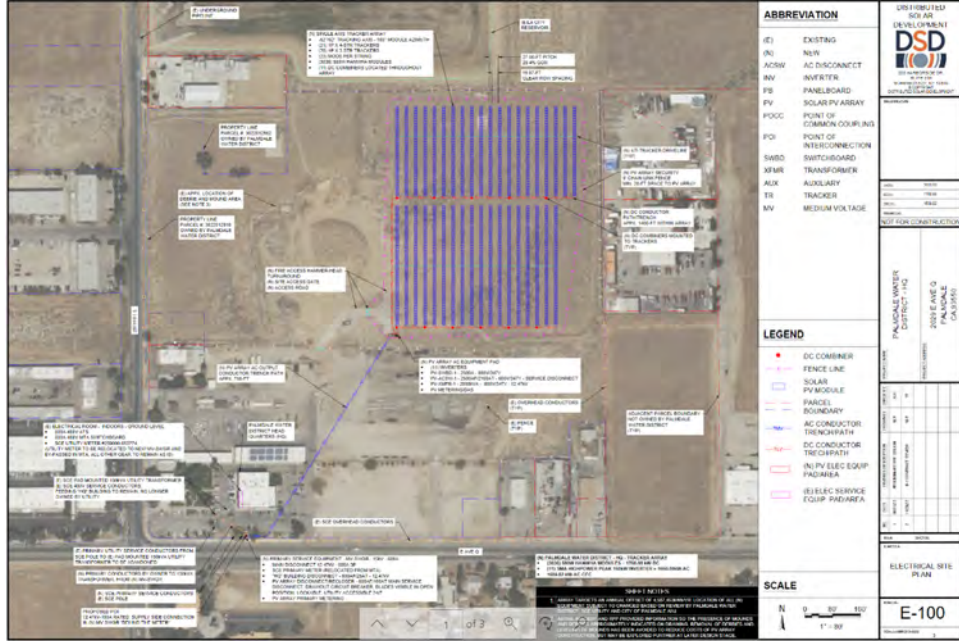
9. CONTROLLING TERMS

In the event of any conflict or inconsistency between the terms of this **Exhibit G** and the PPA or Site Easement Agreement, the terms of the PPA or Site Easement Agreement, as applicable, shall govern.

ATTACHMENT A

TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

PRELIMINARY ENGINEERING DESIGN PACKAGE



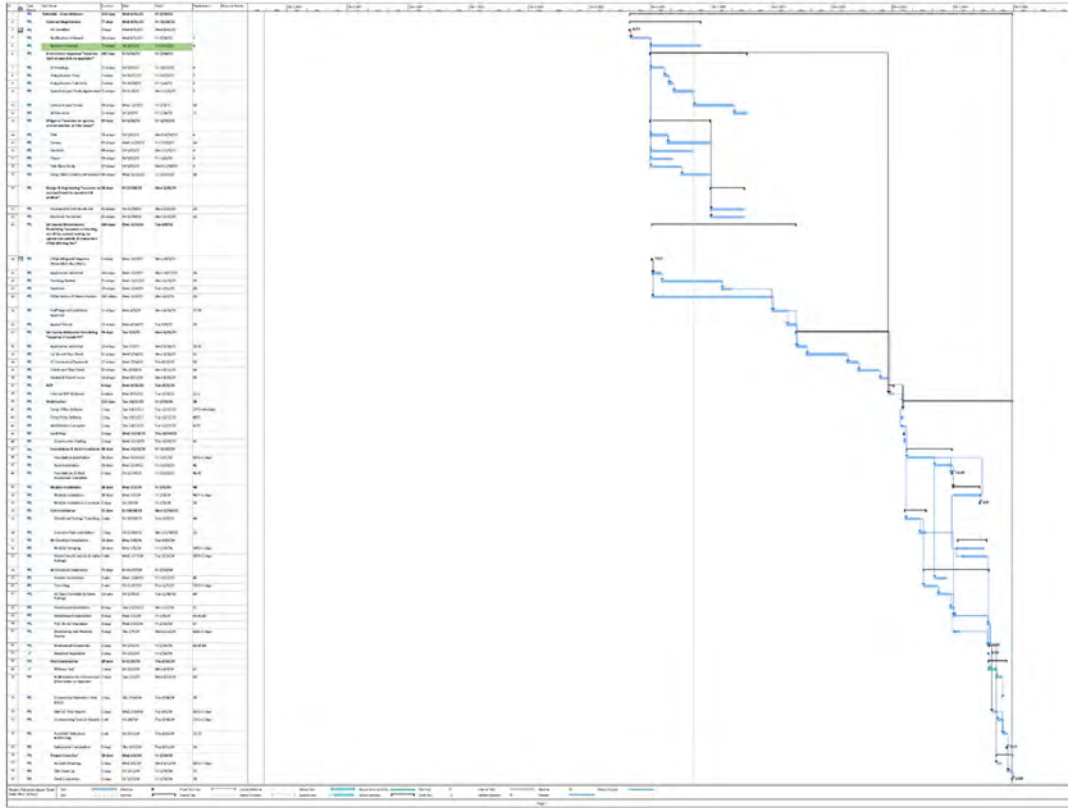
ATTACHMENT B
TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

SYSTEM SITE ASSESSMENT TABLE

ATTACHMENT C

TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

PROJECT SCHEDULE



Provider will develop, with input from District, a Project Schedule using Microsoft® Project or equivalent. Provider and District will establish a weekly construction meeting at which time the work of the previous week will be reviewed, and a three-week look-ahead schedule will be coordinated. The three-week look-ahead schedule shall be created in MS Excel® or like software and present the list of activities occurring at the Site on a daily basis.

The work on the Project shall be completed on or before the Commercial Operation Deadline.

The Project Schedule shall include, at a minimum, the following:

- 50%, 90% and 100% drawings due to District
- District review of 50%, 90%, 100% drawings
- Permit approval
- Procurement
- Site preparation
- Construction start
- Electrical & Mechanical completion
- Interconnection sign off

- Testing & commissioning
- Utility meter and rate switch completion
- Permission to Operate
- Commercial Operation Deadline

The Project Schedule shall not show more than 10% of the total activities as critical, and no activity shall have duration longer than thirty (30) days. The Project Schedule shall indicate the beginning and completion dates of all phases of construction and shall use the “critical path method” (“*CPM*”) for the planning and scheduling of all work required. The schedule will separately identify those milestones or events that must be completed before other portions of the work can be accomplished. The Project Schedule shall incorporate float for inclement weather and resulting muddy site conditions due to rain and shall also include any potential acceleration paths. Scheduled float for non-working rain-related days and resulting muddy site conditions shall be based upon the latest and nearest available data from acceptable data issued from the National Weather Service.

A monthly project schedule update shall be provided to accurately indicate the actual progress of the work against the baseline Project Schedule for the prior month, and the remaining planned completion of the work.

The scheduling is necessary for District’s adequate monitoring of the progress of the work. District may disapprove such a schedule and require modification to it if, in the opinion of District, adherence to the progress schedule will cause the work not to be completed in accordance with the Agreement. Provider shall adhere to any such modifications required by District. Between the monthly schedule updates, it is the obligation of the Provider to monitor the progress of the work against the current construction schedule activities, and to notify District in writing of all changed activity start dates and finish dates.

Provider will exchange scheduling information with Subcontractors and suppliers. Provider will order work, equipment and materials with sufficient lead time to avoid interruption of the work.

The Provider shall also, if requested by District, provide revised schedules within fifteen (15) days if, at any time, District considers the Commercial Operation Date to be in jeopardy. The revised schedule shall be designed to show how the Provider intends to accomplish the work to meet the original Commercial Operation Date. The form and method employed by the Provider shall be the same as for the original progress schedule. The Provider shall modify any portions of the schedule that become infeasible because of “activities behind schedule” or for any other valid reason. Provider will provide documents and justification for any schedule changes. An activity that cannot be completed by its original Commercial Operation Date shall be deemed to be behind schedule.

IF PROVIDER SUBMITS A REVISED SCHEDULE SHOWING AN EARLIER COMMERCIAL OPERATION DATE FOR THE PROJECT, DISTRICT’S ACCEPTANCE OF THIS REVISED SCHEDULE SHALL NOT ENTITLE PROVIDER TO ANY ADDITIONAL COMPENSATION OR CLAIM DUE TO ANY SUCH REVISED SCHEDULE.

ATTACHMENT D
TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

COMMISSIONING SCHEDULE

DSD - PV System Testing

MARCH 25, 2021 - REV 2.2

Revision Control

Rev	Date	Editor	Notes
1.0	08/27/2019	Brian Smith	Initial Release
1.1	06/17/2020	Brian Smith	Alignment to DOR
2.0	9/09/2020	Brian Smith	Consolidation of all testing into one document
2.1	3/8/2021	Brian Smith	Simplify & clarify procedures; Add MLPE info
2.2	3/25/2021	Brian Smith	Added Performance Testing; Other minor edits

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DSD – PV System Testing

Overview

Thorough testing during and at the completion of construction is necessary to ensure the project is constructed to a high standard of quality in materials and workmanship and is ready for safe energization and operation. Testing is an important component of system commissioning.

Testing ensures:

- Equipment is undamaged, configured and installed properly
- The system is ready for energization and will operate safely

Testing documentation becomes part of the project record and may be required by:

- Financiers To show project progress and quality
- Suppliers To show damaged equipment for warranty claims
- AHJ To show code requirements have been met and the system can be safely energized
- Engineering To assist with applying appropriate field modifications during construction
- O&M To help with equipment or performance issues that may arise during the project lifetime

Testing and visual inspections are done as soon as possible in the construction process, so any corrective actions can be quickly applied with minimal impact to project schedule or costs.

Safety Requirements

These safety notations are a generic overview of potential hazards and are provided only as a minimum requirement. There will always be additional factors to consider, specific to the actual conditions and equipment which require additional levels of protection. It is the responsibility of the qualified person performing the procedure to evaluate the actual hazards/conditions and apply appropriate mitigation and protection measures.

All testing technicians must comply with all NFPA 70E PPE requirements and follow all necessary LOTO procedures.

All project specific EHS rules and regulations shall apply to commissioning activities.

Technicians performing electrical and mechanical testing and inspection shall be fully trained and experienced in using the equipment and methods required to complete the testing. These individuals shall have a knowledge of the hazards and risks involved, be able to make good judgments regarding the required tasks and be capable of completing the testing tasks in a safe manner.

All electrical testing must be done on un-energized equipment unless the testing task specifically requires energization, in which case the equipment will be energized only for the minimum amount of time and energized at the lowest voltages and currents needed to properly complete the test.

The nature of energized testing is such that serious injury or death may result if specific safety measures are not taken. When testing any energized circuits, electrical hazards may include shock, arc-flash and arc-blast. It is strongly recommended that two or more technicians work as a team and have clear and consistent communications with each other. It is further recommended that both technicians be properly trained in and use applicable PPE, have training in relevant first-aid practices, including CPR and have prepared a safety response plan in the event of an accident.

Ensure all personnel working onsite have been notified that energized testing will be taking place, and that all non-essential personnel are to remain clear of all related equipment during the testing process. It is the responsibility of the qualified person performing the procedure to always evaluate the actual hazards and conditions and apply appropriate mitigation and protection measures.

Technicians shall use and become familiar with the latest drawings, equipment manuals, specifications and other documentation as needed to understand the equipment being tested and safely perform testing activities on that equipment or system.

Specifically related to Solar Photovoltaic equipment:

- Do not disconnect DC circuits (modules, inverters, combiners, rapid shut-down boxes, etc) while the circuit is under load unless a properly rated switch or other approved disconnecting means is used.
- Use extreme caution and proper PPE when disconnecting DC circuits while PV modules are exposed to sunlight as live voltages will be present.
- Modules and inverters can get hot, use caution when servicing equipment that has been exposed to direct sunlight for extended periods of time.

Follow all safety warnings posted on the equipment.

Use only tools that are properly insulated and approved for working on electrical installations.

Test Equipment

All test equipment shall be in good mechanical and electrical condition and suitable for the tests being performed. Accuracy of metering shall be appropriate for the test being performed.

Test instruments shall have been calibrated within the previous 12 months of the test date and the calibration date needs to be recorded on the test device per ANSI/NETA ATS-2017, Section 5.3.

A certificate of calibration will be attached to the applicable test reports showing the instrument manufacturer, model, serial number and calibration date.

Testing Reports, Forms & Notes

DSD requires proper and complete documentation of all testing activities. Test report forms for various tests are found in the Appendix of this document.

Test reports may be submitted in a different format than the ones provided herein but must contain all requested information. Test reports will not be accepted if information is missing or if they are not signed and dated by the technician doing the work. Each technician signs their name to certify that the data on the form is accurate to the best of their knowledge and that test equipment was operated properly to produce accurate results.

Submitted test forms and related documentation will be reviewed and evaluated by DSD prior to acceptance of the work completed.

Incomplete, unreadable, fraudulent, or out-of-range data will be rejected, pending further investigation and/or re-testing. Reasonable efforts to mediate minor discrepancies will be made. It is in everyone's best interests to

complete the testing process carefully, completely, and accurately. In the event a submitted testing form(s) is found to contain fraudulent data, all related commissioning work will be required to be repeated. Costs for repeated work are the responsibility of the company who submitted the form(s). *Persons responsible for submitting fraudulent forms will be barred from participating in future commissioning and testing activities on DSD projects.*

Testing Activities

A summary of DSD testing activities is shown in the following table. Testing will be allocated to the various responsible parties according to the Testing Division of Responsibilities (DOR).

1. Pre-Energized Testing		
<i>(** tests required for energization, as applicable to the project)</i>		
Test #	Test	Description
1.1	DC Insulation Resistance (Megger) *	Megger test all DC conductors
1.2	AC Insulation Resistance (Megger) *	Megger test all AC conductors
1.3	DC String Voc & Polarity *	Verify string labeling, polarity, fuses and measure Voc
1.4	DC Feeder *	Check and confirm output circuit polarity, fuses and Voc
1.5	IV String	Standard IV String Testing
1.6	Grounding System Inspection *	Inspect integrity of equipment grounding and GEC system
1.7	Ground Fault Primary Current Injection *	Test Main Breaker GFI per NEC 230.95(C)
1.8	Transformer (Liquid Filled & Dry) *	Verify oil content turns ratio, impedance, insulation resistance
1.9	MV Cable Insulation *	VLF Testing
1.10	MV Equipment *	Test all MV Switchgear
1.11	Relay Protection *	Ensure relay set-points accurate and proper relay functionality
1.12	Optical Fiber Cable	Verify integrity of cable, terminations
1.13	Cell Signal Strength	Document cell signal strength for DAS, metering
1.14	Other (1)	Reserved for future use
1.15	Other (2)	Reserved for future use
2. Energized Testing		
2.1	Curtailement / SCADA	Ensures Curtailement / SCADA meets design requirements
2.2	Battery Energy Storage System (BESS)	Per Manufacturer Specifications
2.3	Electrical IR Thermographic Survey	Find poor electrical connections or failing equipment
2.4	Drone Survey (IR, Other)	Find damaged modules
2.5	Other (1)	As needed
2.6	Other (2)	As needed
3. Performance Testing		
3.1	Performance Testing Procedures	To be expanded in more detail in the future
3.2	Other (1)	Reserved for future use

1 Pre-Energized Testing – Procedures and Descriptions

1.1 DC Insulation Resistance (Megger) Testing

Description:

Insulation resistance testing (IRT) of all DC conductors is conducted to verify insulation integrity.

Precautions:

Ensure all safety requirements specified in this document are met.
Do not test through any facility owned equipment.
Do not Megger test through the modules, optimizers or other module level power electronics (MLPE) devices.
Do not test when Surge Protective Devices (SPDs) are in the circuit.
Do not Megger test through any facility owned equipment.
Always consider equipment ratings when testing.

Test Timing:

After conductors are pulled and are in place prior to termination and energization.

Equipment:

Industry standard Megger test equipment.
Timer

Method:

Test all field installed DC conductors between the modules and inverter DC input terminals.
If applicable, test all field installed DC conductors for Energy Storage System equipment (ESS).
Conductors to be tested must be isolated from ground and disconnected from all power sources (de energized).

Perform insulation resistance test on each conductor with respect to ground and adjacent conductors as follows:
Pos to Neg, Pos to Gnd and Neg to Gnd.

Applied test voltages shall be per NETA ATS-2017 Table 100.1.

Minimum applied test voltage of 1000V for equipment rated from 480V to 2500V.

Test time: Stable reading for 60 seconds.

Pass/Fail Criteria:

Minimum test result will be 400 M-ohms.

Additionally, minimum acceptable reading is only considered with respect to all other conductors in the same raceway and of the same physical description-size/type/length. Any passing test deviating from those of similar circuits by more than 50% of the lowest value is to be retested and, if similar results are achieved, replaced with new conductors and retested.

Corrective actions will need to be taken for all failed conductors and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the megger test device.
2. Completely fill out and sign the following form:

1.1 DC IRT / Megger Test Form

Reference:

- IEC 62446-1: 6.7.3.2
- NETA ATS-2017 Table 100.1 & Table 100.14

1.2 AC Insulation Resistance (Megger) Testing

Description:

Insulation resistance testing (IRT) of all AC conductors between inverters and the point where the PV circuits connect to the 'grid' (POCC) is conducted to verify insulation integrity.

Precautions:

Ensure all safety requirements specified in this document are met.
Do not test through any facility owned equipment.
Always consider equipment ratings when testing.

Test Timing:

After conductors are pulled and are in place prior to termination.

Equipment:

Industry standard Megger test equipment.
Timer

Method:

Conductors to be tested must be isolated from ground and disconnected from all power sources (de energized).

Perform insulation resistance test on conductors as follows: A-B, B-C, A-C, A-N, B-N, C-N

Applied test voltages shall be per NETA ATS-2017 Table 100.1.

Minimum applied test voltage of 1000V for equipment rated from 480V to 2500V.

Test time: Stable reading for 60 seconds.

Pass/Fail Criteria:

Minimum test result will be 400 M-ohms.

Additionally, minimum acceptable reading is only considered with respect to all other conductors in the same raceway and of the same physical description-size/type/length. Any passing test deviating from those of similar circuits by more than 50% of the lowest value is to be retested and, if similar results are achieved, replaced with new conductors and retested.

Corrective actions will need to be taken for all failed conductors and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the megger test device.
2. Completely fill out and sign the following form:

1.2 AC IRT / Megger Test Form

Reference:

- NETA ATS-2017 7.3.2, Table 100.1 & Table 100.14

1.3 DC String Voc & Polarity Testing

Description:

String Commissioning is performed during construction and at other times during the PV system lifetime as needed to verify:

- The correct number of modules are wired in series.
- The correct string polarity and identification
- That all the modules in the string are functional and undamaged
- That the modules perform at the manufacturer's stated values, within measurement tolerance.

String testing on a newly installed system sets a baseline for the lifetime of the project.

Note: String I-V Curve Tracing will be covered in a separate test procedure.

Precautions:

Ensure all safety requirements specified in this document are met.

Ensure all DC fuses are removed or are in the open position and LOTO procedures are implemented as appropriate.

Test Timing:

After all DC string conductors are installed and have had DC IRT testing successfully performed.

After all DC string conductors are terminated at each end and accurately labeled.

Before any DC string fuses are closed.

1.3.1 For Strings WITHOUT Module Level Power Electronic Devices (MPLEs)

Equipment:

Use any of the following:

- Digital DC Voltmeter, Rated for circuit max voltage (1000 Vdc or 1500 Vdc as applicable), Minimum CAT III
- Seaward PV 210 Installation Test Kit w/ Solar Survey 200R



Method:

Ensure ALL the following are true prior to proceeding with this test:

- Have ≥ 400 W/m² POA stable irradiance; zero shading, minimal or no soiling on the array
- DC circuit grounding jumper is open (where applicable)
- Combiner disconnect is locked in the open position and tagged to prevent closing
- Combiner fuses are removed or open

1. Test the polarity of all DC conductors using suitable test equipment. Confirm that conductor identification and labeling matches tested polarity and that conductors are landed at the proper terminals in the equipment.
2. Measure and record Open Circuit voltage (Voc) using suitable test equipment. This should be done before closing any switches or fuses. Verify the proper number of strings are landed on each inverter MPPT. Compare the measured Voc value with the expected Voc value. The expected Voc value is calculated by taking the module Voc and multiplying by the number of modules in the string.

Record measured Voc values and polarity for each string
 Record conductor size, type and fuse rating for each string
 Record inverter information and configuration

Pass/Fail Criteria:

All string Voc values are within 5% of the expected temperature corrected string Voc value.
 All strings have proper polarity and insulation coloring (red=positive, black=negative)
 All strings are properly labeled.
 All strings are properly fused with the proper fuse rating.

Corrective actions will need to be taken for all failed string Voc values and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the test device.
2. Completely fill out and sign the following form:

1.3 DC String & Inverter Commissioning Form

1.3.2 For Strings WITH Module Level Power Electronic Devices (MPLEs)

Equipment:

Use a digital DC Voltmeter, rated for circuit max voltage (600 Vdc), Minimum CAT III

Method:

Ensure ALL the following are true prior to proceeding with this test:

- Have ≥ 400 W/m² POA stable irradiance; zero shading, minimal or no soiling on the array
 - DC circuit grounding jumper is open (where applicable)
 - Combiner disconnect is locked in the open position and tagged to prevent it from closing.
 - Combiner fuses are removed or open.
- 1) Test the polarity of all DC conductors using suitable test equipment. Confirm that conductor identification and labeling matches tested polarity and that conductors are landed at the proper terminals in the equipment.
 - a. (Reference: IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.2)
 - 2) Measure and record Open Circuit voltage (Voc) using suitable test equipment. This should be done before closing any switches or fuses. Verify the proper number of strings are landed on each inverter MPPT.
 - a. Compare the measured Voc value with the expected Voc value. The expected Voc value is calculated by taking the unenergized MLPE Voc and multiplying by the number of modules in the string.
 - b. (Reference: IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.4)
 - Tigo TS4-R-Fs should measure 0.6V at the output of each unit.
 - SMA TS4-R-Fs should measure 0.6V at the output of each unit (after it is attached to the solar module) when the inverter's SunSpec keep-alive signal is not present (before commissioning and activating SunSpec transmitter).
 - SolarEdge optimizers should measure 1.0V at the output of each optimizer.
 - Other devices TBD or per manufacturers documentation.

- 3) Once the system is energized and properly working, and if possible, string Vmp measurements can be reviewed through the inverter data available directly from the inverter or through the monitoring platform to verify expected string performance.

Record measured Voc values and polarity for each string
Record conductor size, type and fuse rating for each string
Record inverter information and configuration

Pass/Fail Criteria:

All string Voc values are equal to the output voltage of the MLPE multiplied by the number of MLPEs in the string. A small tolerance for voltage-drop on longer runs may be accepted.

All strings have proper polarity and insulation coloring (red=positive, black=negative)

All strings are properly labeled.

All strings are properly fused.

Corrective actions will need to be taken for all failed string Voc values and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the test device.
2. Completely fill out and sign the following form:

1.3 DC String & Inverter Commissioning Form

Reference:

IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.2 & Sec. 6.4

1.4 DC Feeder Testing

Description:

DC Feeder Testing refers to testing all DC conductors between the string termination point and the inverter DC input. Feeders can be arranged in various topologies and may pass through a DC recombiner. One or more DC Feeders may terminate in an inverter. DC Feeder commissioning is performed to provide:

- Confirmation of proper circuit voltages at each point between the string termination and the inverter.
- Confirmation of proper circuit polarity at each point between the string termination and the inverter.
- Confirmation of the integrity of the installed DC system components (equipment/cabling).
- Mapping/Recording of the DC circuit configuration for monitoring purposes.

Precautions:

Ensure all safety requirements specified in this document are met.

Ensure all DC fuses are removed or are in the open position and LOTO procedures are implemented as appropriate.

Test Timing:

After all DC conductors are installed and have had DC IRT testing successfully performed.

After all DC string conductors are terminated and are accurately labeled at each end.

After DC String Testing is completed, approved, and accepted.

After all DC Combiners are installed, terminated, and labeled.

Equipment:

Use a digital DC Voltmeter, rated for the maximum circuit voltage (up to 1500 Vdc), Minimum CAT III

Method:

Ensure ALL the following are true prior to proceeding with this test:

- Insulation resistance testing (IRT) of all DC conductors is completed, approved, and accepted.
- Have ≥ 400 W/m² POA stable irradiance; zero shading, minimal or no soiling on the array
- All combiner output switches/breakers are open and secured with a LOTO system.
- All DC string conductors to combiners are connected and are energized with fuses in place.
- All DC conductors from inverters or combiners to recombiners are in place and able to be energized from the combiner output switch.
- All recombiner input fuses are removed or input breakers are open.
- The recombiner output OCPD or switch is open and secured with a LOTO system.
- The DC circuit grounding jumper is open (where applicable)

The following testing must be performed in a controlled, systematic order. To avoid any potential reverse polarity or wiring issues that could lead to equipment damage or personal injury, each individual recombiner input circuit is to be energized separately, test results recorded, and then de-energized prior to moving to the next input circuit.

Using two technicians, with open, clear and consistent communication between them, Technician 1 will energize the first input circuit via the string combiner disconnect switch. Technician 2 will take the required polarity and Voc readings at the recombiner output and record the results.

Once measurements are recorded, Technician 1 will then de-energize the input circuit, re-apply the LOTO device, and move onto the next combiner. Repeat the above until all input circuits have been tested and verified individually.

Test each input fuse for continuity if the recombiner input circuits are protected with fuses.
Leave all DC circuit switches in the open or de-energized position with LOTO system devices installed.

Pass/Fail Criteria:

The measured circuit Voc values accurately reflect the DC circuit design voltage (Voc), and are within 5% of the expected temperature corrected Voc value.

All input circuits have the proper polarity and insulation coloring (red=positive, black=negative)

All input circuits are properly labeled.

All fuses (if any) are tested for continuity and have the proper rating.

Corrective actions will need to be taken for all failed circuit values and retesting performed.

Deliverables:

1. Provide copy of the current calibration document for the test device.
2. Completely fill out and sign the following form:

1.4 DC Feeder Testing Form

Reference:

IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.2 & 6.4

1.5 String IV Testing

Description:

I-V String Trace testing is an electrical test for verifying modules are wired correctly and performing properly. The I-V Tracer measures current and power as a function of voltage. Measured results are compared to the expected results and abnormal findings can help with troubleshooting efforts. Data collected is used as a baseline for future array testing efforts.

Precautions:

Ensure all safety requirements specified in this document are met.
Ensure all DC fuses are removed or are in the open position and LOTO procedures are implemented as appropriate.

Test Timing:

After all DC string conductors are installed, terminated, and accurately labeled.
May be done immediately after successfully completing the DC String Voc & Polarity Testing.
May be deferred to a different time when environmental or seasonal conditions are more favorable in meeting testing requirements.

Equipment:

Use the Solmetric PV1000 or Solmetric PV1500 I-V Curve tracer devices with the Solmetric SolSensor.
Laptop with the latest version of the Solmetric PV Analyzer software already installed.
The Seaward PV210 testing unit may be used with permission from DSD.



Method:

Perform I-V String Trace testing on every string in the array (except those connected to MLPE devices such as SolarEdge Optimizers, AMPT optimizers, Rapid Shutdown Devices, etc.)

Along with the manufacturer instructions for using the Solmetric I-V Tracer, ensure the following points are also followed:

- Create the Solmetric (*.PVAPX) configuration file before testing to match the module type and wiring configuration of the array. There needs to be a unique PVAPX file for array containing strings with a unique tilt & azimuth.
- The PV String circuits shall be tested with the inverter(s) disconnected, shut down and locked out according to the LOTO procedure for the site.
- No PV string circuits shall be opened under load.
- Modules should be clean and shade free during the testing.
- Conduct the test under full sun with an irradiance of **at least 500 W/m²** and stable sky conditions (no cirrus clouds or fast-moving clouds near sun) within the time period of six (6) hours centered about solar noon.
- The SolSensor shall be mounted with the same field of view, at the same elevation as the modules and shall not be shaded. If the PV modules are mounted on trackers, the Sol-Sensor shall be mounted such that it tracks with the PV modules.
- The temperature sensor location shall be on a cell approximately equidistant from the center of the module and the edge of the module.
- For each string perform the curve trace following the manufacturer's instructions for a curve of at least ten (10) current-voltage data points (one hundred (100) data points is preferred).

During testing, pay particular attention to the shape of each curve being displayed. It should have the following general characteristics:

- A 'horizontal leg' with slight downward slope
- A 'downward leg' approaching vertical
- A smooth bend or 'knee' between the horizontal and vertical portions

Variations in the curve shape indicate the need for further investigation and are to be documented. Variations include:

- Steps or notches in the curve
- Low current
- Low voltage
- Rounder knee

The contractor can perform any corrective action needed for the string, so the curve trace is well shaped with appropriate values, then retest the string prior to finalizing the testing effort and report.

Any discrepancies or failures shall be noted in the Commissioning Test Report, rectified and re-tested.

Pass/Fail Criteria:

DSD Commissioning will analyze the PVAPX file and provide feedback for any corrective actions or retesting efforts.

The following objectives are to be met:

- IV curves of all strings should be well-formed indicating no string issues or shading.
- String Voc is within 5% of expected values as determined from the PV module manufacturer's data sheet, as adjusted to STC conditions using the temperature coefficient for open-circuit voltage.
- The string open-circuit voltage is within 5% of the average open-circuit voltage from each String in the same combiner box.

Deliverables:

Provide all Raw *.PVAPX data files, properly labeled. (If the Seaward PV 210 is authorized, provide the raw *.SOLCRV file(s) and the *.CSV output file.)

Provide Solmetric Excel file and report.

Provide a report describing in detail any discrepancies or unusual findings.

- There is no testing 'report' in the Appendix to complete for this testing effort.

Reference:

IEC 62446-1, Edition 1.1, 2018-08, Sec. 7.2

1.6 Grounding System Inspection

Description:

The equipment grounding conductor (EGC) provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. (NEC 2017 100) The integrity of the ground-fault current path conducts fault current back to the energy source and is essential for the operation of OCPDs in the circuit which protect life and property.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

After all phase, neutral and equipment grounding conductors are installed and properly torqued.

If applicable to the PV project, after grounding electrodes and grounding electrode conductors are properly installed.

Equipment:

None

Method:

1. Inspect all Equipment Grounding Conductors (EGC) between the point of grid interconnection (POI) and all electrical components of the PV system to ensure that:
 - Every bolted connection is properly torqued to manufacturer specs with torque marks applied.
 - Compression lugs are properly installed on conductors.
 - All metallic raceways, cable trays, metal enclosures, and equipment (inverters, transformers, racking, etc) are bonded with a continuous path to the Grounding Electrode Conductor (GEC)
 - All grounding components, connectors, fittings, clamps, etc are listed and suitable for the environment.
2. For Medium Voltage (MV) equipment, ensure and certify that:
 - Surge arrestors and MV equipment are grounded.
 - MV Cable shielding is grounded.
 - The ground ring and grounding electrodes are properly installed.
 - All grounding components, connectors, fittings, clamps, etc are listed and suitable for the environment.
3. All grounding systems, connections and equipment match the project drawings and meet NEC requirements.

Pass/Fail Criteria:

1. The contractor will certify in writing that the entire grounding and bonding system for the project:
 - Has been inspected,
 - Is installed per the project drawings, and
 - Meets the requirements of the applicable version of the NEC.

Deliverables:

1. Completely fill out and sign the following form:
1.6 Grounding System Inspection Certification Form

Reference:

NETA ATS-2017 7.13

IEC 62446-1, Edition 1.1, 2018-08, Sec. 6.1

1.7 Ground Fault Primary Current Injection Testing

Description:

Primary current injection testing is suitable for testing main PV system service equipment breakers 1000A or greater with GFI functionality. A current is injected directly on the primary side of the breaker to measure if it will trip or fail, and how long the current is live before the circuit is broken.

Protective settings will be provided from arc fault and coordination studies done by others.

Testing is to be done in accordance with the intent of ANSI/NETA-ATS Section 7.6.1.1, and as required by 2017 NEC 230.95(C).

Neutral-Ground Resistance is measured to ensure the Ground Fault mechanism will operate as expected.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Test after switchgear is set in place, but before conductors are landed on main breaker lugs.

Equipment:

Use a high-quality calibrated Primary Injection Test Set.

Method:

Follow test set and NETA recommended procedures for Primary Injection testing.

Test the resistance between the neutral and ground bus bars in the switchgear per 2017 NEC 230.95(C).

Remove the Neutral-Ground bonding jumper and apply a voltage. Measure resistance from Neutral to Ground.

Pass/Fail Criteria:

Breaker should trip according to programmed trip settings. Ground fault pickup values shall be as specified, and trip characteristics shall not exceed manufacturer's published time-current tolerance band.

Neutral-Ground Resistance $\geq 1 \text{ M}\Omega$

Deliverables:

For each breaker tested, completely fill out and submit a test report including project name, address, testing company, technician and all relevant details pertaining to the test method and results.

Reference:

2017 NEC 230.95(C).

ANSI/NETA-ATS Section 7.6.1.1)

1.8 Transformer Testing

1.8.1 Liquid-Filled Transformers

Description:

This testing section applies to all liquid filled transformers.

Transformer testing ensures the electrical characteristics are well understood, the transformer is ready for energizing, and creates a baseline set of data.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Test after transformer is set in place, but before conductors are landed on bushings.

Equipment:

Use high-quality calibrated equipment required for and consistent with the testing being done.

Method:

Perform the following testing according to NETA ATS-2017 7.2.2 (B):

- 1) Compare equipment nameplate data with the drawings and specifications.
- 2) Inspect for physical damage, proper installation, anchorage, and grounding.
- 3) Clean all bushing and insulator surfaces.
- 4) Check the dielectric liquid in tank and bushings for proper level and for leaks.
- 5) Verify that the final tap setting is as specified.
- 6) Insulation resistance tests, winding to winding and winding to ground. Applied voltages shall be per Table 100.5 (below).
- 7) Turns-ratio tests at specified tap positions. Verification that winding polarities are in accordance with nameplate.
- 8) Remove a sample of insulating liquid per ASTM D 923 and test for:
 - a. Dielectric breakdown voltage: ASTM D 877 and/or ASTM D 1816
 - b. Color: ANSI/ASTM D 1500
 - c. Visual Condition: ASTM D 1524
 - d. Water in liquid: ASTM D 1533
 - e. Dissolved-gas analysis (DGA): ANSI/IEEE C57.104 or ASTM D 3612

Pass/Fail Criteria:

As outlined in NETA ATS-2017 7.2.2

Deliverables:

For each transformer tested, completely fill out and submit a testing report showing transformer information, items tested, results, and certify readiness for energization.

Reference:

ANSI/NETA-ATS Section 7.2.2

NETA ATS-2017

TABLE 100.5
Transformer Insulation Resistance
Acceptance Testing

Transformer Coil Rating Type in Volts	Minimum DC Test Voltage	Recommended Minimum Insulation Resistance in Megohms	
		Liquid Filled	Dry
0 - 600	1000	100	500
601 - 5000	2500	1000	5000
Greater than 5000	5000	5000	25000

In the absence of consensus standards, the NETA Standards Review Council suggests the above representative values.

See Table 100.14 for temperature correction factors.

NOTE: Since insulation resistance depends on insulation rating (kV) and winding capacity (kVA), values obtained should be compared to manufacturer's published data.

1.8.2 Dry-Type Air-Cooled Transformers

Description:

This section applies to all dry-type air-cooled transformers.

Transformer testing ensures the electrical characteristics are well understood, the transformer is ready for energizing, and creates a baseline set of data.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Test after transformer is set in place, but before conductors are landed on bushings.

Equipment:

Use high-quality calibrated equipment required for and consistent with the testing being done.

Method:

Perform the following testing according to NETA ATS-2017 7.2.1.2 (B):

- 1) Insulation resistance tests, winding to winding and winding to ground. Applied voltages shall be per Table 100.5 (below).

Pass/Fail Criteria:

As outlined in NETA ATS-2017 7.2.1.2

Deliverables:

For each transformer tested, completely fill out and submit a testing report showing transformer information, items tested, results, and certifying readiness for energization.

Reference:

ANSI/NETA-ATS Section 7.2.1

NETA ATS-2017

TABLE 100.5
Transformer Insulation Resistance
Acceptance Testing

Transformer Coil Rating Type in Volts	Minimum DC Test Voltage	Recommended Minimum Insulation Resistance in Megohms	
		Liquid Filled	Dry
0 - 600	1000	100	500
601 - 5000	2500	1000	5000
Greater than 5000	5000	5000	25000

In the absence of consensus standards, the NETA Standards Review Council suggests the above representative values.

See Table 100.14 for temperature correction factors.

NOTE: Since insulation resistance depends on insulation rating (kV) and winding capacity (kVA), values obtained should be compared to manufacturer's published data.

1.9 MV Cable Insulation Testing

Description:

VLF Dielectric Withstand testing is performed on MV cables to determine the effectiveness of the insulation and the ability to perform safely under expected operating conditions. The insulation under test must withstand a specified applied voltage that is higher than the service voltage across the insulation for a specified period without breakdown of the insulation. VLF (Very Low Frequency) testing applies sinusoidal wave shapes at frequency ranges of 0.01 Hz to 0.1 Hz and is non-destructive to good insulation.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Testing is done after conductors are installed and terminated, but before terminations are connected to equipment.

Equipment:

Good quality calibrated VLF test equipment typical for the testing activities.

Method:

VLF Testing shall be performed on ALL Medium Voltage Cables as outlined in NETA ATS-2017 7.3.3.B

- 1) Perform an insulation-resistance test utilizing a megohmmeter with a voltage of at least 2500 volts or manufacturer's recommended parameters. Individually test each conductor with all other conductors and shields grounded. Test duration shall be one minute.
- 2) Perform a shield-continuity test on each power cable by ohmmeter method.
- 3) Perform an acceptance test on cables, including terminations before the cable system is placed into service. In accordance with IEEE Std. 400.2-2013, testing will be performed by means of Very low frequency (VLF) test set.
- 4) Test voltages shall not exceed 80 percent of cable manufacturer's factory test value, or the maximum test voltages as listed in either IEEE Standard 400.2 Appendix 5 or NETA ATS Table 100.6.4.
- 5) Insure that the input voltage to the test set is regulated.
- 6) Record wet and dry bulb temperatures or relative humidity and temperatures.
- 7) Test each conductor individually with all other conductors grounded. Ground all shields.
- 8) Ensure that the maximum test voltage does not exceed the limits for terminators specified in ANSI/IEEE 48, IEEE 386, or manufacturer's specifications.
- 9) Raise the conductor to the specified maximum test voltage and hold for 15 minutes.
- 10) Apply grounds for a time period adequate to drain all insulation stored charge.

Pass/Fail Criteria:

Pass/fail is per the applicable IEEE standards or NETA procedures.

Deliverables:

Testing entity can provide their own report showing project name, technician name, test voltage, circuits tested, results, and pass/fail status.

Reference:

NETA ATS-2017 7.3.3.B

1.10 MV Equipment Testing

Description:

Depending on the project, various types of MV equipment may be included for testing. Which specific items and the extent of testing on each piece of equipment will be up to the discretion of the PM and engineering groups.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Testing is done after MV equipment is installed and terminated, but before terminations are connected to equipment.

Equipment:

Good quality calibrated test equipment typical for the testing activities.

Method:

The applicable NETA testing procedures for the particular piece of equipment under test will be used unless otherwise indicated.

Pass/Fail Criteria:

Pass/fail is per the applicable NETA procedures.

Deliverables:

Testing entity can provide their own report showing project name, technician name, test voltage, equipment tested, results, and pass/fail status.

Reference:

NETA ATS-2017 7.5.1

1.11 Relay Protection Testing

Description:

Relay testing ensures the relay is properly programmed to meet safety and circuit protection parameters specified by a utility or project engineer.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

Testing is done after the relay, CT's, PT's and controlled devices (OCPD) are installed and can be made functional. This testing may be done as part of a Utility Witness test.

Equipment:

Good quality calibrated test equipment typical for relay testing activities.

Method:

Check the functional operation of each protection element specified in the protection scheme. Verify the logic programmed into the relay. Ensure the clock is set on the relay to local standard time.

Pass/Fail Criteria:

Protection element settings and functionality must agree with the provided engineering and/or utility specifications.

Deliverables:

Provide a PDF report showing project name, technician name, equipment tested, serial number, element test results, and pass/fail status for each tested element.

Provide the 'as-left' relay (*.rdb – SEL or equivalent) file with the report.

Reference:

- NETA ATS-2017 7.9.2

1.12 Optical Fiber Cable Testing

Description:

When installed, optical fiber cable needs to be tested to ensure satisfactory installation and data transmission without undue signal degradation. Testing to “IEC 61280-4-1 Fibre-optic communication subsystem test procedures” is preferred.

Precautions:

Ensure all safety requirements specified in this document are met.
Ensure all industry standard safety precautions applicable to working with fiber optic cables are followed.

Test Timing:

Testing is done after optical fiber cable is installed and terminated.

Equipment:

Good quality calibrated industry standard test equipment typical for the testing activities.

Method:

The applicable industry standard testing procedures for the optical fiber cable under test will be used including:

1. Continuity Testing – Determine that the fiber routing and/or polarization is correct and matches documentation.
2. End-to-End Insertion Loss - Use an OLTS power meter and source. Test singlemode cables using TIA-526-7, and multimode cables by using TIA-526-14. Total loss shall be less than the calculated maximum loss for the cable based on appropriate standards.
3. OTDR testing – May be needed to verify cable installation, splice performance and troubleshoot any problems.

Pass/Fail Criteria:

Pass/fail is per the applicable NETA procedures.

Deliverables:

The testing entity provides their own report showing project name, technician name, test method, equipment tested, results, and pass/fail status.

Reference:

TIA-526-14 – Multimode fiber testing
TIA-526-7 – Singlemode fiber testing
NECA/FOA 301-2016, Section 7

1.13 Cell Signal Strength Testing

Description:

Some utility meters can communicate data through a cellular data signal. The DAS system will also need a cellular data signal for data communications. This test is conducted well in advance of construction and helps determine the cellular signal strength at the location where the meter or DAS equipment will eventually be located.

Precautions:

Ensure all safety requirements specified in this document are met.

Scope:

A cell phone will be used to conduct this test.

The test needs to be completed at each location on the site where a cellular data modem will be located (either for metering or DAS equipment).

Test Timing:

During an initial site visit well in advance of ordering DAS and other metering equipment requiring communications.

Equipment:

Cell phones from different carriers (Verizon & AT&T) having 4G LTE capabilities, GPS, and a mapping app showing current location against satellite mapping imagery background. An app or handheld GPS unit showing location (lat/lon) is also required.

Method:

At the desired meter or DAS location, and using a cell phone mapping app, turn location services (GPS) on and switch to satellite imagery mode. Type in the project address so a pin for the address is displayed as well as the current location. Capture a screenshot by pressing the home and power buttons at the same time (or according to the phone's instructions). Save the captured screenshot image and submit.

Repeat with a cell phone from the other carrier capturing images from both Verizon & AT&T phones at each proposed DAS location.

Pass/Fail Criteria:

The cell signal strength for the particular cellular carrier should display 3 or more bars to pass.

Deliverables:

1. Completely fill out and sign the following form:
1.13 Cell Signal Strength Test Report

1.14 Other Testing (1)

Reserved for future revisions.

1.15 Other Testing (2)

Reserved for future revisions.

2 Energized Testing – Procedures and Descriptions

2.1 Curtailment / SCADA

Description:

When a project has a Curtailment system or other SCADA controls in place to meet certain operational or safety criteria, testing will be coordinated between the equipment provider and project engineers to ensure objectives are met.

Precautions:

Ensure all safety requirements specified in this document are met.

Test Timing:

After the system is connected to the grid and can be energized.

Equipment:

As determined by the party contractor implementing the Curtailment System.

Method:

Under the direction of the project engineer and the contractor implementing the Curtailment System.

Pass/Fail Criteria:

As determined project engineer and the contractor implementing the Curtailment System.

Deliverables:

2.2 BESS (Battery Energy Storage System)

Description:

When a project has a BESS installed to meet certain operational, energy or cost saving goals, testing will be coordinated between the equipment provider and project engineers to ensure objectives are met.

2.3 Electrical IR Thermographic Survey

Description:

Thermographic testing of electrical equipment is used to detect poor conductor terminations, inadequate insulation or other problems in energized electrical equipment. An IR survey provided a baseline for future inspections. Thermographic testing to 'ASTM E 1934-99a Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography' is preferred.

Safety:

Observe all safety precautions listed in the General Testing and Commissioning Instructions section of this document.

Follow NFPA 70E requirements for PPE when working near energized equipment

Always consider equipment ratings when testing.

Scope:

Test all energized electrical equipment components and conductor terminations to establish proper installation and operation.

Test Timing:

Testing is done after equipment is energized and operating at a thermal steady state. A trained technician will determine acceptable testing conditions for optimal results.

Equipment:

A camera should be selected that has high resolution and good thermal sensitivity and accuracy. The operator should be trained in selecting the proper equipment and taking images in the proper conditions.

Method:

A trained technician will take an IR photo survey of electrical equipment in the project. Areas of focus will be conductor terminations, OCPD devices, and other areas where a failure would lead to serious damage of life or property.

Pass/Fail Criteria:

The experience of the technician in taking, processing and interpreting IR images is relied upon to identify items of concern.

Results Form:

The testing entity can provide their own report showing project name, technician name, equipment used, visible and IR images of the items being examined, and commentary on findings.

2.4 Drone Survey

Description:

When there is a concern with project performance, a drone survey to identify module, or string issues will be coordinated between the survey provider and project team.

2.5 Other Testing (1)

Reserved for future revisions.

2.6 Other Testing (2)

Reserved for future revisions.

3. Performance Testing

3.1 Performance Testing Procedures

Description:

Performance Testing assesses whether the total output of the completed PV system is consistent with equipment specifications and system design.

Scope:

Performance Test analysis shall include (1) measuring the total AC output of the PV system, and (2) determining the expected result of such measurement based on the as-built performance model for the system.

Unless circumstances make it impossible to do so, the Performance Test should specifically measure real power output of the system under typical unconstrained operating conditions (called the Reporting Conditions) in accordance with ASTM E2848-13. In this case, the Performance Test may also be referred to as a Capacity Test. Unconstrained operating conditions means system output is not limited by inverter clipping, curtailment signals, shading of panels other than row-to-row shading, snow cover, or excessive soiling.

If weather, shading, system design, or a combination of these factors make completing a Capacity Test following the methodology described below within one month of the System becoming fully operational impossible, an alternate test procedure may be used to satisfy the Performance Testing requirement. In such a case, the alternate test procedure must still compare measured total AC output to expectations based on the as-built performance model for the system, but total AC output may be characterized in terms of real power output during unconstrained operation under specific reporting conditions, in terms of Performance Ratio, or in terms of energy yield over a period of time.

Timing:

The Test Period for the Performance Test shall begin once the following preconditions have been met:

- the PV system is fully energized.
- the data acquisition system is accurately collecting all data points required for analysis (system power, plane-of-array irradiance, ambient temperature, wind speed, and the output of each inverter)
- there are periods of the day for which the system is producing power under unconstrained conditions.
- irradiance sensors must be clean or no more soiled than the solar panels.

The test period shall last a minimum of 3 days and no more than 4 weeks.

Equipment:

All data required for the Performance Test should be accessible from the DAS equipment and associated meters and sensors provided with the PV system.

Plane-of-array irradiance shall be measured with temperature-compensated photovoltaic reference cells with rated accuracy of $\pm 2.5\%$ or better and spectral and incident angle response characteristics that are approximately matched to those of the Plant's PV modules, or with Class A pyranometers per ISO 9060:2018 ("Secondary Standard" under ISO 9060:1990).

3.1.1 Capacity Test Method

The Capacity Test shall be performed in accordance with ASTM E2848-13 and ASTM E2939-13 with the following clarifications:

- In what follows, the terms “photovoltaic system power, P ”, “plane-of-array irradiance, E ”, and “reporting conditions” have the meanings as defined in ASTM E2848-13
- The photovoltaic system power, P , shall be taken to be the AC power at the revenue meter.
- **Multiple POIs:** If the PV system supplies multiple points of interconnect, each with a dedicated revenue meter, either a single capacity test may be performed for the whole system, in which case the photovoltaic system power, P , shall be the sum of AC power across all revenue meters, or multiple capacity tests may be performed – one for each revenue meter.
- **Soiling:** The level of soiling on modules during capacity measurement may not exceed that which would reduce system output by more than 5%. Furthermore, irradiance sensors used for Capacity Test analysis must be at least as clean as the solar modules. The Expected Capacity at Reporting Conditions is to be calculated on the presumption that either both irradiance sensors and modules are clean or that irradiance sensor readings are fractionally impacted by soiling to the same extent as system output.
- **Multiple array planes:** If the PV system comprises multiple array planes, the plane-of-array irradiance, E , shall be the average of plane-of-array irradiance for each array plane weighted by the nominal DC capacity of each array plane. This is consistent with the value PVsyst assigns to the output parameter *GlobInc*.
- **Bifacial modules:** If the PV system is comprised of bifacial modules, the methodology of ASTM E2848-13 and E2939-13 shall be modified as proposed in NREL conference paper NREL/CP-5K00-73982. If the system contains both monofacial and bifacial modules, the calculation of total irradiance as indicated by Equation 4 of that paper shall be further modified by multiplying the term accounting for the rear-side contribution by the fraction of the total DC system size that is from bifacial modules.

Steps

a. Prepare Test Plan

- i. Modify as-built performance model as appropriate:
 - If the performance model includes soiling losses in excess of 5% for the month of the year in which the Test Period will occur, change soiling losses to a low value (e.g. 0.8%) or zero. This is to reflect the expectation that the system will be free of snow and relatively clean during the Test Period.
 - Optionally, set unavailability to zero (alternatively, periods of unavailability may be addressed by filtering affected data points)
- ii. Generate hourly model data.
 - Hourly model data should at a minimum contain the following PVsyst parameters: *E_Grid*, *GlobInc*, *T_Amb*, *WindVel*, *IL_Pmin*, *IL_Vmin*, *IL_Pmax*, *IL_Vmax*, *FIAMGI*, *FSIgl*, and *FShdBm*
 - If reference cells are to be used for measuring plane-of-array irradiance hourly values of global in-plane irradiance should be reduced with post processing to account for the incident angle response and soiling impact on reference cell readings. The incident angle response of the reference cell may be assumed to be the same as that of the modules, in which case it is easily accounted for by using the product $GlobInc * FIAMGI$ for the modeled value of plane-of-array irradiance, E . If the modified model includes soiling losses and the reference cell output is expected to be impacted by soiling to the same degree as system output will be impacted by soiling during the Test Period (a reasonable assumption if the reference cell was last cleaned at the same time as modules and soiling is relatively light and uniform) account for the modeled soiling by further multiplying by *FSIgl* (i.e. use $GlobInc * FIAMGI * FSIgl$ for the modeled value of plane-of-array irradiance, E).
- iii. Filter hourly model data
 - Use only model data for the month of the year in which the Test Period will occur.

- Filter out datapoints for which IL_Pmin , IL_Vmin , IL_Pmax , or IL_Vmax are non-zero as times when inverters are not max power point tracking.
 - Filter out datapoints for which $FShdBm < 0.99$ as times when shades losses are significant.
 - Exclude data for which the plane-of-array irradiance differs from the reporting conditions irradiance, E_{RC} , by more than 20%
- iv. Determine Reporting Conditions and Expected Capacity following the guidance of E2939-13.
 - Reporting Conditions irradiance, E_{RC} , is approximately (within 25 W/m^2) the value that exceeds 60% of all filtered plane-of-array irradiance values. Note that since E_{RC} is both used in filtering criteria and depends on filtering, it may be necessary to iterate the process of filtering and finding the value that exceeds 60% of all filtered values until a suitable value is found.
 - Reporting Conditions temperature, T_{RC} , is the mean ambient temperature rounded to the nearest whole number.
 - Reporting Conditions wind speed, v_{RC} , is the mean wind speed rounded to the nearest whole number.
 - v. Document the analysis used to determine Reporting Conditions and the Expected Capacity and include
 - the minimum reporting requirements of ASTM E2939-13
 - the actual or expected Test Period dates
- b. Prepare System for Test**
- i. Clean irradiance sensors and modules if necessary
 - Sensors used for measuring plane-of-array irradiance must be cleaned prior to the Test Period if either they were last cleaned more than a month earlier than modules were last cleaned or if they are notably more soiled than modules.
 - Both modules and irradiance sensors should be cleaned if the amount of soiling is estimated to be sufficient to reduce system output by more than 5%. Modules must not be cleaned without also cleaning irradiance sensors.
 - ii. Disable curtailment and battery charging/discharging features of the System that would prevent collection of usable data.
- c. Measure Capacity**
- i. **Collect Data**
 - Collect data until a minimum of 50 fifteen-minute intervals (or 12.5 operating hours) of data that pass all filter criteria are available for regression analysis.
 - ii. **Determine measured capacity by applying the regression methodology of ASTM E2848-13**
 - Be sure to filter for irradiance, inverter clipping, unstable conditions, and shading.
 - iii. **Document the analysis used to determine the Measured Capacity and include**
 - the minimum reporting requirements of ASTM E2848-13
 - A chart of photovoltaic system power, P , versus plane-of-array irradiance, E , for both all intervals during the test period and the post-filtering intervals used for regression analysis.

1.1.2 Alternate Test Method

An alternate test method may be based on any of the following:

- A modification to the capacity test method described above.
- A series of capacity tests, each for a different part of the system, that when combined provide an assessment of the entire system.

- a test based on the test protocol outlined in Technical Report NREL/TP-5200-57991, *Weather-Corrected Performance Ratio*
- An energy yield test for which measured meteorological data during the Test Period are provided as inputs to the as-built performance model for the system.

If an alternate test method is to be used to satisfy the Performance Testing requirement, a test plan describing details of the alternate test method must be submitted to the purchaser of the PV system and written notification must be received from the purchaser that such test plan is acceptable. The system purchaser shall not withhold notification of acceptance if reasonable engineering judgement would conclude that the proposed test plan would allow comparison of measured total system output to expectations based on the as-built performance model with at least +/- 5% sensitivity.

Pass/Fail Criteria (Either Method):

The measured total AC output of the system must, to within the margin of uncertainty, meet or exceed the expected AC output less any contract margin.

Deliverables (Either Method):

- Test Plan
- Model data used to determine Reporting Conditions and the Expected Capacity in electronic form.
- Test Report documenting analysis of field data.
- Measured Test Period field data in electronic form

References:

- ASTM E2848-13, *Standard Test Method for Reporting Photovoltaic Non-Concentrator System Performance*
- ASTM E2939-13, *Standard Practice for Determining Reporting Condition and Expected Capacity for Photovoltaic Non-concentrator Systems*
- Waters, Deline, Kemnitz, and Webber, *Suggested Modifications for Bifacial Capacity Testing*, 46th IEEE Photovoltaic Specialists Conference, June 2019 (NREL/CP-5K00-73982 October 2019)
- Technical Report NREL/TP-5200-57991, *Weather-Corrected Performance Ratio*

3.2 Other Testing (1)

Reserved for future revisions.

ATTACHMENT E
TO GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

NOTICE TO PROCEED TEMPLATE

<DISTRICT LETTERHEAD>

Date: <DATE>

To: <PROVIDER CONTACT NAME>
<TITLE>
<COMPANY>
<ADDRESS>
<FAX NUMBER>
<PHONE NUMBER>
<EMAIL>

Subject: **POWER PURCHASE AGREEMENT** for [SITE NAME]

<CONTACT NAME>,

You are hereby authorized to proceed *based on the successful completion of the Conditions Precedent* in the above referenced Agreement beginning <DATE>. Subject to the terms of the Agreement, the date for completion of the project shall be no later than <DATE>.

Sincerely,

<DISTRICT NAME>
<TITLE>
<ENTITY>
<ADDRESS>
<FAX NUMBER>
<PHONE NUMBER>
<EMAIL>

CC: <CC NAME>
<TITLE>
<COMPANY>
<ADDRESS>
<FAX NUMBER>
<PHONE NUMBER>
<EMAIL>

<MORE CCs IF DESIRED>

Exhibit H – BESS Guarantee

Reserved.

Exhibit I – Form of Site Easement Agreement

SOLAR POWER EASEMENT AGREEMENT
([Site Name])

This Solar Power Easement Agreement (this “**Agreement**”) is effective as of the ___ day of _____, 2022 (“**Effective Date**”), by and between Palmdale Water District, (“**Grantor**”) and East Avenue Q Solar Project 2022, LLC, a Delaware limited liability company (“**Grantee**”). Grantor and Grantee are collectively referred to herein as “**Parties**” and individually as a “**Party**.”

RECITALS

WHEREAS, Grantor is the fee owner of approximately _____ acres of land located at [ADDRESS, CITY, CA ZIP], as more particularly described in **Exhibit A** (the “**Property**”).

WHEREAS, Grantor desires to reduce its energy costs as well as its dependence on fossil fuel electric generating resources and to promote the generation and storage of electricity from solar photovoltaic and battery energy storage facilities; and

WHEREAS, Government Code section 4217.10 *et seq.* provides that public agencies may enter into agreements, including but not limited to, lease agreements, for real property upon which alternative energy facilities may be constructed so that the public agency may purchase the energy generated from the facilities constructed on the real property under a power purchase agreement; and

WHEREAS, the governing body of Grantor has made those findings required by Section 4217.12 of the Government Code that: (i) the anticipated cost to Grantor for electrical energy services provided by the solar photovoltaic and battery energy storage system under this Agreement will be less than the anticipated marginal cost to Grantor of electrical energy that would have been consumed by Grantor in the absence of those purchases and (ii) the difference, if any, between the fair market value of the right to access and occupy the real property subject to this Agreement and related payments under this Agreement, if any, is anticipated to be offset by below-market energy purchases or other benefits provided under this Agreement; and

WHEREAS, Grantor desires to obtain a portion of the power required to run its facilities from a ground-mounted photovoltaic generating system having an approximate generating capacity of 1,760.88 kW (DC) and more particularly described on Exhibit F of the PPA (as hereinafter defined) (such system, together with all interconnection facilities and other equipment related thereto, the “**System**”) to be installed, constructed, interconnected, owned and operated on a portion of the Property as shown on **Exhibit B** attached hereto (hereinafter defined as the “**Easement Area**”).

A. Grantee desires to develop the System on the Easement Area and, in furtherance of that desire, Grantee has entered into a Solar Power Purchase Agreement dated of even date herewith (“**PPA**”) whereby Grantee and the Grantor have agreed to the terms for the installation, maintenance, ownership, and operation of the System in the Easement Area.

WHEREAS, Grantor desires to grant to Grantee the Easement (as hereinafter defined) in the Easement Area for the sole purpose of accessing Grantor’s property to develop, construct, install, operate, maintain and repair, and remove the System; and Grantee desires to obtain the Easement in the Easement Area, subject to the terms and conditions set forth in this Agreement.

AGREEMENT

Now therefore, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Grantor and Grantee hereby agree as follows:

1. **Grant of Easement; Term.** Subject to the terms of this Agreement, Grantor hereby grants and conveys to Grantee, its successors and assigns, a non-exclusive easement (the “**Easement**”) on, over, across and under the Easement Area for the Intended Use (as hereinafter defined), together with a right of access across the Property for the purposes of exercising its rights hereunder (as further set forth in Section 2.2 hereof), commencing on the Effective Date and continuing until one hundred eighty (180) days following the expiration or earlier termination of the PPA (including any extensions or renewals thereof) (the “**Term**”). Upon the expiration or earlier termination of the Term, Grantee shall remove the System in accordance with (including within the time period set forth in) Section 3 of the PPA.

2. **Use/Access.**

2.1. **Use.** Grantee may use the Easement Area to install, construct, interconnect, operate, own, maintain, upgrade, repair, replace and remove the System, for such other uses as are reasonably and customarily related to such activities, and to undertake such other activities as may be set forth in Section 18 of the PPA (“**Intended Use**”). The Intended Use may include structural elements to physically support equipment, including vertical support poles, carports, concrete or similar anchors or plugs, and mounting hardware used to attach solar modules and other components at the Easement Area. Grantee may, at its sole cost and expense, periodically inspect, clean, maintain, repair and replace the System at times reasonably determined by Grantee to be necessary or desirable. All electrical output generated by the System shall be subject to the terms and conditions contained in the PPA.

2.2. **Access.** Grantee shall also have the right of ingress and egress over and across the Property for the purpose of exercising the rights set forth herein consistent with and not in excess of the PPA, including, but not limited to, access to (a) receive, unload, store, warehouse and protect all materials, tools and equipment in the Easement Area, as needed; (b) use the Easement Area and adjoining portions of the Property during construction of the System as lay down areas only to the extent necessary to carry out construction activities and removal obligations; (c) provide, install, inspect and maintain through or under the Easement Area during the Term of this Agreement such cables, electric lines, ducts, transformers, fencing and other or other ancillary equipment or apparatus consistent with and not in excess of the PPA as may, in the opinion of Grantee, be necessary or desirable for connecting the System to or for the benefit of Grantee’s electrical system or the local utility’s distribution system; (d) provide a non-exclusive easement over the Property for ingress and egress to and from the Easement Area for Grantee and its employees, agents, contractors and subcontractors, at all times during the Term of this Agreement (the foregoing, collectively, the “**Access Easements**”).

2.3. **Insolation.** Grantor further grants to Grantee the sole and exclusive easement and right to evaluate, develop, capture, use and convert all solar energy resources found on, about,

over, across and at the Easement Area, including the sole and exclusive right to the free and unobstructed Insolation and flow of solar energy resources on, about, over and across the Property to the System (“**Solar Development Easement**”). Without limiting the foregoing or Section 13.B. of the PPA, Grantee shall have the right to remove, trim, prune, top or otherwise control the growth of any tree, shrub, plant or other vegetation on the Property to the extent it obstructs or Insolation to the Easement Area. Grantor agrees that Insolation and the Solar Development Easement are essential to the Intended Use and a material inducement to Grantee in entering into this Agreement.

3. **Consideration.** The consideration given by Grantee for this grant of Easement is the set of obligations under the PPA, which are conditioned upon this grant. The Parties hereby agree and acknowledge that good and sufficient consideration is given for and in this Agreement for all covenants, terms and conditions herein and related hereto.

4. **Grant of Other Rights.** Grantor shall not grant any licenses, easements, leases or rights of way, whether recorded or unrecorded, which could be reasonably expected to interfere with Grantee’s use of the Easement Area to develop, design, construct, install, own, operate, maintain or remove the System or otherwise engage in any Intended Use of the Easement Area.

5. **Operation, Maintenance and Repair.**

5.1. Grantee will own, operate, maintain and repair the System during the Term of this Agreement in accordance with the PPA. Grantee shall provide reasonable notice to Grantor prior to any maintenance and repair activities that could be reasonably expected to materially interfere with Grantor’s operations at the Property (other than the Easement Area), provided that in the event Grantee needs emergency access after regular business hours, Grantor shall provide immediate access to the Property. All work performed by Grantee in connection with the installation, operation, maintenance and repair of the System shall be performed in accordance with the PPA.

5.2. Grantor shall not make any alterations or repairs to the Property which would be reasonably expected to adversely affect the operation and maintenance of the System without Grantee's prior written consent. If Grantor wishes to make such alterations or repairs, Grantor shall give prior written notice to Grantee, setting forth the work to be undertaken (except for emergency repairs, for which notice may be given within 24-hours), and give Grantee the opportunity to advise Grantor in making such alterations or repairs in a manner that avoids damage and/or adverse effects to the System and operation and maintenance thereof. Notwithstanding any such advice from Grantee, Grantor shall be responsible for all damage to the System resulting from such alterations or repairs and caused by Grantor's or its agents’, contractors’, subcontractors’, vendors’, or employees’ acts or omissions or breach of this Agreement or the PPA. To the extent that temporary disconnection or removal of the System is necessary for Grantor to perform such alterations or repairs, such removal and any replacement of the System after completion of Grantor's alterations and repairs, shall be done by Grantee or its contractors at Grantor's cost, and Grantor shall pay Grantee the District Suspension Rate if such suspension exceeds the suspension time allowed in the PPA. All of

Grantor's alterations and repairs shall be done in a good and workmanlike manner and in compliance with all Applicable Laws.

6. **Credits, Rebates and Incentives.** Throughout the Term, Grantor shall be the owner of all Green Attributes and Grantee shall be the owner of all Environmental Financial Incentives, in accordance with the PPA, which is incorporated herein by reference.

7. **Ownership of the System.** As further set forth in the PPA, which is incorporated herein by reference, the System and all alterations, additions, improvements or installations made thereto by Grantee and all personal property of Grantee used in connection with the installation, operation and maintenance of the System, electric lines, ducts or other apparatus related to the System are, and shall be and remain, the personal property of Grantee ("**Grantee's Property**"). In no event shall any Grantee's Property be deemed a fixture, nor shall Grantor, nor anyone claiming by, through or under Grantor (including, but not limited to, any present or future mortgagee of Grantor) have any rights in or to the Grantee's Property at any time. Ownership of Grantee's Property at the end of the Term or earlier termination of this Agreement shall be in accordance with the terms and conditions of the PPA.

8. **Grantor's Representations and Obligations.**

8.1. Grantor represents and warrants that (i) the execution and delivery by Grantor of this Agreement and the performance by it of its obligations hereunder have been duly and validly authorized by all necessary action on behalf of Grantor, including compliance with all procurement laws, rules and ordinances applicable to Grantor, (ii) this Agreement has been duly and validly executed and delivered by Grantor and constitutes the legal, valid and binding obligation of Grantor enforceable against it in accordance with its terms (iii) Grantor has good and marketable fee simple title to the Property, and (iv) to the best of Grantor's knowledge, there are no liens, covenants, restrictions, rights of way, easements or other encumbrances affecting the Property that could be reasonably expected to prevent, limit or adversely affect the Intended Use.

8.2. Grantor covenants that Grantee shall at all times during the Term peaceably and quietly have, hold and enjoy the Easement Area without hindrance or disturbance of any kind by Grantor or any person claiming by, through or under Grantor.

8.3. Except as disclosed by Grantor to Grantee, to the best of its knowledge, there are no Hazardous Substances that exist in the areas on or near the portion of the Property where Grantee or its subcontractors will undertake to install, operate, maintain, or repair the System.

8.4. In no event shall Grantor cause or permit the Property (i) any structure or facility to be erected within the Easement Area or elsewhere on the Property, or (ii) the growth of foliage, in each case that might be reasonably expected to interfere with or cause or permit any interference with the System, electric lines, ducts, or other apparatus related to the System, or the insolation of the System.

8.5. Grantor at its sole cost and expense shall materially comply with all applicable federal, state and local laws, rules, regulations and ordinances relating to the ownership and occupancy of the Property.

9. Grantee's Representations and Obligations

9.1. Grantee represents and warrants that (i) the execution and delivery by Grantee of this Agreement and the performance by it of its obligations hereunder have been duly and validly authorized by all necessary action on behalf of Grantee, including compliance with all procurement laws, rules and ordinances applicable to Grantee, and (ii) this Agreement has been duly and validly executed and delivered by Grantee and constitutes the legal, valid and binding obligation of Grantor enforceable against it in accordance with its terms

9.2. Grantee at its sole cost and expense, shall materially comply with all applicable federal, state and local laws, rules, regulations and ordinances, including without limitation all environmental and occupational, health and safety requirements relating to Grantee's use or occupancy of the Property and the operation and maintenance of the System.

10. Default; Remedies.

10.1. Grantee Default. In the event Grantee is in default of any of the terms and conditions of this Agreement, and such breach is not cured within thirty (30) days following written notice by Grantor to cure the default (unless by the nature of such default a longer period to cure is required, in which event Grantee shall not be in default if it commences to cure the default within thirty (30) days of receipt of notice from Grantor and diligently proceeds to cure the default thereafter) (hereinafter "**Event of Default by Grantee**"), then so long as such Event of Default of Grantee is continuing, without limitation of Grantor's other rights and remedies at law or equity, Grantor may terminate this Agreement by written notice to Grantee, such termination to be effective on the date set forth in such notice. Upon termination of this Agreement, Grantee shall remove the System in accordance with (including within the time period set forth in) the PPA.

10.2. Grantor Default. A failure by Grantor to perform or comply with any of the terms and conditions of this Agreement may be considered an event of default by Grantor under this Agreement (hereinafter "**Event of Default by Grantor**"). If an Event of Default by Grantor occurs, Grantee shall notify Grantor in writing of such default. Grantor shall have forty-five (45) days following written notice by Grantee to cure the default. If an Event of Default by Grantor has not been cured within such period, Grantee shall have the right to terminate this Agreement in accordance with the terms and conditions contained in the PPA.

11. Indemnification; Limitation of Liability.

11.1. Indemnification. Subject to the limitations herein, and except with respect to environmental claims pursuant to Section 10.2. below, at all times during the Term of this Agreement, the Parties will indemnify each other in the same manner and to the extent as provided in the PPA, which is incorporated herein by reference.

11.2. Environmental Indemnification. Grantee shall indemnify, defend and hold harmless all of Grantor's Indemnified Parties from and against all Indemnity Claims arising out of or relating to the existence at, on, above, below or near the Property of any Hazardous Substance (as defined in the PPA) to the extent deposited, spilled or otherwise caused by Grantee or any of its officers, employees, contractors, subcontractors, or agents. Grantor shall indemnify, defend and hold harmless all of Grantee's Indemnified Parties from and against all Indemnity Claims arising out of or relating to the existence at, on, above, below or near the Property of any Hazardous Substance, except to the extent deposited, spilled or otherwise caused by Grantee or any of its officers, employees, contractors, subcontractors or agents. Each Party shall promptly notify the other Party if it becomes aware of any Hazardous Substance on or about the Property generally or any deposit, spill or release of any Hazardous Substance. Without limitation of the foregoing, if Grantor fails to remediate or remove any Hazardous Substance that it is required to remediate or remove pursuant to the foregoing, then Grantee may suspend construction or operation of the System until such time as Grantor has remediated or removed such Hazardous Substance in accordance with Applicable Laws.

11.3. No Consequential Damages. EXCEPT WITH RESPECT TO PAYMENT OF TERMINATION VALUES, THE DISTRICT SUSPENSION RATE OR IN CONNECTION WITH THIRD-PARTY INDEMNIFICATION CLAIMS, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY SPECIAL, PUNITIVE, EXEMPLARY, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, THIS AGREEMENT OR THE PPA.

11.4. Actual Damages. Grantee's aggregate liability under this Agreement and the PPA arising out of or in connection with the performance or non-performance of this Agreement shall not exceed the amounts provided in Section 17(D) of the PPA. The provisions of this Section 10.3 shall apply whether such liability arises in contract, tort (including negligence), strict liability or otherwise. Any action against Grantee must be brought within one (1) year after the cause of action accrues.

11.5. Waiver of Jury Trial. TO THE EXTENT ENFORCEABLE UNDER APPLICABLE LAW, EACH PARTY HEREBY KNOWINGLY, VOLUNTARILY, AND INTENTIONALLY WAIVES ANY RIGHTS THEY MAY HAVE TO A TRIAL BY JURY, AND INSTEAD AGREE TO A BENCH TRIAL, IN RESPECT OF ANY LITIGATION BASED HEREON, OR ARISING OUT OF, UNDER, OR IN CONNECTION WITH, THIS AGREEMENT OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN), OR ACTIONS OF EITHER PARTY. THIS PROVISION IS A MATERIAL INDUCEMENT FOR GRANTEE TO ENTER INTO THIS AGREEMENT.

12. Insurance. At all times following the Effective Date, the Parties shall maintain the insurance required under the PPA, which requirements are incorporated herein by reference.

13. Defined Terms; Incorporation of Select PPA Terms. Capitalized terms used in this Agreement shall have the meanings ascribed to them herein. Capitalized terms used in this Agreement but not defined herein shall have the meaning ascribed to them in the PPA. Except as

otherwise expressly provided in this Agreement, the terms, provisions, and conditions contained in the PPA that are expressly incorporated in this Agreement (including defined terms) are made a part hereof as if herein set forth at length, Grantor being substituted for “District” under the PPA, Grantee being substituted for “Provider” under the PPA, and this Agreement being substituted for “Agreement” under the PPA. Notwithstanding the foregoing, unless expressly incorporated herein, the terms and provisions of the PPA are not made a part hereof and neither Party shall be hereby bound by or obligated to perform any of its respective obligations under and pursuant to such provisions of the PPA, unless such obligations also independently arise under this Agreement without regard to the existence of the PPA. Notwithstanding any other provision of this Agreement, the terms, provisions, and conditions contained in the PPA that are expressly incorporated in this Agreement (including defined terms) shall survive the expiration or termination of the PPA.

14. **Force Majeure.** If either Party is rendered wholly or partly unable to timely perform its obligations under this Agreement because of a Force Majeure event, that Party shall be excused from the performance affected by the Force Majeure event (but only to the extent so affected) and the time for performing such excused obligations shall be extended as reasonably necessary (but of no greater scope and of no longer duration than is required by the Force Majeure event); provided, the Party affected by such Force Majeure event uses all reasonable efforts to mitigate or remedy its inability to perform as soon as reasonably possible.

15. **Run with the Land.** The burdens and benefits of this Agreement shall run with the land and shall bind and inure to the benefit of the parties hereto, the successors in title of Grantor in and to the Property, and the successors and assigns of Grantee and Grantee’s employees, agents and contractors.

16. **Notices.** Any notice required or permitted to be given hereunder by one party to the other shall be in writing and shall be delivered in the same manner as, and to the same address for the Party to be notified as specified in, Section 22.B. of the PPA, which is incorporated herein by reference.

17. **Amendments; Governing Law; Severability.** This Agreement may not be amended except by written document signed by the then current owner of the Property and Grantee. This Agreement shall be governed and construed in accordance with the laws of the State of California without regard to its conflict of laws principles. Any dispute or proceeding arising under this Agreement shall be resolved as set forth in Section 15 of the PPA and may be joined with any action arising under the PPA having a common set of facts or circumstances, provided that any matter arising hereunder that is required by applicable law to be determined by or adjudicated in a court of law shall be brought in the state or federal courts sitting in the California County in which the Property is located. The illegality, invalidity or unenforceability of any provision of this Agreement shall not affect the legality, validity or enforceability of any other provision of this Agreement. In the event either Party brings an action arising under this Agreement or any provisions contained herein, then the Party that substantially prevails in such action shall be entitled to recover from the non-prevailing Party, in addition to all other remedies or damages as limited herein, reasonable attorneys’ fees and costs of court incurred in such action.

18. **Casualty; Condemnation.**

18.1. In the event that the System is materially damaged or destroyed by casualty of any kind, other than by Grantee's gross negligence or willful misconduct, Grantee may determine whether and to what extent to repair and restore the System and shall notify Grantor of such determination within ninety (90) days following the relevant event. If Grantee determines not to repair or restore the System such that it is not capable of regular, safe and commercially viable operation at the Easement Area, then Grantee's notice to Grantor may include its election to terminate this Agreement as of a date specified in such notice. Following such termination, Grantee shall remove the System as set forth in Section 3 of the PPA.

18.2. If the Property or Grantor's building or facilities thereon are materially damaged or destroyed by casualty of any kind, other than by Grantor's gross negligence or willful misconduct, such that the operation of the System and/or Grantor's ability to accept the electric energy produced by the System are materially impaired or prevented, Grantor shall promptly repair and restore the Property, building or facility, as applicable to its pre-existing condition; provided, however, Grantor may elect not to so repair and restore, in which case Grantor shall pay to Grantee the applicable Termination Value as set forth in the PPA and all other costs previously accrued but unpaid under this Agreement and the PPA, and thereupon terminate this Agreement.

18.3. Upon receipt by either Grantor or Grantee of notice of any proceedings for the taking or condemnation of all or a portion of the Property (a "**Taking**"), the Party receiving such notice shall promptly give notice thereof to the other Party and such other Party may also appear in such proceeding. In the event of a permanent Taking of the fee title to or of control of all or substantially all of the Easement Area, this Agreement shall terminate as of the effective date of such Taking. In the event of a Taking of less than all or substantially all of the Easement Area, Grantee shall reasonably determine, in its sole discretion, whether the continued use and occupancy of the remainder of the Easement Area is or can reasonably be made to be safe, economically viable, structurally sound and otherwise feasible for the Intended Use. In the event of a Taking, Grantor and Grantee shall be entitled to receive and retain such separate awards and portions of lump sum awards as may be allocated to their respective interests in any condemnation proceedings. If the condemning authority does not make separate awards, the award will be allocated on a proportionate value basis. If the Parties are unable to agree as to such proportion, then each Party shall select a recognized and neutral independent appraiser experienced in the appraisal of real estate and solar power facilities who shall determine the allocation. The cost of the appraiser shall be borne equally by the Parties. Nothing herein shall limit the rights of either Party to participate in such condemnation proceedings or seek specific compensation from a condemning authority.

19. **Taxes.** The Parties shall pay all real and personal property taxes as and to the extent set forth in Section 16 of the PPA.

20. **Recordation.** Grantor shall execute and deliver to Grantee a memorandum, substantially in form set forth in Exhibit D, for recordation in the land records of the County Recorder's Office of Los Angeles County, California to evidence the easements granted hereunder within ten (10) days following written request therefor.

21. **Assignment.** The Parties may sell, assign, collaterally assign or otherwise transfer their respective rights under this Agreement to the same extent as and subject to the terms set forth in Section 19 of the PPA.
22. **Financing Party Accommodations.** Grantee may collaterally assign, pledge, mortgage or grant a security interest and/or otherwise encumber its rights, title and/or interest in this Agreement in favor of any financing party to the same extent as and subject to the terms set forth in Section 19 of the PPA. Grantor shall cooperate with Grantee and provide such estoppels, consents and other documents, all to the same extent as and subject to the terms set forth in Section 19 of the PPA.
23. **Subordination and Non-Disturbance.** If Grantor has granted one or more mortgages, deeds of trust or other security instrument (collectively, the “**Mortgages**”, individually, a “**Mortgage**”) that encumber some or all of the Grantor’s Property to certain persons (each such person, a “**Mortgagee**”), then, for each Mortgage, Grantor will obtain from the Mortgagee within thirty (30) days of Grantee’s request, a reasonable and customary subordination and non-disturbance among Grantor, such Mortgagee and Grantee pursuant to which (a) Grantee confirms that this Agreement is subordinated to the Mortgage granted to such Mortgagee and the Grantee will attorn to such Mortgagee in the event that the Mortgagee acquires title to the Property and (b) such Mortgagee shall honor this Agreement, that the Agreement shall remain in full force and effect and shall not be terminated and Grantee shall be permitted to exercise all of its rights and remedies hereunder, including in the event of foreclosure under the Mortgage to which such Mortgagee is a party.
24. **Confidentiality.** Information made available by one Party to the other Party pursuant to this Agreement shall be subject to the provisions of the PPA relating to Confidential Information, incorporated herein by reference.
25. **Non-Waiver.** Unless otherwise expressly provided in this Agreement, no waiver by Grantor or Grantee of any provision hereof shall be deemed to have been made unless expressed in writing and signed by Grantor or Grantee, as the case may be. No delay or omission in the exercise of any right or remedy accruing to Grantor or Grantee, as the case may be, upon any breach under this Agreement shall impair such right or remedy or be construed as a waiver of any such breach theretofore or thereafter occurring. The waiver by Grantor or Grantee of any breach of any term, covenant or condition herein stated shall not be deemed to be a waiver of any other term, covenant or condition.
26. **Captions.** Section titles or captions contained in this Agreement are inserted as a matter of convenience and for reference only, and in no way define, limit, extend or describe the scope of this Agreement.
27. **Exhibits.** All Exhibits attached hereto shall be incorporated herein by reference as if set out herein in full.
28. **Entire Agreement.** This Agreement, together with all exhibits attached hereto or mentioned herein, shall constitute the entire Agreement between the parties and may not be amended, modified or terminated except by a writing signed by the Parties hereto. This Agreement

and the Exhibits hereto wholly supersede any and all oral statements, representations or agreements made by the Parties to this Agreement. This Agreement shall become binding when executed by Grantor and Grantee.

29. **Construction of Agreement.** This Agreement is the product of negotiations between the Parties and shall not be construed as being drafted by one Party as opposed to the other.

30. **Counterparts.** This Agreement may be executed by the parties hereto in separate counterparts, each of which when so executed and delivered shall be an original, but all such counterparts shall together constitute but one and the same instrument.

31. **Further Assurances.** Grantor and Grantee each agree to execute and deliver such other documents and instruments, and to take such other actions, as may commercially reasonably be required and which may be necessary to effectuate the agreements set forth in this Agreement; provided, however, that such additional documents, instruments or actions do not impose upon either Grantor or Grantee any obligations, duties, liabilities or responsibilities which are not expressly provided for in this Agreement.

TO HAVE AND TO HOLD the above-described Easement, together with all and singular, the rights and appurtenances thereto in anywise belonging, unto Grantee, its successors and assigns, forever. Grantor does hereby bind itself, its successors and assigns, to warrant and forever defend, all and singular, the said Easement, subject to all matters now of record affecting the Property, unto Grantee, its successors and assigns, against every person whomsoever lawfully claiming or to claim the same or any part thereof, by, through or under Grantor, but not otherwise.

[Signature pages follow]

Executed to be effective as of the Effective Date.

Grantor:

Palmdale Water District

By: _____

Name: _____

Title: _____

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California)
County of _____)

On _____ before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

My Commission Expires: _____

EXHIBIT A

Legal Description of Real Property

[TO BE INSERTED]

To be provided at contract signature

EXHIBIT C

Form of Memorandum of Easement

Memorandum of Easement

**RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:**

[SPACE ABOVE THIS LINE FOR RECORDER'S USE.]

STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

MEMORANDUM OF SOLAR POWER EASEMENT AGREEMENT

THIS MEMORANDUM OF SOLAR POWER EASEMENT AGREEMENT (this "**Memorandum**") is made and entered into as of [REDACTED], 2022, by and between Palmdale Water District ("Grantor") and East Avenue Q Solar Project 2022, LLC, a Delaware limited liability company, with a place of business at 1 River Road, Schenectady, New York 12345 ("**Grantee**"). Grantor and Grantee are referred to collectively herein as the "**Parties**".

- A. Grantor and Grantee have entered into a Solar Power Easement Agreement dated [REDACTED] (the "**Agreement**") pursuant to which Grantor granted to Grantee an non-exclusive easement for the installation, maintenance, operation, inspection, repair and replacement of certain photovoltaic systems and related cables, electrical lines, ducts, transformers and other equipment, on, over, across and under the "Easement Area" on the real property described in **Schedule A**, which Easement Area is shown in **Schedule B** attached hereto and incorporated herein by reference, together with the right of ingress and egress to and from the Easement Area described in the Agreement.
- B. The term of the Agreement commenced on the date of the Agreement and shall continue until one hundred eighty (180) days following the expiration or earlier termination of the PPA (as defined in the Agreement). The PPA commenced on the date of the Agreement and, unless earlier terminated according to its terms, the PPA shall expire on the date which is twenty-five

(25) years after the Commercial Operation Date (as defined in the PPA) unless extended for up to an additional ten (10) years in accordance with the terms of the PPA.

- C. The Parties have executed this Memorandum, which is to be recorded in order that third parties may have notice of the interests of Grantee in the Easement Area and of the existence of the Agreement and of certain easement rights granted to Grantee in the Easement Area pursuant to the Agreement.
- D. In the event of any conflict between this Memorandum and the Agreement, the Agreement shall govern. This Memorandum does not alter, amend, modify or change the Agreement in any respect and is executed by the Parties hereto solely for the purpose of recordation in the real property records of the counties, districts, boroughs and parishes in which the Easement Area is located to give notice of, and to confirm, the Agreement and all of its terms to the same extent as if all such terms were fully set forth herein. All capitalized terms used in this Agreement but not defined herein shall have the meanings ascribed to such terms in the Agreement. This Memorandum may be executed in multiple counterparts, each of which shall be deemed to be an original and all of which together shall comprise but a single instrument.

[Signature page follows]

IN WITNESS WHEREOF, Grantor and Grantee have executed this Memorandum as of the day and year first above written.

Grantor:

Palmdale Water District

By: _____

Name: _____

Title: _____

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California)
County of _____)

On _____ before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

My Commission Expires: _____

Grantee:

East Avenue Q Solar Project 2022, LLC

By: _____

Name: Erik Schiemann

Title: President

THE STATE OF NEW YORK §
 §
COUNTY OF SCHENECTADY §

This instrument was acknowledged before me on _____, 2022, by Erik Schiemann, President of East Avenue Q Solar Project 2022, LLC, a Delaware limited liability company, on behalf of said limited liability company.

Notary Public, State of _____
Printed Name: _____
My commission expires: _____

Schedule A

To be provided at contract signature

[]

Exhibit J – PVSYST Report

PVsyst - Simulation report

Grid-Connected System

Project: Palmdale Water District - HQ

Variant: TKR_Contract_V1.0_20221128

Tracking system with backtracking

System power: 1761 kWp

V3.6_Palmdale-HQ - United States

Nick Pasco





Project: Palmdale Water District - HQ

Variant: TKR_Contract_V1.0_20221128

PVsyst V7.2.21

VC7, Simulation date:
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with v7.2.21

Distributed Solar Development

Project summary

Geographical Site V3.6_Palmdale-HQ United States	Situation Latitude 34.55 °N Longitude -118.05 °W Altitude 864 m Time zone UTC-8	Project settings Albedo 0.20
Meteo data V3.6_Palmdale-HQ Solar Anywhere, satellite data, SUNY model - TMY		

System summary

Grid-Connected System	Tracking system with backtracking	
PV Field Orientation Orientation Tracking plane, horizontal N-S axis Axis azimuth 0 °	Tracking algorithm Astronomic calculation Backtracking activated	Near Shadings According to strings Electrical effect 100 %
Shadings of thin objects According to strings Electrical effect 10 %	User's needs Unlimited load (grid)	
System information PV Array Nb. of modules 3036 units Pnom total 1761 kWp	Inverters Nb. of units 11 units Pnom total 1650 kWac Pnom ratio 1.067	

Results summary

Produced Energy 4504694 kWh/year	Specific production 2558 kWh/kWp/year	Perf. Ratio PR 86.36 %
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Cover page	1
Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Horizon definition	5
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9
P50 - P90 evaluation	10



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Distributed Solar Development

General parameters

Grid-Connected System

Tracking system with backtracking

PV Field Orientation

Orientation

Tracking plane, horizontal N-S axis
 Axis azimuth 0 °

Tracking algorithm

Astronomic calculation
 Backtracking activated

Backtracking array

Nb. of trackers 38 units

Sizes

Tracker Spacing 8.22 m
 Collector width 2.42 m
 Ground Cov. Ratio (GCR) 29.4 %
 Phi min / max. +/- 52.0 °

Backtracking strategy

Phi limits +/- 72.8 °
 Backtracking pitch 8.22 m
 Backtracking width 2.42 m

Models used

Transposition Perez
 Diffuse Imported
 Circumsolar separate

Horizon

Average Height 1.4 °

Near Shadings

According to strings
 Electrical effect 100 %

Shadings of thin objects

According to strings
 Electrical effect 10 %

Bifacial system

Model 2D Calculation
 unlimited trackers

Bifacial model geometry

Tracker Spacing 8.22 m
 Tracker width 2.42 m
 GCR 29.4 %
 Axis height above ground 1.88 m

Bifacial model definitions

Ground albedo average 0.20
 Bifaciality factor 70 %
 Rear shading factor 7.8 %
 Rear mismatch loss 2.4 %
 Shed transparent fraction 0.0 %

Monthly ground albedo values

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.20

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer Hanwha Q Cells
 Model Q.PEAK DUO XL-G11.3 580/BFG
 (Custom parameters definition)
 Unit Nom. Power 580 Wp
 Number of PV modules 3036 units
 Nominal (STC) 1761 kWp
 Modules 132 Strings x 23 In series

At operating cond. (50°C)

Pmpp 1611 kWp
 U mpp 944 V
 I mpp 1706 A

Inverter

Manufacturer SMA
 Model Sunny Highpower PEAK3 SHP150-US (600Vac)
 (Custom parameters definition)
 Unit Nom. Power 150 kWac
 Number of inverters 11 units
 Total power 1650 kWac
 Operating voltage 855-1500 V
 Pnom ratio (DC:AC) 1.07



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Distributed Solar Development

PV Array Characteristics

Total PV power		Total inverter power	
Nominal (STC)	1761 kWp	Total power	1650 kWac
Total	3036 modules	Number of inverters	11 units
Module area	8318 m ²	Pnom ratio	1.07
Cell area	7673 m ²		

Array losses

Array Soiling Losses

Average loss Fraction 6.4 %

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0.8%	0.8%	2.3%	3.8%	5.3%	6.8%	8.3%	9.8%	11.3%	12.8%	14.3%	0.8%

Thermal Loss factor

Module temperature according to irradiance
 U_c (const) 29.0 W/m²K
 U_v (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 3.0 mΩ
 Loss Fraction 0.5 % at STC

LID - Light Induced Degradation

Loss Fraction 1.0 %

Module Quality Loss

Loss Fraction -0.2 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

IAM loss factor

Incidence effect (IAM): User defined profile

0°	20°	30°	40°	50°	60°	70°	80°	90°
1.000	1.000	1.000	1.000	1.000	1.000	0.950	0.750	0.000

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 600 Vac tri
 Loss Fraction 0.12 % at STC
Inverter: Sunny Highpower PEAK3 SHP150-US (600Vac)
 Wire section (11 Inv.) Alu 11 x 3 x 120 mm²
 Average wires length 10 m

MV line up to Injection

MV Voltage 12.5 kV
 Wires Alu 3 x 70 mm²
 Length 260 m
 Loss Fraction 0.13 % at STC

AC losses in transformers

MV transfo

Grid voltage 12.5 kV
Operating losses at STC
 Nominal power at STC 1731 kVA
 Iron loss (24/24 Connexion) 1.73 kW
 Loss Fraction 0.10 % at STC
 Coils equivalent resistance 3 x 2.08 mΩ
 Loss Fraction 1.00 % at STC



Horizon definition

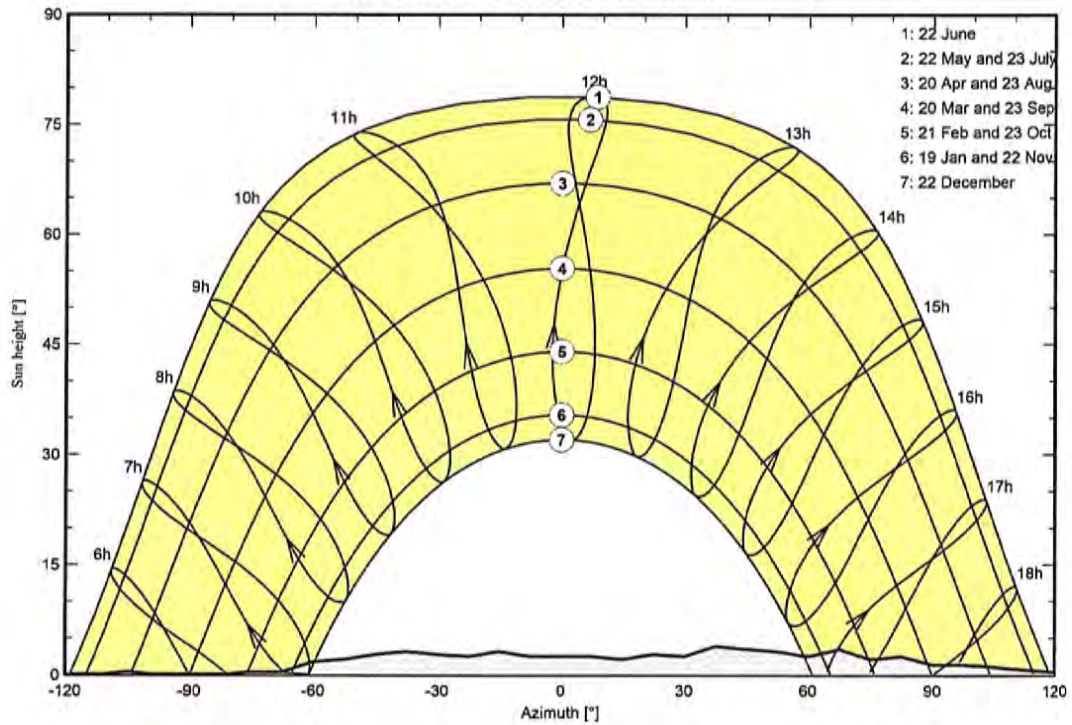
CSV horizon file, lat:34.589129, lng:-118.093894, exported by solargis.info at 2

Average Height	1.4 °	Albedo Factor	0.91
Diffuse Factor	0.98	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-113	-105	-98	-83	-75	-68	-60	-53	-45	-38	-30	-23
Height [°]	0.0	0.0	0.4	0.0	0.0	0.4	0.4	1.8	2.1	2.8	3.2	2.8	2.5
Azimuth [°]	-15	-8	8	15	23	30	38	45	53	60	68	75	83
Height [°]	3.2	2.5	2.5	2.1	2.8	2.5	3.9	3.5	3.2	2.5	3.5	2.1	2.5
Azimuth [°]	90	98	105	113	120	128	135	143	150	158	165	173	
Height [°]	1.4	1.4	1.1	0.7	0.4	0.7	0.7	1.1	0.7	0.4	0.7	0.4	

Sun Paths (Height / Azimuth diagram)



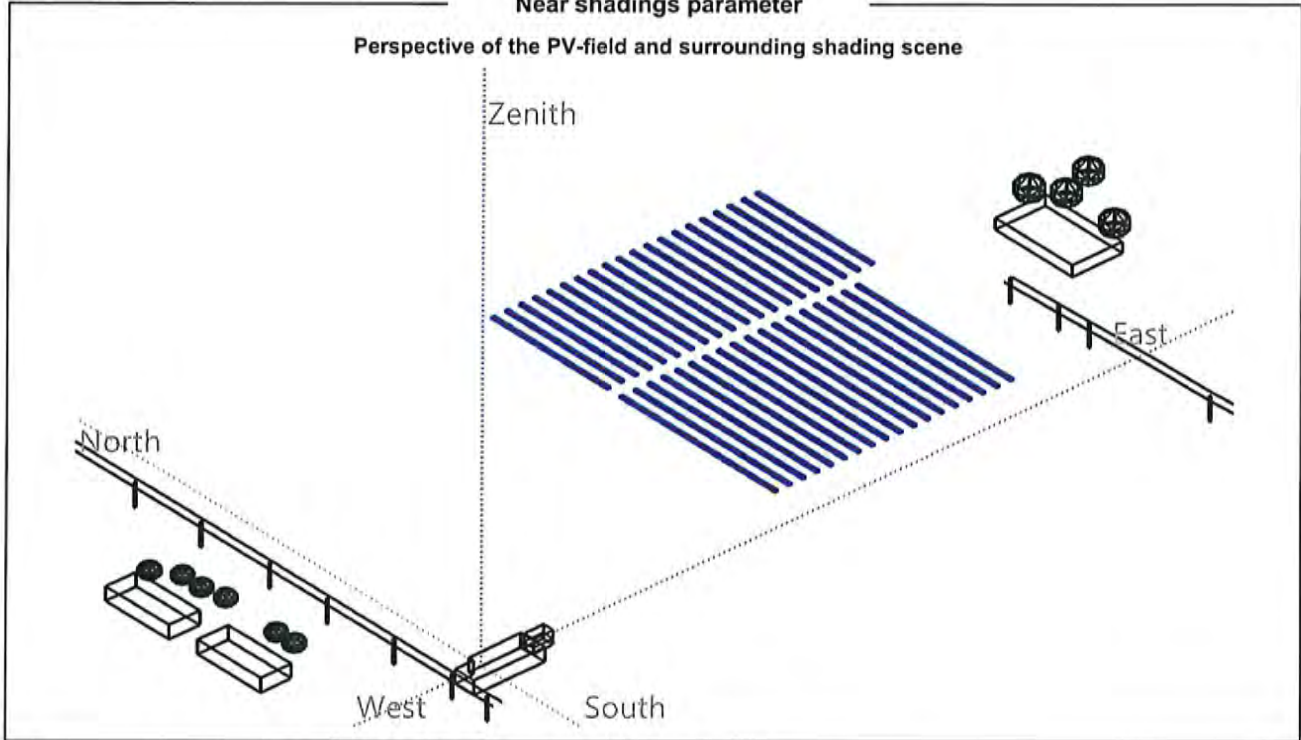


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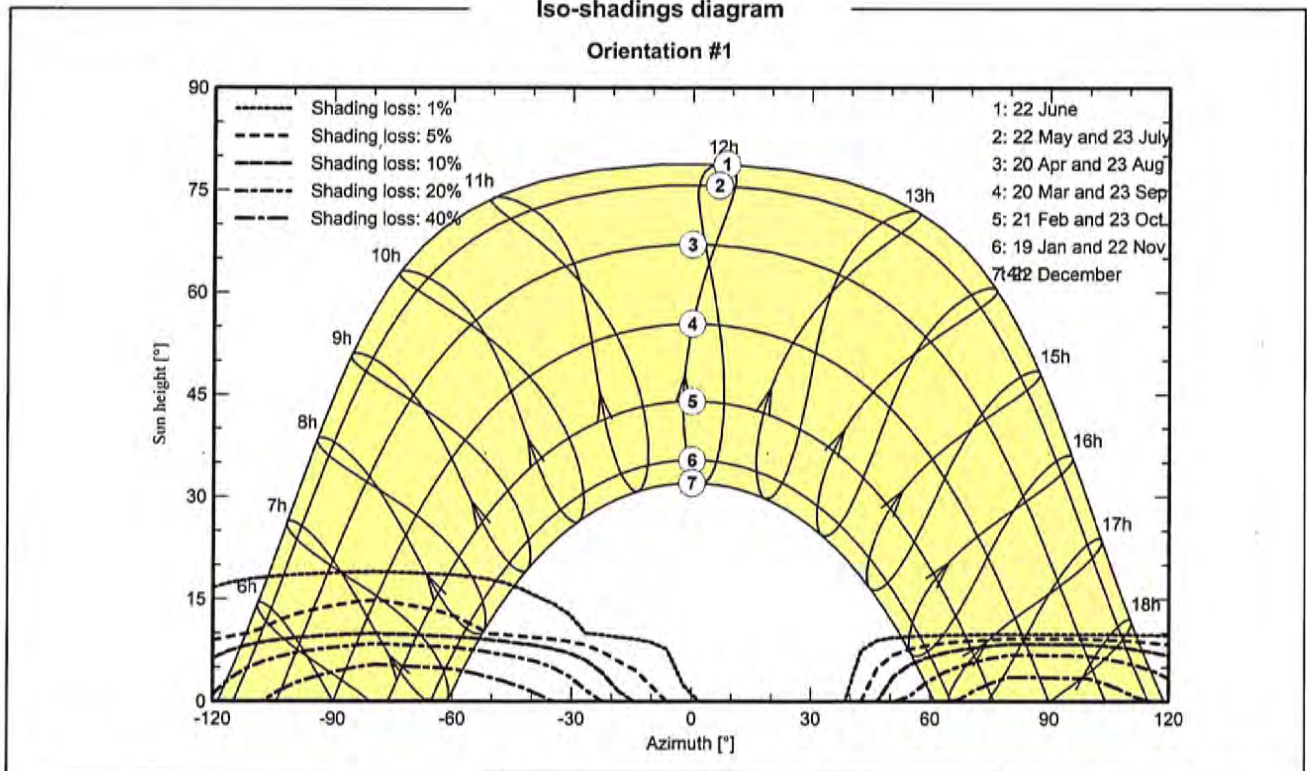
Distributed Solar Development

Near shadings parameter



Iso-shadings diagram

Orientation #1





Project: Palmdale Water District - HQ

Variant: TKR_Contract_V1.0_20221128

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Main results

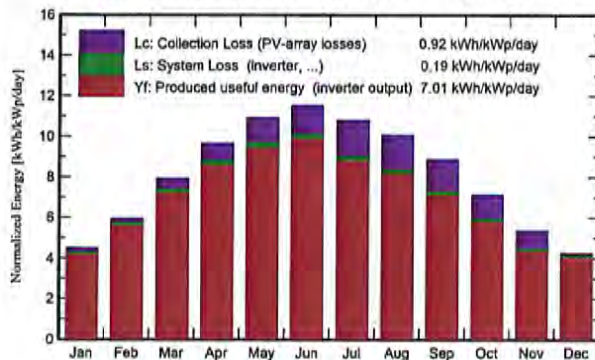
System Production

Produced Energy 4504694 kWh/year

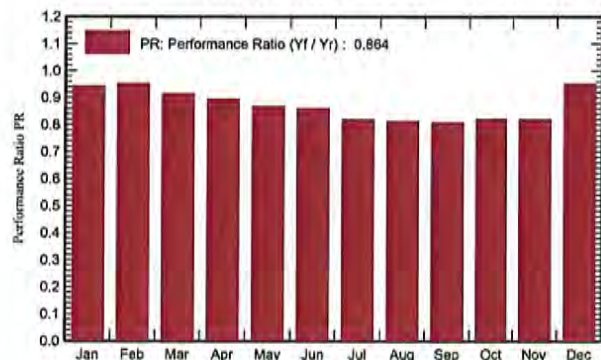
Specific production
Performance Ratio PR

2558 kWh/kWp/year
86.36 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	98.7	29.42	9.90	140.5	136.0	239464	233343	0.943
February	118.8	34.26	7.78	166.8	163.1	287362	279857	0.953
March	178.0	48.36	11.73	246.6	237.2	408351	397420	0.915
April	214.9	55.43	14.49	290.5	276.3	470752	457851	0.895
May	252.0	56.06	17.10	339.1	317.5	533741	519302	0.870
June	258.4	52.26	16.85	346.9	320.0	539778	525406	0.860
July	251.8	53.05	26.04	335.5	304.3	497449	484711	0.821
August	229.1	46.35	24.70	313.0	279.4	460963	448993	0.815
September	189.9	34.19	22.63	267.0	234.2	389967	380114	0.809
October	155.4	32.10	14.94	221.7	190.6	329012	320844	0.822
November	111.3	27.81	12.30	161.9	136.6	239978	233958	0.821
December	91.9	26.63	8.08	132.9	129.1	228830	222892	0.952
Year	2150.4	495.93	15.60	2962.3	2724.3	4625648	4504694	0.864

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

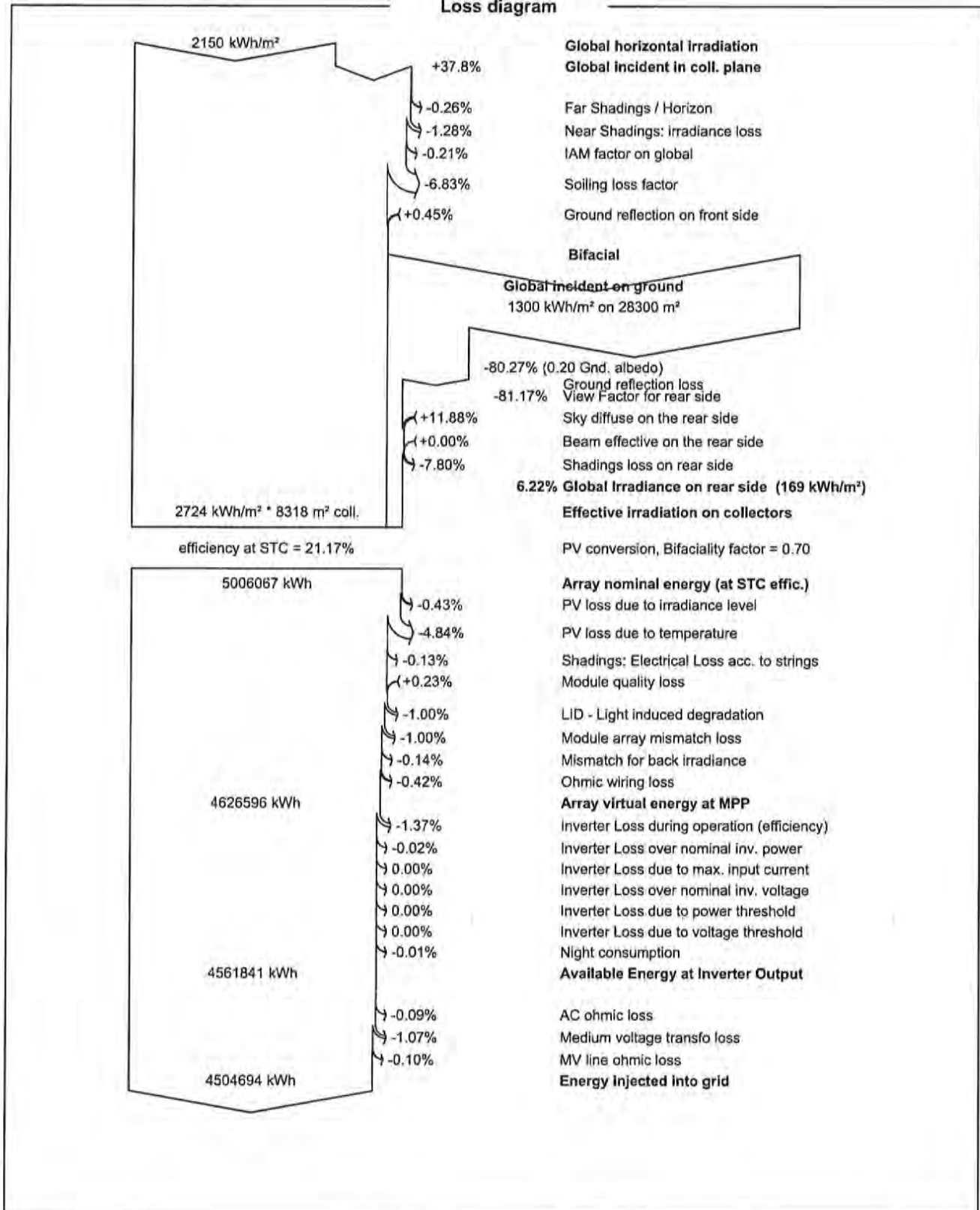


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Loss diagram

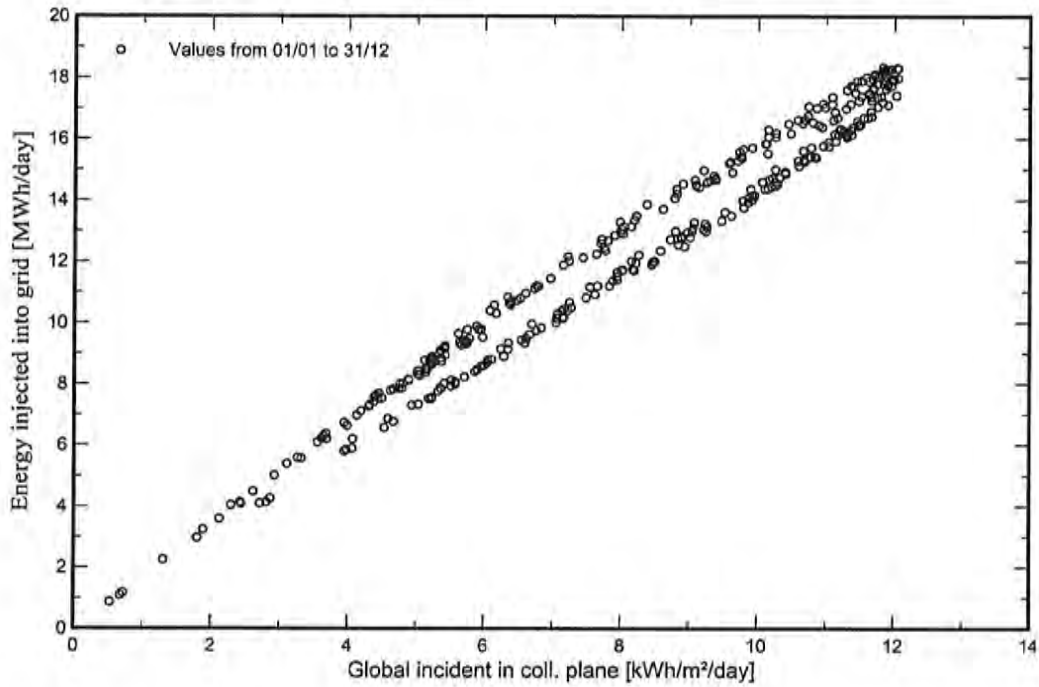




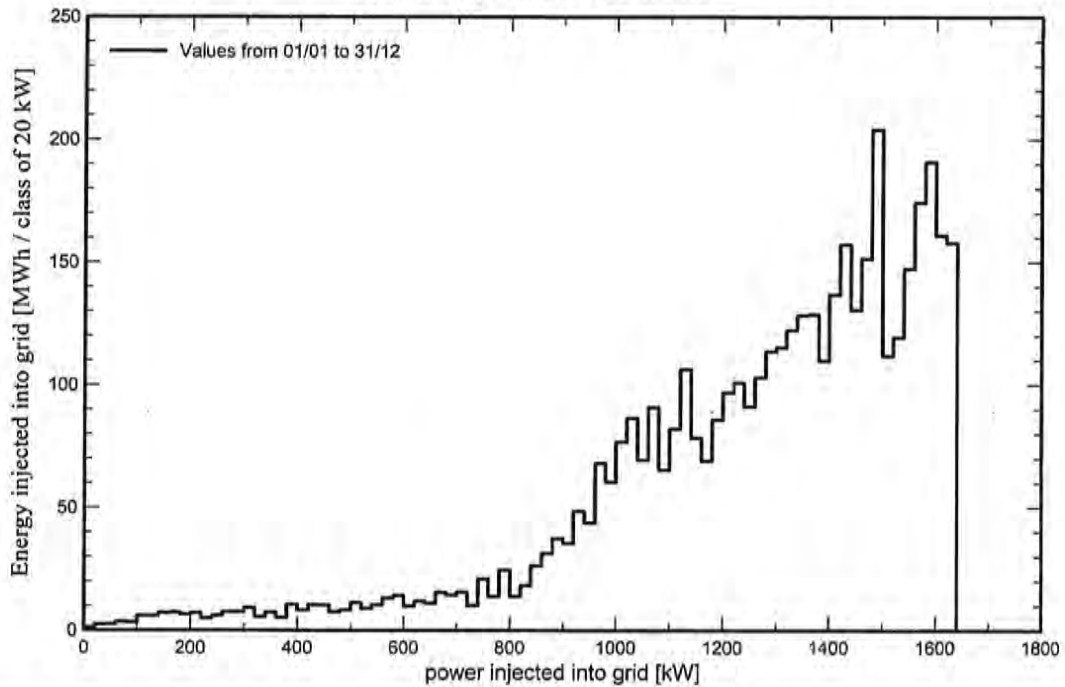
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Special graphs

Daily Input/Output diagram



System Output Power Distribution





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29/11/22 08:58
with v7.2.21

Distributed Solar Development

P50 - P90 evaluation

Meteo data

SourceSolar Anywhere, satellite data, SUNY model
Kind TMY, multi-year
Year-to-year variability(Variance) 2.5 %
Specified Deviation
Climate change 0.0 %

Global variability (meteo + system)

Variability (Quadratic sum) 3.1 %

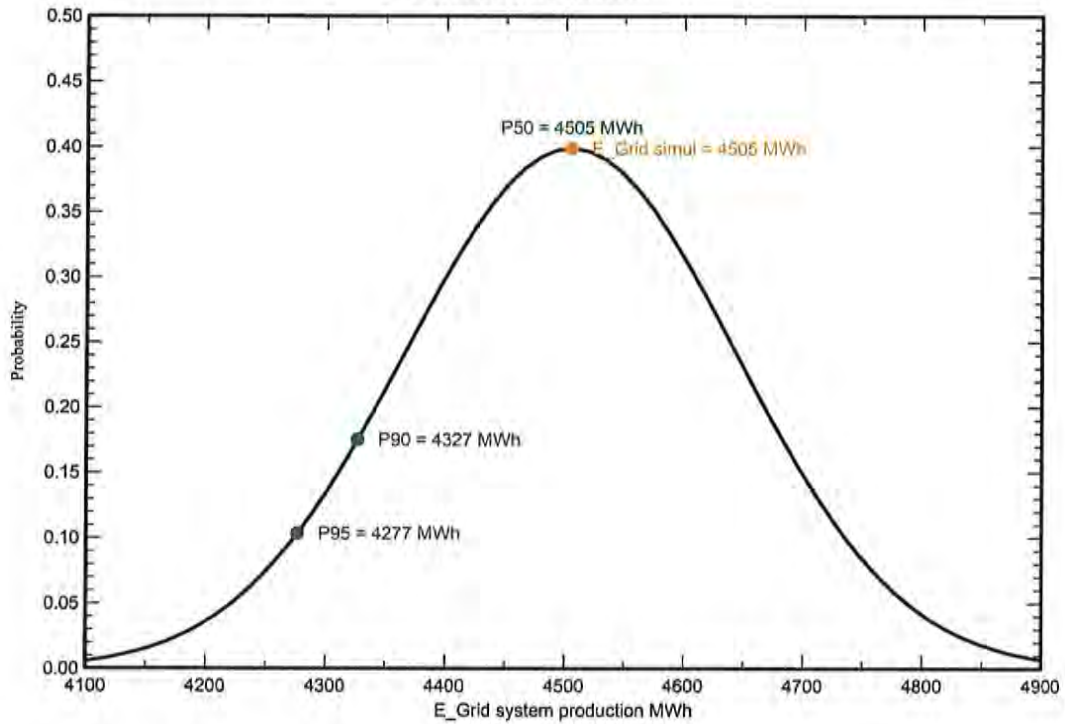
Simulation and parameters uncertainties

PV module modelling/parameters 1.0 %
Inverter efficiency uncertainty 0.5 %
Soiling and mismatch uncertainties 1.0 %
Degradation uncertainty 1.0 %

Annual production probability

Variability 139 MWh
P50 4505 MWh
P90 4327 MWh
P95 4277 MWh

Probability distribution



BOARD OF DIRECTORS
PALMDALE WATER DISTRICT

VIA: Mr. Adam Ly, Assistant General Manager
Mr. Dennis D. LaMoreaux, General Manager

December 6, 2022

Staff prepared a solicitation and collected proposals from vendors that meet the technical specifications for the Membrane Filtration System. The proposals collected provide treatment technology that is required for demonstration testing and regulatory approval. Ultimately, the treatment systems from demonstration testing will be incorporated into the full-scale design.

Staff received three proposals from vendors and plans to preselect a vendor and execute a contract for the design submittal production (Phase 1) and establish a guaranteed price for the equipment, construction, and startup support services (Phase 2). The services contract for Phase 1 will require the Phase 2 price to be a guaranteed not-to-exceed amount with an adjustment factor based on the contract terms and California Construction Cost Index as produced by Engineering News Record. The general construction contract will be brought to the Board for approval.

When the District requests bids for the Demonstration Facility (between June and July 2023), the approved design submittal package from the selected vendor is intended to be included in the general construction contract. At that time, the selected vendor would be required to supply the Phase 2 equipment and services at the guaranteed price under a subcontract or purchase order to the selected contractor that will construct the Demonstration Facility.

The vendor's experience related to the Pure Water AV project has been utilized to evaluate the general competency of the vendor for the equipment needed to meet technical specifications, purchasing costs, and life cycle costs. Wigen Water Technologies is the qualified bidder by meeting the criterion set forth in the solicitation with a price of \$803,022.25.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 3 – Systems Efficiency.
This item directly relates to the District's Mission Statement.

Budget:

This item is budgeted and will be covered as part of Work Order No. 22-653.

Supporting Documents:

- Bid Results Summary
- Proposal Package from Wigen Water Technologies



**AWT Demo Facility
MF System**

Vendor Proposals

FIRM	Biwater	H2O Innovation	Wigen
Contact	Richard White	Shayan Yaghoubi	Michael Bourke
Phone	(909) 599-4129	(619) 884-5834	(303) 884-0694
Email	richard.white@biwater.com	shayan.yaghoubi@h2oinnovation.com	michael.bourke@wigen.com
Criteria	Value	Value	Value
Meets the Design Criteria (Y/N)	No	No	Yes
Phase 1 Schedule (weeks)	(missing from proposal)	8	10
Phase 2 Schedule (weeks)	14 to 16	25 to 26	28
Warranty Provisions (months)	12-months from start-up 18-months from shipment 5-year pro-rated UF membrane warranty	12-months from start-up 18-months from shipment 5-year pro-rated UF membrane warranty	12-months from start-up 18-months from shipment 5-year pro-rated UF membrane warranty
Required Skid Dimensions (L x W x H)	11' x 7' x 13' (membrane skid) 7' x 7' x 8' (ancillary skid)	11' x 7' x 13' (membrane skid) 7' x 7' x 8' (ancillary skid)	11' x 7' x 13' (membrane skid) 7' x 7' x 8' (ancillary skid)
Proposed Skid Dimensions (L x W x H)	15' x 7' x 12' (two independent membrane/CIP skids) ¹ "unknown dimensions" (single ancillary skid for compressor)	20' x 6' x 10' (two independent membrane skids) ¹ 6' 6" x 2' 2" x 5' (ancillary skid for compressor w/ receiver tank) 2' 8" x 4' 7" x 2' (chemical dosing skid) ²	12' x 7' x 10' (single combined membrane skid) 8' 4" x 6' x 6' 2" (ancillary skid) ¹
Base Fee Proposal	\$837,750.13	\$802,561.00	\$862,122.25
Value Engineering (VE) Options Cost Savings	(see notes below)	(see notes below)	(\$59,100.00)
Potential Cost Adders	\$30,000.00	\$92,352.00	(see notes below)
Total Fee Proposal with VE Savings	\$867,750.13	\$894,913.00	\$803,022.25
Recommended Proposal Ranking	2	3	1
	Notable Exceptions/Clarifications	Notable Exceptions/Clarifications	Notable Exceptions/Clarifications
	<ol style="list-style-type: none"> Proposed membrane skid footprint does not comply with specifications. Proposing two independent membrane/CIP skids at the indicated dimensions. This will require expanding the building footprint. CIP is shared between the two UF trains. Separate control systems proposed for each UF train. Proposing single combined master PLC control system for selection of both MF and RO proposals. Where only one unit process is selected, add \$30,000 per Biwater clarification email. Proposal indicates HCl for MF CIP per recommendation from membrane supplier (DuPont). HCl will not be considered for this project. Biwater indicates a deduct of \$10,000 can be applied for eliminating the HCl in lieu of citric acid. This was deducted from the base fee proposal above. Proposal includes metering pumps that are different from those listed in the Contract Documents. Peristaltic pumps may increase the cost. Proposal is missing redundant chemical dosing pumps per Section 46 30 01.2.1.E. Biwater notes a dedicated CIP pump is provided for each MF skid. These can be used to dose chemical to either skid, thus providing redundancy; Biwater notes if 100% redundancy is required, a \$5,000 adder must be applied to the proposal fee. Bid deduction for single supplier of MF and RO systems (\$5,000 for engineering and \$20,000 for equipment). 	<ol style="list-style-type: none"> Proposed membrane skid footprint does not comply with specifications. Proposing two independent membrane skids at the indicated dimensions. This will require expanding the building footprint. Total of six (6) chemical dosing skids at the proposed dimensions. Proposal includes tankless CIP design. The design is based on a traditional CIP system. Price Adder to provide standalone CIP skid: \$92,352. Non-disclosed cost impact for immersion heater over proposed inline heater. The proposal indicates an ORP analyzer will be used instead of the specified chlorine analyzers for measurement of chloramines. Chlorine analyzers are required. Proposal includes metering pumps that are different from those listed in the Contract Documents. H2O noted the decision to use the DDA style pumps was cost driven. Peristaltic pumps can be provided at a cost adder of ~\$2,500 per pump. Proposal is based on the use of Bray valves and double acting pneumatic actuators. Exception taken to the requirements of Section 40 91 00. H2O noted the proposal defaulted to standard controls approach as a cost driven decision due to such a small scope. Scope of work listed can be provided but will increase the cost. Bid deduction for single supplier of MF/RO systems (\$38,700 for engineering and \$21,800 for equipment). 	<ol style="list-style-type: none"> Wigen noted the skid length could be reduced to 7' if the compressor is removed and located elsewhere. Value Engineering Options proposed (total above captures only the accepted options below): <ul style="list-style-type: none"> -\$35,100.00 for use of Bray valves and actuators (accept offer)(needs further negotiation as additional savings were identified by Wigen) -\$14,400.00 for combined UF AND RO PLC controls (reject offer where RO system is not selected) -\$79,800.00 for shared UF AND RO CIP system (reject offer where RO system is not selected) -\$24,000.00 for Wigen chlorine and ammonia skid (accept offer) Proposal includes metering pumps that are different from those listed in the Contract Documents. The Contract Documents require peristaltic pumps for all chemicals with the exception of stepping motor diaphragm or gear pumps for sulfuric acid. Wigen noted DDA pumps are preferred for chemical transfer for CIP as accuracy is not as sensitive. Wigen noted peristaltic pumps can be provided but this may increase the cost (DDA pumps cost considerably less than the specified pump suppliers). Proposal is missing redundant chemical dosing pumps per Section 46 30 01.2.1.E. Wigen noted redundant pumps can be provided. Proposing to build chemical pump skids in-house as this will eliminate potential for cost increase.





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PURE WATER AV – DEMONSTRATION FACILITY MEMBRANE FILTRATION AND REVERSE OSMOSIS SYSTEM PALMDALE WATER DISTRICT

Submitted by:

Michael Bourke
VP Business Development
(303) 350-3086
michael.bourke@wigen.com

Bid Date:

November 4, 2022

Represented by:

Tarn Victor
JBI Water
(949) 302-6622
tarnvictor@jbiwater.com

Issue Date:

November 4, 2022

Proposal No:

102022-200A



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3.0 SCOPE OF SUPPLY	6
4.0 WARRANTIES	18

ATTACHMENTS:

1. Exceptions to Terms and Conditions
2. Similar System GA Drawings
3. RO System Projections



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1.0 INTRODUCTION



Wigen Water Technologies (Wigen) is pleased to provide this proposal to supply the Ultrafiltration and Reverse Osmosis Systems for the Pure Water AV- Demonstration Facility.

Wigen has extensive experience in building Micro/Ultrafiltration and Reverse Osmosis systems of a similar size as is required for this project.

The following proposal describes in detail our technical scope of supply.

Representative layout drawings of similar sized UF and RO systems are included in Attachment 2. The RO system can fit within the specified dimensions. The UF skid will be no more than 12" longer than the specified 11ft but it may be possible to shorten this skid further when it is drawn up. The UF ancillary skid can meet the 7x7 ft footprint if the compressor and air receiver is not on this skid. With the compressor and air receiver on this skid it will be around 8.5 ft long.

A number of value engineering suggestions totaling \$226,000.00 are provided in Section 3.0, page 16.

There were not specific details in Section 01 75 00 as to what the 12-Month Initial plant operations support entails. The support included in the bid pricing includes remote support and a monthly report on plant performance from downloading the data remotely, assuming remote access is available and one additional in-person service trip during the first year of operation.

If you have any questions on this proposal, please do not hesitate to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Michael Bourke".

Michael Bourke
VP Business Development
Tel: 303-350-3085

2.0 DESIGN BASIS

Table 1: Design Basis: Membrane Filtration System

Parameter	Value
Number of UF Trains	2
Modules per Train	8
Membrane Modules Supplied	Toray HFU-2020N (775 ft ²) Scinor SMT600-P72 (775 ft ²)
Temperature for Design Flux	19.2 to 27.5 deg C
UF System Recovery	> 95%
Instantaneous Maximum Feed Flow per Train	113 GPM
Design Instantaneous Filtration Flux Rate per Train	30 GFD – basis for number of module spaces (can also operate at 35 and 40 gfd)
Average Net Filtrate Production Flow per Train	100 GPM
Minimum CIP Cleaning Interval	30 days
Minimum Mini-CIP Chlorine Cleaning Interval	24 hours
Maximum Design TMP during Filtration	25 psi
Filtered Water Turbidity	< 0.10 for 95% of the time < 0.15 NTU 100% of the time

Table 2: Design Basis: Reverse Osmosis System

Parameter	Value
Number of Trains	1
Feed Flow	180 gpm
Average Flux	11.7 gfd
Stage 1 and 2 Permeate Flow	137.1 gpm
Stage 2 Concentrate Flow	42.9 gpm
Stage 1 and 2 Recovery	70-80%
Stage 3 Recovery	50-80%
Stage 1 and 2 Array	4:2, 7L, 8" elements
Stage 3 Array	1, 7L, 4" elements
Portion of Stage 2 Concentrate Flow to Break Tank	27.9 – 35.7 gpm
Portion of Stage 2 Concentrate Flow to Stage 3	7.2 – 15 gpm

2.0 DESIGN BASIS

Table 3: MFS Feed Water Quality

Parameter	Units	Design Value	Target Range
Turbidity	NTU	0.9	0.5 to 1.8
Total Suspended Solids	mg/L	Not available	Not Available
Chloramines	mg/L as Cl ₂	3.0	1.0 to 5.0
pH	Standard	7.1	6.8 to 7.4
Iron	µg/L	40.0	Up to 50.0
Manganese	µg/L	20.7	Not Available
Total Organic Carbon	mg/L	6.1	5.4 to 6.9

RO Feed Water Quality

As per table in Section 46 63 23 Part 1.1.F.1.



3.0 SCOPE OF SUPPLY

SECTION 46 61 33 – MEMBRANE FILTRATION SYSTEM

Membrane Filtration Skid (2 Trains on Single Skid)

Feed Pumps	
Quantity	(1) per Train, (2) Total
Manufacturer/Model	Goulds
Type/ Performance	Centrifugal / 125 GPM @ 30 PSI Boost
Materials of Construction	316 SS housing and impeller
Motor	7.5 HP, 3600 RPM, 480 V, premium efficiency, TEFC
VFDs	Allen Bradley Powerflex 400, Mounted in NEMA 1 carbon steel panel, supplied loose for contractor installation in MCC.
Automatic-Strainer	
Quantity	(1) per Train, (2) Total
Manufacture/Model	Forsta C3-90
Screen Size	300 Mesh
Design Flow Rate	120 gpm Max each
Cleaning Initiation	By differential pressure across filter.
Membrane Elements	
Membrane Quantity	(8) per train (16 total)
Manufacturer/Model	Toray HFU-2020AN – 775 ft2 per module Scinor SMT600-P72 – 775 ft2 per module
Membrane Pore Size	Toray HFU-2020AN - 0.01 microns Scinor SMT600-P72 – 0.1 microns
Membrane Materials	PVDF
Type	Hollow fiber, outside-in
Membrane Module Warranty	A Two-Year Full Membrane Module Warranty and Three Year Pro-Rated Membrane Module Warranty will be provided (5 year total warranty).
Piping Materials	
Main Inlet Piping	Schedule 80 PVC
Piping to each UF Module	Schedule 80 PVC
CIP Feed and Return	Schedule 80 PVC
Process Control Valves	
Quantity	(13) per train
Manufacturer/Model	Bray, 31 Series – Dezurik BHP butterfly valves
Materials of Construction	Stainless steel with Teflon seat
Actuator	Jamesbury VPL Series
Flow Meters	
Quantity	(3) Feed per train, Backwash
Manufacturer/Model	E&H W400
Size/Type	3.0" FNPT, Mag Meter, 4-20 mA signal output to PLC



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3.0 SCOPE OF SUPPLY

Membrane Filtration Skid Cont'd.

Turbidity Meters	
Quantity	(3) Feed, Filtrate per rack
Manufacturer/Model	HACH, 5300sc Low Range Turbidimeter, with Flow Meter, EPA Version
Type	With (1) two channel sc4500 controller, Panel Mounted
Pressure Transmitters	
Quantity	(4)
Manufacturer/Model	Ashcroft G-series
Size/Type	0.5" MNPT, 0 to 100 psi, pressure indicating
Main Inlet Temperature Transmitter	
Quantity	(1)
Manufacturer/Model	Rosemount 3144PD
Size/Type	0.25" MNPT, temperature indicating
Air Scour Flow Meter	
Quantity	(1) Air Scour Flow to UF Skid
Manufacturer	IFM Efactor, SD, 0.5", 0 to 42 CFM
Backwash Pump	
Quantity	(1)
Manufacturer/Model	Goulds
Type/ Performance	Centrifugal / 125 GPM @ 30 PSI Boost
Materials of Construction	316 SS housing and impeller
Motor	5 HP, 3600 RPM, 480 V, premium efficiency, TEFC
VFD	Allen Bradley Powerflex 400 located in NEMA 1 Enclosure, loose to be installed ICC.
Control Panel	
Processor (PLC)	(1) Allen-Bradley – CompactLogix Processor
Operator Interface (OIT)	(1) Allen-Bradley - Panel View Plus 10" Color Touchscreen HMI
Enclosures	Hoffman Concept - NEMA 4X 304 Stainless Steel
Container Conduit	Liquid-Tight flexible metal or PVC rigid conduit
Location	
Internet Capabilities	Ewon Internet Compatible switch supplied for remote access and troubleshooting.
UF Skid	
Skid	<p>Powder coated Carbon Steel Skid.</p> <p>Approximate dimensions (W x L x H): 84" x 144" x 120".</p> <p>Note: The length may be able to be reduced to 11ft but this cannot be confirmed until the skid is drawn up.</p>

Master Cor

3.0 SCOPE OF SUPPLY

Membrane Filtration Ancillary Skid

CIP / Neutralization Tank	
Quantity	(1)
Manufacturer/Model	Poly Tanks, 500 Gallon
Type	Cone Bottom with painted carbon steel stand
Materials of Construction	HDPE
Level Transmitter and Switch	IFM Efector, PX
CIP Tank Heater	
Quantity	(1)
Manufacturer/Model	Chromalox, in Stainless housing in CIP Piping
Size/Type	12 KW, insertion, With Internal Thermostat
Starter	Installed in Panel on skid.
CIP pH Meter	
Quantity	(1) on CIP Pump Discharge
Manufacturer	Hach DPD191.1
Size/Type	0.75" Process Connection,
CIP Chlorine Analyzer	
Quantity	(1)
Manufacturer	Hach CL17
CIP Pump	
Quantity	(1)
Manufacturer/Model	Goulds 3196
Type/Performance	Centrifugal / 105 GPM @ 30 PSI Boost
Materials of Construction	SS Impeller and housing
Air Compressor	
Quantity	(1)
Manufacturer/Model	Gardener Denver L04
Size/Type	Rotary Screw 5HP
Ancillary Skid	
Skid	Powder coated Carbon Steel Skid. Approximate dimensions (W x L): 72" x 100" Note: The skid length could be reduced to 84" if the compressor is removed and located elsewhere.

3.0 SCOPE OF SUPPLY

MF Chemical Dosing Systems

CIP/Maintenance Clean Chemical Injection Systems

Quantity	(4) – Sodium Hypochlorite, Sodium Hydroxide, Citric Acid and Sodium Bisulfite
Manufacturer	Yamada
Type/Performance	Air Diaphragm, up to 2 GPM
Materials of Construction	PP/PTFE Backed Viton
Accessories provided assembled on a shelf.	CPVC / PTFE Pressure relief, Pressure regulating, Check and Isolation / Calibration Ball valves for each pump.
Shelf/Skid	Each Pump to be mounted on shelf/skid which would be located above chemical day tank

Chloramine, Sulfuric Acid and Antiscalent Dosing System

Quantity	(2 – 1 for each chemical) – For Sodium Hypochlorite and Ammonium Sulfate
Manufacturer	Prominent
Model (Antiscalent, Ammonia & sulfuric)	GammaXL
Model (Ammonium Sulfate)	Dulcoflex Peristaltic
Materials of Construction	PVDF liquid end / EPDM Seals
Accessories provided assembled on a shelf.	(1) set of PVC / EPDM or Viton Pressure relief, Pressure regulating, Check and Isolation / Calibration Ball valves per pump.
Shelf/Skids	To be mounted on shelf which would be located above chemical totes. One shelf/skid per chemical.
Notes	Injection quills and static mixers provided loose.

Supplied By Others

- MF Feed Tank
- RO Feed Tank (and backwash water supply tank)
- All Chemical Storage Tanks
- Loading of membrane modules under supervision of Wigen Technician.
- Monochloramine Analyzer

3.0 SCOPE OF SUPPLY

SECTION 46 63 23 – CONVENTIONAL REVERSE OSMOSIS SYSTEM

RO Transfer Pump

Transfer Pump (Loose)	
Quantity	(1)
Manufacturer/Model	Goulds, 3196
Type/ Performance	Centrifugal / 200 GPM @ 30 PSI Boost
Materials of Construction	316 SS housing and impeller
Motor	7.5HP, 3600 RPM, 480 V, premium efficiency, TEFC
Starter	By others

RO Vessel Skid

Cartridge Filter	
Quantity	(1)
Manufacture/Model	Filtrek S6GL14
Housing Construction	316L Stainless Steel, Rated for Minimum 100 psi Working Pressure, ASME Stamp
Cartridge Quantity	(42) 2.5" Dia x 40" Length
Cartridge Construction	Single Open End, Spun Polypropylene, 5 Micron
Differential Pressure Indicator	Ashcroft 1128 Differential Pressure Gauge

Feed Pump	
Quantity	(1)
Manufacturer/Model	Goulds
Type/ Performance	Centrifugal / 120 GPM @ 30 PSI Boost
Materials of Construction	316 SS housing and impeller
Motor	5 HP, 3600 RPM, 480 V, premium efficiency, TEFC
VFDs	Allen Bradley Powerflex 400, Mounted in NEMA 1 carbon steel panel, supplied loose for contractor installation in MCC.

Interstage Boost Pump (on third stage feed)	
Quantity	(1)
Manufacturer/Model	Goulds
Type/ Performance	Centrifugal / 15 GPM @ 75 PSI Boost
Materials of Construction	Duplex housing and impeller
Motor	10HP, 3600 RPM, 480 V, premium efficiency, TEFC
VFDs	Allen Bradley Powerflex 400, Mounted in NEMA 1 carbon steel panel, supplied loose for contractor installation in MCC.

3.0 SCOPE OF SUPPLY

RO Vessel Skid Cont'd

Membrane Elements	
Membrane Quantity	42 x 8" (stages 1 and 2), 7 x 4" (stage 3)
Manufacturer/Model	Toray TMG20-400
Type	Polyamide, Thin Film Composite
Membrane Pressure Vessels	
Vessel Quantity	6 x 8" dia. and 1 x 4" dia. (each 7 elements long) plus Canary Vessel as Specified.
Manufacturer/Model	Protec Model PRO-8-300-MSP-7, ASME Code, 7 Long 8" and Protec Model PRO-4-300-MSP-7, ASME Code, 7 Long 4"
Vessel Construction	FRP, 300 psi
Valves	
RO Inlet from Pressure Pump	One (1) 4" Dezurik BHP w/ Rotork Electric Actuator
RO Flush Inlet	One (1) 4" Dezurik BHP w/ Rotork Electric Acuator
CIP Inlet	One (1) 4" Dezurik BHP w/ Lever
1 st Stage Feed Isolation	One (1) 4" Dezurik BHP w/ Lever
1 st Stage Cleaning Feed/Return Isolation	One (1) 4" Dezurik BHP w/ Lever
1 st Stage Concentrate Isolation	One (1) 4" Dezurik BHP w/ Lever
2 nd Stage Feed Isolation	One (1) 4" Dezurik BHP w/ Lever
2 nd Stage Cleaning Feed/Return Isolation	One (1) 3" Dezurik BHP w/ Lever
2 nd Stage Concentrate Isolation	One (1) 3" Dezurik BHP w/ Lever
3 rd Stage Feed Isolation	One (1) 2" Dezurik BHP w/ Lever
3 rd Stage Cleaning Feed/Return Isolation	One (1) 2" Dezurik BHP w/ Lever
Combined Permeate	One (1) 4" Dezurik BHP w/ Lever
Combined Concentrate	One (1) 4" Dezurik BHP w/ Lever
Concentrate Control Valve	One (1) 4" Globe Valve with Rotork Modulating Electric Actuator
Concentrate Flush Valve	One (1) 4" Dezurik BHP w/ Rotork Electric Actuator
Combined Concentrate Check Valve	Two (1) 3" 316SS
Permeate Check Valves	One (1) 4" 316SS
Sampling Panel/Trough	Feed, Housing Permeate, 1 st , 2 nd , & 3 rd stage Permeate, Total Permeate – ¼" PVC Labcock Valves w/1/4" tubing Interstage 1 & 2 and Concentrate – ¼" SS Plug valves w/tubing SS Sample Trough.
Pressure Relief Valve	Two (2) 4"
Pressure Vessel Permeate	One (1) per pressure vessel – 1/4" PVC ball valves

3.0 SCOPE OF SUPPLY

RO System Instruments (Arranged on Panel)

Feed pH Meter	
Quantity	(1)
Manufacturer/Model	Hach DPD191.1
RO System Feed Conductivity/Temperature Meter	
Quantity	(2)
Manufacturer/Model	Rosemount 400VP; (1) 0.50 Cell, (1) 0.05 Cell
Feed ORP Meter	
Quantity	(1)
Manufacturer/Model	Hach DRD1P5.1
Permeate Conductivity Meters	
Quantity	(3) – 1 st , 2 nd , 3 rd Stage Permeate
Manufacturer/Model	Rosemount 400VP; 0.05 Cell
Concentrate Conductivity Meters	
Quantity	(3) – 1 st , 2 nd , 3 rd Stage Concentrate
Manufacturer/Model	Rosemount 400VP; 0.50 Cell
First Stage Permeate Flow Meter	
Quantity	(1) Per RO Train
Manufacturer/Model	4" E&H W400
Second Stage Permeate Flow Meter	
Quantity	(1) Per RO Train
Manufacturer/Model	2" E&H W400
Third Stage Permeate Flow Meter	
Quantity	(1) Per RO Train
Manufacturer/Model	2" E&H W400
Final Concentrate Flow Meter	
Quantity	(1) Per RO Train
Manufacturer/Model	2" E&H W400

3.0 SCOPE OF SUPPLY

RO System Instruments Cont'd

RO System Combined Concentrate Flow Meter	
Quantity	(1)
Manufacturer/Model	3" E&H W400
Pressure Transmitters	
Quantity	(6)
Manufacturer/Model	Rosemount 3051
Pressure Gauges	
Quantity	(1)
Manufacturer/Model	Ashcroft 1279 Duragauge
Pressure Switches	
Quantity	(2)
Manufacturer/Model	Ashcroft G-Series NEMA 4
Combined RO System Conductivity/Temperature Meter	
Quantity	(1) –Combined Permeate
Manufacturer/Model	Rosemount 400VP; (1) 0.50 Cell, (1) 0.05 Cell
Piping Materials	
RO Skid Inlet	Schedule 80 PVC
RO Skid High Pressure	Schedule 10S 316L Stainless Steel
RO Skid Permeate	Schedule 80 PVC
RO Skid CIP	Schedule 80 PVC
RO Skid Concentrate	Duplex Stainless Steel from header to concentrate control valve Schedule 80 PVC after concentrate control valve
Feed Manifolds	Schedule 10 316L Stainless Steel
Concentrate Manifolds	Duplex Stainless Steel
RO Skid	
Skid Quantity	(1)
Construction	Powder coated carbon steel per specifications.
Dimensions (W x L x H)	60"x316"x84" (Approx. Overall Dimensions).
Control Panel (Mounted on RO skid)	
Processor (PLC)	(1) Allen-Bradley – CompactLogix Processor
Operator Interface (OIT)	(1) Allen-Bradley - Panel View Plus 10" Color Touchscreen HMI
Enclosures	Hoffman Concept - NEMA 4X 304 Stainless Steel
Container Conduit	Liquid-Tight flexible metal or PVC rigid conduit
Location	Master Control Panel to be mounted on Skid
Internet Capabilities	Ewon Internet Compatible switch supplied for remote access and troubleshooting.

3.0 SCOPE OF SUPPLY

CIP Skid

CIP	
Quantity	(1)
Manufacturer/Model	Goulds,
Type/ Performance	Centrifugal, 200 GPM @ 65 PSI
Materials of Construction	316 SS housing and impeller
Motor	20 HP, 3600 RPM, 460 V, premium efficiency, TEFC
VFD/Starter	Provided by Others
CIP Tank Heater	
Quantity	(1) <i>to be installed by others</i>
Manufacturer/Model	Chromalox
Size/Type	20 KW, insertion, 6.0" flanged connection, with local control panel, wired to PLC by others.
CIP Tank	
Quantity	(1)
Manufacturer/Model	Norwesco, 1000 Gallon
Type	Cone Bottom with painted carbon steel stand
Materials of Construction	HDPE
Level Transmitter	Rosemount 3051
CIP Cartridge Filter	
Housing Quantity	(1)
Manufacturer	Filtrek, 17-Round
Housing Construction	316L Stainless Steel, Rated for Minimum 100 psi Working Pressure, ASME Stamp
Cartridge Quantity	(17) 2.5" Dia x 40" Length
Cartridge Construction	Single Open End, Spun Polypropylene, 5 Micron
Differential Pressure Indicator	Ashcroft 1128 Differential Pressure Gauge
CIP pH Meter	
Quantity	(1) on CIP Pump Discharge
Manufacturer	Hach
Size/Type	0.75" Process Connection,
CIP ORP Meter	
Quantity	(1) on CIP Pump Discharge
Manufacturer	Hach
Size/Type	0.75" Process Connection,
Controls	
Remote I/O Panel	(1) Allen-Bradley CompactLogix Remote I/O

3.0 SCOPE OF SUPPLY

Chemical Metering Systems

Antiscalant and Sulfuric Acid Dosing Systems

Quantity	(2) – For Antiscalant and Sulfuric Acid
Manufacturer	Prominent GammXL
Materials of Construction	EPDM Seals/PVDF Liquid end
Accessories provided assembled on a shelf.	(1) set of PVC / EPDM or Viton Pressure relief, Pressure regulating, Check and Isolation / Calibration Ball valves per pump.
Shelf/Skids	To be mounted on shelves or skids which would be located above chemical totes. One shelf/skid per chemical.
Notes	Injection quills and static mixers provided loose.

Flush Pump

Flush Pump (Loose)

Quantity	(1)
Manufacturer/Model	Goulds,
Type/ Performance	Centrifugal / 200 GPM @ 65 PSI Boost
Materials of Construction	316 SS housing and impeller
Motor	20 HP, 3600 RPM, 480 V, premium efficiency, TEFC
Starter	By others

Spare Parts & Special Tools

- (3) Brine seals for membrane elements and (10) O-rings for permeate tube interconnectors
- (2) Product water tube (PWT) adaptor seals
- (2) head seals
- (2) sets of head retaining rings with fasteners
- (2) PWT shims
- (1) Complete head assembly
- (1) complete set of cartridge filters
- (1) head retainer ring pliers

Supplied By Others

- RO Feed Tank
- Chemical storages and chemical transfer pumps for CIP solution make-up.
- Installation of membrane elements under supervision of a Wigen Technician.

3.0 SCOPE OF SUPPLY

Value Engineering Solutions

1. Use of Bray Valves and Actuators

Bray valves and actuators will be significantly less expensive than those from Dezurik included in the bid pricing. Deducts for using Bray valves and actuators are as follows:

UF System Deduct: (\$35,100.00)

RO System Deduct: (\$41,200.00)

2. Combining PLC Control Systems

If the UF and RO systems are controlled by a single control panel the following deduct would apply:

Combined PLC Control System Deduct: (\$14,400.00)

3. Sharing UF and RO CIP Systems

It is possible to share the UF and RO CIP tanks and pumps. This is common for industrial UF/RO systems.

Combining CIP System Deduct: (\$79,800.00)

4. Removing Cartridge from RO CIP Skid

Since there is just one RO train and the cartridge filter housing for the CIP skid is the same size as the RO skid, it is not necessary to have a separate CIP cartridge filter where the RO skid cartridge filter can be used during CIPs.

RO CIP Cartridge Filter Deduct: (\$7,500.00)

5. Wigen Manufactured Chemical Metering Skids

Wigen Can manufacture the chemical metering skids at a significantly lower price than what was quoted by the specified suppliers as follows:

UF System Chlorine and Ammonia Dosing Skids: (\$24,000.00)

RO System Antiscalant and Acid Dosing Skids: (\$24,000.00)



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3.0 SCOPE OF SUPPLY

Start-up Services (UF and RO Systems)

Service	No. Trips	No. Days Onsite
Pre-Startup Inspection	1	1
Pre-commissioning and Functional Testing	2	8
System Performance Testing	1	7
Training	2	4 (2 per trip)

The start-up and training services listed above have been included in the equipment price in this proposal. If additional services are required due to the equipment not being installed correctly or the contractor is not ready when our personnel arrive on site at the requested time, the service rates are outlined below.

In addition to the start-up and training services, WWT engineers shall also provide data analysis and additional assistance and advice for process performance optimization. Telephone support is available 24/7 via toll free number.

Wigen Field Representative	Hourly Rate
Weekday, regular time, 7 am – 4 pm	\$170
Weekday, overtime, 4 pm – 7 am	\$255
Saturday or Sunday	\$255
Holiday	\$340

**Travel costs and per diem are not included in aforementioned rates. Hourly rates valid until 6/30/23.*

12-Month Initial Plant Operations Support

There were not specific details in Section 01 75 00 as to what this support entails.

The support included in the bid pricing includes remote support and a monthly report on plant performance from downloading the data remotely and one additional service trip during the first year of operation.

Schedule

The schedule for delivering the equipment and services outlined in this proposal is as follows:

Engineering Submittals: 10 weeks from Purchase Order

O&M Manuals are included in pricing and will be provided closer to the delivery date.

Equipment Delivery: 28 weeks from Approved Submittals and Release for Fabrication



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4.0 WARRANTIES

UF Equipment Warranty

The warranty duration for materials and workmanship provided with WWT's equipment is twelve (12) months from the date of Completion of Start-up and Acceptance Testing or 18 months from delivery, whichever is sooner.

UF Membrane Module Warranty

A five (5) year prorated membrane element warranty is provided consisting of a full replacement warranty for the first two (2) years and prorated from years three (3) to five (5).

RO Equipment Warranty

The warranty duration for materials and workmanship provided with WWT's equipment is (24) months from the date of Final Acceptance by the owner or 18 months from delivery, whichever is sooner.

RO Membrane Element Warranty

A three (3) year prorated membrane element warranty is provided consisting of a full replacement warranty for the first (1) year and prorated from years two (2) to three (3).





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ATTACHMENT 1:
EXCEPTIONS TO
CONTRACT SERVICES AGREEMENT
AND
RFP PRODUCT TERMS AND CONDITIONS



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CONTRACT SERVICES AGREEMENT

Wigen Water Technologies requests the following changes/additions to the Contract Services Agreement:

Section 3: Insurance and Indemnification

We would like to see the indemnification clause changed as shown below:

3.3 Indemnification. To the full extent permitted by law, SUPPLIER agrees to indemnify, defend and hold harmless the District, its officers, employees and agents ("Indemnified Parties") against, and will hold and save them and each of them harmless from, any and all actions, either judicial, administrative, arbitration or regulatory claims, damages to persons or property, losses, costs, penalties, obligations, errors, omissions or liabilities whether actual or threatened (herein "claims or liabilities") that may be asserted or claimed by any person, firm or entity arising out of ~~or in~~ ~~connection with~~ the negligent performance of the work, operations or activities provided herein of SUPPLIER, its officers, employees, agents, subcontractors, invitees, or any individual or entity for which SUPPLIER is legally liable ("indemnitors"), or arising from SUPPLIER's or indemnitors' reckless or willful misconduct, or arising from SUPPLIER's or indemnitors' negligent performance of or failure to perform any term, provision, covenant or condition of this Agreement, except claims or liabilities occurring as a result of District's ~~sole~~ negligence or willful acts or omissions. The indemnity obligation shall be binding on successors and assigns of SUPPLIER and shall survive termination of this Agreement.

EXHIBIT E TO PALMDALE WATER DISTRICT CONTRACT SERVICES AGREEMENT

Section 6: Notification

Wigen must notify the Owner by telephone within one business day of any potential problems. It is requested this be extended to at least 3 business days and ideally 5.

Section 8: Warranty

The warranty is for one year from the date of final written acceptance by Owner after Final Completion. We request this is modified to include, "or 18 months after delivery, whichever is shorter".



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RPF - PRODUCT TERMS AND CONDITIONS

Section IV. F. Notification

Wigen must notify the Owner by telephone within one business day of any potential problems. It is requested this be extended to at least 3 business days and ideally 5.

Section IV. H. Warranty

The warranty is for one year from the date of final written acceptance by Owner after Final Completion. We request this is modified to include, "or 18 months after delivery, whichever is shorter".

Section IV. J. Duty to Indemnify

Wigen requests the following changes shown in red:

To the fullest extent permitted by law, SUPPLIER shall indemnify and hold OWNER, its Board, members of the Board, employees, and authorized volunteers free and harmless from any and all claims, demands, causes of action, costs, expenses, liability, loss, damage or injury of any kind, in law or equity, to property or persons, including wrongful death, in any manner arising out of, ~~pertaining to, or incident to~~ any alleged acts, errors or omissions, or willful misconduct of SUPPLIER, its officials, officers, employees, subcontractors, consultants or agents in connection with the performance of the SUPPLIER's services, or this Agreement, including without limitation the payment of all ~~consequential damages~~, expert witness fees and attorneys' fees and other related costs and expenses.



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ADDITIONAL REQUESTED CHANGES

Many of our standard terms are absent from the contract documents. In addition to the above, Wigen would like to make the additional commercial exceptions:

1. Seller's total liability shall be limited to the purchase price paid to Seller.
2. Seller's liability for liquidated damages, if any, shall be limited to 5% of the purchase price paid to Seller.
3. In the event Seller is not able to timely secure materials/product due to no fault of its own, Seller shall not be liable for damages resulting therefrom, including liquidated damages, and the Parties agree to adjust the time for Seller's performance accordingly.
4. Seller shall not be liable for project delays in the event Owner or others is unable/unwilling to accept equipment at the scheduled times or Owner or others is unprepared/unwilling to commence commissioning or does not commence commissioning at agreed upon times.
5. Neither party shall be liable for delays in performance for causes beyond its reasonable control, including but not limited to war, pandemic/epidemic, natural disasters, and unforeseen international shipping delays.
6. Seller's warranty excludes damage to any equipment supplied by Seller caused by: (1) improper maintenance and/or operation and/or modification; (2) repair by persons other than Seller; and (3) normal wear and tear.
7. Should a release for manufacture be commenced beyond the date contemplated by the RFP, Buyer agrees to compensate Seller for any increase in pricing caused thereby, it being understood that material and equipment prices may be unpredictable and volatile and beyond the control of Seller.



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ATTACHMENT 2:

REPRESENTATIVE GENERAL ARRANGEMENT DRAWINGS

The general arrangement following drawings are from projects with similar UF and RO systems.

A summary of the drawings is as follows:

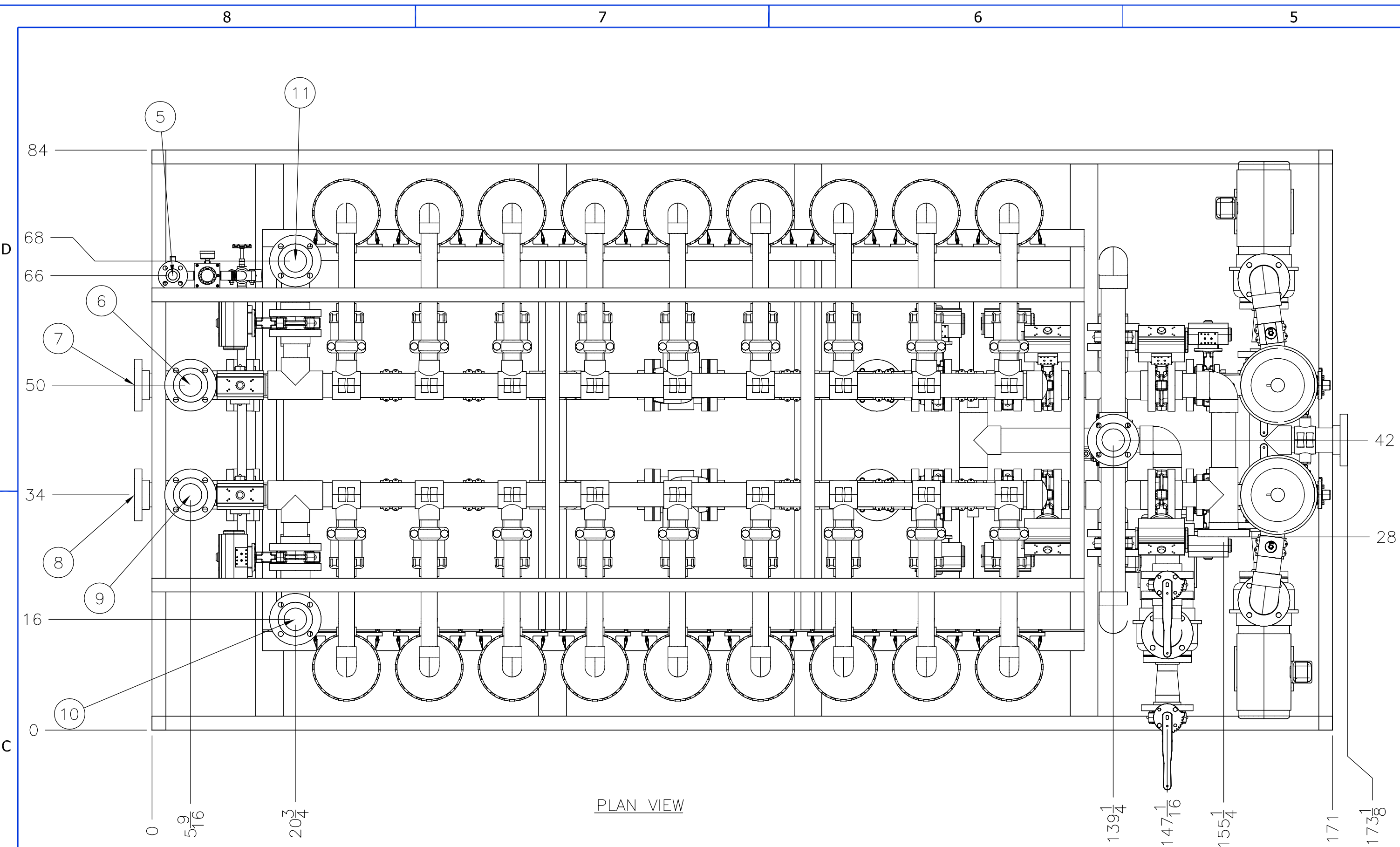
UF System:

The drawing of the Conifer High School UF skid shows a skid with 2 independent UF trains, each with 9 modules. This is very similar to what is specified for the Pure Water AV Demonstration Facility. To shorten the skid to the specified length, the modules on each train will be configured as two offset rows where each module slightly overlaps. This configuration is shown on the drawing for the Winter Park WTP skid which is much more compact. The Winter Park skid is just one train so the two-train skid would be wider to accommodate 2 separate headers.

RO System:

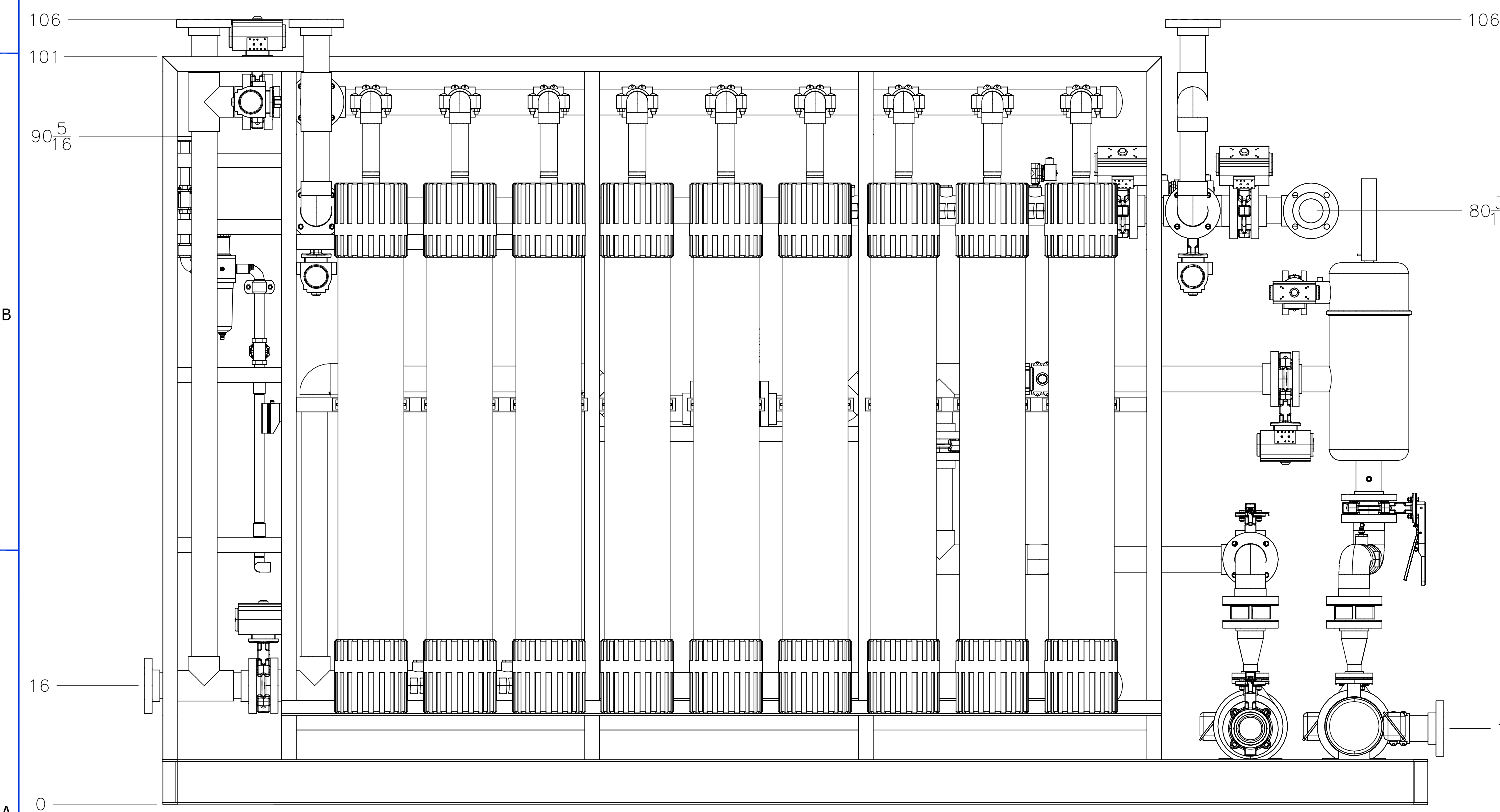
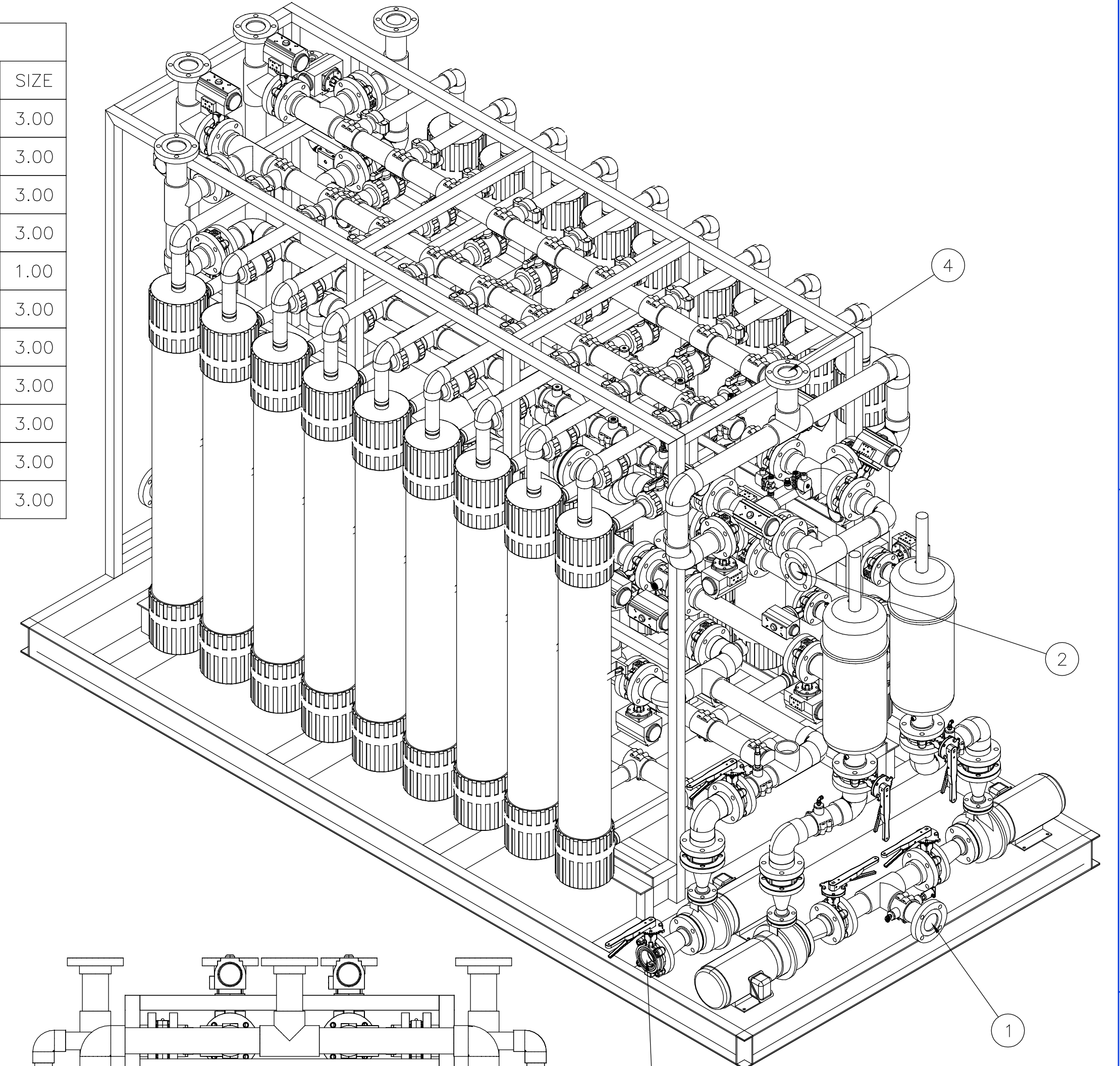
The attached RO skid drawing shows a 4:2, 6M skid with 8" elements. For the Pure Water AV Demonstration Facility, the 4" housing for the third stage would be under the two second stage housings, so there would be no difference in skid width or height. The skid would be longer for 7M housings, but the end piping would be reconfigured to keep the skid length within the specifications.

An example of a similar CIP skid is included. The CIP pump would be placed under the CIP tank cone to reduce the skid footprint.

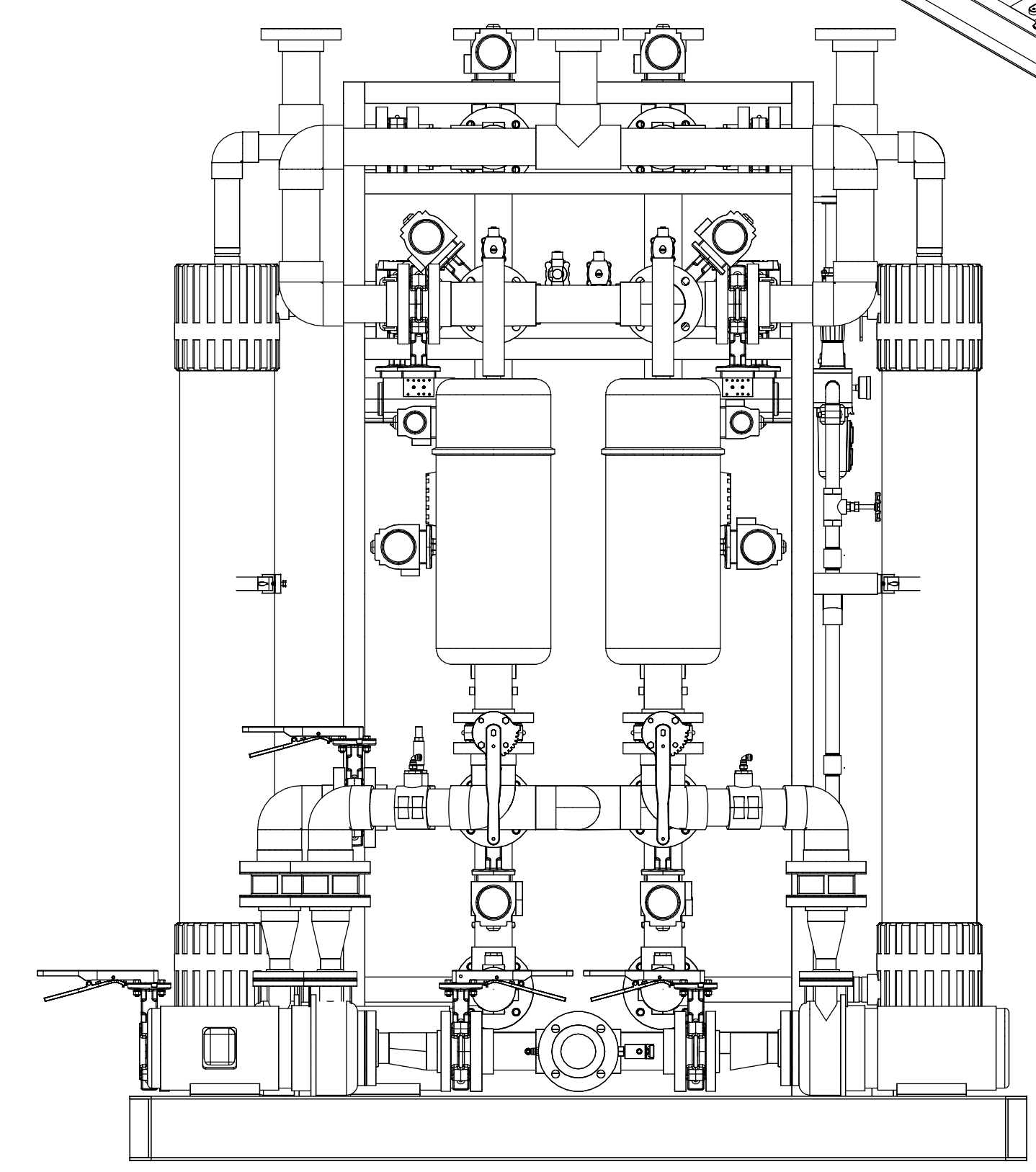
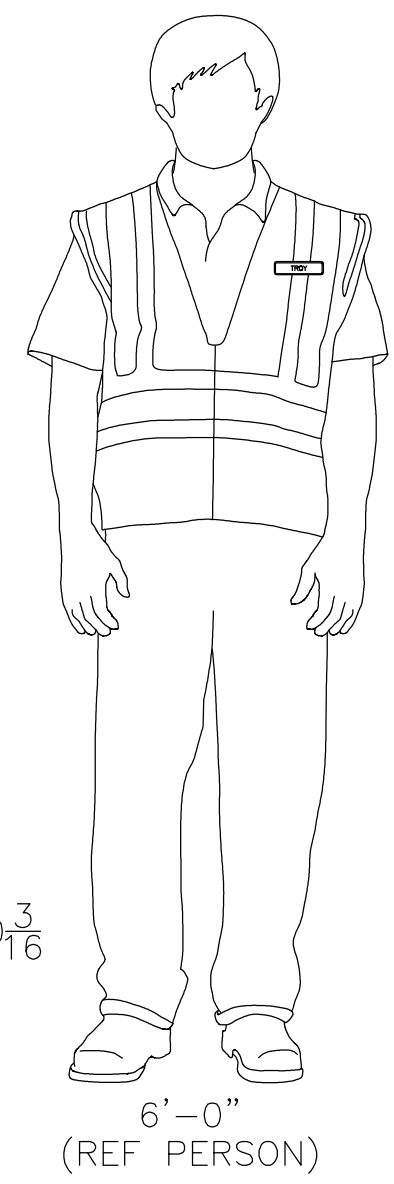


PLAN VIEW

#	DESCRIPTION	TYPE	SIZE
1	UF FEED	150# FLANGE	3.00
2	BACKWASH INLET	150# FLANGE	3.00
3	CIP INLET	150# FLANGE	3.00
4	UF SYSTEM FILTRATE	150# FLANGE	3.00
5	SYSTEM AIR INLET	150# FLANGE	1.00
6	TRAIN #1 DRAIN VENT	150# FLANGE	3.00
7	TRAIN #1 BACKWASH TO WASTE	150# FLANGE	3.00
8	TRAIN #2 BACKWASH TO WASTE	150# FLANGE	3.00
9	TRAIN #2 DRAIN VENT	150# FLANGE	3.00
10	TRAIN #2 CIP RETURN	150# FLANGE	3.00
11	TRAIN #1 CIP RETURN	150# FLANGE	3.00



FRONT ELEVATION VIEW

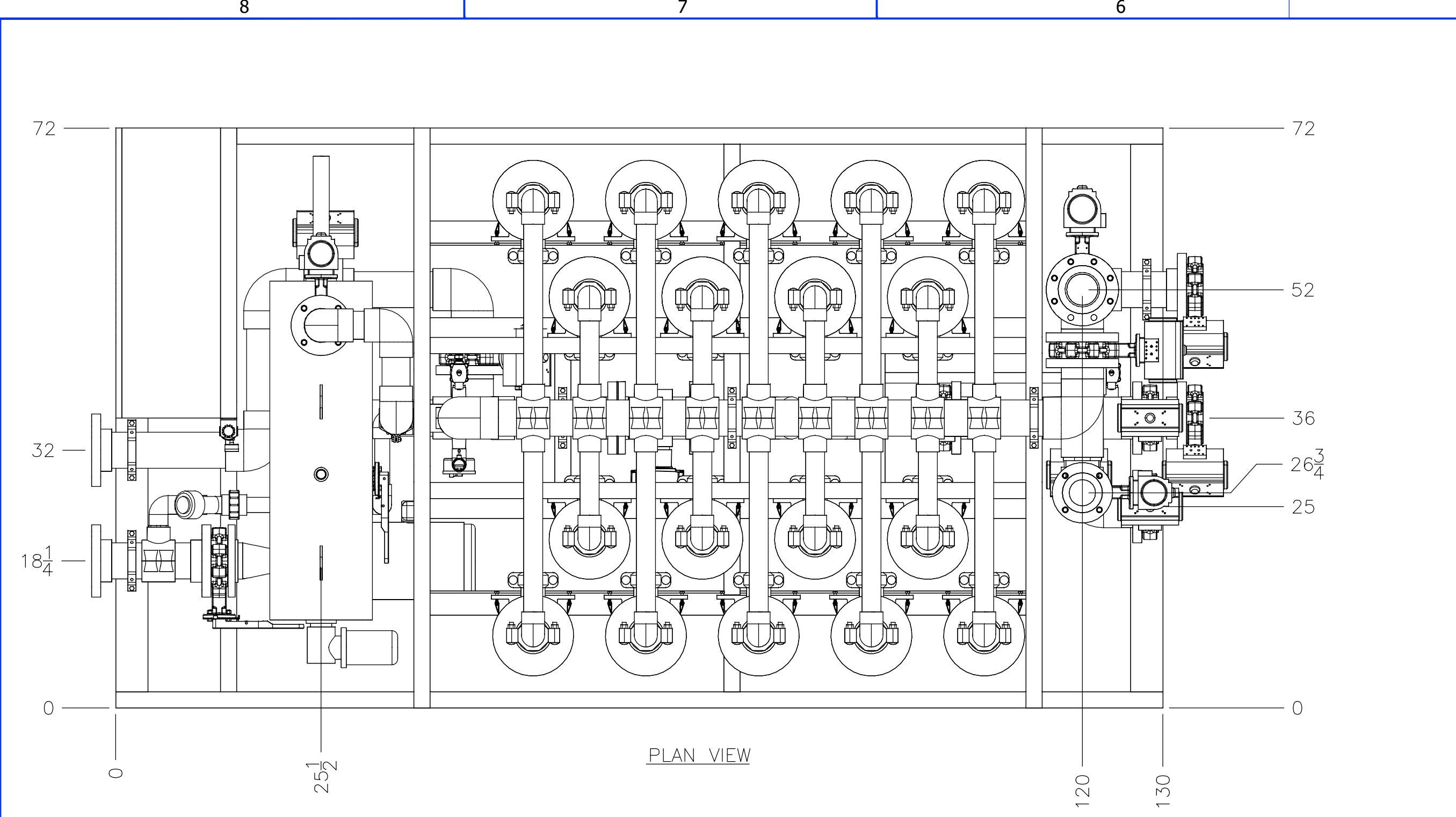


R. END ELEVATION VIEW

UNCONTROLLED IF PRINTED (UNLESS STAMPED OTHERWISE)			REV	DATE	DWN	APVD	DESCRIPTION
FRAC	DECIMALS	ANGLES					
±	.X ±	±					
	.XX ±						
	.XXX ±						
TOLERANCES UNLESS NOTED							
8	7		6				5

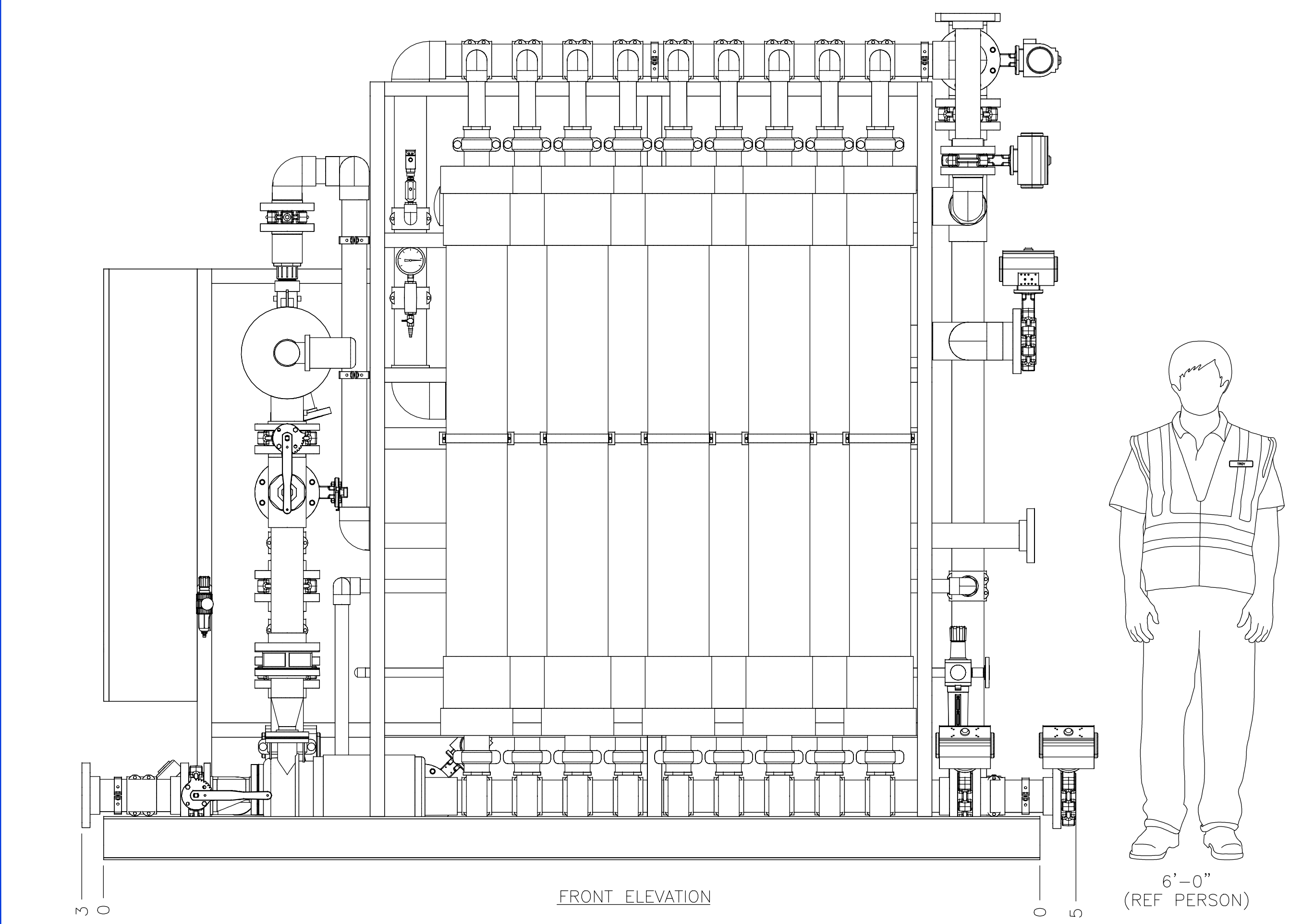
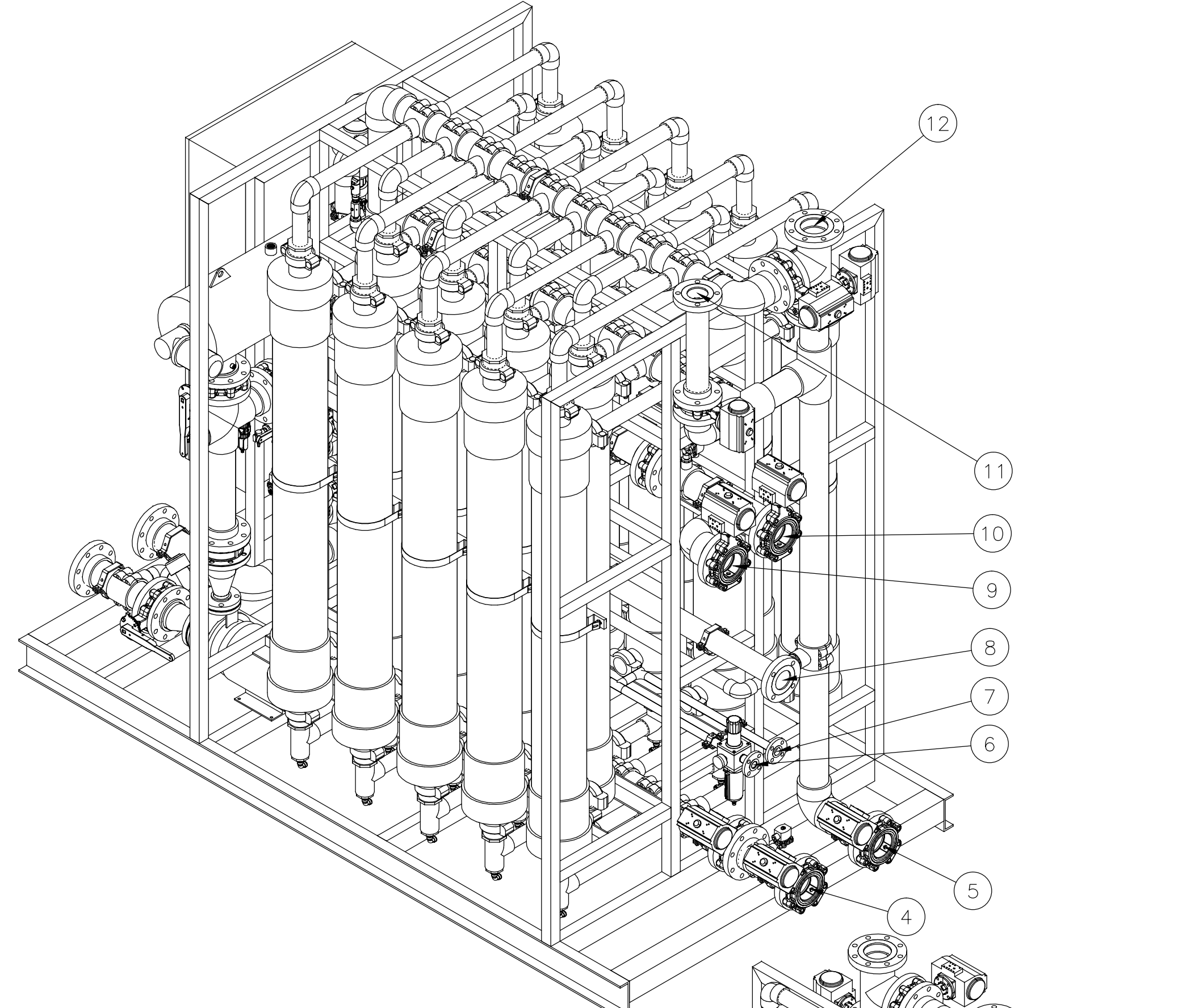
NOTICE ON REPRODUCTIONS		DRAWN BY	DATE	TITLE
THIS DOCUMENT IN ALL MEDIA FORMATS IS THE SOLE PROPERTY OF WIGEN WATER TECHNOLOGIES, INC., REPRODUCTION IS STRICTLY PROHIBITED WITHOUT PRIOR WRITTEN CONSENT.		MDH	10/30/15	GENERAL ARRANGEMENT TWO TRAIN UF SKID SYSTEM *****PRELIMINARY*****
		CHK'D BY	DATE	CLIENT NAME
		SAB	10/30/15	CONNIFER HIGH SCHOOL JEFFERSON CITY, CO
		SIZE	SCALE	PROJECT NUMBER
		D	NONE	C-3380-1015
		FILE TYPE	DRAWING NUMBER	SHEET
		ACAD	C-3380-101-1	1 OF 1
				REV
				A

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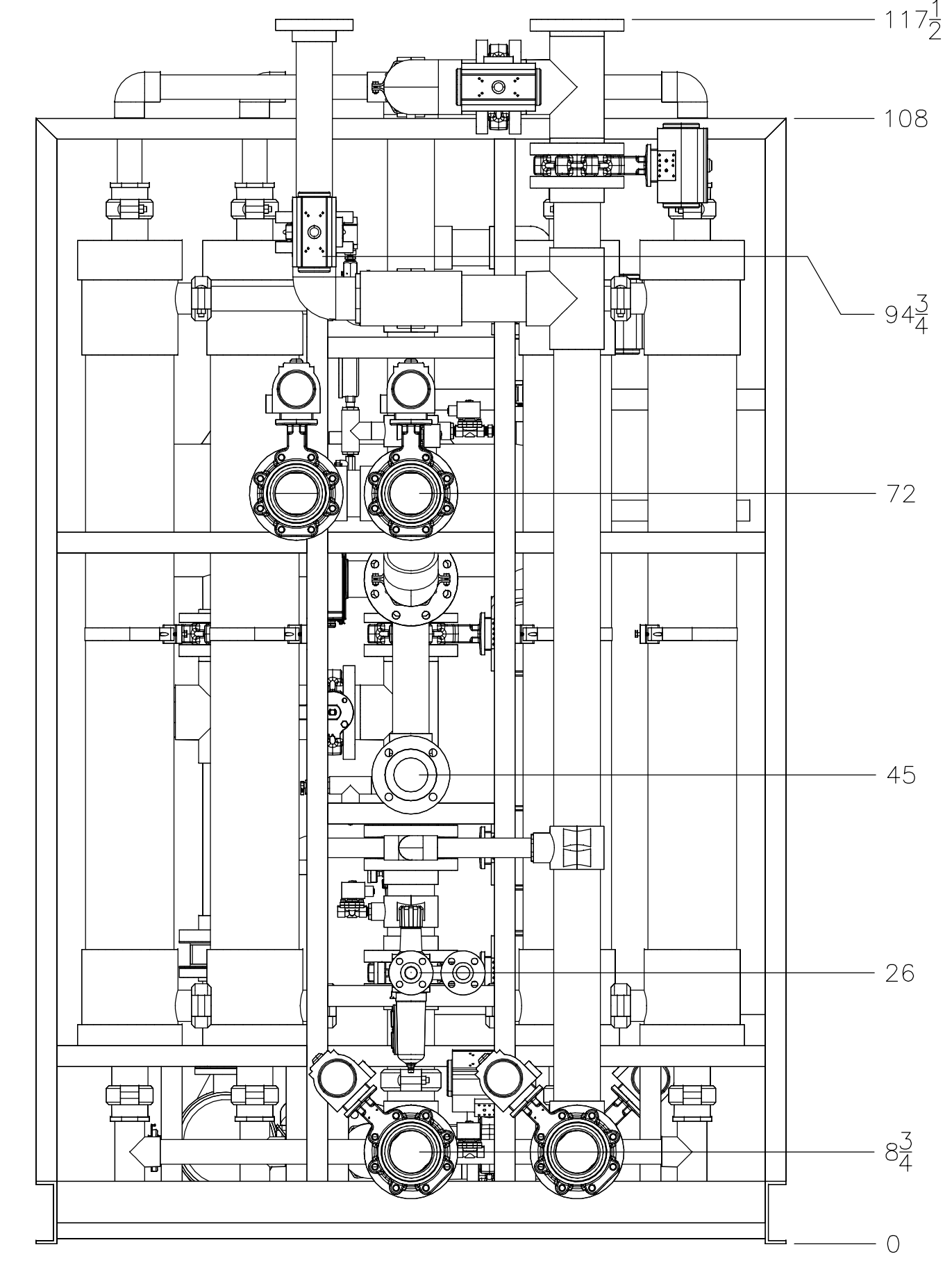
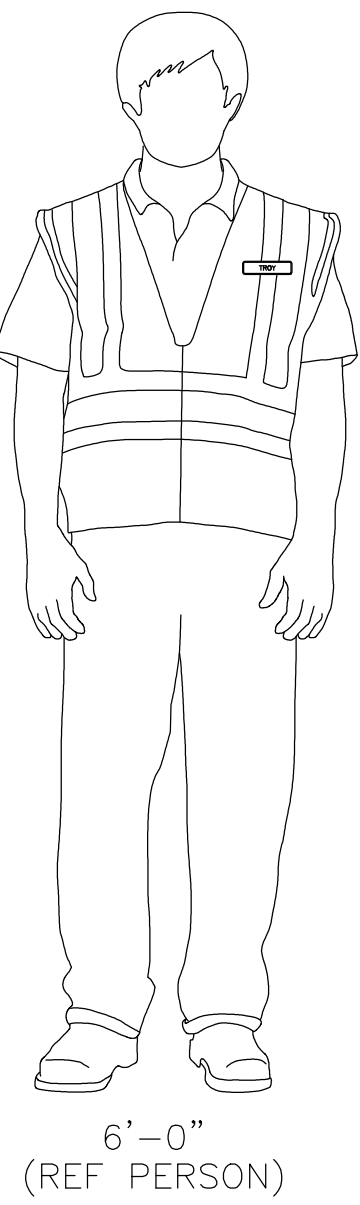


PLAN VIEW

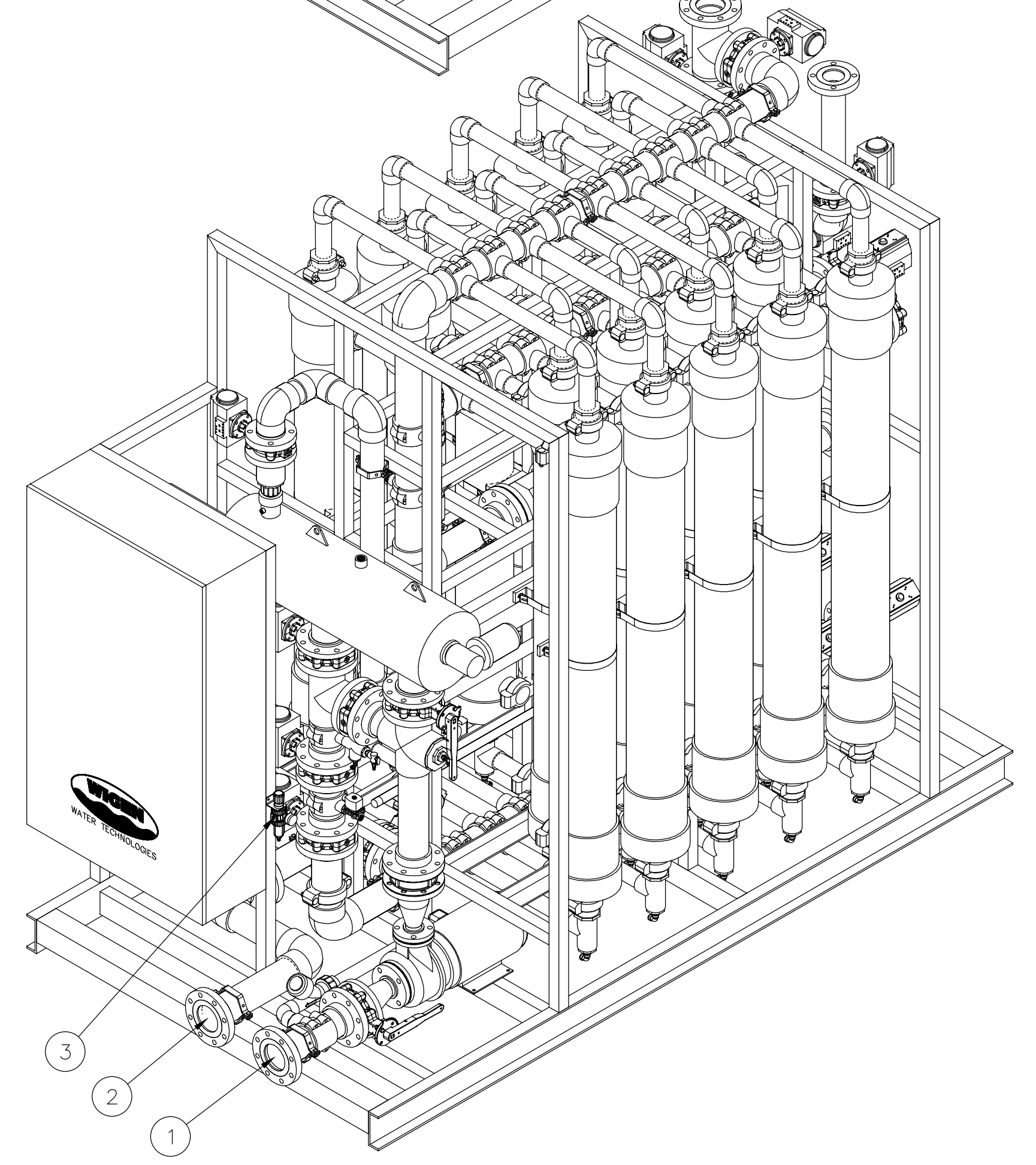
CONNECTION SCHEDULE			
#	DESCRIPTION	TYPE	SIZE
1	RAW WATER INLET	150# FLG	4.00
2	UF BACKWASH TO DRAIN PUMPS	150# FLG	4.00
3	INSTRUMENT AIR INLET	O.D. TUBE	0.25
4	UF CIP INLET	150# FLG	4.00
5	UF BACKWASH DRAIN (GRAVITY)	150# FLG	4.00
6	AIR SCOUR/TEST AIR INLET	150# FLG	1.00
7	AIR SCOUR/TEST TO SKID# 2	150# FLG	1.00
8	UF SCREEN CLEAN TO DRAIN	150# FLG	3.00
9	UF BACKWASH INLET	150# FLG	4.00
10	UF FILTRATE OUTLET	150# FLG	4.00
11	UF DRAIN VENT TO OUTSIDE	150# FLG	3.00
12	UF CIP TANK RETURN	150# FLG	1.50



FRONT ELEVATION



R. END ELEVATION



FRAC	DECIMALS	ANGLES
±	.X ±	±
	.XX ±	
	.XXX ±	
TOLERANCES UNLESS NOTED		

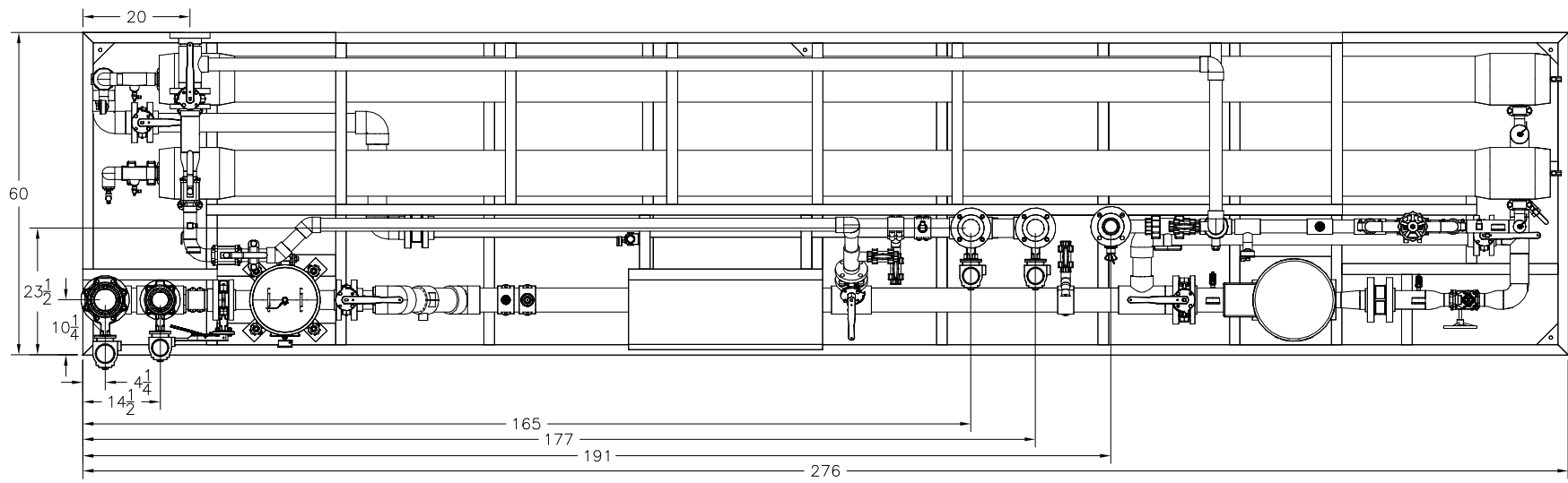
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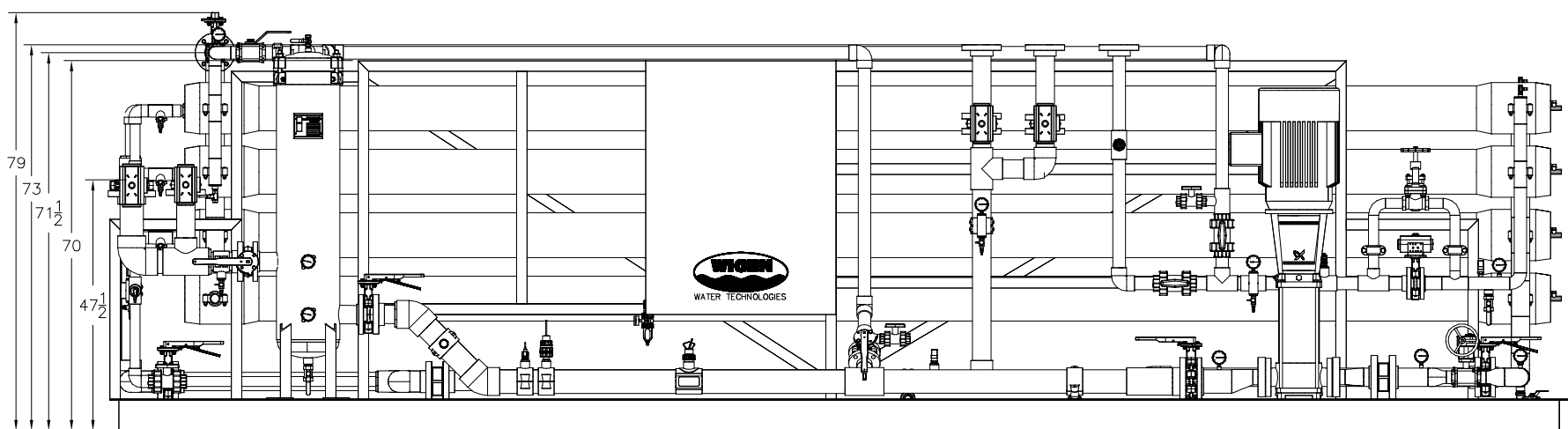
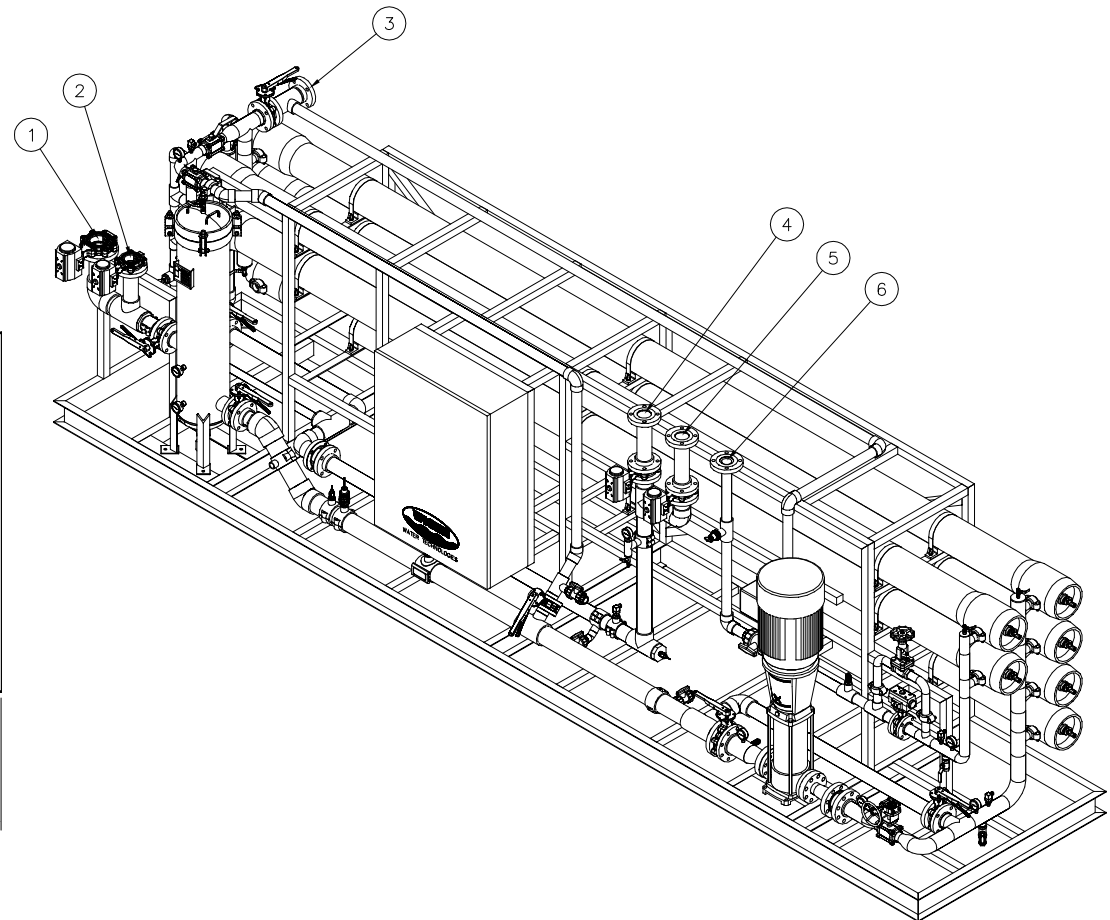
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CLIENT NAME			
UNION PACIFIC RAILWAY WINTER PARK WTP WINTER PARK, CO			
PROJECT NUMBER	DRAWING NUMBER	SHEET	REV
C-3373-0815	C-3373-101-1	1 OF 1	1

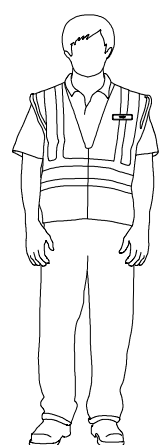
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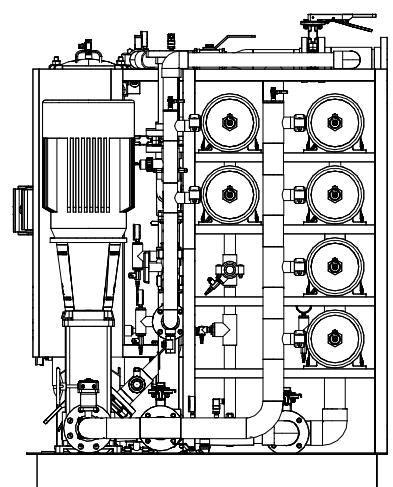
PLAN VIEW



FRONT ELEVATION



6'-0" (REF PERSON)



R.SIDE ELEVATION

CONNECTION SCHEDULE			
#	DESCRIPTION	TYPE	SIZE
1	RAW WATER FEED	150# FLG.	4.00
2	RO CIP/PERMEATE FLUSH	150# FLG.	3.00
3	RO CONC RETURN TO TANK	150# FLG.	3.00
4	PERM WATER TO STORAGE TANK	150# FLG.	3.00
5	RO PERM RETURN TO TANK	150# FLG.	3.00
6	RO CONC/FLUSH TO DRAIN	150# FLG.	2.00



NOTE 1.
NOTE 2.
NOTE 3.
NOTE 4.
NOTE 5.
NOTE 6.

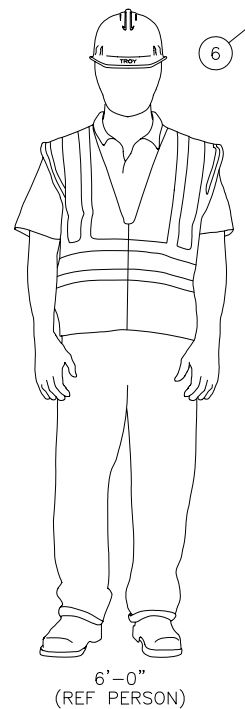
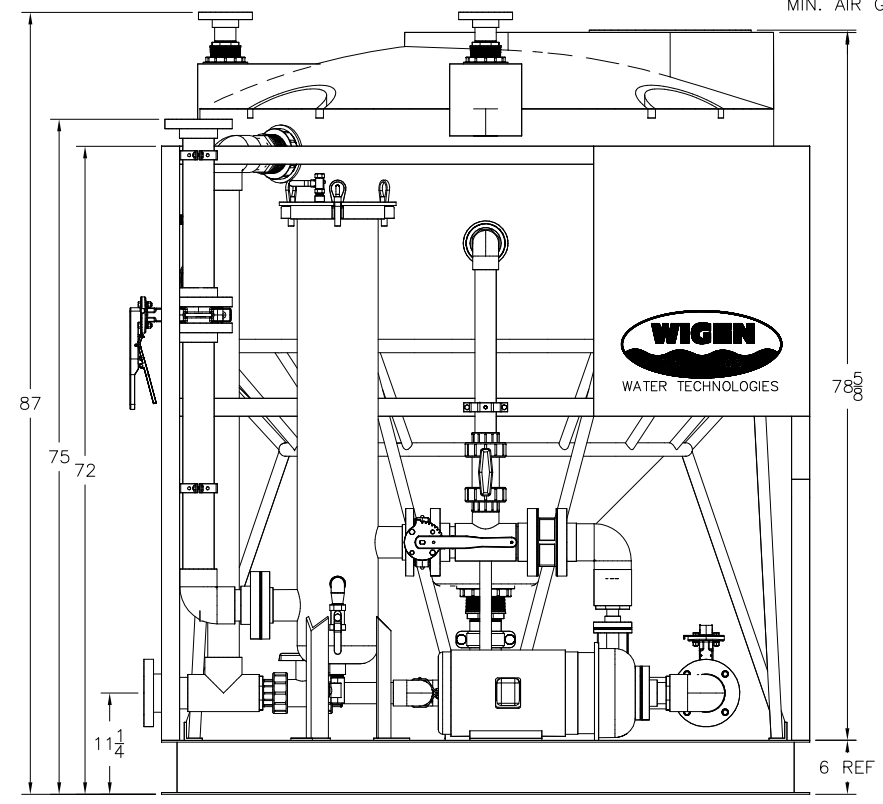
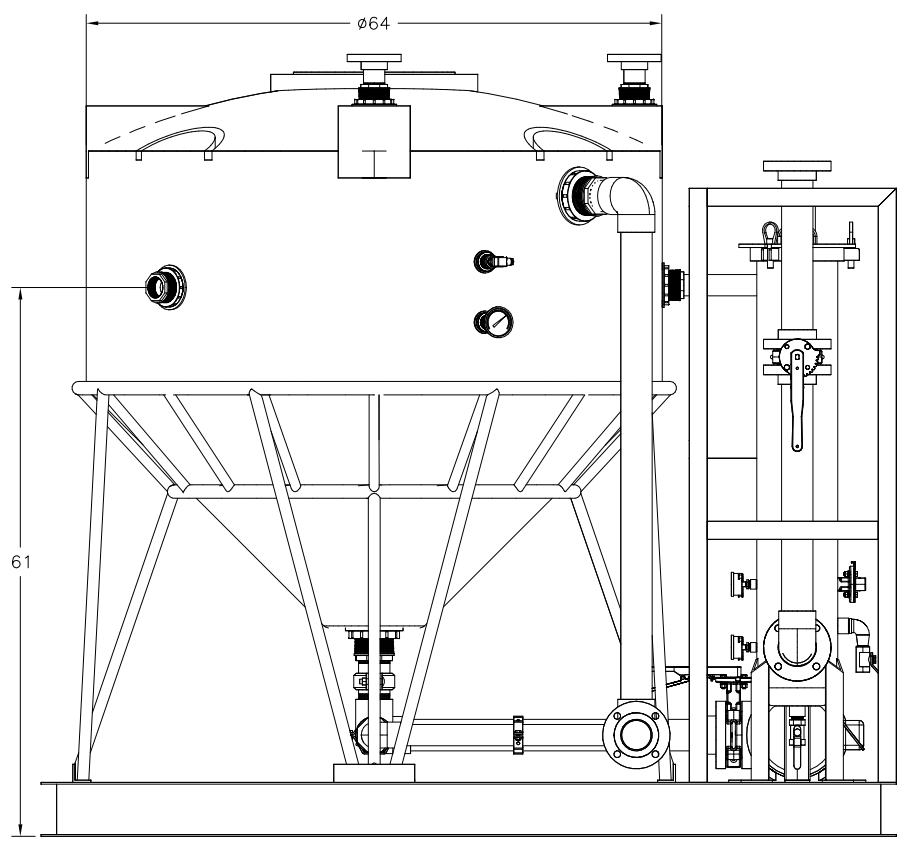
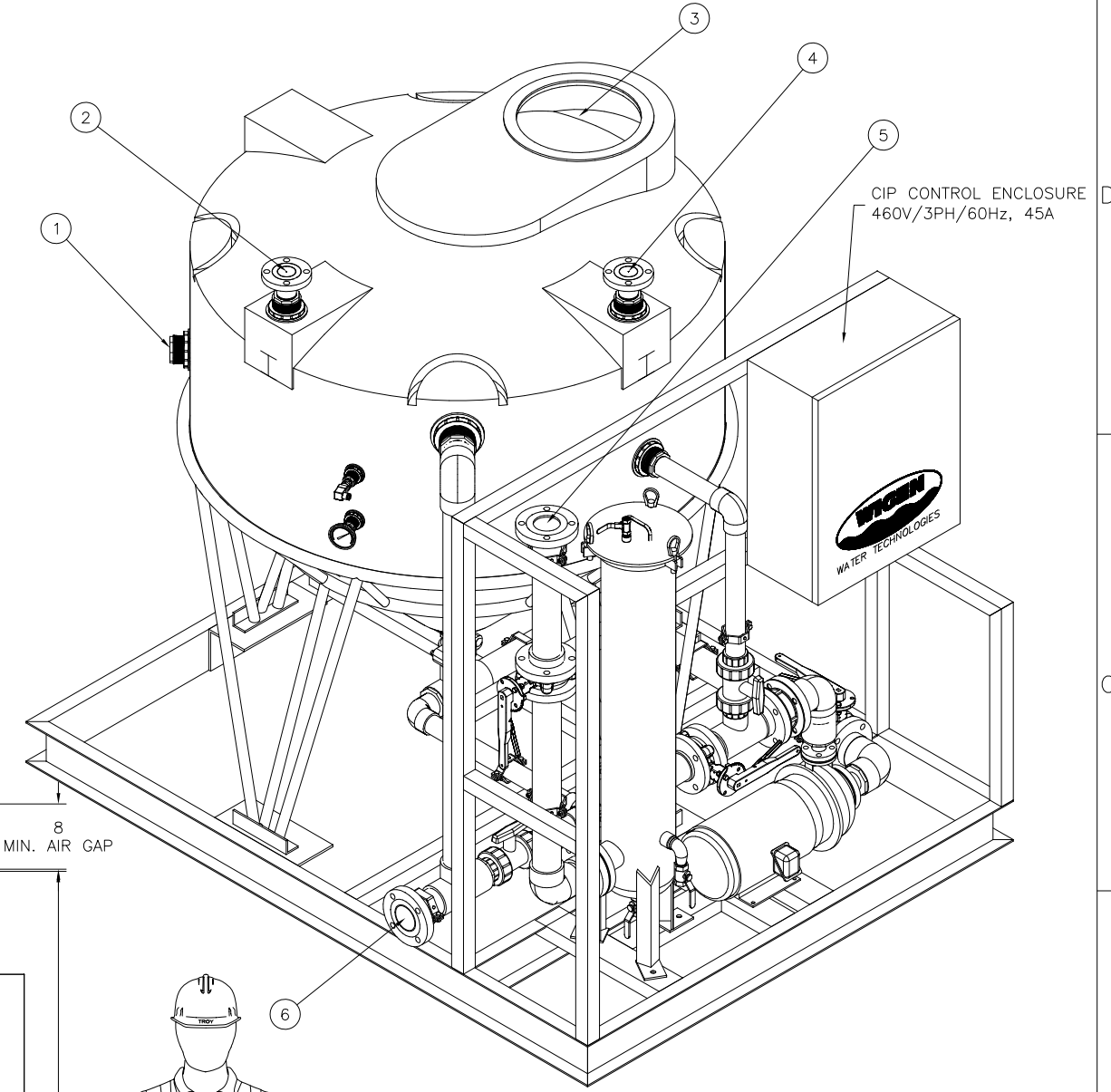
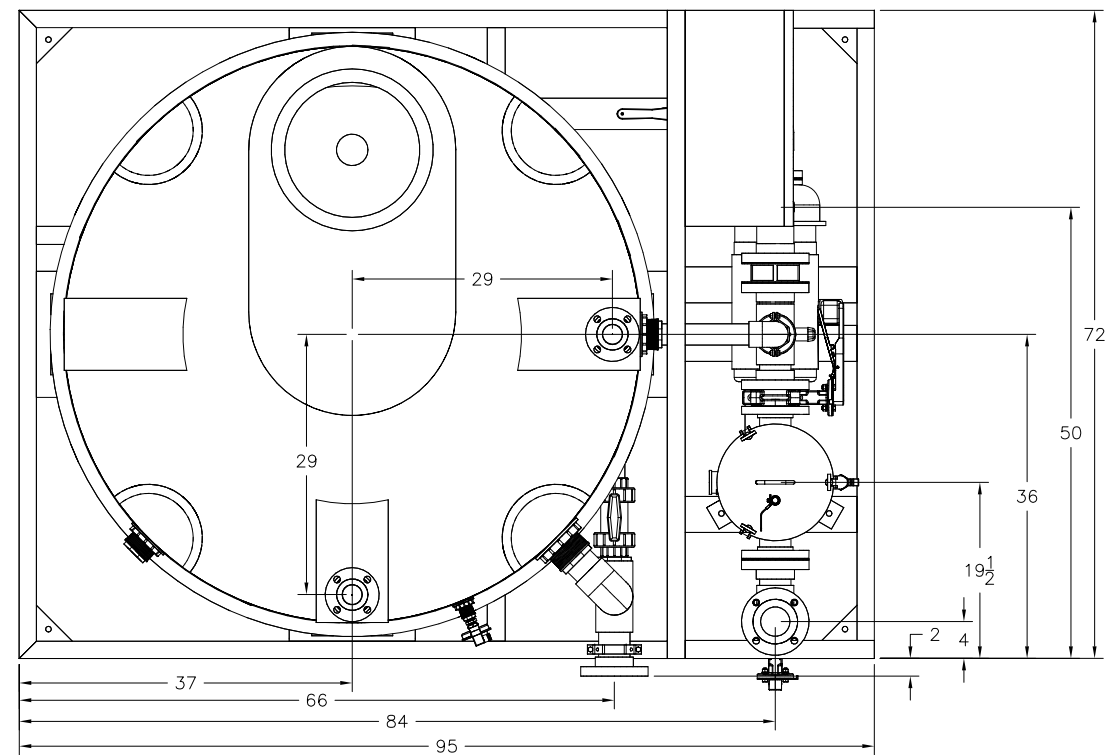
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DRAWN BY MDH CHK'D BY TJC SIZE D	DATE 10/11/13 DATE 10/11/13 SCALE NONE	TITLE GENERAL ARRANGMENT REVERSE OSMOSIS SYSTEM - 115 GPM RO SKID SYSTEM CLIENT NAME CITY OF JOAQUIN 2008 USDA WATER SYSTEM IMPROVEMENTS JOAQUIN, TEXAS	PROJECT NUMBER C-3295-0913	DRAWING NUMBER C-3259-100	SHEET 1 OF 1	REV A
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CONNECTION SCHEDULE			
#	DESCRIPTION	TYPE	SIZE
1	IMMERSION HEATER	FNPT	2.00
2	PERMEATE CIP RETURNS	150# FLANGE	2.00
3	PERMEATE FLUSH FILL W/AIR GAP	OPENING	15
4	CONCENTRATE CIP RETURNS	150# FLANGE	2.00
5	CIP OUTLET	150# FLANGE	3.00
6	CIP TANK DRAIN/OVERFLOW	150# FLANGE	3.00



NOTE 1.
NOTE 2.
NOTE 3.
NOTE 4.
NOTE 5.
NOTE 6.

REV	DATE	DWN	APVD	DESCRIPTION
B	4/4/12	TJC	SAB	REVISED PERMEATE FILL CONNECTION TO SHOW 8" AIR GAP INTO MANWAY - AS BUILT

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DRAWN BY TJC	DATE 3/9/12
CHK'D BY TJC	DATE 3/9/12
SIZE D	SCALE NONE
FILE TYPE ACAD	

TITLE		CLIENT NAME	
GENERAL ARRANGEMENT CIP SYSTEM 80 GPM		VILLAGE OF LARUE WATER TREATMENT PLANT LARUE, OH	
PROJECT NUMBER C-3217-1011	DRAWING NUMBER C-3217-102	SHEET 1 OF 1	REV B



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ATTACHMENT 3:

RO SYSTEM PROJECTIONS

- Separate projections for first 2 stages and 3rd stage



System Overview Report

Project	WIGEN\tim.seibert 95:Palmdale 2 Stage 76%	
Case	1	Palmdale 76%
Revision	1	New Revision
Calculation Mode	Feed Water Type: RO Permeate; AutoBalance is ON	
Errors, Warnings, Cautions and Notices	Errors:0, Warnings:0,Cautions:0,Notices:1. See Important Notes at end /E	
Database Info :	Project Database : C:\Users\tim.seibert\OneDrive - Wigen Water Technologies\Documents\TorayDS2\App_Data\DS2.sdf(Ver:2.7) Membrane Database (V.20160) :C:\Users\tim.seibert\OneDrive - Wigen Water Technologies\Documents\TorayDS2\App_Data\TorayMembrane.sdf.	

		Overall	Pass 1		
Raw water TDS	mg/l	689.2	689.2		
EC @25C / @19.20C	uS	1,133.5 / 983.7	1,133.5 / 983.7		
Feed Pressure	psi	0.0	83.57		
Temperature	deg C	19.200			
Total DP	psi	18.152	18.152		
Brine Pressure	psi	65.42	65.42		
Flow Allowance	3.00 yrs		0.848		
SP % Increase (Max)	3.00 yrs		33.10%		
Recovery	%	76.00%	76.0%		
Feed Flow	gal/min	180.0	180.0		
Product Flow	gal/min	136.8	136.8		
Average Flux	gfd	11.723	11.723		
Concentrate Flow	gal/min	43.20	43.20		
Product TDS	mg/l	10.764	10.764		
Concentrate TDS	mg/l	2,833	2,833		
Primary HP Pump kW	kilowatt	8.180	8.180		
Power Consumption	kWh/m ³	0.263	0.263		
Ions		Feed	Net Feed	Conc	Product
Ca	mg/l	40.00	40.00	165.5	0.371
Mg	mg/l	13.000	13.000	54.03	0.0429
Na	mg/l	139.8	139.8	575.6	2.175
K	mg/l	16.000	16.000	65.87	0.252
Ba	mg/l	0.03	0.03	0.124	0.0003
Sr	mg/l	0.0	0.0	0.0	0.0
NH4	mg/l	6.800	6.800	27.64	0.221
Fe	mg/l	0.06	0.06	0.250	0.0
HCO3	mg/l	150.0	150.0	608.6	2.071
Cl	mg/l	180.0	180.0	744.7	1.680

SO4	mg/l	79.00	79.00	328.8	0.122
NO3	mg/l	40.00	40.00	156.4	3.235
F	mg/l	0.0	0.0	0.0	0.0
Br	mg/l	0.0	0.0	0.0	0.0
B(Boron)	mg/l	0.0	0.0	0.0	0.0
SiO2	mg/l	21.10	21.10	86.04	0.592
PO4	mg/l	1.900	1.900	7.912	0.0015
CO3	mg/l	1.502	1.502	11.682	0.0002
CO2	mg/l	1.531	1.531	3.451	1.957
TDS	mg/l	689.2	689.2	2,833	10.764
EC @25C / @19.20C	uS	1,134 / 984	1,134 / 984	4,167 / 3,624	17.6 / 15.2
pH	pH	8.200	8.200	8.415	6.159
Osmotic Press (DS1 / Pitzer)	psi	6.194 / 5.47	6.194 / 5.47	25.181 / 21.59	0.095 / 0.09
LSI / SDSI		0.42 / 0.36	0.42 / 0.36	1.68 / 1.64	-5.20 / -5.42
CaSO4 / SrSO4 %	%	0.8% / 0.0%	0.8% / 0.0%	7.8% / 0.0%	0.0% / 0.0%
BaSO4 / SiO2 %	%	74.9% / 14.3%	74.9% / 14.3%	550.8% / 52.8%	
Pitzer % Solubility	Calcite/Dolomite	130% / 342%	130% / 342%	2,119% / 92,191%	
Pitzer % Solubility	CaSO4/SrSO4	1% / 0%	1% / 0%	9% / 0%	

Stage/Bank Data	Pass1	Stage 1	Stage 2
Lead Element Type		TMG20D-400	TMG20D-400
Last Element Type		TMG20D-400	TMG20D-400
Total Elements	42	28	14
Total Vessels	6	4	2
Elements per Vessel		7	7
Feed Flow	gal/min	180.0	79.36
Product Flow	gal/min	100.6	36.16
Average Flux	gfd	12.936	9.297
Brine Flow	gal/min	79.36	43.20
Recovery %	%	55.91 %	45.57 %
Feed Pressure	psi	83.57	74.13
dP Elements	psi	9.441	8.711
Boost Pressure	psi	0.0	0.0
Piping Loss	psi	0.0	0.0
Net (Boost - dP piping)	psi	0.0	0.0
Brine Pressure	psi	74.13	65.42
Permeate Pressure	psi	0.0	0.0
Feed TDS	mg/l	689.2	1,554
Perm TDS	mg/l	6.511	22.60
Lead Element	Pass1	Stage 1	Stage 2
Feed Flow	gal/min	45.00	39.68
Product Flow	gal/min	4.002	3.054
Product TDS	mg/l	3.554	13.286

Flux	gfd	14.405	10.991
Last Element	Pass1	Stage 1	Stage 2
Product Flow	gal/min	3.164	2.099
Product TDS	mg/l	11.628	39.53
Brine/Product Ratio	ratio	6.270	10.291
Brine Flow	gal/min	19.841	21.60
Net Driving Pressure	psi	58.99	38.95
Beta		1.211	1.130

Chemicals 100%. Disclaimer: These estimated dose rates are provided as a courtesy to Toray DS2 users and are not guaranteed.

No Chemicals Added

Errors

Warnings

Cautions

Notices

1. Conc Stiff Davis Index = 1.64 Warning - the Stiff Davis Index (SDSI) is greater than 0. Scale inhibitor required.

See <https://rpicalc.ropur.com> for detailed calculation

Disclaimer : The program is intended to be used by persons having technical skill, at their own discretion and risk. The projections, obtained with the program, are the expected system performance, based on the average, nominal element-performance and are not automatically guaranteed. Toray shall not be liable for any error or miscalculation in the program. The obtained results cannot be used to raise any claim for liability or warranty. It is the users responsibility to make provisions against fouling, scaling and chemical attacks, to account for piping and valve pressure losses, feed pump suction pressure and permeate backpressure. For questions please contact us:

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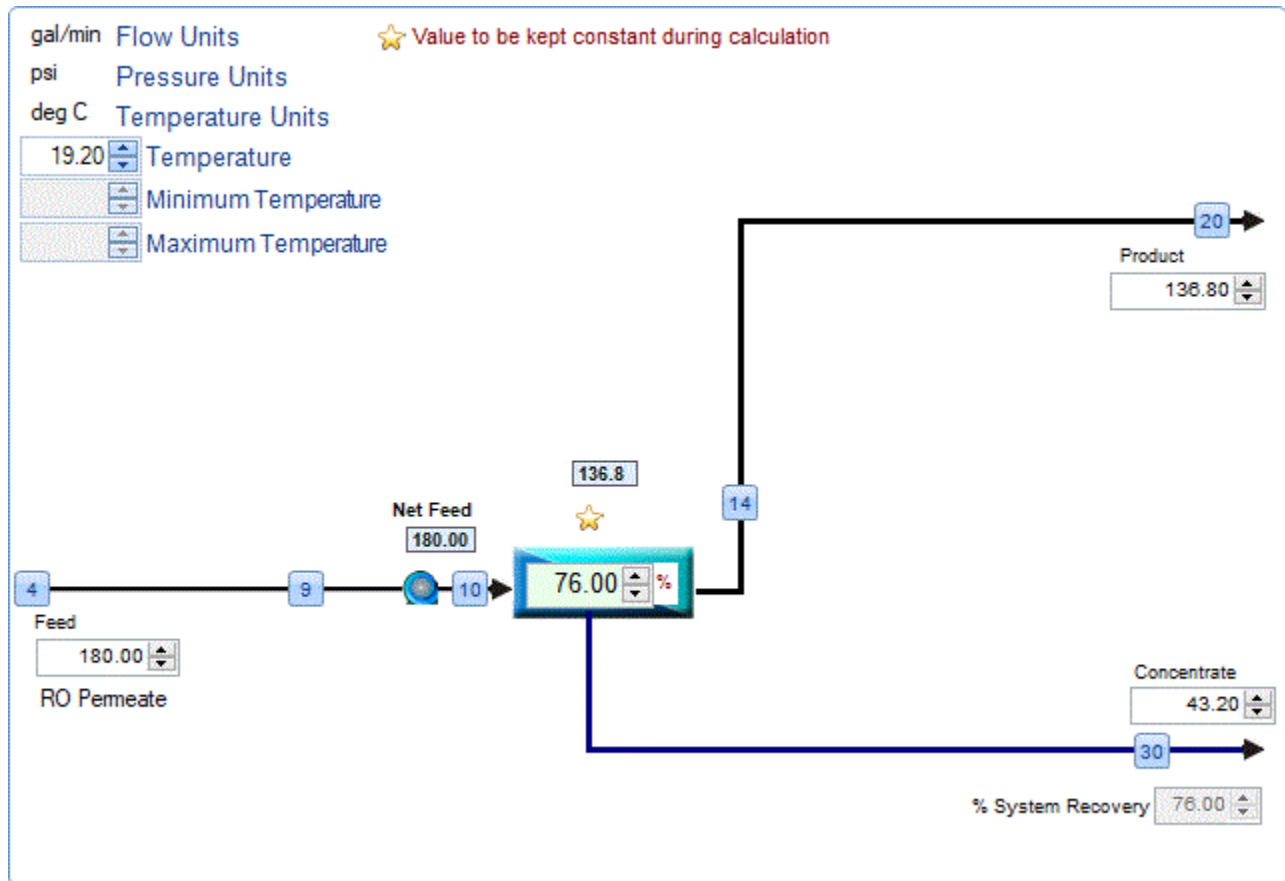
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Date/Time :	11/4/2022 2:01:19 PM
Project	WIGEN\tim.seibert 95:Palmdale 2 Stage 76%
Case :	1:Palmdale 76%
Revision :	1:New Revision
User name :	WIGEN\tim.seibert
Prepared for :	
Notes :	
Membrane Database	
Version Number:	20160
ReleaseDate:	5/31/2021
UpdateBy:	YK
Toray DS2 version :	2.2.3.199(1.2.6.118)

Flow Diagram:



Stream Details					
Stream Number	Flow	Pressure	TDS	Est uS	pH
20. Final Product	136.8	0.0	10.764	15.2	6.159
4. Feed Net	180.0	0.0	689.2	978.5	8.200
10. Feed to Pass 1	180.0	83.57	689.2	978.5	8.200
30. Conc to brine	43.20	65.42	2,833.13	3,605.2	8.415

Element Details in Pass 1

Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	10	10	10	10	10
SPI Applied	33.10	33.10	33.10	33.10	33.10
FLOW Allowance	0.848	0.848	0.848	0.848	0.848
Recovery %	8.894	9.431	10.057	10.786	11.635
Feed Flow(gal/min)	45.00	41.00	37.13	33.40	29.79
Perm Flow(gal/min)	4.002	3.867	3.734	3.602	3.467
Conc Flow(gal/min)	41.00	37.13	33.40	29.79	26.33
Flux(gfd)	14.405	13.916	13.440	12.965	12.477
Beta	1.176	1.180	1.184	1.190	1.196
Feed Press(psi)	83.57	81.61	79.88	78.37	77.05
DP(psi)	1.961	1.729	1.514	1.316	1.135
Conc Press(psi)	81.61	79.88	78.37	77.05	75.92
Perm Press(psi)	0.0	0.0	0.0	0.0	0.0
Pi_Feed(psi)	6.194	6.791	7.489	8.315	9.306
Pi_Memb(psi)	7.619	8.408	9.341	10.462	11.826
Pi_Conc(psi)	6.792	7.491	8.317	9.308	10.515
Pi_Perm(psi)	0.0309	0.0366	0.0437	0.0529	0.0648
Net Press(psi)	74.99	72.37	69.82	67.29	64.71
Pass 1 Stage 1	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m ² / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	10.000	10.000			
SPI Applied	33.10	33.10			
FLOW Allowance	0.848	0.848			
Recovery %	12.621	13.755			
Feed Flow(gal/min)	26.33	23.00			
Perm Flow(gal/min)	3.323	3.164			
Conc Flow(gal/min)	23.00	19.841			
Flux(gfd)	11.959	11.388			
Beta	1.203	1.211			
Feed Press(psi)	75.92	74.95			
DP(psi)	0.969	0.817			
Conc Press(psi)	74.95	74.13			
Perm Press(psi)	0.0	0.0			
Pi_Feed(psi)	10.512	12.005			
Pi_Memb(psi)	13.511	15.623			
Pi_Conc(psi)	12.009	13.890			
Pi_Perm(psi)	0.0806	0.102			
Net Press(psi)	61.98	58.99			

	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.117	0.140	0.168	0.204	0.251
Mg	0.0135	0.0161	0.0193	0.0235	0.029
Na	0.690	0.823	0.990	1.202	1.478
K	0.0798	0.0952	0.114	0.139	0.171
Ba	8.79E-05	0.0001	0.0001	0.0002	0.0002
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.0704	0.0839	0.101	0.122	0.150
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	0.716	0.828	0.977	1.163	1.421
Cl	0.527	0.629	0.757	0.920	1.134
SO4	0.038	0.0454	0.0547	0.0665	0.0819
NO3	1.041	1.240	1.489	1.806	2.217
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.260	0.295	0.338	0.391	0.457
PO4	0.0005	0.0006	0.0007	0.0008	0.001
CO3	2.59E-05	3.46E-05	4.63E-05	6.23E-05	8.82E-05
CO2	1.531	1.526	1.589	1.665	1.758
pH	5.943	6.005	6.058	6.110	6.173
TDS	3.554	4.197	5.009	6.038	7.391
Perm mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1		
Ca	0.314	0.400	0.221		
Mg	0.0362	0.0462	0.0254		
Na	1.845	2.350	1.298		
K	0.213	0.272	0.150		
Ba	0.0002	0.0003	0.0002		
Sr	0.0	0.0	0.0		
NH4	0.188	0.239	0.132		
Fe	0.0	0.0	0.0		
HCO3	1.755	2.216	1.259		
Cl	1.418	1.809	0.996		
SO4	0.103	0.131	0.072		
NO3	2.762	3.508	1.947		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	0.542	0.655	0.410		
PO4	0.0012	0.0016	0.0009		
CO3	0.0001	0.0002	7.69E-05		
CO2	1.893	2.060	1.704		
pH	6.230	6.293	6.092		
TDS	9.177	11.628	6.511		
Feed mg/l Pass 1 Stage 1					

	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	40.00	43.89	48.45	53.85	60.33
Mg	13.000	14.268	15.752	17.511	19.625
Na	139.8	153.4	169.3	188.1	210.7
K	16.000	17.554	19.372	21.53	24.11
Ba	0.03	0.0329	0.0363	0.0404	0.0453
Sr	0.0	0.0	0.0	0.0	0.0
NH4	6.800	7.457	8.225	9.133	10.223
Fe	0.06	0.0659	0.0727	0.0808	0.0906
HCO3	150.0	164.6	181.4	201.4	225.3
Cl	180.0	197.5	218.0	242.3	271.5
SO4	79.00	86.71	95.73	106.4	119.3
NO3	40.00	43.80	48.24	53.46	59.71
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	21.10	23.13	25.51	28.33	31.71
PO4	1.900	2.085	2.303	2.560	2.869
CO3	1.502	1.639	1.932	2.296	2.756
CO2	1.531	1.526	1.589	1.665	1.758
pH	8.200	8.238	8.260	8.283	8.305
TDS	689.2	756.1	834.4	927.0	1,038.23
Feed mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1		
Ca	68.25	78.06	40.00		
Mg	22.21	25.41	13.000		
Na	238.2	272.4	139.8		
K	27.26	31.17	16.000		
Ba	0.0512	0.0585	0.03		
Sr	0.0	0.0	0.0		
NH4	11.549	13.190	6.800		
Fe	0.103	0.117	0.06		
HCO3	254.4	290.4	150.0		
Cl	307.1	351.3	180.0		
SO4	135.0	154.5	79.00		
NO3	67.28	76.60	40.00		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	35.82	40.92	21.10		
PO4	3.247	3.716	1.900		
CO3	3.308	4.027	1.502		
CO2	1.893	2.060	1.531		
pH	8.323	8.340	8.200		
TDS	1,173.78	1,341.77	689.2		

	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	10	10	10	10	10
SPI Applied	33.10	33.10	33.10	33.10	33.10
Flow Allowance	0.848	0.848	0.848	0.848	0.848
Recovery %	7.696	7.916	8.137	8.354	8.556
Feed Flow(gal/min)	39.68	36.63	33.73	30.98	28.40
Perm Flow(gal/min)	3.054	2.899	2.745	2.588	2.430
Conc Flow(gal/min)	36.63	33.73	30.98	28.40	25.97
Flux(gfd)	10.991	10.435	9.878	9.316	8.744
Beta	1.141	1.140	1.139	1.138	1.136
Feed Press(psi)	74.13	72.45	70.94	69.58	68.37
DP(psi)	1.678	1.511	1.358	1.219	1.092
Conc Press(psi)	72.45	70.94	69.58	68.37	67.27
Perm Press(psi)	0.0	0.0	0.0	0.0	0.0
Pi_Feed(psi)	13.884	15.021	16.287	17.701	19.280
Pi_Memb(psi)	16.465	17.821	19.328	21.00	22.86
Pi_Conc(psi)	15.024	16.291	17.705	19.285	21.05
Pi_Perm(psi)	0.117	0.136	0.159	0.188	0.230
Net Press(psi)	56.92	53.98	51.06	48.11	45.13
Pass 1 Stage 2	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m ² / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	10.000	10.000			
SPI Applied	33.10	33.10			
Flow Allowance	0.848	0.848			
Recovery %	8.729	8.857			
Feed Flow(gal/min)	25.97	23.70			
Perm Flow(gal/min)	2.267	2.099			
Conc Flow(gal/min)	23.70	21.60			
Flux(gfd)	8.158	7.554			
Beta	1.133	1.130			
Feed Press(psi)	67.27	66.30			
DP(psi)	0.978	0.875			
Conc Press(psi)	66.30	65.42			
Perm Press(psi)	0.0	0.0			
Pi_Feed(psi)	21.04	23.01			
Pi_Memb(psi)	24.92	27.18			
Pi_Conc(psi)	23.01	25.19			
Pi_Perm(psi)	0.282	0.350			
Net Press(psi)	42.08	38.95			

	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.458	0.535	0.627	0.739	0.908
Mg	0.053	0.0619	0.0726	0.0857	0.105
Na	2.691	3.140	3.677	4.331	5.317
K	0.312	0.364	0.426	0.502	0.616
Ba	0.0003	0.0004	0.0005	0.0006	0.0007
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.273	0.318	0.372	0.438	0.537
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	2.540	2.945	3.447	4.073	4.978
Cl	2.077	2.427	2.847	3.359	4.132
SO4	0.150	0.176	0.206	0.243	0.300
NO3	4.005	4.665	5.453	6.409	7.850
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.723	0.822	0.939	1.080	1.249
PO4	0.0018	0.0021	0.0025	0.003	0.0037
CO3	0.0002	0.0003	0.0004	0.0005	0.0007
CO2	2.267	2.370	2.512	2.668	2.839
pH	6.310	6.353	6.395	6.443	6.500
TDS	13.286	15.457	18.071	21.26	26.00
Perm mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2		
Ca	1.120	1.390	0.788		
Mg	0.130	0.162	0.0914		
Na	6.558	8.130	4.616		
K	0.760	0.943	0.535		
Ba	0.0008	0.001	0.0006		
Sr	0.0	0.0	0.0		
NH4	0.662	0.820	0.467		
Fe	0.0	0.0	0.0		
HCO3	6.139	7.634	4.332		
Cl	5.106	6.346	3.585		
SO4	0.370	0.461	0.260		
NO3	9.655	11.930	6.820		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	1.456	1.712	1.100		
PO4	0.0045	0.0056	0.0032		
CO3	0.001	0.0014	0.0006		
CO2	3.026	3.230	2.662		
pH	6.562	6.630	6.431		
TDS	31.96	39.53	22.60		
Feed mg/l Pass 1 Stage 2					

	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	90.44	97.95	106.3	115.7	126.2
Mg	29.45	31.90	34.64	37.70	41.13
Na	315.4	341.5	370.6	403.1	439.4
K	36.10	39.08	42.41	46.13	50.29
Ba	0.0678	0.0735	0.0797	0.0868	0.0946
Sr	0.0	0.0	0.0	0.0	0.0
NH4	15.255	16.505	17.896	19.448	21.18
Fe	0.136	0.147	0.160	0.174	0.190
HCO3	335.8	363.2	393.7	427.9	466.0
Cl	407.0	440.8	478.4	520.6	567.7
SO4	179.1	194.0	210.7	229.3	250.2
NO3	88.25	95.28	103.1	111.7	121.3
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	47.34	51.22	55.56	60.39	65.80
PO4	4.308	4.667	5.068	5.517	6.020
CO3	4.981	5.631	6.312	7.098	8.008
CO2	2.267	2.370	2.512	2.668	2.839
pH	8.358	8.370	8.378	8.385	8.393
TDS	1,553.62	1,681.91	1,824.96	1,984.80	2,163.55
Feed mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2		
Ca	137.9	151.0	90.44		
Mg	44.97	49.26	29.45		
Na	480.1	525.4	315.4		
K	54.94	60.12	36.10		
Ba	0.103	0.113	0.0678		
Sr	0.0	0.0	0.0		
NH4	23.11	25.26	15.255		
Fe	0.208	0.228	0.136		
HCO3	508.6	556.0	335.8		
Cl	620.4	679.3	407.0		
SO4	273.6	299.7	179.1		
NO3	131.9	143.6	88.25		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	71.84	78.57	47.34		
PO4	6.583	7.212	4.308		
CO3	9.061	10.278	4.981		
CO2	3.026	3.230	2.267		
pH	8.400	8.408	8.358		
TDS	2,363.30	2,585.99	1,553.62		



System Overview Report

Project	WIGEN\tim.seibert 95:Palmdale 3rd Stage		
Case	1	Palmdale 3rd Stage	
Revision	2	New Revision	
Calculation Mode	Feed Water Type: RO Permeate; AutoBalance is ON		
Errors, Warnings, Cautions and Notices	Errors:0, Warnings:0,Cautions:0,Notices:5. See Important Notes at end /E		
Database Info :	Project Database : C:\Users\tim.seibert\OneDrive - Wigen Water Technologies\Documents\TorayDS2\App_Data\DS2.sdf(Ver:2.7) Membrane Database (V.20160) :C:\Users\tim.seibert\OneDrive - Wigen Water Technologies\Documents\TorayDS2\App_Data\TorayMembrane.sdf.		

		Overall	Pass 1		
Raw water TDS	mg/l	2,833.1	2,833.1		
EC @25C / @19.20C	uS	4,167.7 / 3,624.7	4,167.7 / 3,624.7		
Feed Pressure	psi	0.0	197.8		
Temperature	deg C	19.200			
Total DP	psi	14.140	14.140		
Brine Pressure	psi	183.7	183.7		
Flow Allowance	3.00 yrs		0.848		
SP % Increase (Max)	3.00 yrs		33.10%		
Recovery	%	72.00%	72.0%		
Feed Flow	gal/min	15.000	15.000		
Product Flow	gal/min	10.800	10.800		
Average Flux	gfd	22.34	22.34		
Concentrate Flow	gal/min	4.200	4.200		
Product TDS	mg/l	47.35	47.35		
Concentrate TDS	mg/l	9,982	9,982		
Primary HP Pump kW	kilowatt	1.616	1.616		
Power Consumption	kWh/m ³	0.659	0.659		
Ions		Feed	Net Feed	Conc	Product
Ca	mg/l	165.5	165.5	586.7	1.697
Mg	mg/l	54.03	54.03	192.5	0.198
Na	mg/l	575.6	575.6	2,030	9.901
K	mg/l	65.87	65.87	232.3	1.150
Ba	mg/l	0.124	0.124	0.440	0.0013
Sr	mg/l	0.0	0.0	0.0	0.0
NH4	mg/l	27.64	27.64	96.16	0.992
Fe	mg/l	0.250	0.250	0.893	0.0
HCO3	mg/l	608.6	608.6	2,118	9.309
Cl	mg/l	747.7	747.7	2,650	7.861

SO4	mg/l	328.8	328.8	1,173	0.570
NO3	mg/l	156.4	156.4	521.9	14.253
F	mg/l	0.0	0.0	0.0	0.0
Br	mg/l	0.0	0.0	0.0	0.0
B(Boron)	mg/l	0.0	0.0	0.0	0.0
SiO2	mg/l	86.04	86.04	303.7	1.409
PO4	mg/l	7.912	7.912	28.24	0.007
CO3	mg/l	8.626	8.626	48.02	0.0011
CO2	mg/l	5.696	5.696	12.651	7.069
TDS	mg/l	2,833	2,833	9,982	47.35
EC @25C / @19.20C	uS	4,168 / 3,625	4,168 / 3,625	12,906 / 11,254	77.7 / 67.2
pH	pH	8.200	8.200	8.345	6.260
Osmotic Press (DS1 / Pitzer)	psi	25.193 / 21.71	25.193 / 21.71	87.359 / 73.47	0.421 / 0.38
LSI / SDSI		1.46 / 1.42	1.46 / 1.42	2.51 / 2.24	-3.83 / -4.01
CaSO4 / SrSO4 %	%	7.8% / 0.0%	7.8% / 0.0%	39.7% / 0.0%	0.0% / 0.0%
BaSO4 / SiO2 %	%	550.8% / 58.2%	550.8% / 58.2%	2399.1% / 192.1%	
Pitzer % Solubility	Calcite/Dolomite	1,358% / 37,562%	1,358% / 37,562%	12,792% / 3,300,980%	
Pitzer % Solubility	CaSO4/SrSO4	9% / 0%	9% / 0%	43% / 0%	

Stage/Bank Data	Pass1	Stage 1
Lead Element Type		TMG10D
Last Element Type		TMG10D
Total Elements	8	8
Total Vessels	1	1
Elements per Vessel		8
Feed Flow	gal/min	15.000
Product Flow	gal/min	10.800
Average Flux	gfd	22.34
Brine Flow	gal/min	4.200
Recovery %	%	72.00 %
Feed Pressure	psi	197.8
dP Elements	psi	14.140
Boost Pressure	psi	0.0
Piping Loss	psi	0.0
Net (Boost - dP piping)	psi	0.0
Brine Pressure	psi	183.7
Permeate Pressure	psi	5.000
Feed TDS	mg/l	2,833
Perm TDS	mg/l	47.35
Lead Element	Pass1	Stage 1
Feed Flow	gal/min	15.000
Product Flow	gal/min	1.707

Product TDS	mg/l	17.200
Flux	gfd	28.24
Last Element	Pass1	Stage 1
Product Flow	gal/min	0.940
Product TDS	mg/l	104.8
Brine/Product Ratio	ratio	4.468
Brine Flow	gal/min	4.200
Net Driving Pressure	psi	76.26
Beta		1.310

Chemicals 100%. Disclaimer: These estimated dose rates are provided as a courtesy to Toray DS2 users and are not guaranteed.

No Chemicals Added

Errors

Warnings

Cautions

Notices

1. Conc Stiff Davis Index = 2.25 Warning - the Stiff Davis Index (SDSI) is greater than 0. Scale inhibitor required.

See <https://rpicalc.ropur.com> for detailed calculation

2. Conc BaSO4 % Sat'n = 2399.10 Warning - concentrate barium sulfate exceeds saturation.

3. Conc SiO2 % Sat'n = 192.10 Warning - concentrate silica exceeds saturation.

4. Pass 1 : SPIs are unequal.

5. Pass 1 : FAs are unequal.

Disclaimer : The program is intended to be used by persons having technical skill, at their own discretion and risk. The projections, obtained with the program, are the expected system performance, based on the average, nominal element-performance and are not automatically guaranteed. Toray shall not be liable for any error or miscalculation in the program. The obtained results cannot be used to raise any claim for liability or warranty. It is the users responsibility to make provisions against fouling, scaling and chemical attacks, to account for piping and valve pressure losses, feed pump suction pressure and permeate backpressure. For questions please contact us:

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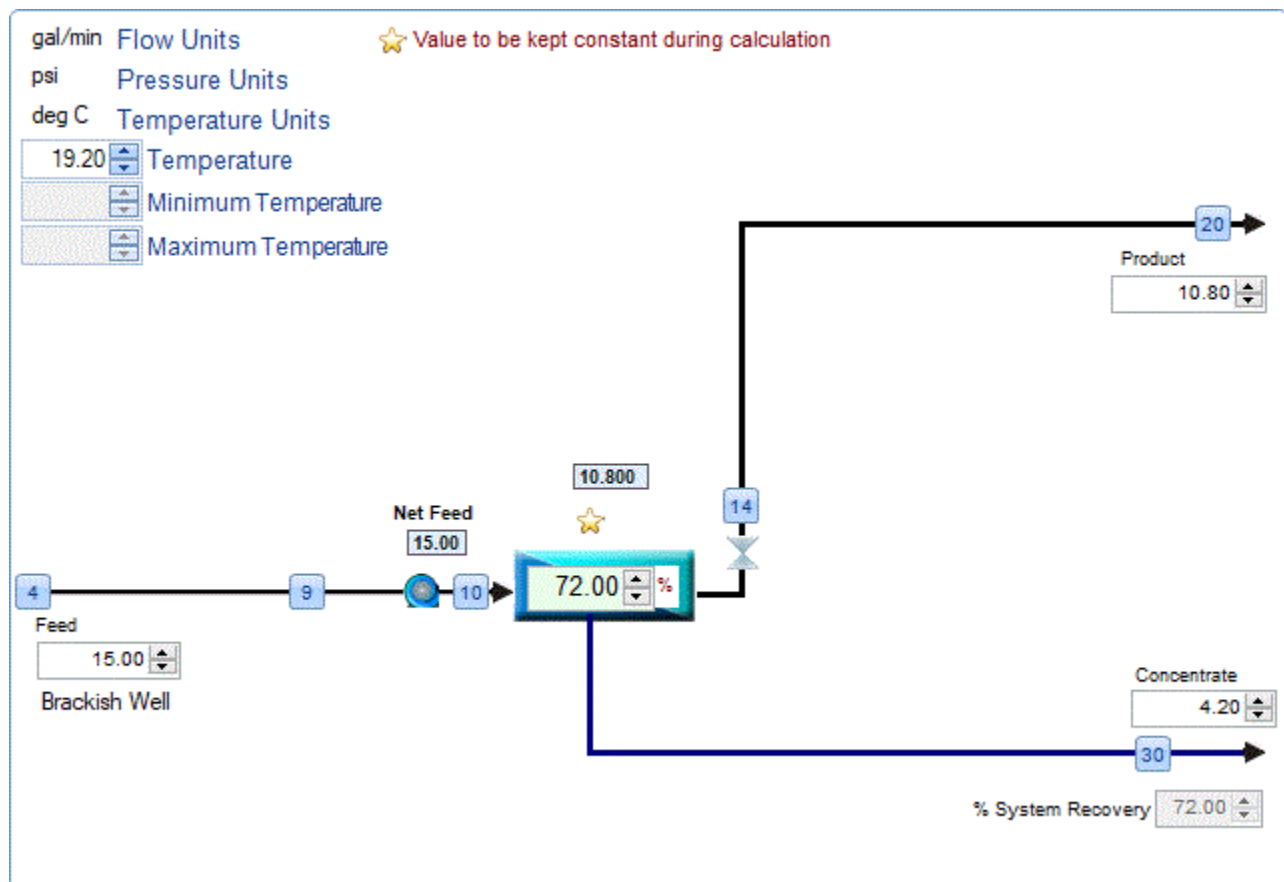
Toray Advanced Materials Korea Inc.
KoreaToray R&D Center 7, Magokdong-ro10-gil, Gangseo-gu, Seoul, 07790, Republic of Korea

TEL +82-2-3279-7389 FAX +82-2-3279-7088

<http://www.toraywater.com/>

Date/Time :	11/4/2022 1:53:29 PM
Project	WIGEN\tim.seibert 95:Palmdale 3rd Stage
Case :	1:Palmdale 3rd Stage
Revision :	2:New Revision
User name :	WIGEN\tim.seibert
Prepared for :	
Notes :	
Membrane Database	
Version Number:	20160
ReleaseDate:	5/31/2021
UpdateBy:	YK
Toray DS2 version :	2.2.3.199(1.2.6.118)

Flow Diagram:



Stream Details					
Stream Number	Flow	Pressure	TDS	Est uS	pH
20. Final Product	10.800	5.000	47.35	66.9	6.260
4. Feed Net	15.000	0.0	2,833.09	3,605.9	8.200

10. Feed to Pass 1	15.000	197.8	2,833.09	3,605.9	8.200
30. Conc to brine	4.200	183.7	9,981.67	11,197.5	8.345

Element Details in Pass 1

Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG10D	TMG10D	TMG10D	TMG10D	TMG10D
Area m ² / dia inch	8.08 / 4	8.08 / 4	8.08 / 4	8.08 / 4	8.08 / 4
Age	3	3	3	3	3
SPI %/yr	10	10	10	10	10
SPI Applied	33.10	33.10	33.10	33.10	33.10
FLOW Allowance	0.848	0.848	0.848	0.848	0.848
Recovery %	11.377	12.221	13.165	14.185	15.223
Feed Flow(gal/min)	15.000	13.293	11.669	10.133	8.695
Perm Flow(gal/min)	1.707	1.625	1.536	1.437	1.324
Conc Flow(gal/min)	13.293	11.669	10.133	8.695	7.372
Flux(gfd)	28.24	26.88	25.42	23.78	21.90
Beta	1.295	1.302	1.310	1.317	1.320
Feed Press(psi)	197.8	194.5	191.7	189.5	187.7
DP(psi)	3.385	2.765	2.231	1.778	1.400
Conc Press(psi)	194.5	191.7	189.5	187.7	186.3
Perm Press(psi)	5.000	5.000	5.000	5.000	5.000
Pi_Feed(psi)	25.19	28.37	32.24	37.03	43.01
Pi_Memb(psi)	34.53	39.30	45.17	52.42	61.39
Pi_Conc(psi)	28.38	32.25	37.04	43.03	50.56
Pi_Perm(psi)	0.153	0.195	0.251	0.330	0.444
Net Press(psi)	156.7	148.9	140.6	131.4	120.9
Pass 1 Stage 1	Element 6	Element 7	Element 8		
Model	TMG10D	TMG10D	TMG10D		
Area m ² / dia inch	8.08 / 4	8.08 / 4	8.08 / 4		
Age	3.000	3.000	3.000		
SPI %/yr	10.000	10.000	0.0		
SPI Applied	33.10	33.10	0.0		
FLOW Allowance	0.848	0.848	0.955		
Recovery %	16.166	16.826	18.289		
Feed Flow(gal/min)	7.372	6.180	5.140		
Perm Flow(gal/min)	1.192	1.040	0.940		
Conc Flow(gal/min)	6.180	5.140	4.200		
Flux(gfd)	19.718	17.205	15.554		
Beta	1.318	1.306	1.310		
Feed Press(psi)	186.3	185.2	184.4		
DP(psi)	1.090	0.844	0.648		
Conc Press(psi)	185.2	184.4	183.7		
Perm Press(psi)	5.000	5.000	5.000		
Pi_Feed(psi)	50.54	60.01	71.78		
Pi_Memb(psi)	72.38	85.51	103.5		

Pi_Conc(psi)	60.05	71.83	87.42
Pi_Perm(psi)	0.616	0.880	0.934
Net Press(psi)	108.8	94.96	76.26

Perm mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.606	0.777	1.003	1.322	1.787
Mg	0.0704	0.0903	0.117	0.154	0.209
Na	3.549	4.543	5.867	7.727	10.432
K	0.411	0.527	0.681	0.897	1.211
Ba	0.0005	0.0006	0.0008	0.001	0.0013
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.357	0.457	0.590	0.776	1.046
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	3.365	4.269	5.518	7.235	9.776
Cl	2.787	3.572	4.622	6.101	8.259
SO4	0.202	0.259	0.335	0.442	0.599
NO3	5.183	6.622	8.532	11.207	15.077
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.666	0.790	0.956	1.182	1.501
PO4	0.0025	0.0032	0.0041	0.0054	0.0073
CO3	0.0002	0.0003	0.0004	0.0006	0.001
CO2	5.696	5.483	5.924	6.535	7.282
pH	6.028	6.145	6.223	6.295	6.378
TDS	17.200	21.91	28.23	37.05	49.90

Perm mg/l Pass 1 Stage 1	Element 6	Element 7	Element 8	Stage 1
Ca	2.483	3.561	3.791	1.697
Mg	0.290	0.418	0.446	0.198
Na	14.486	20.74	22.05	9.901
K	1.682	2.411	2.565	1.150
Ba	0.0019	0.0027	0.0028	0.0013
Sr	0.0	0.0	0.0	0.0
NH4	1.450	2.073	2.198	0.992
Fe	0.0	0.0	0.0	0.0
HCO3	13.625	19.507	20.77	9.309
Cl	11.507	16.547	17.681	7.861
SO4	0.835	1.202	1.286	0.570
NO3	20.84	29.68	31.33	14.253
F	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0
SiO2	1.965	2.664	2.688	1.409
PO4	0.0102	0.0147	0.0157	0.007
CO3	0.0018	0.0033	0.0032	0.0011

	8.198	9.314	10.772	7.069
pH	6.470	6.568	6.530	6.260
TDS	69.18	98.83	104.8	47.35

Feed mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	165.5	186.7	212.6	244.6	284.8
Mg	54.03	60.96	69.43	79.94	93.13
Na	575.6	649.0	738.8	849.9	989.1
K	65.87	74.27	84.54	97.25	113.2
Ba	0.124	0.140	0.159	0.183	0.213
Sr	0.0	0.0	0.0	0.0	0.0
NH4	27.64	31.14	35.41	40.69	47.29
Fe	0.250	0.282	0.321	0.370	0.431
HCO3	608.6	686.8	780.4	896.2	1,041.05
Cl	747.7	843.3	960.2	1,105.12	1,286.78
SO4	328.8	371.0	422.6	486.6	567.0
NO3	156.4	175.8	199.4	228.3	264.2
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	86.04	97.00	110.4	127.0	147.8
PO4	7.912	8.927	10.170	11.711	13.646
CO3	8.626	9.537	11.633	14.228	17.674
CO2	5.696	5.483	5.924	6.535	7.282
pH	8.200	8.263	8.280	8.293	8.305
TDS	2,833.09	3,194.90	3,636.05	4,182.17	4,866.28
Feed mg/l Pass 1 Stage 1	Element 6	Element 7	Element 8	Stage 1	
Ca	335.7	399.9	480.1	165.5	
Mg	109.8	130.9	157.3	54.03	
Na	1,164.82	1,386.65	1,662.96	575.6	
K	133.3	158.7	190.3	65.87	
Ba	0.251	0.300	0.360	0.124	
Sr	0.0	0.0	0.0	0.0	
NH4	55.60	66.04	78.98	27.64	
Fe	0.509	0.607	0.730	0.250	
HCO3	1,223.49	1,453.27	1,739.04	608.6	
Cl	1,516.36	1,806.55	2,168.66	747.7	
SO4	668.7	797.5	958.6	328.8	
NO3	308.9	364.5	432.2	156.4	
F	0.0	0.0	0.0	0.0	
Br	0.0	0.0	0.0	0.0	
B	0.0	0.0	0.0	0.0	
SiO2	174.0	207.2	248.6	86.04	
PO4	16.095	19.197	23.08	7.912	
CO3	22.31	28.59	36.61	8.626	

	8.198	9.314	10.772	5.696
pH	8.318	8.330	8.338	8.200
TDS	5,729.85	6,819.87	8,177.49	2,833.09

P A L M D A L E W A T E R D I S T R I C T
B O A R D M E M O R A N D U M

DATE: December 6, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Scott Rogers, Engineering Manager
VIA: Mr. Adam Ly, Assistant General Manager
Mr. Dennis LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 8.6 – CONSIDERATION AND POSSIBLE ACTION ON AUTHORIZING STAFF TO NEGOTIATE AND EXECUTE A SERVICES CONTRACT WITH BIWATER, INC. FOR ENGINEERING SUBMITTALS FOR A REVERSE OSMOSIS SYSTEM FOR THE PURE WATER AV DEMONSTRATION FACILITY AND AGREE TO THE PURCHASING TERMS FOR THE PRESENT PRICING OF THE EQUIPMENT. (\$539,730.31 NOT-TO-EXCEED – BUDGETED – ENGINEERING MANAGER ROGERS)***

Recommendation:

Staff recommends that the Board authorizes staff to negotiate and execute a services contract with Biwater, Inc. for engineering submittals for a Reverse Osmosis System for the Pure Water AV Demonstration Facility and agree to the purchasing terms for the present pricing of equipment in the amount not-to-exceed \$539,730.31.

Alternative Options:

Reject all proposals and rebid the project.

Impact of Taking No Action:

It will delay the Pure Water AV Demonstration Facility project that includes demonstration testing for permitting approval and full-scale design criteria development.

Background:

Staff and the District’s program manager, Stantec, have been pursuing the implementation of Pure Water Antelope Valley (Pure Water AV), which will be a regional recycled water program to address and improve water supply resiliency and groundwater aquifer management. Pure Water AV is planned to be an indirect potable reuse (IPR) project to be permitted under Title 22 Code of California Regulations for groundwater augmentation via direct injection. The District has plans to construct an Advanced Water Treatment Demonstration Facility (Demonstration Facility) to provide a place for public education, training and tours, demonstration testing for permitting approval, and full-scale design criteria development.

BOARD OF DIRECTORS
PALMDALE WATER DISTRICT

VIA: Mr. Adam Ly, Assistant General Manager
Mr. Dennis D. LaMoreaux, General Manager

December 6, 2022

Staff prepared a solicitation and collected proposals from vendors that meet the technical specifications for the Reverse Osmosis System. The proposals collected provide treatment technology that is required for demonstration testing and regulatory approval. Ultimately, the treatment systems from demonstration testing will be incorporated into the full-scale design.

Staff received three proposals from vendors and plans to preselect a vendor and execute a contract for the design submittal production (Phase 1) and establish a guaranteed price for the equipment, construction, and startup support services (Phase 2). The services contract for Phase 1 will require the Phase 2 price to be a guaranteed not-to-exceed amount with an adjustment factor based on the contract terms and California Construction Cost Index as produced by Engineering News Record. The general construction contract will be brought to the Board for approval.

When the District requests bids for the Demonstration Facility (between June and July 2023), the approved design submittal package from the selected vendor is intended to be included in the general construction contract. At that time, the selected vendor would be required to supply the Phase 2 equipment and services at the guaranteed price under a subcontract or purchase order to the selected contractor that will construct the Demonstration Facility.

The vendor's experience related to the Pure Water AV project has been utilized to evaluate the general competency of the vendor for the equipment needed to meet technical specifications, purchasing costs, and life cycle costs. Biwater, Inc. is the qualified bidder by meeting the criterion set forth in the solicitation with a price of \$539,730.31.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 3 – Systems Efficiency.
This item directly relates to the District's Mission Statement.

Budget:

This item is budgeted and will be covered as part of Work Order No. 22-653.

Supporting Documents:

- Bid Results Summary
- Proposal Package from Biwater, Inc.

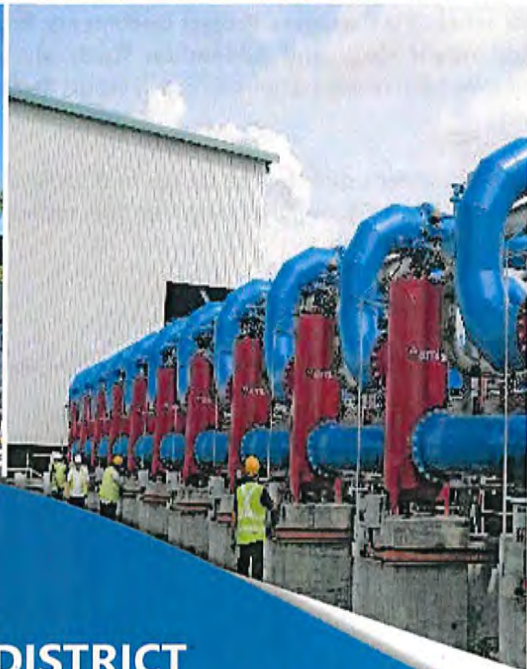
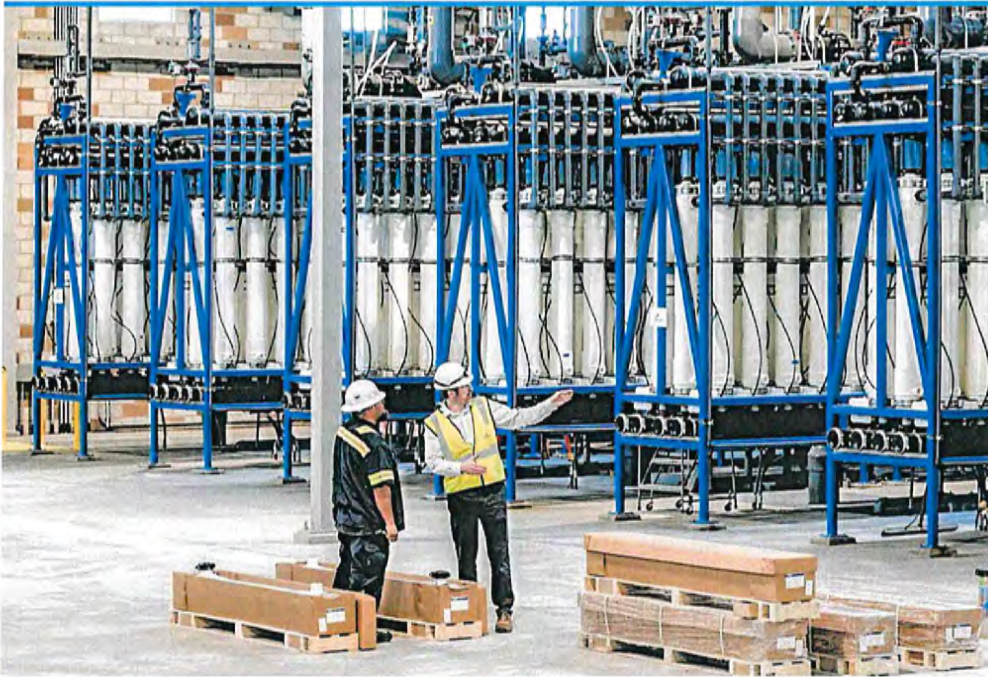


AWT Demo Facility
RO System

Vendor Proposals

FIRM	Biwater	H2O Innovation	Wigen
Contact	Richard White	Shayan Yaghoubi	Michael Bourke
Phone	(909) 599-4129	(619) 884-5834	(303) 884-0694
Email	richard.white@biwater.com	shayan.yaghoubi@h2oinnovation.com	michael.bourke@wigen.com
Criteria	Value	Value	Value
Meets the Design Criteria (Y/N)	Yes	Yes	Yes
Phase 1 Schedule (weeks)	(missing from proposal)	8	10
Phase 2 Schedule (weeks)	14 to 16	25 to 26	28
Warranty Provisions (months)	12-months from start-up for equipment and workmanship 18-months from shipment for equipment and workmanship (24-month extended warranty provided for RO System only) 3-year pro-rated RO membrane warranty	24-months from start-up for equipment and workmanship 30-months from shipment for equipment and workmanship (no pro-rated warranty for RO membranes identified in proposal)	24-months from Final Acceptance for equipment and workmanship 18-months from shipment for equipment and workmanship 3-year pro-rated RO membrane warranty
Required Skid Dimensions (L x W x H)	25' x 5.5' x 11.5' (RO skid) 7' x 7' x 8' (RO CIP skid)	25' x 5.5' x 11.5' (RO skid) 7' x 7' x 8' (RO CIP skid)	25' x 5.5' x 11.5' (RO skid) 7' x 7' x 8' (RO CIP skid)
Proposed Skid Dimensions (L x W x H)	25'4-3/8" x 5'6" x 7' 4-7/8" (RO skid) 6' x 4' x 7' (RO CIP skid)	29' x 5' x 8' (RO skid) 2'-8" x 4'-7" x 2' (RO CIP skid x 2) 6.5' x 2.2' x 5' (air compressor with receiver tank)	26'-4" x 5' x 7' (RO skid) 7'-11" x 6' x 7'-3" (RO CIP skid)
Base Fee Proposal	\$509,730.31	\$545,823.00	\$927,450.32
Value Engineering (VE) Options Cost Savings	(see notes below)	(see notes below)	(\$328,300.00)
Potential Cost Adders	\$30,000.00	\$65,570.00	(see notes below)
Total Fee Proposal with VE Savings	\$539,730.31	\$611,393.00	\$599,150.32
Recommended Proposal Ranking	1	3	2
	<p>Notable Exceptions/Clarifications</p> <ol style="list-style-type: none"> Proposing single combined master PLC control system for selection of both MF and RO proposals. Where only one unit process is selected, add \$30,000 per Biwater clarification email. Proposal is missing redundant chemical dosing pumps per Section 46 30 01.2.1.E. Biwater indicated two additional pumps can be provided at no cost. Bid deduction for single supplier of MF and RO systems (\$5,000 for engineering and \$20,000 for equipment). 	<p>Notable Exceptions/Clarifications</p> <ol style="list-style-type: none"> Proposed RO skid footprint does not comply with the specifications. H2O noted the general arrangement drawing in the proposal was an 8 element vessel. The 7 element vessel will be smaller and should meet the specified footprint. The proposal is based H2O's standard Osmoflex RO skid, which incorporates a shared CIP/Flush skid. Price adder for standalone flush skid \$34,615. The proposal is missing the second stage feed mag meter. H2O noted the flow can be calculated by considering the feed flow and permeate flow. The design approach is based on flow measurement for feed and concentrate and not on the permeate side due to low conductivity of permeate. H2O notes a mag meter on the second stage feed can be provided for a cost adder of \$3,565, excluding taxes. Proposal includes metering pumps that are different from those listed in the Contract Documents. H2O noted the decision to use the DDA style pumps was cost driven. Peristaltic pumps can be provided at a cost adder of ~\$2,500 per pump. Proposal is based on the use of Bray valves and double acting pneumatic actuators. Exception taken to the requirements of Section 40 91 00. H2O noted the proposal defaulted to standard controls approach as a cost driven decision due to such a small scope. Scope of work listed can be provided but will increase the cost. The proposal indicates PE tubing will be provided for sulfuric acid dosing. This is not acceptable. H2O noted PVDF material can be supplied on the sulfuric acid dosing skid. A cost adder of \$9,615, excluding taxes will apply. Proposal indicates standard SUPPLIER tagging will be provided. H2O indicates custom tagging van be provided for added cost of \$17,775. Bid deduction for single supplier of MF/RO systems (\$38,700 for engineering and \$21,800 for equipment). 	<p>Notable Exceptions/Clarifications</p> <ol style="list-style-type: none"> Proposal includes metering pumps that are different from those listed in the Contract Documents. The Contract Documents require peristaltic pumps for all chemicals with the exception of stepping motor diaphragm or gear pumps for sulfuric acid. Wigen noted peristaltic pumps can be provide but this may increase the cost (DDA pumps cost considerably less than the specified pump suppliers). Value Engineering Options proposed (total above captures <i>only</i> the accepted options below): <ul style="list-style-type: none"> -\$71,900.00 for use of Bray valves and actuators (accept offer)(needs further negotiation as additional savings were identified by Wigen) -\$14,400.00 for combined UF AND RO PLC controls (reject offer where MF system is not selected) -\$79,800.00 for shared UF AND RO CIP system (reject offer where MF system is not selected) -\$7,500.00 for RO CIP cartridge filter deduct (consider rejecting offer) -\$24,000.00 for Wigen antiscalant and acid skid (accept offer) -\$27,200.00 for use of standard feed, transfer and CIP pumps instead of stainless steel. (consider hybrid approach on select pumps and piping) -\$16,300.00 for use of 316 stainless steel interstage booster pump instead of duplex stainless steel. (accept offer) -\$11,150.00 for use of 316 stainless steel piping for all concentrate piping except third stage RO. (accept offer) -\$13,550.00 for use of Rosemount pressure transmitters and IFM Effector temperature analyzers instead of specified. (accept offer) -\$20,000.00 deduct if notice to fabricate is issued immediately following approved shop drawings with negotiated factory storage. (consider negotiating) Proposal is missing redundant chemical dosing pumps per Section 46 30 01.2.1.E. Wigen noted redundant pumps can be provided. Proposing to build chemical pump skids in-house as this will eliminate potential for cost increase. Bid deduction for single supplier of MF and RO systems (\$50,000 total)





Proposal for
**PALMDALE WATER DISTRICT
PURE WATER AV- DEMONSTRATION
FACILITY MEMBRANE FILTRATION AND
REVERSE OSMOSIS SYSTEM**

Submitted by Biwater Inc.

November 2022



04 November 2022

Palmdale Water District
2029 East Avenue Q
Palmdale, CA 93550

Attention: Jaron Hollida, Assistant Engineer
Email: jhollida@palmdalewater.org

Dear Jaron,

**RE: Pure Water AV – Demonstration Facility Membrane Filtration and Reverse Osmosis System
- Bid Submission**

In response to the Request For Proposal (“RFQ”) from Palmdale Water District (“PWD”) for the captioned project “**Pure Water AV – Demonstration Facility Membrane Filtration and Reverse Osmosis System**” (the “Project”), located in Palmdale, CA, we, **Biwater Inc.** (“**Biwater**”), is pleased to submit this proposal (“**Biwater’s Proposal**” or “**Proposal**”) for PWD’s consideration.

We have received the complete set of **RFQ Package – Project Documents**, together with the Addenda issued: **Addendum No.1, Addendum No.2, and Addendum No.3**, which are available through OPENGOV Procurement Portal. We have reviewed the said Bid Package, and understood the purpose and requirements of the Project.

The Proposal as enclosed presents Biwater’s offer for the design and supply for the Project, including the services of system testing, start-up and commissioning and the support services as requested. Pricing and scope information are also included.

Please kindly review the Proposal submitted.

We look forward to working with PWD and the Engineer’s team for this Project.

For and on behalf of
Biwater Inc.

Richard White

Aaron O'Donnell



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***A. Integrated Treatment System
- Membrane Filtration and Reverse Osmosis Systems***

A.1 Scope of Supply



A.1 Scope of Supply, Exclusions, Comments and Exceptions

1 Biwater's Scope of Supply

In general, scope of supply included in this Proposal comprises of design, supply (on delivery to job-site basis), supervision of installation, supervision of start-up, commission and performance tests of Biwater's supplied electro-mechanical, instrument and control equipment as described in this Proposal.

Please read below in conjunction with the enclosed PID showing Biwater's scope of supply and battery limits for the supply.

Biwater's scope of supply is summarized as follows:

- 1) **Design and engineering** for the **Membrane Filtration System** and **Reverse Osmosis System** and associated electro-mechanical equipment, instrument, controls and associated piping and wiring materials. Submittals shall include shop drawings, specifications, product datasheets, design calculations of the followings as specified in Owner's Request for Proposal (RFP) Documents:
 - a) System Skids of Membrane Filtration Systems, Chemical Metering Systems, and Compressed Air System
 - b) System Skid of Reverse Osmosis System, CIP Systems, and Chemical Metering Systems
 - c) Mechanical design and engineering calculations
 - d) Electro-mechanical equipment
 - e) Membranes and Vessels/Housings
 - f) Valves and actuators
 - g) Instrumentation
 - h) PLC and associated panels
 - i) Pipes and associated fittings specifications
 - j) Tanks
 - k) Other associated hardware to complete the system

Structural calculations for skid frame (including skid anchorage requirements) endorsed by a registered Professional Engineer per specification requirements is included.

- 2) **Supply** of electro-mechanical equipment, instrument, controls and associated skid piping and wiring materials, as shown in the attached PID drawings, and critical spare parts, on delivery to job-site basis.
- 3) **Execution**
 - a) **Installation of Membrane Elements**

Biwater will provide a qualified representative to supervise the loading and unloading of the membrane elements. Biwater shall NOT BE RESPONSIBLE for any tools, labor, equipment,



incidental materials or any other required materials or services not specifically included in the scope of supply as set forth herein.

b) **Manufacturer's Representative**

Biwater will provide the services of manufacturer's representatives for Biwater supplied equipment as maybe required to comply with the applicable specification requirements, if any.

c) **Membrane System Equipment Protection**

Biwater will conform to the membrane system equipment protection requirements as set forth in the project specification, if any, or as may be necessary to reasonably protect the equipment during shipping. The Contractor shall be solely responsible for any damage to the equipment during off loading at site, during storage, setting, installation, erection, test and checkout, and acceptance testing until final hand over to the owner.

d) **Biwater's Support Services for Installation SUPERVISION, Start-up, Testing and Training**

On-site support services are included in Biwater's lump-sum price as set forth herein. The time allocated for each identified task is, in Biwater's opinion, adequate and sufficient to complete each identified task; provided, however, that Biwater is permitted to prosecute its work in a prompt, efficient, and workmanlike manner, without delay or interruption, and that all necessary and reasonable construction pre-requisites have been accomplished by Contractor with respect to site conditions, including, but not limited to, the continuous availability of acceptable quality feed water, the complete installation, test and check-out of all ancillary equipment, systems and subsystems, plant control systems and all other pre-conditions to system commissioning.

Please refer to **Chapter D – Support Services** of this Proposal for details.

e) **Operation Support Service**

Biwater will provide 12-month operations support service as a package to the Owner. The services will be provided during the first 12-month of operations (concurrent with the 12-month warranty period).

Please refer to **Chapter D – Support Services** of this Proposal for details.

f) **Other Optional Technical Services**

Biwater will provide the number of days together with the number of trips as set forth in paragraph (d) & (e) above, compensation for which is included in Biwater's lump sum price as set forth herein. In the event that the Contractor or the Owner requires additional time for on-site services, Biwater shall provide such services at its standard field service day rate as summarized below, portal to



portal, plus all direct expenses as actual plus 10%. The Owner or the Contractor shall provide Biwater with a minimum of 1-week prior notice of the scheduled arrival on site of the Biwater field representatives. Installation supervision will be billed monthly. Additional terms and conditions of Biwater's Standard Field Service Policy will be provided upon request.

Capacities of the Service Personnel	Daily Rates* (USD/man-day)
Senior Field Engineer / Programmer	1,400
Field Engineer	1,200

g) **Delays**

In the event that Biwater's performance is delayed or interfered with by acts of Owner, Contractor, or other Subcontractors Biwater is entitled to a time extension and an adjustment in contract price, but only if, and then only to the extent that, such delay or interference results in Biwater incurring additional costs, expenses or such other financial loss beyond its control as a result of such delay or interference. The intent of this paragraph is that Biwater be kept in the same financial position as it otherwise would have been in but for delays beyond Biwater's reasonable control.

4) **Warranty**

a) **Membrane Elements**

Biwater will pass on the membrane elements warranties provided by the membrane elements manufacturer.

b) **Equipment and Components**

In general, Biwater will provide limited warranty on workmanship and materials supplied for **twelve (12) months**, starting from the date of Completion of 7-day Plant Wide Performance Test (Substantial Completion), or for 18 months from delivered to job-site, whichever comes first. The warranty provided is subject to terms and conditions applied.

For the supplied Reverse Osmosis System, extended overall **twenty-four (24) months** warranty duration will be provided, as per **Article 1.6 in Owner's Specification 46 63 23**.

Please refer to **Chapter A.2 – Warranty** of this Proposal for details.



2 Exclusions

All items not specifically listed in the scope of work including the following equipment, materials and services are excluded from Biwater's scope of work and supply:

- Interconnecting piping and manual valves
- Interconnecting electrical, communication
- Interconnecting Tanks, outside equipment skids
- Power, fuel, water, chemicals and consumables.
- Water supply and disposal during setup, testing and operation.
- Any necessary temporary piping
- All sampling and laboratory analyses during testing and operation.
- All civil works.
- All equipment, labor and tools as required including heavy machinery rentals (i.e.: overhead cranes, forklifts, etc.).
- All local permits and licenses.
- All instrumentation & controls not specifically mentioned in **Section 1 – Biwater's Scope of Supply** of this Chapter or listed in **Chapter B.4 & C.4 – List of Key Equipment & Instrument** of this Proposal.
- All valves not mentioned in **Section 1 – Biwater's Scope of Supply** of this Chapter or listed in **Chapter B.4 & C.4 – List of Key Equipment & Instrument** of this Proposal.
- All other components & equipment not mentioned in **Section 1 – Biwater's Scope of Supply** of this Chapter or listed in **Chapter B.4 & C.4 – List of Key Equipment & Instrument** of this Proposal.
- Any consequential and liquidated damages.
- All installation and assembly works at job-site.
- Floor/ceiling mounted pipe supports.
- Security and insurance for the stored and installed equipment.
- Site storage, handling, loading, unloading or protection of the equipment following delivery to the site.
- Equipment or materials, not specifically mentioned in **Section 1 – Biwater's Scope of Supply** of this Chapter or listed in **Chapter B.4 & C.4 – List of Key Equipment & Instrument** of this Proposal.
- Pressure Testing and Necessary Re-Pressure Testing, except where specified.
- Disinfection of systems and equipment.
- Loop Checking of Field Terminated equipment by others.
- Pipe Labeling, Pipe and Valve Painting.



3 Clarifications, Comments and Exceptions

Items	Ref Spec	Comments / Exceptions
01 10 00 SUMMARY OF WORK		
1.2.A.2		To optimize the design of control & automation of the Demonstration Facility, the control panel (RO Control Panel) mounted on the RO System will house the PLC which will be served as the Master PLC for both the supplied RO System and the MFS. This RO PLC will control all equipment of the RO System, and connect with the MF PLC on each of the MF Skid. No other upstream PLC Panels will be provided. Linkage and interfacing of this RO PLC with the other PLC systems and/or Plant SCADA Control System shall be completed by others.
46 61 33 MEMBRANE FILTRATION SYSTEM (MFS)		
1.2.D.1 & 2		To optimize piping and wiring works, the proposed Membrane Skids will include membrane modules, rack piping, a PLC Control Panel, instrumentation, a Feed Pump, a Back Wash Pump, a Backwash Tank and a CIP Tank. One (1) stand-alone compact type air compressor systems, come with an air receiver will be provided to supply air for air sourcing operation of MF process. Equipment on each MF Skid will be controlled by its PLC Control Panel. Such design allows higher flexibility in system operations for demonstration and tests. The two MF Skids could be easily modified into two (2) independent MSFs, which could be deployed for any emergency applications or other purposes in long run.
1.2.F		The proposed integrated MF Skid will have footprint larger than 11' x 7 ft. Optimized arrangement of the MF Skid can be made when actual site layout and other requirements are provided for review.
2.1		Toray Model HFU-2020N and Dupont Model SFD 2880 XP will be provided for the MFS.
2.2.A.4		Air compressors will be used for supplying air for air scouring.
2.2.A.6 & 7		Automatic maintenance clean system and automatic CIP system will be share-use the same solution mixing tank (CIP Tank), chemical dosing pumps. The supplied Control System will be programmed such that adequate operations are performed respectively for maintenance cleaning and CIP cleaning for MFS.
2.3.A.		Unlike in full scale treatment facility where VFDs will be installed in MCC in the Electrical Room of a plant, taking into consideration of the capacity and set up of the MF Demonstration System, and to minimize associated wiring and cabling works, NEMA 4X enclosed VFDs, integrated within the control panel mounted on the MF Skid, will be supplied.



Items	Ref Spec	Comments / Exceptions
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46 63 23 CONVENTIONAL REVERSE OSMOSIS (RO SYSTEM)

1.2.E The supplied RO System will have: (1) Vessel Skid – supplied with pressure vessels, rack piping, control panel (Master PLC Panel for RO System and MFS), sample panel, instrumentation and pumps; (2) RO CIP Skid; (3) Chemical Metering Pump Skids.

The control panel mounted on the RO System will be served as the Master PLC for both the RO System and the MFS. This PLC will control all equipment of the RO System, and connect with the MF PLC on each of the MF Skid. No separate upstream PLC Panel will be provided.

Unlike in full scale treatment facility where VFDs will be installed in MCC in the Electrical Room of a plant, taking into consideration of the capacity and set up of the RO Demonstration System, and to minimize associated wiring and cabling works, NEMA 4X enclosed VFDs, integrated within the control panel mounted on the RO Skid, will be supplied.

2.1 Toray TMG20D-400 RO membrane will be provided.

2.3.E No Flush Tank shall be provided. The Flush Tank shall be provided by other parties.

2.8.D Pressure Vessels manufactured by Codeline will be provided.

2.13.G Valve seals of Butterfly Valves provided will be made of EPDM, not PTFD or Viton.

2.14.B Biwater will utilize the following piping materials on the supplied RO Skid:

The 3rd stage concentrate will be duplex piping up to concentrate control valve. All other high pressure piping 1st stage feed/concentrate, 2nd stage feed/concentrate, 3rd stage feed all 316SS.

Piping upstream of the first stage feed pump, downstream of 3rd stage concentrate control valve, and all permeate piping is PVC SCH 80.

2.17.D The control panel (RO Control Panel) mounted on the RO System will house a PLC which will be served as the Master PLC for both the RO System and the MFS. This RO PLC will control all equipment of the RO System, and connect with the MF PLC on each of the MF Skid. No separate upstream PLC Panel will be provided. Linkage and integration between this RO PLC with the other PLC systems and/or Plant SCADA Control System supplied by other parties shall be by others.

Items	Ref Spec	Comments / Exceptions
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46 30 01 CHEMICAL METERING PUMP SKIDS

2.1.E To optimize the design and take into account that the RO System and MF System are demonstration facilities in nature, the number of chemical metering pumps will be supplied as follows:

- MF System
 - o One chemical metering pump will be provided for each cleaning chemicals for each MF Skid to facilitate membrane cleaning/maintenance. As two MF Skids will be provided, therefore, in total, two units of cleaning chemicals metering pumps are supplied for each chemicals in the MF System. These pairs of metering pumps will be installed separately in their respective Metering Pump Skids, one kind of chemicals per Skid.
 - o Dosing of Ammonium Sulfate and NaOCl solution will be performed at the common pipe leading to the inlets of the two MF Skids. One chemical metering pump will be provided for each cleaning chemicals. Metering Pump for Ammonium Sulfate will have its own Pump Skid. The NaOCl Metering Pump will be installed with the other two NaOCl Metering Pumps using for membrane cleaning/maintenance in another Pump Skid.
- RO System
 - o One unit of Metering Pump will be provided for Anti-scalant dosing and one unit of Metering Pump will be provided for Sulfuric Acid dosing. The two Metering Pumps will be installed separately in two respective Pump Skid.

2.1.G Biwater will manufacture and supply the Chemical Metering Pump Skids for this project.

2.3 Schedule of Metering Pumps
 Taking into account the factors such as dosing rates, process requirements, and cost-effectiveness etc., different types of Metering Pumps will be provided for the RO System and MF System. Apart from peristaltic pumps and stepping motor diaphragm pumps, other types of metering pumps or transfer pumps will be supplied.

3.2.D.1 Biwater's Engineer, instead of manufacturer's representatives, will be present at Site for functional testing of the supplied equipment. Request for the presence of manufacturer's representatives at Site for start-up or tests will be subject to additional cost. Quotation for such services could be provided upon request.



Items	Ref Spec	Comments / Exceptions
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43 23 31 VERTICAL INLINE PUMPS

2.3.A Mechanical seals provided will be the standard with Viton elastomer seals.

25 05 10 ELECTRICAL MOTORS

For pump motors: Motors provided are Standard Premium Efficient with TEFC enclosures. Aegis bearing protection rings are included.

OTHERS IN GENERAL

1 Biwater's Engineer(s), instead of manufacturer's representatives, will be present at Site for installation, functional testing, start-up and training of the supplied equipment. Request for the presence of manufacturer's representatives at Site for installation, inspection, start-up or tests or training will be subject to additional costs. Quotation for such services could be provided upon request.

2 Conduit raceways for Biwater's supplied equipment will be rigid and flexible PVC non-metallic conduit as per **Article 2.2B in Specification 26 05 33**.

3 Pneumatic Actuators and Flow Control Globe Valves:

Due to the compact nature of the UF Skid and small line sizes, the pneumatic double acting actuators utilized on the MF System will not have manual declutchable handwheel operators. They will have manual override at the solenoid block on each valve.

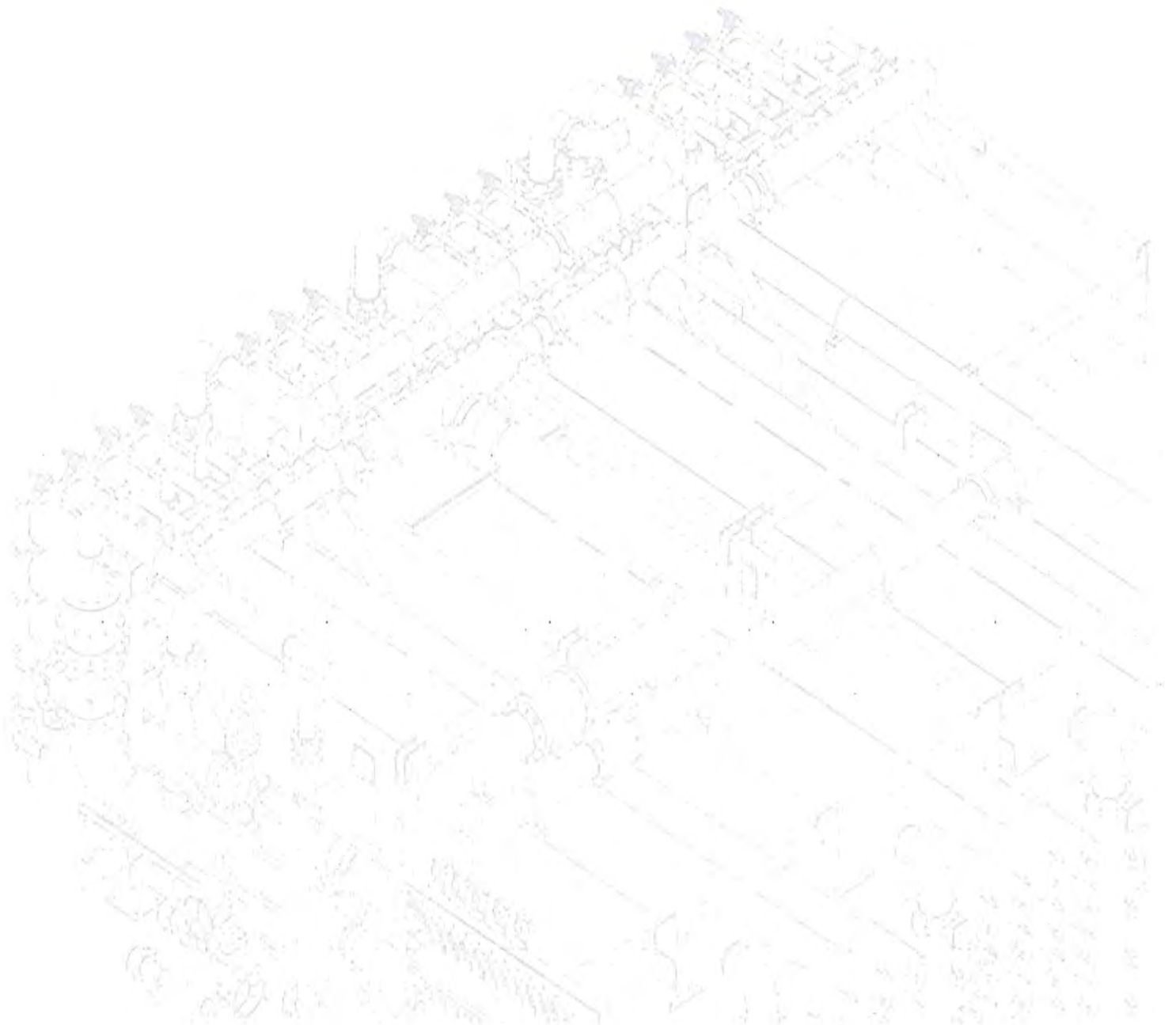
For concentrate flow control valves on the RO System, it doesn't seem that the Globe valves specified are of suitable material for service. Biwater takes exception to using globe valves for this service and will be using our standard for high accuracy, high performance sliding orifice gate control valves for small valve on pilot system. 316SS on the second stage concentrate and duplex or equal on the third stage concentrate. Gate flow control Shubert & Salzer Series 8038 316SS Motorized Sliding Gate Concentrate Control Valve for the 2nd Stage Concentrate Flow Control and 3rd Stage Concentrate Flow Control, variable orifice gate design, 110/120 VAC, 4-20 mA signals, with manual override.

4 Horizontal ANSI Pumps: To meet the unique compact and performance requirements of the MF System and RO System of this Project, vertical or horizontal ANSI pumps will be selected and proposed.



***A. Integrated Treatment System
- Membrane Filtration and Reverse Osmosis Systems***

A.2 System Warranty





A.2 Warranty

1 Equipment and Components

In general, Biwater will provide limited warranty on workmanship and materials supplied for **12 months**, starting from the date of Completion of 7-day Plant Wide Performance Test (Substantial Completion), or for 18 months from delivered to job-site, whichever comes first. The warranty provided is subject to terms and conditions applied. See attached Terms and Conditions on standard Biwater's Limited Warranty.

For the supplied Reverse Osmosis System, extended overall **twenty-four (24) months** warranty duration will be provided, as per **Article 1.6** in Owner's **Specification 46 63 23**.



Biwater's Standard Warranty Terms and Conditions

- Warranty after Delivery** 1 In these Conditions the expression '**Warranty Period**' means **twelve (12) months** from the date of completion of Tests on Completion or **eighteen (18) months** from the date of delivery of materials to job-site, whichever comes first.
- The Buyer shall issue the **Performance Certificate** for the Plant and/or Section of the Plant respectively within **fourteen (14) days** after the expiry dates of the Warranty Period.
- Making Good Defects** 2 Biwater shall be responsible for making good by repair or replacement with all possible speed at his expense any defect in or damage to any part of the Plant which may appear or occur during the Warranty Period and which arises either:
- (a) from any defective materials or workmanship during manufacture or design, or
(b) from any act or omission of the Biwater done or omitted during the said period.
- The Biwater's obligations under this Clause shall not apply to any defects in designs furnished or specified by the Buyer in respect of which the Biwater has disclaimed responsibility, nor to any damage to any part of the Plant in consequence thereof. The supply to the Buyer insured and carriage paid to the address stipulated by the Buyer of a defective or damaged part of the Plant properly repaired or of a part in replacement thereof shall constitute fulfilment by the Biwater of his obligations under this Sub-Clause in respect of that defective or damaged part. If it is reasonably practicable for a defective or damaged part to be returned to the Biwater and the Biwater shall call for its return the Buyer shall cause it to be returned to the Biwater at the Biwater's risk and expense.
- Notice of Defects** 3 If any such defect shall appear or damage occur the Buyer shall forthwith inform the Biwater thereof stating in writing the nature of the defect or damage. The provisions of this Sub-Clause shall apply to all repairs or replacements carried out by the Biwater to remedy defects and damage, except that the period during which the Biwater's responsibility under **Sub-Clause 2 (Making Good Defects)** for the subject items shall be either **twelve (12) months** from the date of replacement or renewal or repair of the damage or the unexpired period of the Warranty Period whichever is the later to expire. Under no circumstances, the overall duration of Warranty Period shall not exceed twenty-four (24) months.
- Extension of Defects Liability** 4 If any part of the Plant cannot be put to its intended use by reason of defects in or damage to any other Plant the Warranty Period in relation thereto shall be extended by a period equal to the period during which such part of the Plant cannot be used.
- Delay in Remedying Defects** 5 If any such defect or damage be not remedied within a reasonable time, the Buyer may proceed to do the work at the Biwater's risk and expense provided that he does so in a reasonable manner and notifies the Biwater of his intention so to do. The costs reasonably incurred by the Buyer shall be paid by the Biwater to the Buyer.
- Further Tests** 6 If the repairs or replacements are of such a character as may affect the operation of the Plant or any part thereof, the Buyer may request the Biwater to repeat such tests thereof as were carried out prior to Delivery.



Limitation of Liability for Defects

7 Biwater's liability under this Clause shall be in lieu of any condition or warranty implied by law as to the quality or fitness for any particular purpose or the workmanship of any part of the Plant delivered and, save as in this Clause and in **Sub-Clause 8 (Latent Defects)** expressed, neither Biwater nor his sub-contractors, their respective servants or agents shall be liable, whether in contract, in tort (including but not limited to negligence) or by reason of breach of statutory duty or otherwise, in respect of defects in or damage to such part, or for any damage or loss of whatsoever kind attributable to such defects or damage or any work done or service or advice rendered in connection therewith.

For the purposes of this Sub-Clause Biwater contracts on his own behalf and on behalf of and as trustee for his sub-contractors, servants and agents. Nothing in this Clause shall affect the liability of the Biwater under these Conditions in respect of any part of the Plant not delivered or his liability for death or personal injury caused by his wilful or negligent acts or omissions.

Latent Defects

8 If any defect of the kind referred to in **Sub-Clause 2 (Making Good Defects)** shall appear in any part of the Plant within a period of **three (3) years** after the date of Delivery of such part of the Plant, the same shall be made good by Biwater by repair or replacement, provided that the defect was caused by the gross misconduct of the Biwater as defined below and would not have been disclosed by a reasonable examination prior to the expiry of the Warranty Period.

'Gross Misconduct' does not comprise each and every lack of care or skill but means an act or omission on the part of the Biwater which implies either a failure to pay due regard to the serious consequences which a conscientious and responsible Biwater would normally foresee as likely to ensue or a wilful disregard of any consequences of such act or omission.

The Buyer's or User's Responsibilities

9 Except otherwise specified, Biwater's warranty shall only apply to the following conditions:

- The supplied equipment, materials, or treatment systems are operated under the design and specified performance conditions.
- The supplied equipment and materials are operated and maintained as per Biwater's operation & maintenance instructions.
- Any pollutants or compounds not provided or given in feedwater qualities shall be considered as Absent, or Present in concentrations below or better than the product water, or Present in at a level that does not inhibit the proposed treatment process



2 Warranty of Membrane Elements

Biwater will pass on the membrane elements warranties provided by the membrane elements manufacturers. Please see below the warranty details provided by membrane manufacturers.

Membrane Manufacturers	Warranty
Ultrafiltration Membrane	
Toray	See enclosed Membrane Warranty Statement provided by Membrane Manufacturers
Dupont	See enclosed Membrane Warranty Statement provided by Membrane Manufacturers
Reverse Osmosis Membrane	
Toray	See enclosed Membrane Warranty Statement provided by Membrane Manufacturers



A. Integrated Treatment System
- *Membrane Filtration and Reverse Osmosis Systems*

A.2 System Warranty

- *Dupont UF Membrane*



Module Warranty

DuPont Ultrafiltration Module Five Year Prorated Warranty

LIMITED WARRANTY

DuPont offers limited warranties on the materials, workmanship and integrity of its Ultrafiltration module ("Module"), when properly installed, operated, and maintained in accordance with the terms and conditions set forth in this warranty document ("Warranty") and in accordance with Supplier's published documentation or documentation provided to Buyer. The warranties herein set forth are granted to the buyer of the Module ("Buyer") by the legal entity of the DuPont group of companies that is selling the Module to Buyer (such entity being the "Supplier") and Buyer's sole remedy under this Warranty shall be against Supplier. This Warranty shall apply exclusively; Supplier does not accept any conditions of Buyer which conflict with or differ from this Warranty, unless Supplier has expressly agreed, in writing, to their applicability.

Materials and Workmanship Limited Warranty

1. Supplier warrants that the Module is free from defects in materials and workmanship which might prevent the Module to be installed, operated, and maintained in accordance with Supplier's published documentation or documentation provided to Buyer (the "Workmanship Warranty").
2. Supplier's obligation under this Warranty covers a period of twelve (12) months starting from date of delivery of the Module to Buyer.
3. This Workmanship Warranty shall be null and void if the Module is not properly installed, operated and maintained in accordance with the requirements set forth in this Warranty, Supplier's published or provided documentation and good engineering practices.
4. If the Buyer's claim under this Workmanship Warranty is valid, Supplier's sole obligation, and Buyer's sole remedy under this Workmanship Warranty is expressly limited to the repair or, at Supplier's discretion, replacement of the defective Module.

Five Year Limited Module Integrity Prorated Warranty

1. Supplier warrants that when the Module is properly operated in accordance with the requirements set forth in this Warranty, Supplier's published or provided documentation and good engineering practices, the cumulative fiber breakage rate in that one Module over the course of the Module Integrity Warranty Period (as defined below) shall not exceed 0.5% of the total number of fibers in that Module (the "Module Integrity Warranty")

Fibers repaired during production and testing (prior to delivery) are excluded from the failure count.

Fiber repair on site is the responsibility of Buyer and/or owner/user.

Buyer should contact Supplier (DuPont Water Solutions) before any fiber repair is initiated by Buyer and/or owner/user.

2. This Module Integrity Warranty shall be effective for a period commencing on the first to occur of (i) Start Up (Start Up, as used herein, means the first day a process stream is introduced to the Module) or (ii) one hundred and eighty (180) days after the date of delivery of the Module to Buyer (the "Commencement Date"), and ending five (5) years after the Commencement Date ("Module Integrity Warranty Period").
3. If Buyer's claim under this Module Integrity Warranty is valid, Supplier's sole obligation, and Buyer's sole remedy, under this Module Integrity, is expressly limited to Supplier crediting 1/60 of the original purchase price of the Module for each unused month of the Module Integrity Warranty Period towards the purchase of a replacement Module at the current prevailing price.

Conditions voiding all warranties

Supplier's warranties as described herein shall not apply in the cases described below as excluded from this Warranty and shall be null and void if any of the following conditions are not met:

- a. The design parameters (such as flux, recovery, filtration cycle, cleaning frequency, air score, pressure, temperature) plus instrumentation and other components of the system in which the module(s) are employed shall be consistent with sound engineering practice. Supplier reserves the right to review system design.
- b. Feedwater temperature and all operating temperatures (including CIP) shall be less than 104°F (40°C).
- c. Feedwater TSS shall not exceed 100 mg/L.
- d. Feedwater Turbidity shall not exceed 300 NTU and feedwater turbidity shall be monitored on a continuous basis.
- e. The influent water shall have the same characteristics as the water used during pilot testing (if any) and shall be consistent with the water parameters specified at the time of bid.
- f. Feed water shall not contain particles of abrasive or sharp-edged nature, grit or sand causing fiber damage or abrasion.
- g. Feed water shall not contain free oil, grease, or any other organic or inorganic matter or solutions harmful to the module(s).
- h. Normalized operating flux shall not exceed 110 LMH unless otherwise expressly specified in the validated designs.
- i. Chlorine concentrations (oxidizing agent) in Module feedwater shall not exceed the maximum chlorine concentrations specified in the Module Specifications attached as Attachment A hereto. No other oxidizers in Module feedwater are permitted unless expressly specified.
- j. Module(s) must not be exposed to operating conditions in excess of maximum limits for feed and backwash inlet pressure, feed and backwash transmembrane pressure, the maximum permitted rate of temperature change and operation outside the permissible backwash flux range as specified in the respective product data sheet/process guidelines/operation manual.

- k. Air scour when applicable shall be performed below 15 Nm³/hr/module and 2.5 barg.
- l. Air for scouring when applicable and the module integrity test shall be oil-free and filtered to remove particles.
- m. Module(s) shall be operationally protected against hydraulic transients (water hammer) and abrupt pressure fluctuations in excess of 0.5 bar/s.
- n. Module(s) flow performance shall be properly maintained using backwash, chemically enhanced backwash, clean in place procedures, and/or similar cleaning processes.
- o. During continuous operation and/or shut down the pH range shall be within the limits established in the Module Specifications attached as Attachment A hereto.
- p. There shall be no particulate or colloidal or precipitated solids in the backwash, CEB and CIP supply water.
- q. Adequate provisions against microbiological fouling shall be incorporated into the system design, as well as into all operating and maintenance procedures.
- r. During cleaning, the Modules must not be exposed to (i) a pH outside the pH range tolerance specified in the Module Specifications attached as Attachment A hereto and (ii) chemical concentrations exceeding the limits specified in the Module Specifications attached as Attachment A hereto. Cleaning chemicals/solutions and cleaning protocols shall be adequately documented and shown to be compatible by Buyer or owner/user with Supplier's Module if they are not industry standard.
- s. Buyer is fully responsible for the effects of non-compatible chemicals on the Module, including unapproved polymer use.
- t. Buyer is responsible for providing the owner/user with adequate system operating and maintenance manuals, operator and supervisor training; ensuring owner/user's ability to perform cleaning and other performance restoration and diagnostic procedures.
- u. Buyer and/or owner/user shall ensure that frequent, adequate system and subsystem normalized performance data are routinely recorded in a systematic format and reviewed (the "Information"). Such Information to be available to Supplier on a reasonable basis in the event a claim is made against Supplier pursuant to Warranty. Process parameters to be recorded include feed and filtrate pressures, feed and Backwash flow, temperature, turbidity, TSS, pH and chemical concentrations. Calculated parameters to be recorded include TMP and normalized permeability. Parameters shall be logged at least every 2 seconds during backwash and CEB and every 3 minutes during filtration.
Buyer and/or owner/user shall ensure also proper registration of any fiber repair.
- v. Module(s) must be stored in accordance with Supplier's published guidelines or operating conditions and membranes must be kept moist at all times, in accordance with the minimum moisture content specified in published guidelines Supplier's operating instructions.
- w. Module(s) shall not be exposed at any time to direct sunlight or temperatures above 40 °C or below -20°C without adequate storage solution to protect the Module(s) against excessive heat and cold and direct sunlight.

- x. Accidental damages and/or externally caused damages as well as damages caused by improper installation, use handling, operation or maintenance are excluded from this Warranty, including without limitation damage caused by operation and/or exposure of membranes modules to conditions, outside the instructions and conditions listed herein and in Supplier product documentation or damage or malfunction arising from repairs, replacement(s), or other maintenance tasks not specifically authorized by the Supplier. Damages caused by uncontrolled and/or defective operation of the overall water treatment process in which the Module is used are also excluded from this Warranty.
- y. Module fibers repaired during manufacturing, transportation, handling, or plant start-up are excluded from fiber repair count.
- z. Supplier understands that the Module will be used as a part of a larger water treatment process. Supplier must be given the opportunity by way of written invitation, with reasonable notice, to review engineering documents, inspect the plant before installation of the Module and attend testing and commissioning activities of all aspects of the water treatment process which may affect the Module lifetime and performance. Neither a review of the engineering documents nor attendance of testing or commissioning or inspection of the plant nor the declining of the opportunity enlarges Supplier's warranty hereunder nor create any liability or constitutes any endorsement by Supplier for any aspect of the system.
 - aa. The Buyer and/or owner/user of the Module shall maintain for the duration of this Warranty complete and accurate daily records of all relevant process settings and data. Copies of these data shall be made available to Supplier upon request.
 - bb. In the case where Buyer and owner/user are separate parties, Buyer has sole and exclusive responsibility for making the owner/user aware of its responsibility under the conditions of this Warranty. Failure of Buyer to meet its respective obligations set forth above may invalidate this Warranty.
 - cc. If Buyer is not current on all payments due to Supplier, then this Warranty shall be suspended until all outstanding payments are paid in full by Buyer.

No Other Warranties; Limitation of Liability

1. The limited warranties granted herein are the sole warranties provided by Supplier with respect to the Module (including without limitation with respect to the Module quality and performance) and to the maximum extent permitted under applicable law all other warranties, whether express, statutory or implied, including without limitation any implied warranty of fitness for a particular purpose or merchantability are excluded and disclaimed. Supplier's warranties as hereinabove set forth shall not be enlarged, diminished or otherwise affected by, nor shall any obligation or liability of Supplier arise out of, Supplier's or its affiliates' rendering of technical advice or service in connection with the Module supplied.
2. SUPPLIER'S LIABILITY FOR ANY BREACH OF THIS WARRANTY SHALL BE LIMITED TO THE REMEDIES EXPRESSLY SET FORTH HEREIN. IN NO EVENT SHALL SUPPLIER BE LIABLE FOR ANY DAMAGE, COSTS OR EXPENSES ASSOCIATED WITH WARRANTY, WHETHER FOR THE REPLACEMENT OR REPAIR OF MODULE OR PARTS THEREOF, INCLUDING LABOR, INSTALLATION OR OTHER COSTS INCURRED BY BUYER OR

OWNER/USER AND, IN PARTICULAR, ANY COSTS RELATED TO THE REMOVAL OR REPLACEMENT OF ANY MODULE OR PARTS THEREOF INCORPORATED INTO A SYSTEM OR OTHERWISE. WITHOUT PREJUDICE TO SUPPLIER'S OBLIGATIONS UNDER THIS WARRANTY, BUYER ASSUMES ALL RISKS AND LIABILITIES RESULTING FROM THE USE, INSTALLATION AND ANY HANDLING OF THE MODULE AND PARTS THEREOF. SUPPLIER'S LIABILITY FOR CONSEQUENTIAL, PUNITIVE, SPECIAL, EXEMPLARY OR INCIDENTAL DAMAGES OR FOR LOSS OF PRODUCTION, LOSS OF PROFITS, REVENUES OR SAVINGS ARISING OUT OF OR IN CONNECTION WITH THE USE OF THE MODULE AND PARTS THEREOF OR A BREACH OF THIS WARRANTY IS EXCLUDED. The foregoing limitations and exclusions shall not apply in case of gross negligence or wilful misconduct on the Supplier's part, or in case of injury to life, body or health, or to the extent that Supplier's liability cannot be limited or excluded under mandatory provisions of applicable law.

3. Prior to any repair or shipping of any replacement of the Module or crediting any amount, Supplier reserves the right to inspect and test the alleged defective Module on Buyer's or owner/user's premises, or to request Buyer to perform such inspections and/or tests and forward the results thereof to Supplier through their local representative.
4. If the Module failure is determined to be from any cause other than breach of the warranties herein set forth, Buyer shall pay to Supplier a fee of \$1,000 per day, plus direct travel expenses incurred by Supplier employees in connection with any inspection and testing of the Modules and system on Buyer's or owner/user's premises.
5. Any Module shipped to Supplier for warranty examination must be shipped freight prepaid. Any Module examined as part of a warranty claim which is found to be performing as warranted, will be returned to Buyer freight collected and a handling charge will be levied against Buyer.
6. Any Module repaired or replaced under this Warranty will be warranted under the terms of this Warranty for the remainder of their original warranty period.

Warranty Claim Procedure

Before returning any Module to Supplier for warranty examination, Supplier must be contacted to obtain return authorization. Any Module shipped to Supplier's facility without return documentation will be returned to shipper unopened, freight collected.

The following procedure shall be followed to determine warranty protection:

1. Buyer shall send a written notice to Supplier within fourteen (14) days of problem occurrence or the claim is waived.
2. Buyer shall submit all relevant operating data requested by Supplier.
3. Supplier will be provided a reasonable time to review the data and make initial recommendations in writing for further evaluation of the claim.
4. Buyer will make all reasonable efforts to execute and implement Supplier's recommendations and collect, record and submit all relevant data resulting from these recommendations.
5. In the event Supplier's initial recommendations do not address and solve the issue, Buyer will grant Supplier access to the Module and system and a reasonable time to perform testing and evaluation of Module conditions.

6. In the event Supplier's recommendations address and solve the issues, the claim shall immediately be withdrawn and disposed.
7. In the case that Buyer decides not to follow Supplier's recommendations then the claim will be deemed withdrawn and disposed in respect of the defects that gave rise to the claim.
8. Any defective Module(s) shall be returned to Supplier at Buyer's expense if so requested by the Supplier in accordance to Supplier's Return Authorization policy.

Attachments

Attachment A, Module (s) Specifications, Process and Design Guidelines and/or good practices, Operational Manual, Assembly Manual

Contact DuPont Water Solutions:
www.dupont.com/water/contact-us

Governing Law

This limited warranty agreement shall be governed by and construed in accordance with the laws of the State of Delaware where the DuPont selling legal entity is established in the U.S.A. or the laws of the country where the DuPont selling legal entity is established in all other cases. The conflict of laws provisions of the applicable law as per the foregoing and the United Nations Convention on Contracts for the International Sale of Goods shall not apply. Where this warranty agreement is governed by German law in accordance with the foregoing, it is agreed that the Workmanship Warranty set forth herein shall be construed as statutory warranty under German law, and the Module Integrity Warranty shall be construed as a contractual guarantee under German law in addition to and independent from statutory warranty.

Non-assignment

The rights and duties under this limited warranty agreement are not assignable or transferable by either party without the other's written consent, except that Customer hereby consents to Supplier's potential future assignment of some or all of Supplier's obligations hereunder to any affiliate of Supplier without further notice to Customer.

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A. Integrated Treatment System
- Membrane Filtration and Reverse Osmosis Systems

A.2 System Warranty

- Toray UF Membrane





Toray Membrane USA, Inc.

TORAY ULTRAFILTRATION MEMBRANE WARRANTY

Toray Membrane USA, Inc. (TMUS)

13435 Danielson Street, Poway, CA 92064, U.S.A.

Tel: +1 (858) 208-6728

E-mail: Charles.wardle.w7@mail.toray

Warranty provided to:

Project Name: Palmdale Pure Water Advanced Water Demonstration Facility

Engineer: Stantec

Model:

OEM Company: BiWater

Contact: Richard White

Telephone: 909-599-4129

E-mail: Richard.White@biwater.com

2 Years Full

3 Years Prorated

This schedule sets out the warranties with respect to TORAY Membrane Modules. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE GIVEN EXCEPT AS EXPRESSLY PROVIDED BELOW. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE NOT PROVIDED AND ARE EXPRESSLY DISCLAIMED AND EXCLUDED. TORAY IS NOT LIABLE FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL EXEMPLARY AND PUNITIVE DAMAGES, LOSS OF PROFITS, PLANT SHUT DOWN TIME OR SUITS BY THIRD PARTIES AGAINST BUYER, DUE TO A PERFORMANCE FAILURE OR DEFECT OF THE MODULE(S). ALL LIMITATIONS ON LIABILITY SHALL SURVIVE THE EXPIRATION, TERMINATION OR CANCELLATION OF THIS LIMITED WARRANTY. FAILURE OR REFUSAL TO FULLY DISCLOSE THE USE AND OPERATING PARAMETERS OF THE MODULES TO TORAY SHALL RENDER ALL WARRANTIES, OTHER THAN MATERIALS AND WORKMANSHIP, NULL AND VOID.

1. Definitions

A. BUYER

"BUYER" - means a company who buys TORAY Membrane Modules directly from TORAY or through TORAY's subsidiaries or through the trading company which TORAY designates.

B. Fiber Breakage

"Fiber Breakage" is defined as one membrane fiber exhibiting large continuous bubbles during a bubble test where pressurized air (lower than 50 kPa / 7.3 psi) is introduced into the feed side of the module. Bubble tests are to be performed on individual modules after a failure of LRV/PDT test during normal operation.

C. Membrane Module Replacement Price (hereinafter referred to as "MMRP")

Unless otherwise stated, "MMRP" shall be the price taken from TORAY's published retail price list that is in effect on the Module Failure Date for the membrane module(s) required to rectify the Module Failure. In circumstances

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Toray Membrane USA, Inc.

Toray Ultrafiltration Membrane Warranty

where MMRP has been specified in writing by TORAY in advance, the MMRP shall be based on that written specified price, plus the rate of inflation compounded monthly based on the U.S. Consumer Price Index as calculated by the U.S. Bureau of Labor Statistics, unless another inflation index has been specified in the Contract of Sale. All replacement membrane modules are shipped Ex-Works Poway, CA USA. All freight and any applicable taxes, import duties, brokerage, etc. are the responsibility of the BUYER.

D. Module Failure

"Module Failure" means a situation where, as a result of faulty materials or workmanship, the membrane modules fail to produce filtrate quality and / or quantity, as described in Appendix B.

E. Module Failure Date

"Module Failure Date" shall be the date that written notification of the alleged Module Failures is received by TORAY.

F. Project Reference

"Project Reference" means the information for the project including the location, the design conditions such as feed water quality, required treatment capacity and treated water quality and, operating conditions.

G. Term

"Term" means the number of months following the Warranty Start date, subject to certain expiry conditions for failure of the BUYER to comply with certain terms and conditions set out in this document.

H. TORAY

"TORAY" means Toray Industries, Inc. a corporation duly organized and existing under the laws of Japan and having its principal place of business at 1-1, Nihonbashi-Muromachi 2-chome, Chuo-ku, Tokyo, 103-8666, Japan

I. Warranty Start Date

For purposes of warranty pro-rating and the effective date for claims commencement, the herein warranty period shall commence on the first date of the membrane modules are placed in operation or six (6) months after shipment of the membrane module(s) from TORAY's facility, whichever comes earlier.

2. Materials and Workmanship Warranty

2.1. Materials and Workmanship

TORAY warrants to BUYER that its new modules are free from defects in materials and workmanship. Subject to the applicable mandatory legal regulations, this Materials and Workmanship Warranty is effective during Term.

2.2. TORAY Liability

In full satisfaction of any valid claim hereunder, TORAY, at its sole discretion, shall repair or supply the replacement module for any membrane module that is found by TORAY to be mechanically defective due to faulty material or errors in manufacturing workmanship.

2.3. Satisfaction of Claims

TORAY shall have the right to satisfy valid claims under this warranty in a flexible manner in order to restore performance. Such flexibility may include the retrofit of newer membrane components or by upgrading failed membrane modules with newer membrane module(s) that embody design and efficiency improvements. Buyer acknowledges that, by virtue of ongoing advances in TORAY's technology and design, fewer compatible replacement membrane modules may, in the future, be required in a given installation. Provided that all contractually specified performance levels are met, should TORAY so proscribe, Buyer consents to the replacement of membrane modules pursuant to this Warranty with a compatible embodiment of TORAY's membrane module technology.



3. Membrane Performance Warranty

Subject to the conditions set forth in this document, TORAY warrants TORAY Ultrafiltration (hereinafter "UF") module(s) shall meet the UF Performance Criteria described in Appendix B, beginning at the Warranty Start Date for the duration of the Term of this warranty.

Model numbers of TORAY UF module may change without notice, due to technical modifications and/or production changes.

4. Conditions of Limited Performance Warranty

4.1. Limitation of Warranty

Occurrence of any of the following as determined by TORAY shall void all warranties hereunder:

- a. The design parameter plus instrumentation and other components of the system shall be consistent with sound engineering practice. TORAY reserves the right to review system design. Physical abuse or misuse of membrane modules.
- b. Unauthorized alteration of any parts originally supplied by TORAY with membrane modules.
- c. Faulty installation of membrane modules.
- d. Failure to adhere to contractually defined feed water specifications at all times.
- e. Failure to discharge all streams obtained at a feed rate of 40 LMH minimum for a period of 4 Hours upon start-up to remove chemical preservative.
- f. Failure by the BUYER to follow contractually specified maintenance procedures and schedule.
- g. Failure to strictly and exclusively adhere to TORAY specified membrane module cleaning procedures, including the use of anything other than TORAY-approved membrane module cleaning agents.
- h. Failure to maintain membrane module flow performance using backwash, air-scrubbing, Toray Maintenance Cleaning and chemical cleaning procedure.
- i. There shall be no membrane fouling by colloidal or precipitated solids from the backwash supply water.
- j. Adequate provisions against microbiological fouling shall be incorporated into the system design, as well as into all operating and maintenance procedures.
- k. Failure to protect against water hammer and abrupt pressure fluctuations. Maximum feedwater and backwash water pressure is 43.5 psi (300 kPa).
- l. Failure to adhere to fiber breakage repair procedure authorized by Toray according to Appendix E.
- m. Failure to providing the user with adequate system operating and maintenance manuals, operator and supervisor training and ensuring user's ability to perform cleaning and other performance restoration and diagnostic procedures.
- n. Failure to maintain complete and accurate operating data at all times as described in Appendix C.
- o. Module (s) shall not be directly exposed to sunlight or freezing temperatures. Module(s) must be stored in accordance with Toray's published guidelines and must be kept moist at all times.

4.2. Membrane Performance Warranty Terms

- a. If the system fails to perform in accordance with the warranty due to the module(s) failure and the BUYER notifies Toray in writing within fourteen (14) working days of determining, TORAY will take

appropriate counter-measures to restore the performance in reasonable time. TORAY has the right to decide on the applied counter-measures such as module(s)'s repair, regeneration or replacement of module(s).

- b. If the required number of the replacement exceeds BUYER's liability in order to restore the plant performance to the warranted figures set forth, TORAY shall supply new module(s) free of charge freight collect, excluding customs, taxes, levies, fees, installation work etc.
- c. TORAY's liability shall be limited to the extent that the total number of replaced module(s) and/or added module(s) in the system will be less than or equal to the number of initially installed module(s). Changing UF module's specification by BUYER shall be excluded from this warranty.
- d. Module(s) returned to TORAY for warranty examination shall be shipped freight prepaid. If the failure of the system performance is due to cause of breach of warranty as set forth above, BUYER shall pay to TORAY all direct expense incurred by investigation. If the performance of module(s) examined is found equal or better than the warranty, TORAY shall return them to BUYER freight collect.

4.3. Standard Guidelines

The BUYER provides TORAY with the Project Reference beforehand in order for TORAY to issue the Official Quotation including permeate water quality specifications and permeate water flow rate. This Limited Warranty is conditional upon the shipping, storage, system design, installation, operation and maintenance of the membrane modules in strict accordance with the TORAY membrane module operations and maintenance guidelines as updated by TORAY from time to time. BUYER authorizes TORAY to conduct any reasonable review of system design or to inspect facilities where membrane modules are installed upon reasonable notice to the BUYER. Such reviews and/or inspections are intended to assist TORAY and the BUYER in detection of system faults and to optimize the care and operation of the membrane modules.

4.4. Additional Equipment

TORAY bears no liability for any additional equipment not authorized by TORAY that may be installed in or connected to the plant after operation has begun.

4.5. Warranty Maintenance

To maintain the warranty described herein, plant operating records from initial start-up date until claim must be maintained and made available to TORAY upon request. Such documentation must be provided in detail as specified in Appendix A and C in order to: a) verify uninterrupted compliance with guidelines; and b) establish liability for module(s) replaced or repaired under limited warranty. IT IS AGREED AND UNDERSTOOD THAT THE BUYER SHALL NOT BE ENTITLED TO MAKE ANY CLAIMS UNDER THIS LIMITED WARRANTY IF THE MEMBRANE MODULES HAVE NOT BEEN OPERATED IN STRICT ACCORDANCE WITH THE TORAY MEMBRANE MODULE OPERATIONS AND MAINTENANCE GUIDELINES AS UPDATED BY TORAY FROM TIME TO TIME. BUYER must monitor and maintain records to establish that the membrane module(s) have been operated in accordance with such guidelines, failing which all warranties and rights of the customer shall be null and void.

4.6. Notification of Performance Deficiency

All claims filed hereunder shall be made in writing within fourteen (14) days of identifying a defect in materials or workmanship and shall present a detailed analysis of the system and individual module data showing the performance deficiency and must include: The serial number(s) of the module(s) involved, and the individual membrane module(s) operating data, system operating data or defect in materials or workmanship upon which the claim is based. Operating data must include regular information on: flow, trans-membrane pressure, contractually specified feed water quality parameters and temperature, and elapsed time since start-up (days).

TORAY reserves the right to require additional data as necessary to validate claims filed. The Module Failure Date shall be the date that written notification of the alleged Module Failure is received by TORAY.

4.7. Verification of Performance Deficiency

After receipt of notice, TORAY will promptly undertake such investigations as, in TORAY's opinion are necessary to verify whether a deficiency exists and to establish liability for remedy of any deficiency. BUYER may, in course of these investigations, be requested to return module(s) or element(s) to TORAY for examination. TORAY may also conduct reasonable tests and inspections that are standard in the industry (hereinafter referred to as "Tests") at end-user's or at BUYER's premises. If, following the performance of such Tests, it is determined that the membrane modules or elements are not defective and/or there is a problem or deficiency whose remedy is not the responsibility of TORAY, BUYER shall reimburse TORAY for all reasonable costs and expenses associated with said inspections and Tests, including applicable travel expenses.

4.8. Return Procedure

In the event that the return of a membrane module(s) or element(s) is required pursuant to this Limited Warranty, BUYER shall first obtain a Return Goods Authorization (hereinafter referred to as "RGA") number from TORAY. Membrane module(s) or element(s) shipped to TORAY for limited warranty examination must be shipped freight prepaid. If BUYER desires temporary replacement membrane module(s) or element(s) to replace those alleged to be defective and returned to TORAY for limited warranty examination, BUYER is responsible for the cost associated with any such replacements until examination of the returned membrane modules or elements pursuant to this warranty is complete. Membrane module(s) or element(s) examined as part of a warranty claim which are subsequently found by TORAY to be performing as warranted will be returned to BUYER, freight collect.

5. Membrane Module Replacement Price

5.1. Full Warranty Period

TORAY will replace the originally shipped TORAY Membrane Modules free of charge, should such TORAY Module Failure occur within the first twenty-four (24) months from the Warranty Start Date; provided the total number of module(s) to be supplied for free replacement during this period will be less than or equal to the number of initially purchased modules.

5.2. Prorated Warranty Period

Thereafter, the price that the BUYER will pay for TORAY membrane modules supplied under the terms of this Warranty to replace modules originally shipped as part of the Project Reference system shall be calculated as follows:

$$\text{Price} = \frac{\text{Number of whole months elapsed between Module Failure Date} - \text{Warranty Start Date}}{\text{Term}} \times (\text{MMRP})$$

5.2.1. Price for further replacement TORAY Membrane Modules During the Term

The price the BUYER will pay for TORAY membrane modules supplied under the terms of this warranty to replace replacement TORAY membrane modules, being modules already supplied under Section 5.2., shall be calculated as follows:

$$\text{Price} = \frac{\text{Number of whole months elapsed between Previous Module Failure Date} - \text{New Failure Date}}{\text{Term}} \times (\text{MMRP})$$

5.3. Maximum Term of Warranty

The Maximum term of the warranty of any replacement modules shall not exceed the Term of this Warranty.

6. Precedence

If there is any inconsistency or conflict between the provisions of this Membrane Performance Warranty and the other documents including but not limited to Subcontract Agreement and Toray's "Operation, Maintenance and Handling Manual for membrane modules", this Membrane Performance Warranty takes precedence over other documents.

Appendix A: UF Feedwater Requirements:

Process Flow for this project is:

Parameter	Unit	Minimum	Average	Maximum
UF Feed Flow	m ³ /d	1310	1310	1310
Turbidity	NTU	0.5	0.9	1.8
TSS	mg/L			
TOC	mg/L	5.4	6.1	6.9
BOD	mg/L			
Fe	mg/L	0.04	0.04	0.05
Mn	mg/L	0.02	0.02	0.02
pH		6.8	7.1	7.4
Temperature	°C	19.2		27.5
Oil & Grease	mg/L	0	0	0

Notes: Additional feedwater parameters available in specification Stantec Equipment Procurement Bid, Pure Water Av – Demonstration Facility, Table 1.1 E.

Appendix B: UF Membrane Performance Criteria

Term of Prorated Warranty is 5 years, 2 years full followed by 3 years prorated

Table B1: Filtrate Quality

Criteria	Unit	95% of the time	100 % of the time
Filtrate Turbidity	NTU	≤ 0.1	≤ 0.15

Notes:

- For the above turbidity warranty to be fulfilled it is mandatory on-line samples are collected every 15 minutes, using an Ultra-High Precision low range laser turbidimeter such as the HACH TU5400 model.
- Turbidity meters should be calibrated correctly by the method specified by the manufacturer on a regular basis, preferably more than once a month.
- If an abnormal turbidity value is found, the measurement should be repeated after checking for bubbles and cleaning the piping.
- After chemical rinsing, there is a possibility that contaminants in the piping may exist, thus if an abnormal value is included, the value should be excluded, and the measurement should be repeated.
- No guarantee is made for contamination of the piping from the outlet of the UF filtered water to the turbidimeter.
- SDI sampling must comply with the contents of ASTM D4189-07
- UF is unable to remove dissolved constituents' organic buildup, or any other dissolved solid buildup, on the SDI test pad. The presence of these constituents on the pad will invalidate the SDI test results.
- SDI Sampling point shall be soon after UF permeate outlet
- The measured water temperature shall not differ from the actual plant water temperature by more than ±1°C for the SDI testing
- 90% time is determined by the SDI measurements performed immediately after the start of operation and immediately after the implementation of CIP at the sampling frequency specified in Warranty
- The daily average value shall be the representative value for that day, and if the weekly average value deviates from the guaranteed conditions, please contact Toray.

Table B2: Fiber Repairs

Criteria	Per Year	Over the Term of the Warranty 5 Years
Maximum number of fiber repairs per HFU-2020AN module	N/A	46

Notes:

- Toray Inc. has agreed to warranty a maximum of 0.5% (46) fiber breaks per module per over the life (5 yrs) of the membrane module. Each HFU-2020AN module houses 9,100 fibers for an active surface area of 775 ft². A fiber break is defined as one membrane fiber exhibiting large continuous bubbles during a bubble test where pressurized air (lower than 50 kPa / 7.3 psi) is introduced into the feed side of the module. Bubble tests are to be performed on individual modules after a failed LRV / PDT test has occurred during normal operation.

Appendix C: Required data logging items

1. Feed pressure (per each train)
2. Permeate pressure (per each train)
3. Feed Water Flow rate
4. Product Water Flow rate
5. Air Flow Rate (per each train)
6. Feed Water Temperature (per plant)
7. Feed Turbidity (per plant)
8. Permeate Turbidity (per each train)
9. Graphed Trans-Membrane Pressure (TMP)
10. Graphed Normalized Permeability

Appendix D: UF Design Projections

Appendix E: Toray fiber repair procedure



A. Integrated Treatment System
- *Membrane Filtration and Reverse Osmosis Systems*

A.3 System Warranty

- *Toray RO Membrane*





Toray Membrane USA, Inc.

Toray Membrane USA, Inc., (hereinafter "TMUS") provides a limited warranty on the materials, workmanship, and performance of its spiral-wound reverse osmosis elements, when installed and operated in accordance with TMUS's recommended design and operating specifications as follows:

Materials and Workmanship Limited Warranty.

TMUS warrants that its reverse osmosis elements are new, and free from defects in materials and workmanship. The TMUS obligation under this limited warranty is limited to repairing or replacing at TMUS discretion, any element when examined by TMUS appears to be defective under this provision of the limited warranty. This limited warranty covers the first twelve (12) months of service from the first day of operation, or 18 months from date of shipment by seller (whichever is earliest), provided that such elements are operated and maintained in accordance with the conditions of warranty, design guidelines and good engineering practices.

Prorated Performance Limited Warranty.

TMUS warrants the performance of its elements for a period of three years from the first occurring event:

Either

- a. First exposure to feed water in a system; or
- b. Three (3) months following shipment from manufacturing facility in the US or Four (4) months following shipment from Japan to a destination in the US, Canada, or Mexico; or
- c. Six (6) months following shipment from either Japan or the US to another destination other than (b) above.

Initial Performance.

TMUS warrants that the elements herein offered have the initial minimum permeate flow and initial minimum salt rejection as specified in the appropriate specification sheets. These parameters are established under standard test conditions specified by TMUS. Should any element(s) not meet performance specifications, and Buyer notifies TMUS of such deficiency, TMUS will, upon confirmation of faulty performance, repair, or issue credit for the defective element(s). Shipping costs, in such case, will be paid by TMUS.

Performance During Three-Year Limited Warranty Period.

With reference to the Toray published element specification sheet, during the first three years of operation of the element(s), TMUS warrants that minimum permeate flow, when operated under standard test conditions given on the appropriate specification sheet, shall not be less than 70 percent of the published

Reverse Osmosis Element Three-Year Prorated Warranty

minimum product flow rate. TMUS further warrants that maximum salt passage, when an element is operated under standard test conditions to give the specification product flow rate, will not exceed 1.35x the published maximum salt passage value. TMUS will, on confirmation of loss of performance during the warranty period, credit 1/36 of the original purchase price of the element for each unused month of the warranty period toward the purchase of a replacement element, at the current prevailing price.

Conditions of Prorated Performance Limited Warranty.

Performance during the Three-Year Limited Warranty Period, shall be null and void if any of the Mandatory Operating Conditions listed in this document are not met.

Repair or Replacement.

Buyer's sole remedy for any breach of warranty is limited to and shall be fully discharged by TMUS repairing any defective element or, at TMUS discretion, replacing same at the then selling price EX Works TMUS's plant. TMUS reserves the right to test the alleged defective elements and the reverse osmosis systems on user's or Buyer's premises or to request Buyer to perform such inspections or tests and forward the results thereof to TMUS. If the element failure is determined to be from cause other than breach of warranty as set forth above, Buyer shall pay to TMUS a fee of \$1000 per day, plus direct travel expenses incurred by TMUS's employees, in connection with any inspection and testing of such elements and system on Buyer's premises. Elements shipped to TMUS for warranty examination must be shipped freight prepaid, with RMA number issued by TMUS. Elements examined as part of a warranty claim which are found to be performing as warranted will be returned to the Buyer freight collect.

Warranty Notice.

Failure or refusal to fully disclose to TMUS the use and operating parameters of TMUS membrane elements, including details of all pretreatment, post treatment and cleaning chemicals, shall render all warranties other than that covering materials and workmanship null and void.

LIABILITY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL, EXEMPLARY, AND PUNITIVE DAMAGES ARE EXCLUDED.

Toray Membrane USA, Inc.

13435 Danielson Street, Poway, CA 92064
858 218-2360 (Tel.)
858 486-2380 (Fax)



Toray Membrane USA, Inc.

Reverse Osmosis Element Three-Year Prorated Warranty

Mandatory Operating Conditions for Performance Warranty

Toray Membrane USA, Inc. (TMUS) guarantees the performance of its Reverse Osmosis (RO) membrane elements in accordance with the conditions presented below.

Conditions of Warranty

- a. The system array, recovery, instrumentation, design parameters and components in which the element(s) are employed shall be consistent with sound engineering practice. TMUS reserves the right to review all system designs.
- b. Feed water temperature shall be less than 45 °C.
- c. Feed water SDI (15 min. 30 psi) shall be ≤ 3.0 for 95% of the time and ≤ 5.0 for 100% of the time. Alternatively, the feed water Turbidity shall be ≤ 0.5 NTU for 95% of the time and ≤ 1.0 NTU for 100% of the time.
- d. The element(s) shall not be exposed to pressures greater than 1200 psi (82 bar) for seawater elements, 600 psi (42 bar) for brackish water elements, or 365 psi (25.2 Bar) for ultra-low-pressure elements (model TMHxxA).
- e. Permeate static backpressure shall not exceed static reject pressure at any time.
- f. During continuous operation, the pH shall never be less than 2.0 and greater than 11.0. pH adjustment, if required, will be adjusted using H_2SO_4 or NaOH or approved equivalent.
- g. Recovery ratio shall be consistent with concentration of sparingly soluble salts. There shall be no irreversible membrane scaling of any type through operation under supersaturated concentration conditions including but not limited to Ca, Mg, Sr, Ba, salts, and silica.
- h. There shall be no irreversible membrane fouling by colloidal or precipitated solids. The feed water shall contain no colloidal sulfur.
- i. There shall be no membrane damage or irreversible fouling caused by chemical compounds of inorganic or organic nature (e.g., surfactants, solvents, soluble oils, free oils, lipids and high molecular weight natural polymers).
- j. Feed water shall contain no ozone, permanganate, chlorine, or other strong oxidizing agents.
- k. Adequate provisions against microbiological contamination shall be incorporated into the system design, as well as into all operating and maintenance procedures. There shall be no irreversible fouling caused by such organisms of any type (including but not limited to algae, bacteria, molds, and yeasts, either viable or deceased)
- l. Cleaning shall be initiated when the normalized product flow declines by 10% to 15%.
- m. The element(s) shall not be exposed to a pH less than 1 or greater than 12.5 during cleaning or in shutdown periods. More specifically, maximum pH 12.5 when the cleaning temperature is less than or equal to 30 °C, and maximum pH 12 when the temperature is greater than 30 °C but less than or equal to 35 °C and maximum pH 11 when the temperature is greater than 35 °C but less than or equal to 45 °C
- n. Foulants are site specific. The optimal cleaning regime usually can only be determined at the site through running cleaning trials. Toray recommends the buyer to consult with an expert membrane cleaning chemical supplier to determine the best cleaning regime. It is the responsibility of the buyer to maintain the elements in a clean condition.
- o. It is the responsibility of the client to satisfy themselves that all third party chemicals which may contact the membrane element (including, but not limited to antiscalants, pretreatment additives and cleaners), are compatible with Toray membrane elements and effective for their purpose. Such information shall be supplied by the chemical vendors.
- p. Buyer shall be responsible for providing the user with adequate system operating and maintenance manuals, operator and supervisor training and ensuring user's ability to perform cleaning and other performance restoration and diagnostic procedures.
- q. Buyer shall ensure that frequent, adequate system and subsystem performance data are routinely logged, reviewed, and filed in a systematic Excel spreadsheet format. Such information is to be made available to TMUS on a reasonable basis in the event a claim is made against TMUS. Performance data shall include as a minimum: operating time, pH, pressure, and pressure drop; feed water, permeate and brine flows, and TDS; feed water temperature and antiscalant dosage.
- r. TMUS will have the final decision on element replacement, repair, or supply of additional elements necessary to maintain output quality and quantity.

Reminders

1. Permeate obtained from first hour of operation should be discharged to drain.
2. If elements need to be returned to TMUS for warranty evaluation, please obtain an RMA (Return Material Authorization) number from TMUS before shipping.

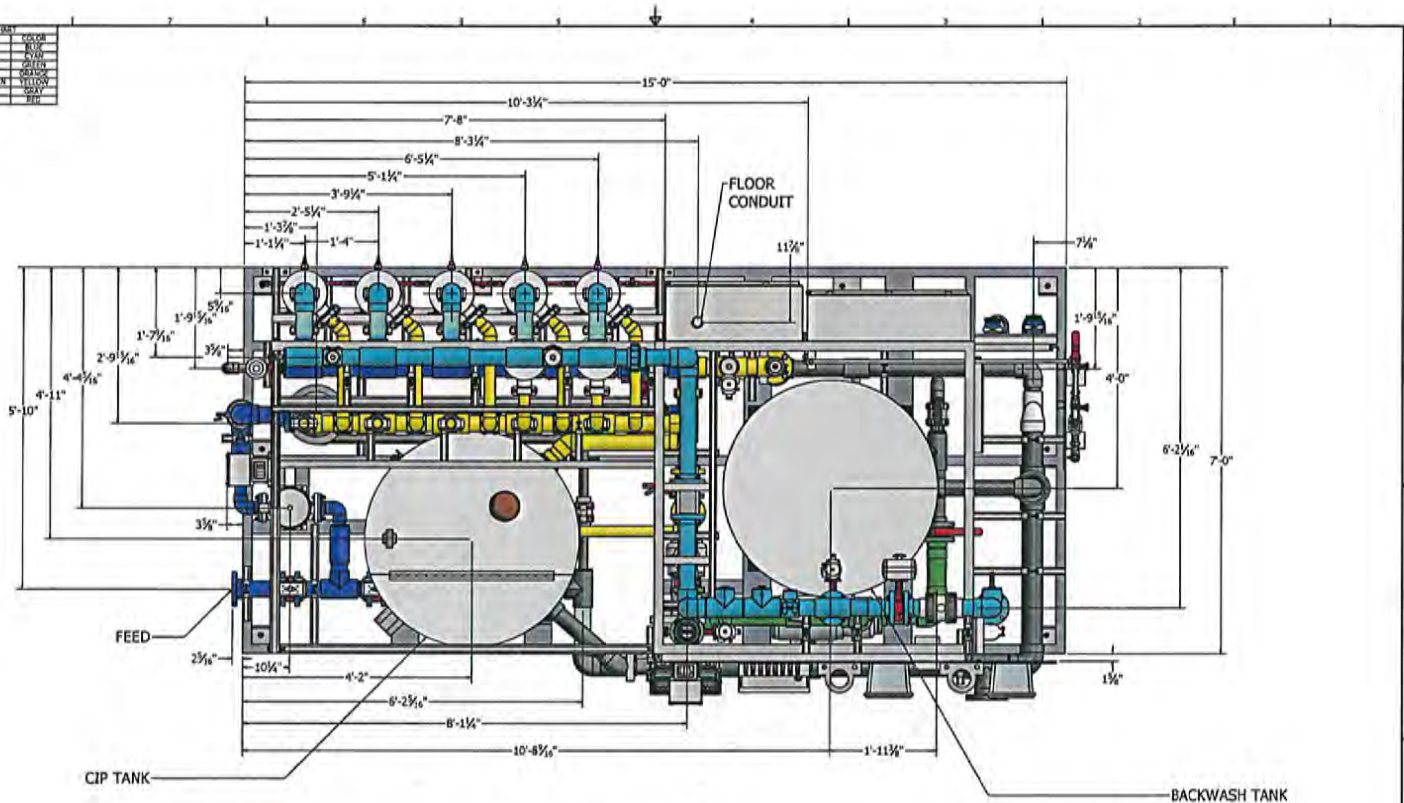


B. Preliminary Design of MF System

B.1 General Arrangement Drawings



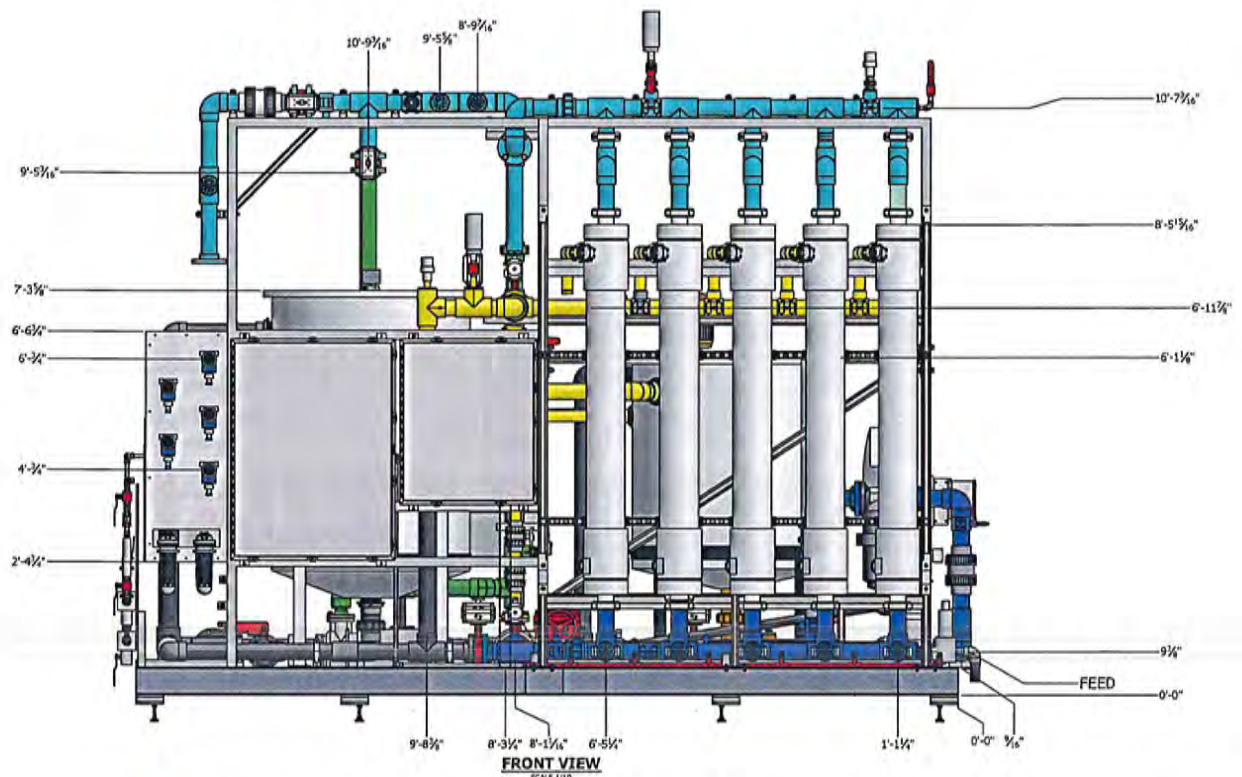
BLOCK COLOR	COLOR
PIPE	BLUE
VALVE	RED
FLANGE	GREEN
CONCENTRIC TEED RETURN	YELLOW
WELD	GRAY
ME SCALE	RED



PLAN VIEW
SCALE 1/8" = 1'-0"

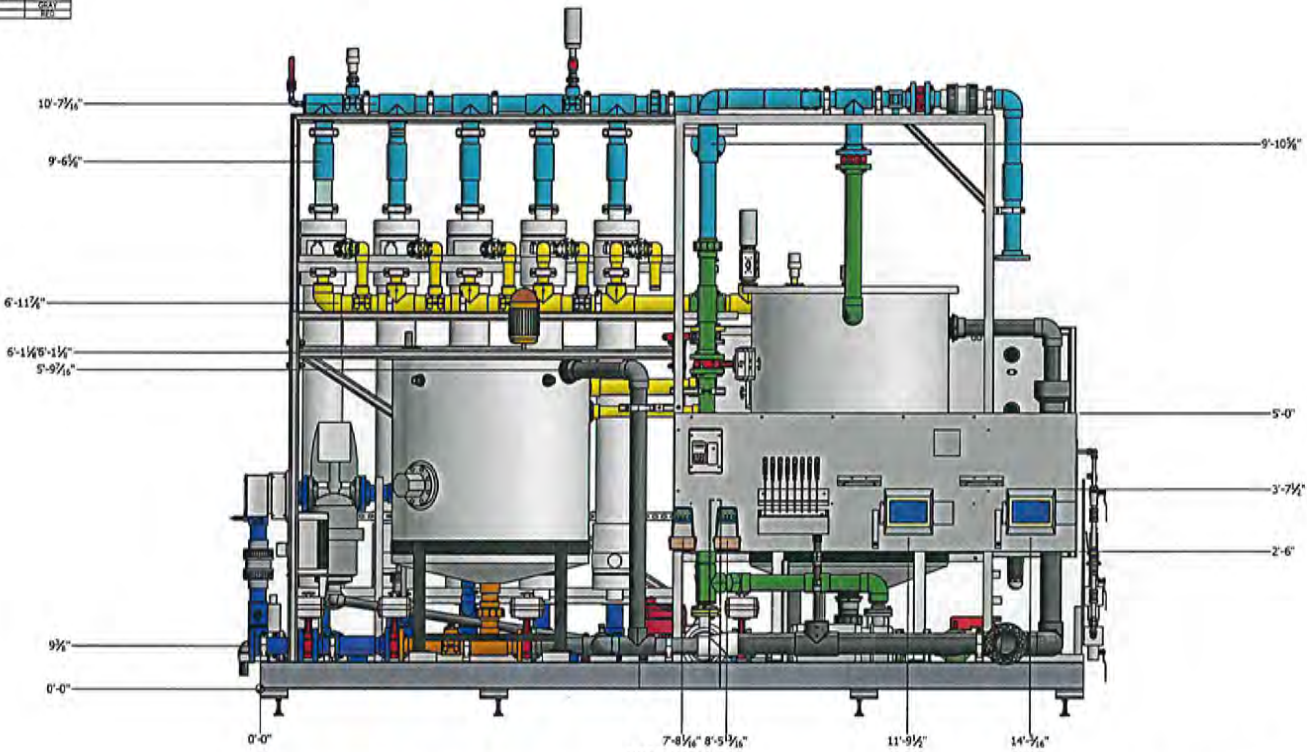
	BIWATER INC. 1101 GARDNER STREET, SUITE 100 PALMDALE, CA 91354 TEL: (909) 391-1111 FAX: (909) 391-1112 WWW.BIWATER.COM	DATE: 11/03 DRAWN: JFF CHECKED: JFF APPROVED: JFF TOLERANCE: (DIM & FIT) ± 0.005 BLOCK: (DIM) ± 0.015 millimeter	DRAFT FOR BID SUBMISSION STANTEC	PALMDALE WATER DISTRICT PURE WATER AND ADVANCED WATER TREATMENT DEMONSTRATION FACILITY	UF SYSTEM GENERAL ARRANGEMENT SHEET NO. 4511-UF-M-101
	DATE: 11/03 DRAWN: JFF CHECKED: JFF APPROVED: JFF TOLERANCE: (DIM & FIT) ± 0.005 BLOCK: (DIM) ± 0.015 millimeter				

Piping Color Code	
Process	Blue
Feed	Blue
Permeate	Blue
Backwash	Yellow
Top Feed	Yellow
Concentrate / ESP Return	Yellow
WFI	Grey
Air Stage	Red



	BIWATER INC. 4701 WEST 10TH AVENUE, SUITE 100 DENVER, CO 80202 TEL: 303.733.1100 FAX: 303.733.1101 WWW.BIWATER.COM	DATE: 11/03 DRAWN: JJK CHECKED: JJK APPROVED: JJK TOLERANCE: UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES AND DECIMALS THEREOF. BLOCK: UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS.	DRAFT FOR BID SUBMISSION STANTEC	PALMDALE WATER DISTRICT PURE WATER AV ADVANCED WATER TREATMENT DEMONSTRATION FACILITY	UF SYSTEM GENERAL ARRANGEMENT 1511-UF-M-101
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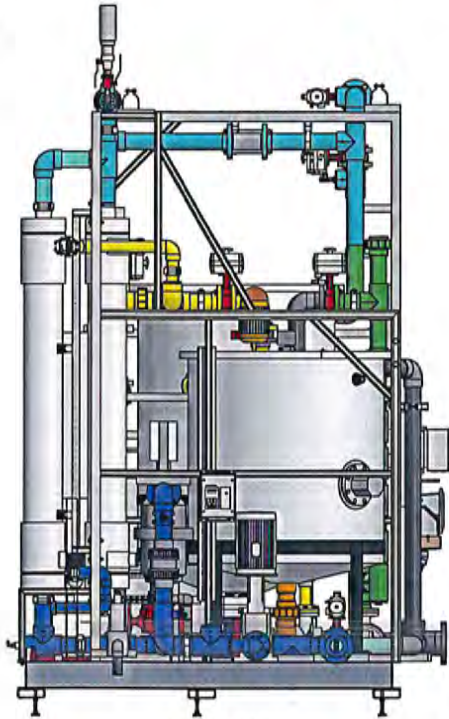
REVISIONS	DATE	BY	DESCRIPTION
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2	11/03	JLW	REVISED
3	11/03	JLW	REVISED
4	11/03	JLW	REVISED
5	11/03	JLW	REVISED
6	11/03	JLW	REVISED
7	11/03	JLW	REVISED
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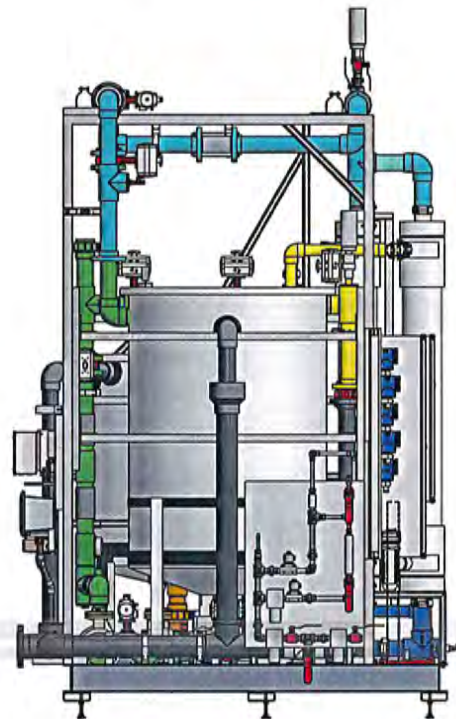
REAR VIEW
SCALE 1/10

	BIWATER INC. 4750 FREEMAN BLVD. #100 PALMDALE, CA 91767 Phone: 909.386.2029 Fax: 909.386.2020	DATE: 11/03 DRAWN BY: JLW CHECKED BY: JLW PROJECT: 4511-UF-M-101	PROJECT: PALMDALE WATER DISTRICT PURE WATER AV ADVANCED WATER TREATMENT DEMONSTRATION FACILITY	SYSTEM: UF SYSTEM GENERAL ARRANGEMENT
	TOLERANCE: (INCH) = +/- 0.005 (1/400) (MILLIMETER) = +/- 0.10	DRAFT FOR BID SUBMISSION STANTEC	SHEET NO.: 0 TOTAL SHEETS: 1	PROJECT NO.: 4511-UF-M-101

PROCESS COLOR KEY	
PROCESS	YELLOW
PERM	RED
ULTRATE	PURPLE
REVERSE	GREEN
PERM	ORANGE
COND. TREATMENT / CSP RETURN	YELLOW
ROSW	PURPLE
ARE SCOUR	RED



RIGHT SIDE
SCALE 1/10



LEFT SIDE
SCALE 1/10



BIWATER INC.
 4750 WILSON AVENUE, PALMDALE, CA 93551
 Phone: 805.344.7171 Fax: 805.344.7172
 www.biwater.com
 This is a preliminary drawing and is not to be used for construction without the approval of the design engineer. All dimensions are in millimeters unless otherwise specified. Tolerances are as shown. © 2011 Biwater Inc.

DATE: 11/02/2011
 TIME: 11:00 AM
 PROJECT: STANTEC
 DRAWING: DRAFT FOR BID SUBMISSION

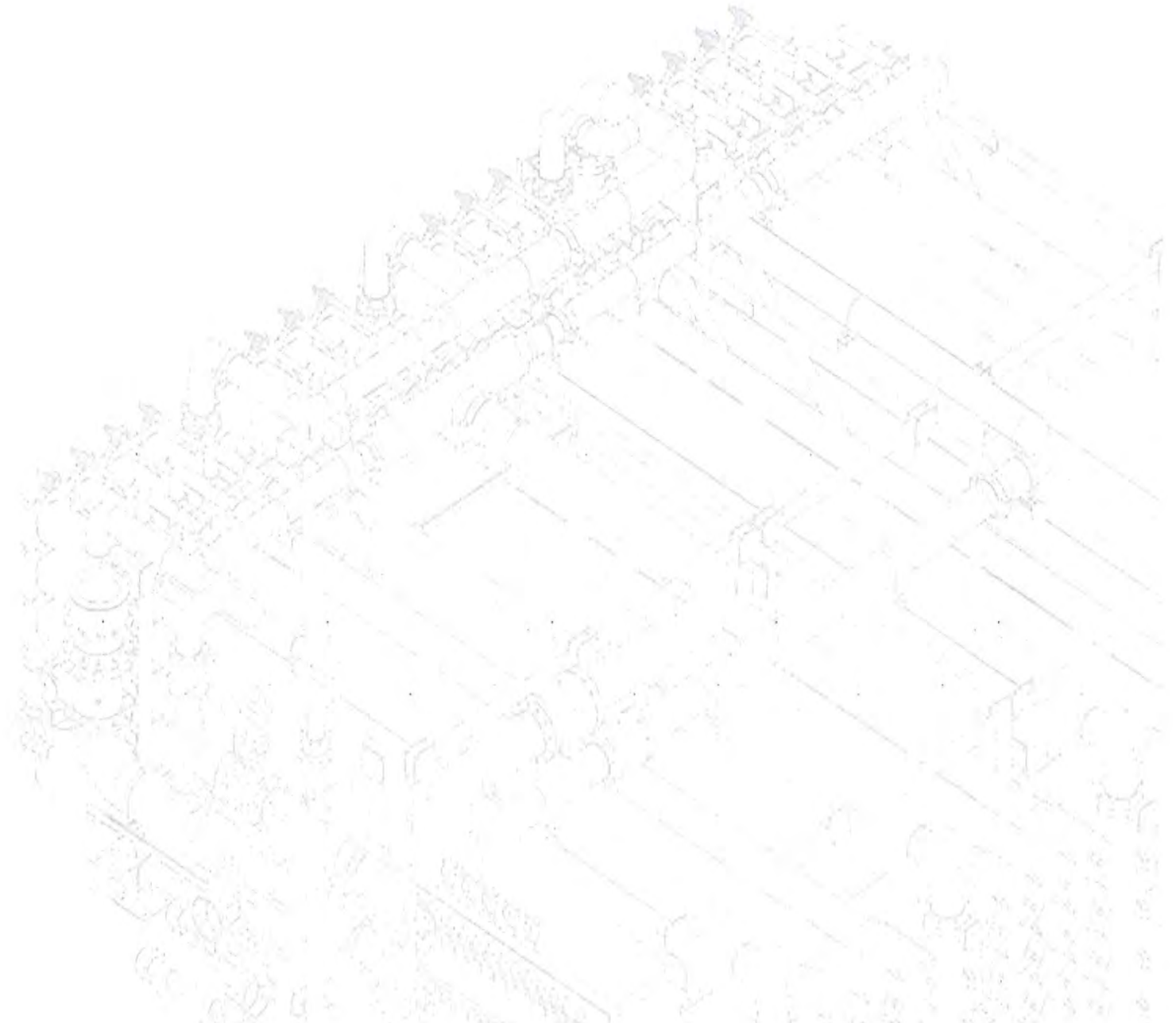
PALMDALE WATER DISTRICT
 PURE WATER ADVANCED WATER
 TREATMENT DEMONSTRATION FACILITY

UF SYSTEM
 GENERAL ARRANGEMENT
 SHEET: 1511-UF-M-101



B. Preliminary Design of MF System

B.2 Process & Instrumentation Diagram

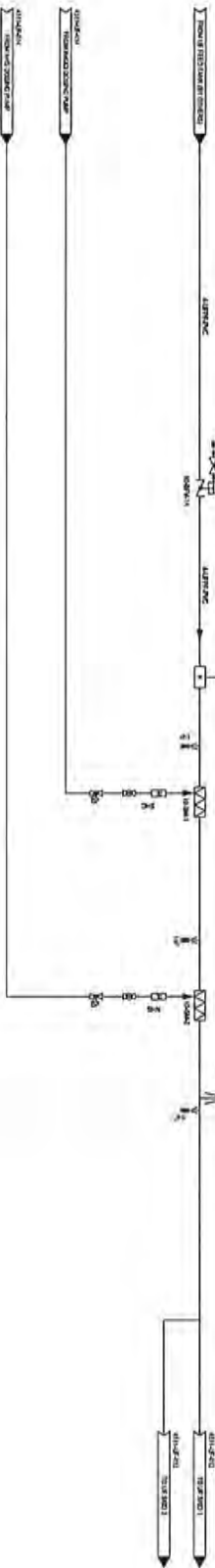


NOTES:
 1. CONSULT DRAWING
 2. SEE GENERAL NOTES
 3. POWER TO BE PROVIDED

MPT
 WATER P/LC



DRAFT ONLY
 ALL COMPONENTS AND INFORMATION ARE SUBJECT TO
 CHANGE TO MEET MINIMUM CONTRACT REQUIREMENTS.



NO.	REVISION	DATE	BY	APP'D
1	ISSUE FOR BIDDING	11/11/2022	STANTEC	
2				
3				
4				
5				



BIWATER, INC.
 6711 Highway 10, Houston, TX 77036
 Tel: 281.486.1000
 Fax: 281.486.1001
 www.biwater.com

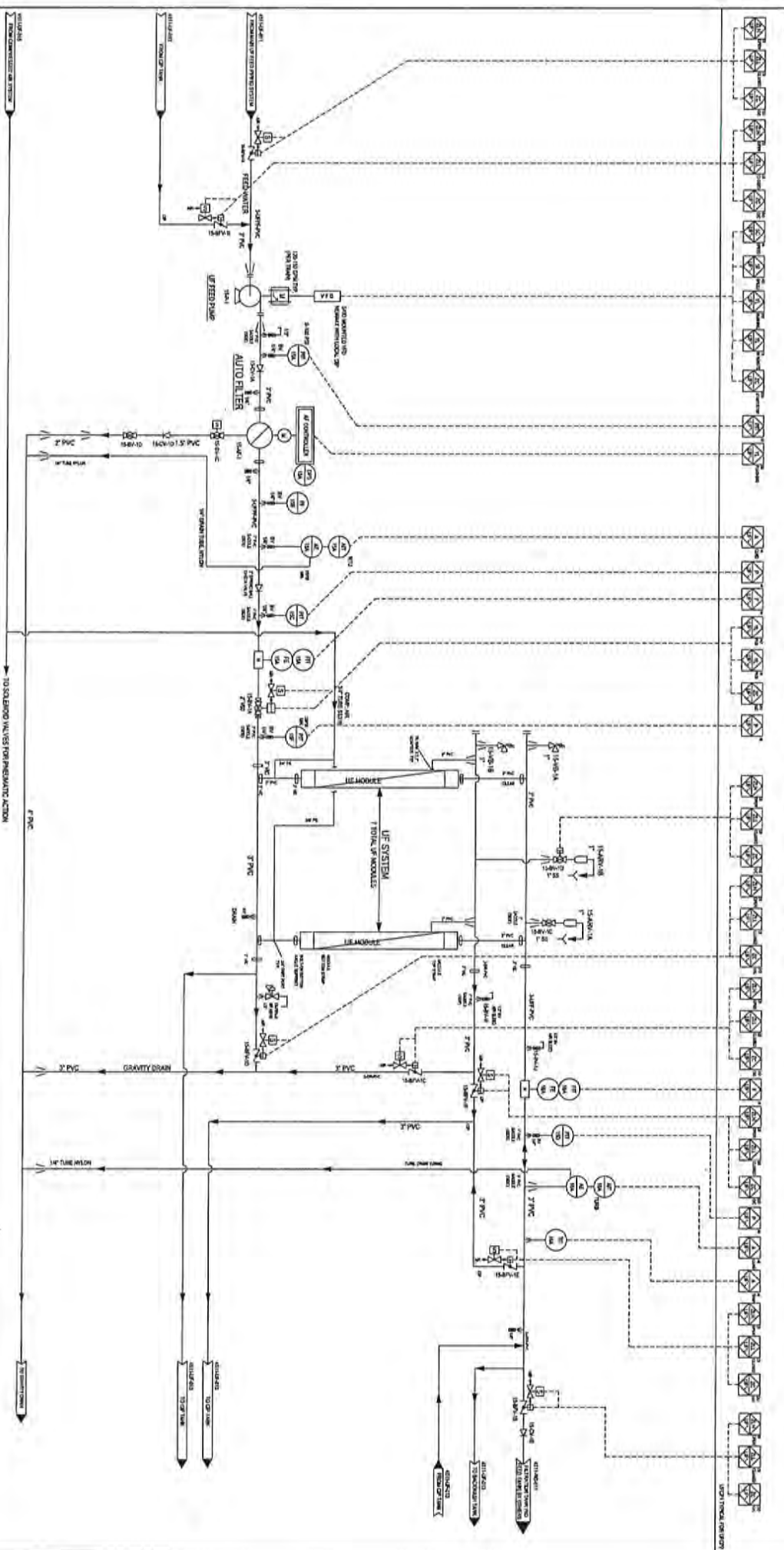
PROJECT NO.	11020202	DATE	11/11/2022
CLIENT	STANTEC	PROJECT	4511
SCALE	AS SHOWN	DATE	11/11/2022
TOLERANCE	UNLESS OTHERWISE SPECIFIED	SCALE	AS SHOWN
REVISIONS	AS NOTED	SCALE	AS SHOWN

DRAFT - FOR BID SUBMISSION
 PROJECT: PALMDALE WATER DISTRICT
 PURE WATER AVANCED WATER
 TREATMENT DEMONSTRATION FACILITY

PROJECT: PALMDALE WATER DISTRICT
 PURE WATER AVANCED WATER
 TREATMENT DEMONSTRATION FACILITY

PROJECT: PALMDALE WATER DISTRICT
 PURE WATER AVANCED WATER
 TREATMENT DEMONSTRATION FACILITY

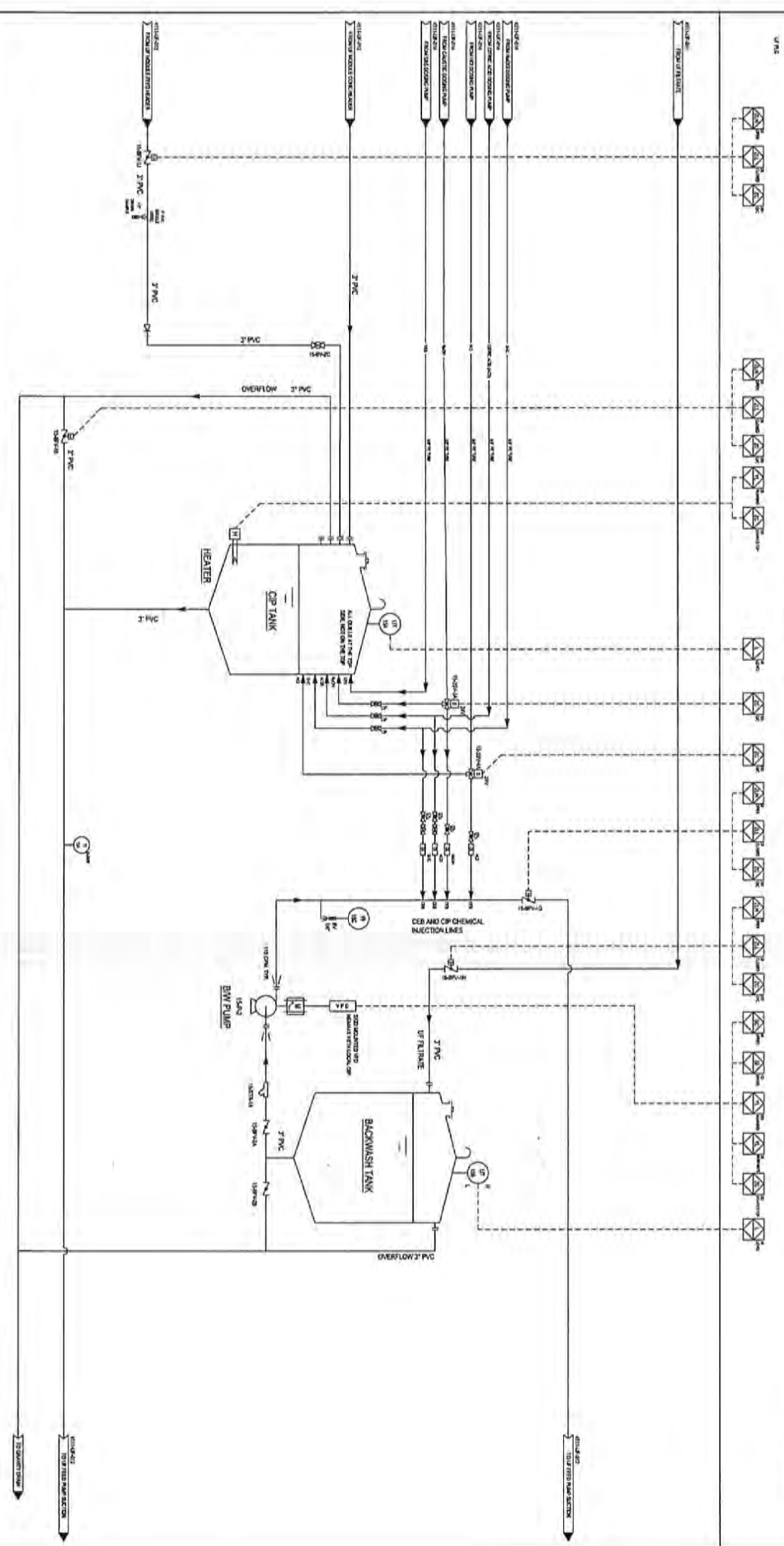
DRAFT ONLY
 ALL COMPONENTS AND INFORMATION ARE SUBJECT TO
 CHANGE TO MEET MINIMUM CONTRACT REQUIREMENTS.



		BIWATER, INC. <small>10000 W. 10th Street, Suite 100, Denver, CO 80231 Phone: (303) 751-1100 Fax: (303) 751-1101 Website: www.biwater.com</small>		PROJECT: PALMDALE WATER DISTRICT DATE: 11/03/2012 SCALE: AS SHOWN PROJECT NO.: 4511-UF-012	
DESIGNER: STANTEC <small>10000 W. 10th Street, Suite 100, Denver, CO 80231 Phone: (303) 751-1100 Fax: (303) 751-1101 Website: www.stantec.com</small>		CLIENT: PALMDALE WATER DISTRICT <small>10000 W. 10th Street, Suite 100, Denver, CO 80231 Phone: (303) 751-1100 Fax: (303) 751-1101 Website: www.palmdalewater.com</small>		PROJECT NO.: 4511-UF-012 DATE: 11/03/2012 SCALE: AS SHOWN PROJECT NO.: 4511-UF-012	
PROJECT: PALMDALE WATER DISTRICT TREATMENT DEMONSTRATION FACILITY		PROJECT NO.: 4511-UF-012 DATE: 11/03/2012 SCALE: AS SHOWN PROJECT NO.: 4511-UF-012		PROJECT NO.: 4511-UF-012 DATE: 11/03/2012 SCALE: AS SHOWN PROJECT NO.: 4511-UF-012	

- NOTE:
- A) TYPICAL FOR BOTH SIZES
 - B) CER SYSTEM REQUIREMENTS
 - C) CER WATER FLOW TO THE CER TANK THROUGH THE CER DRAIN TANK
 - D) CER WATER FLOW TO THE CER TANK THROUGH THE CER DRAIN TANK
 - E) AIRLIFTED WATER FLOW TO DRAIN THROUGH THE CER TANK DRAIN BACKFLOW VALVE

DRAFT ONLY
 ALL COMPONENTS AND INFORMATION ARE SUBJECT TO
 CHANGE TO MEET MINIMUM CONTRACT REQUIREMENTS.

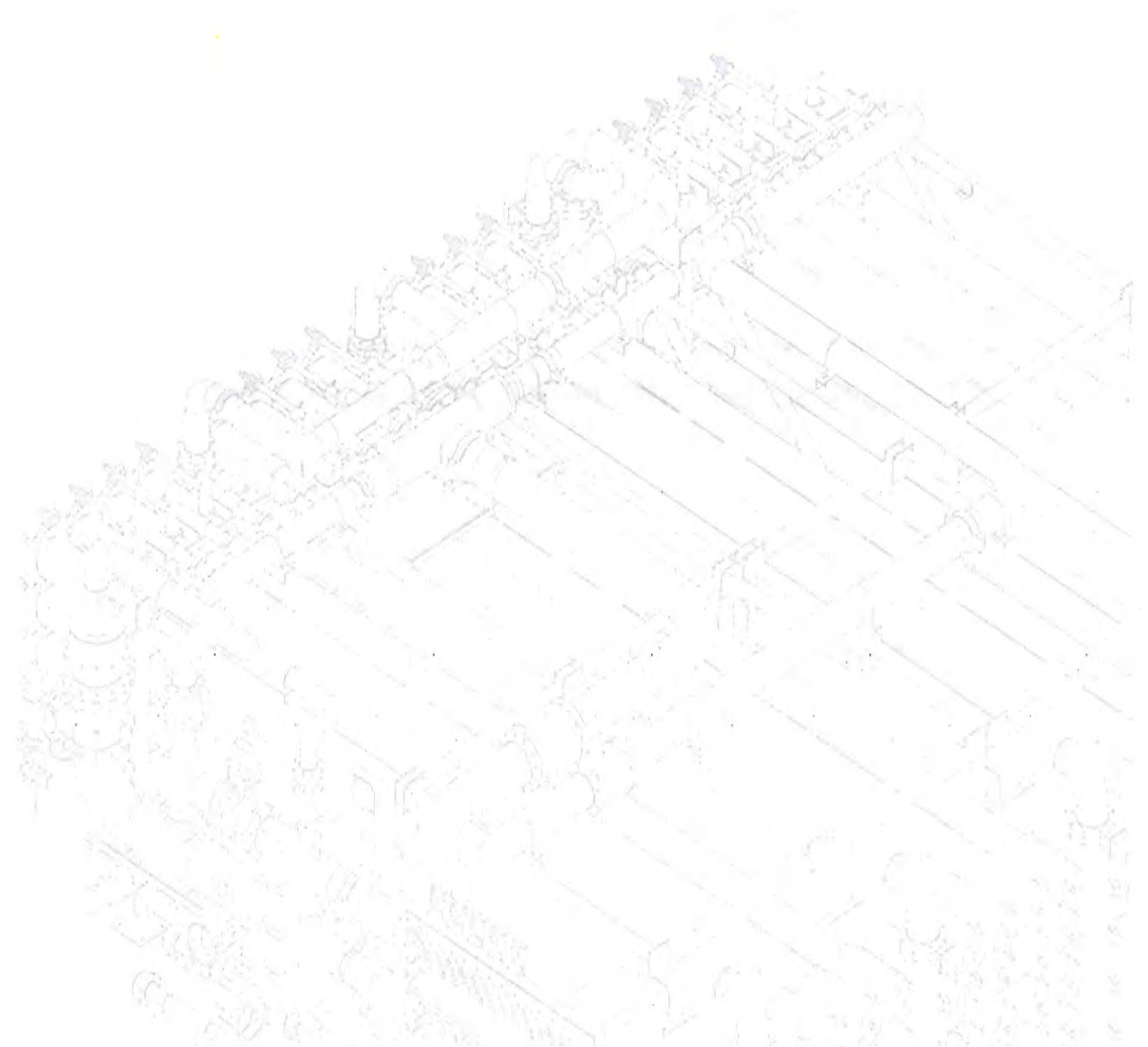


		BIWATER, INC. 6110 Highway 20, Santa Clara, CA 95050 TEL: 408.253.1234 FAX: 408.253.1235 WWW.BIWATER.COM		PROJECT 11/03/2023		DATE 11/03/2023	
CLIENT STANTEC		PROJECT PALMDALE WATER DISTRICT PURE WATER AV ADVANCED WATER TREATMENT DEMONSTRATION FACILITY		SCALE 1/8" = 1'-0"		NO. 4511-UF-013	
DESIGNER STANTEC		CHECKED STANTEC		DATE 11/03/2023		NO. 4511-UF-013	
PROJECT PALMDALE WATER DISTRICT PURE WATER AV ADVANCED WATER TREATMENT DEMONSTRATION FACILITY		DATE 11/03/2023		NO. 4511-UF-013		NO. 4511-UF-013	



B. Preliminary Design of MF System

B.3 MF Membrane Specifications





B.3 MF Membrane Specifications

Biwater will provide the following Ultra-Filtration (UF) membranes supplied by **two (2)** membrane manufacturers for the ITS.

- Dupont, Model SFD-2880XP
- Toray, Model HFU-2020AN

1 Dupont SFD-2880XP Ultra Filtration Membrane

Key Specifications	
Brand	• Dupont
Model & Type	• SFD-2880XP
Materials	• PVDF (Polyvinylidene Fluoride)
Pore Size	• 0.03 um
Outer Membrane Surface Area	• 829 sq feet
Flow Range	• 8.8 – 37.4 gpm

Please see enclosed the Membrane Data Sheet.

2 Key Specifications of Toray HFU-2020AN Ultra Filtration Membrane

Key Specifications	
Brand	• Toray
Model & Type	• HFU-2020AN Hollow Fiber Ultrafilters
Materials	• PVDF (Polyvinylidene Fluoride)
Pore Size	• 0.01 um
Outer Membrane Surface Area	• 775 sq feet
Max Feed Flow	• 53 gpm

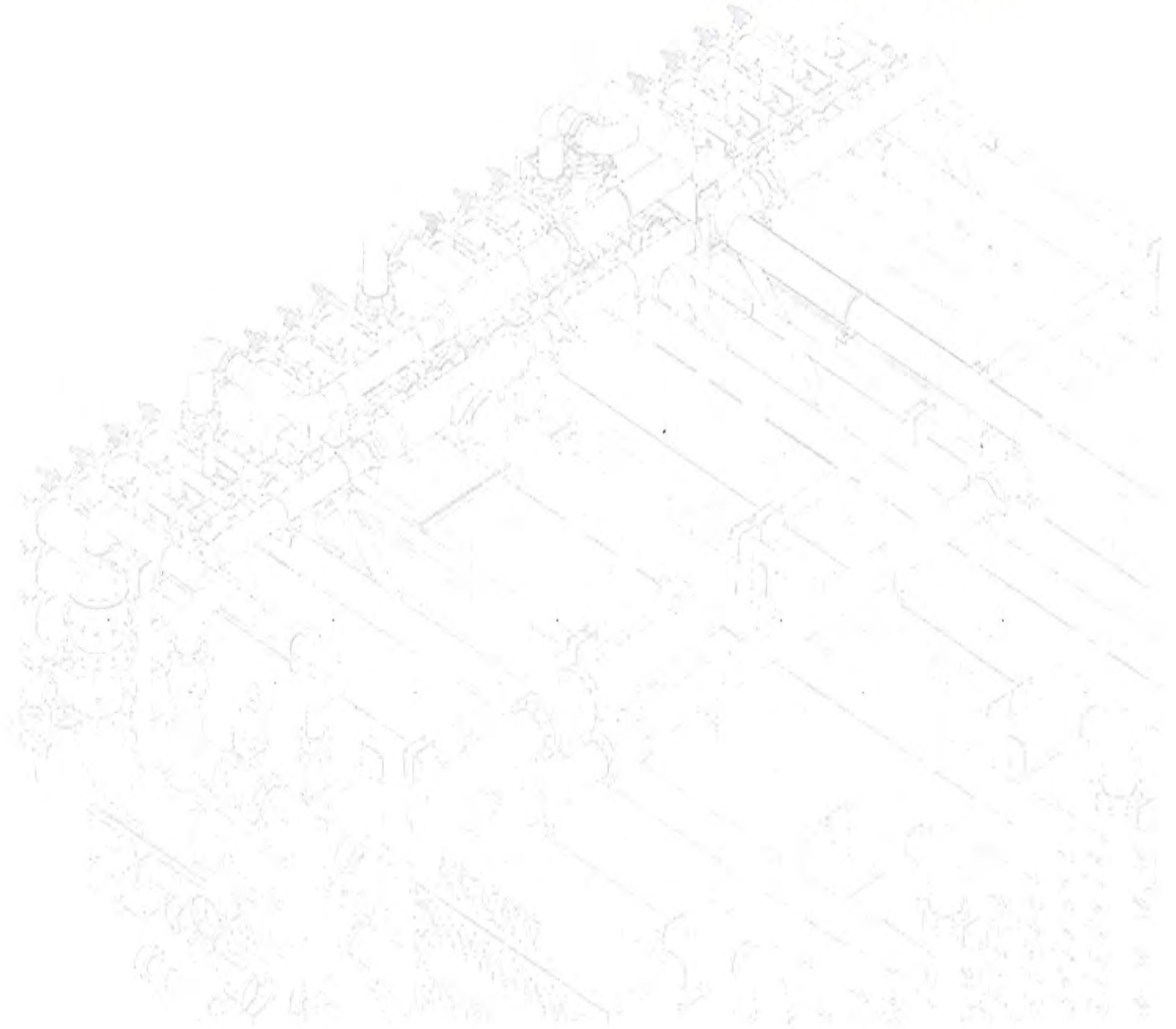
Please see enclosed the Membrane Data Sheet.



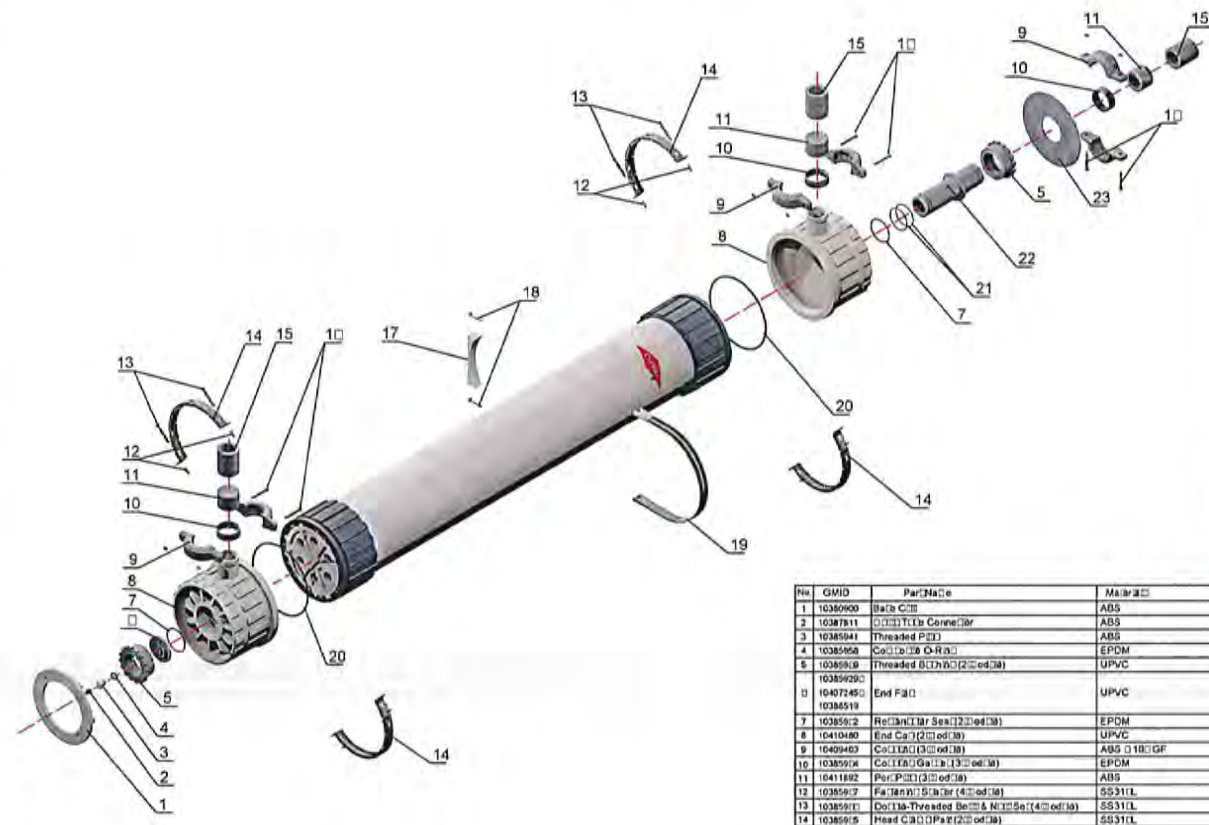
B. Preliminary Design of MF System

B.3 MF Membrane Specifications

- Dupont UF Membrane



REFERENCE



Rev	GMID	Part Name	Material
1	10380900	Ball Cap	ABS
2	10387811	End Cap Connector	ABS
3	10385941	Threaded Pin	ABS
4	10385958	Collar O-Ring	EPDM
5	10385959	Threaded Connector	UPVC
6	10385920	End Cap	UPVC
7	10385952	Retention Seal	EPDM
8	10410480	End Cap	UPVC
9	10409485	Collar	ABS O-Ring
10	10385954	Collar	EPDM
11	10411492	Pin	ABS
12	10385957	Retention Seal	SS316L
13	10385951	Do Not Threaded Bolt	SS316L
14	10385955	Head Cap	SS316L
15	---	Grooved Connector	Brass
16	10411413	Hex Head Screw	SS316L
17	10411883	Mod. Saddle	PE TPR
18	10387837	Bolt	SS316L
19	10387835	Mod. Cap	SS316L, EPDM, Col. Br.
20	10385953	X-Ring	EPDM
21	10385905	Inlet Connector	EPDM
22	11051593	Inlet Connector	UPVC
23	10385974	Head Cap	ABS
24	10380199	Head Cap	ABS

APPROVED BY: [Signature]
DATE: [Date]
DESCRIPTION: [Description]

TECHNOLOGY PROVIDER: **DOW**
WATER PROCESSING

CUSTOMER: GENERAL

PROJECT TITLE: SFD (SFP - 28) (SPL - 28) (SPL)
SFD (SFP - 28) (SPL - 28) (SPL)

DRAWING TITLE: SFD (SFP - 28) (SPL - 28) (SPL)
SFD (SFP - 28) (SPL - 28) (SPL)
A (SPL) (SPL) (SPL)

SCALE: 1:1
DRAWN BY: [Name]
CHECKED BY: [Name]
DATE: [Date]

DRAWING NO: SFD (SFP - 28) (SPL - 28) (SPL)
SHEET NO: 1
SHEET TOTAL: 1

THE DOW COMPANY

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Product Data Sheet

IntegraFlux™ Ultrafiltration Modules

Model SFP-2860XP, SFD-2860XP, SFP-2880XP and **SFD-2880XP**

Description

IntegraFlux™ Ultrafiltration (UF) modules with XP fiber are made from high permeability, high mechanical strength, hollow fiber PVDF membranes. The modules provide excellent performance, industry leading membrane area with low energy and chemical consumption. IntegraFlux™ modules have the following general properties and characteristics:



- Up to 35% higher permeability than previous generation modules helping to improve operating efficiencies and productivity
- 0.03 µm nominal pore diameter for removal of bacteria, viruses, and particulates including colloids to protect downstream processes such as RO
- PVDF polymeric hollow fibers for high mechanical strength with excellent chemical resistance providing long membrane life and reliable operation
- Outside-In flow configuration allowing a wide range of solids in the feed water minimizing the need for pretreatment processes and reducing the backwash volume compared to Inside-Out configurations



These modules are an excellent choice for systems with capacities greater than 50 m³/hr (220 gpm). The shorter SFP-2860XP or SFD-2860XP modules are well suited for installations with limited height. Larger and longer, 8 inch diameter and 80 inch in length, the SFP-2880XP or SFD-2880XP modules offer a high effective membrane area combined with high permeability that provides the most economical and efficient membrane system design.

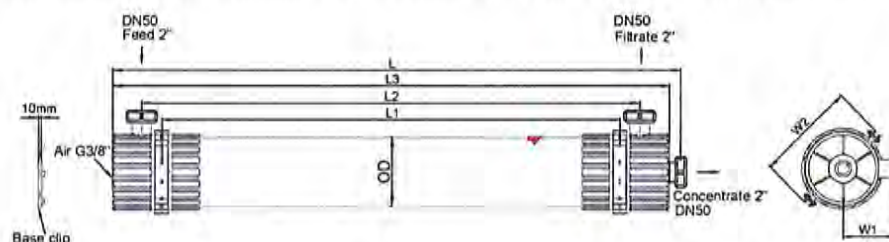
IntegraFlux™ Ultrafiltration Modules can be used for a wide variety of treatment applications such as industrial and municipal wastewaters, surface water, and seawater.

Typical Properties

Product	Type	Membrane Area		Volume		Weight (empty/water filled)	
		m ²	ft ²	liters	gallons	kg/lbs	kg/lbs
SFP-2860XP	Industrial	51	549	35	9.3	48/83	106/183
SFD-2860XP	NSF/ANSI 61 and 419	51	549	35	9.3	48/83	106/183
SFP-2880XP	Industrial	77	829	39	10.3	61/100	135/220
SFD-2880XP	NSF/ANSI 61 and 419	77	829	39	10.3	61/100	135/220

Dimensions

SFP-2860XP, SFD-2860XP, SFP-2880XP, and SFD-2880XP (8-inch diameter)



Product	Units	Length				Diameter D	Width	
		L	L1	L2	L3		W1	W2
SFP-2860XP and SFD-2860XP	SI (mm)	1860±3	1500	1630±3	1820±3	225	180	342
	US (inch)	73.2±0.1	59.1	64.2±0.1	71.7±0.1	8.9	7.1	13.5
SFP-2880XP and SFD-2880XP	SI (mm)	2360±3	2000	2130±3	2320±3	225	180	342
	US (inch)	92.9±0.1	78.7	83.9±0.1	91.3±0.1	8.9	7.1	13.5

Suggested Operating Conditions

	SI Units	US Units
Filtrate Flux (25°C)	40 – 110 l/m ² /hr	24 – 65 gfd
Flow Range Per Module ¹	2.0 – 8.5 m ³ /hr	8.8 – 37.4 gpm
Temperature	1 – 40°C	34 – 104°F
Maximum Inlet Module Pressure (20°C)	6.25 bar	90.65 psi
Maximum Inlet Module Pressure (40°C)	4.75 bar	68.89 psi
Maximum Operating TMP	2.1 bar	30.5 psi
Maximum Operating Air Scour Flow	12 Nm ³ /hr	7.1 scfm
Maximum Backwash Pressure	2.5 bar	36 psi
Operating pH	2 – 11	
Maximum NaOCl	2,000 mg/L	
Maximum Partide Size	300 µm	
Flow Configuration	Outside in, dead end flow	
Expected Filtrate Turbidity	≤ 0.1 NTU	
Expected Filtrate SDI	≤ 2.5	

¹ Flow range represents DUPONT™ Ultrafiltration SFP-2860XP, SFD-2860XP, SFP-2880XP, and SFP-2880XP Modules for filtrate flux range shown

Important Information

Proper start-up of an ultrafiltration system is essential to prepare the membranes for operating service and to prevent membrane damage. Following the proper start-up sequence also helps ensure that system operating parameters conform to design specifications so that system water quality and productivity goals can be achieved.

Before initiating system start-up procedures, membrane pretreatment, installation of the membrane modules, instrument calibration and other system checks should be completed.

Please refer to the Ultrafiltration Technical Manual (Form No. 45-D00874-en).

Operation Guidelines

Avoid any abrupt pressure variations during start-up, shutdown, cleaning or other sequences to prevent possible membrane damage. Flush the ultrafiltration system to remove shipping solution prior to start-up. Remove residual air from the system prior to start-up. Manually start the equipment. Depending on the application, filtrate obtained from initial operations should be discarded.

Please refer to the Ultrafiltration Technical Manual (Form No. 45-D00874-en).

General Information

- If operating limits and guidelines given in this bulletin are not strictly followed, the limited warranty will be null and void.
- To control biological growth during extended system shutdowns, it is recommended that storage solution be injected into the membrane modules.

Please refer to the Ultrafiltration Technical Manual (Form No. 45-D00874-en) and Technical Service Bulletins.

Product Stewardship

DuPont has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with DuPont products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

DuPont strongly encourages its customers to review both their manufacturing processes and their applications of DuPont products from the standpoint of human health and environmental quality to ensure that DuPont products are not used in ways for which they are not intended or tested. DuPont personnel are available to answer your questions and to provide reasonable technical support. DuPont product literature, including safety data sheets, should be consulted prior to use of DuPont products. Current safety data sheets are available from DuPont.

Please be aware of the following:

- The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

Regulatory Note

NSF/ANSI 61 and 419 certified drinking water modules require specific conditioning procedures prior to producing potable water. Please refer to the Ultrafiltration Technical Manual (Form No. 45-D00874-en) flushing section for specific procedures. Drinking water modules may be subjected to additional regulatory restrictions in some countries. Please check local regulatory guidelines and application status before use and sales.

Have a question? Contact us at:

www.dupont.com/water/contact-us

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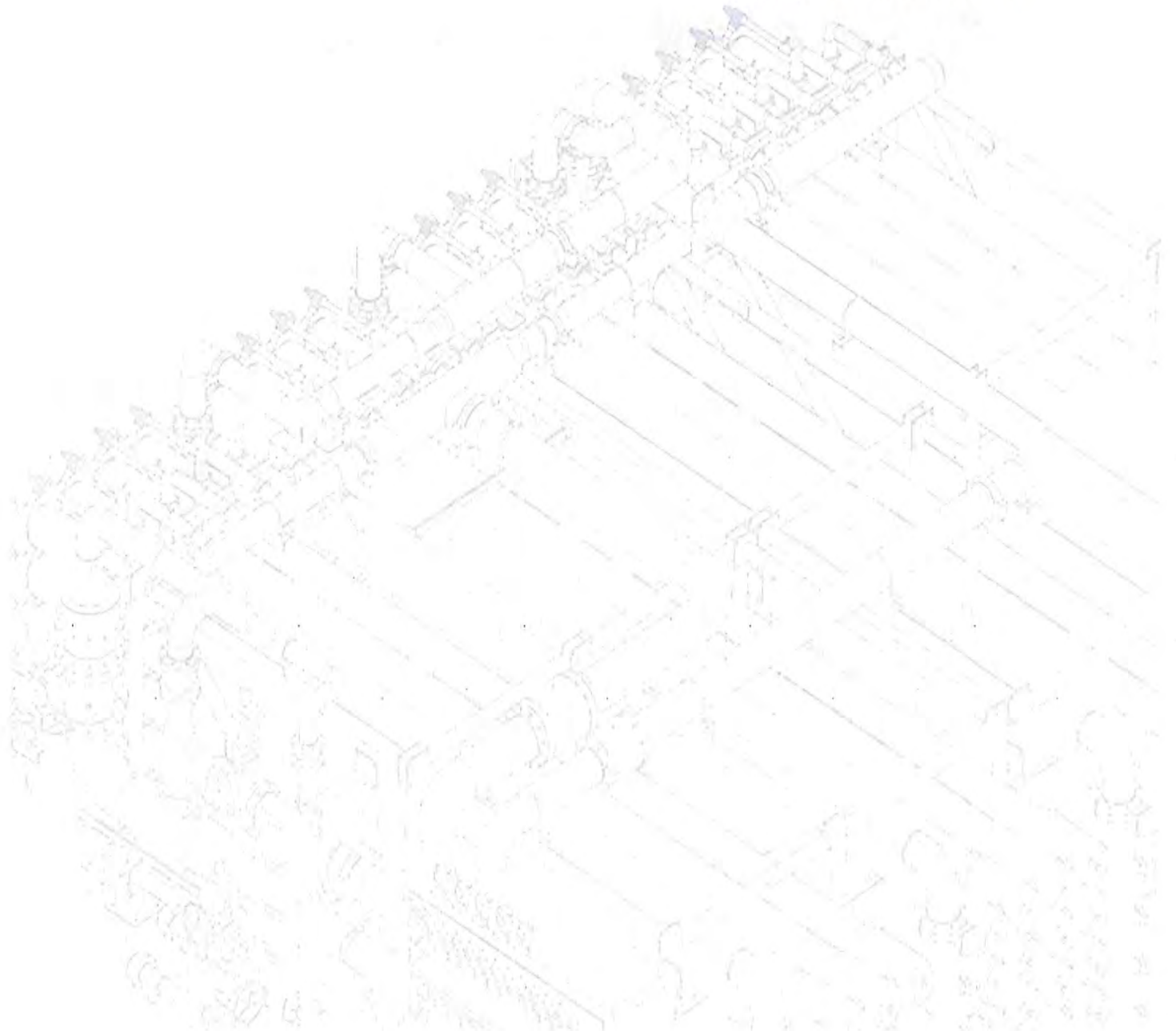




B. Preliminary Design of MF System

B.3 MF Membrane Specifications

Toray UF Membrane



HFU-2020AN

Pressurized Outside to In / Dead-end Filtration Ultrafiltration (UF) Membrane Module

Toray's PVDF membrane construction is highly resistant to chlorine and strong acids, which allows for better cleaning and optimization of filtration flux rates after cleaning. The hollow fiber modules effectively remove suspended solids, viruses, and bacteria and are certified for drinking water applications.

Membrane Characteristics	Unit	Value
Membrane Material		PVDF (Polyvinylidene fluoride)
Nominal Pore Size	μm	0.01
Outer Membrane Surface Area	m ² (ft ²)	72 (775)

Operating Parameters	Unit	Value
Maximum Feed water / Filtrate Flow	m ³ /h (gpm)	12 (53)
Maximum Backwash Flow	m ³ /h (gpm)	13.5 (59)
Maximum Air Flow	Nm ³ /h (scfm)	9.0 (5.3)
Maximum Inlet Pressure	kPa (psi)	300 (43.5)
Maximum Backwash Pressure	kPa (psi)	300 (43.5)
Normal Operating Transmembrane Pressure	kPa (psi)	0–200 (0–29)
Operating Temperature Range	°C (°F)	0–40 (32–104)
pH Range	During Filtration	1–10
	During Cleaning	0–12

*Please contact Toray for operating manual and preliminary design, as capacity per module is highly dependent on feed water quality.



Product Certifications and Compliances

- NSF/ANSI 61 for drinking water applications
- NSF/ANSI 419 to comply with the U.S. EPA's Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), which allows membrane manufacturers to prove Cryptosporidium reduction.
- Association of Membrane Separation Technology of Japan



Applications

Drinking water, Industrial process water, Pretreatment for seawater RO desalination, Secondary and Tertiary wastewater

HFU-2020AN

Pressurized Outside to In / Dead-end Filtration Ultrafiltration (UF) Membrane Module

Dimensions and Weight		Unit	Value
Diameter		mm (in)	216 (8.5)
Length		mm (ft)	2,160 (7.087)
Weight	Full of Water	kg (lbs)	92 (203)
	After Draining	kg (lbs)	49 (108)

Connections	Value
(A) Filtrate Outlet	80A
(B) Air Outlet	65A
(C) Feed Water / Air Inlet	80A

Material Specifications	
Description	Material
Casing	uPVC
Cap	uPVC
Potting	Epoxy resin
O-ring	EPDM

Please contact Toray for more detailed drawing and dimensions.



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All data may change without prior notice, due to technical modifications or production changes. Please be sure to inquire about the latest product specifications.

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B. Preliminary Design of MF System

B.4 MF Membrane Projections





B.4 MF Membrane Projections

Biwater will provide the following Ultra-Filtration (UF) membranes supplied by **two (2)** membrane manufacturers for the ITS.

- Dupont, Model SFD-2880XP
- Toray, Model HFU-2020AN

1 Dupont SFD-2880XP Ultra Filtration Membrane

Membrane Projections	
7 modules; Flux Rate: 30 GFD; 40 min Filtration	• Recovery at 95%
7 modules; Flux Rate: 30 GFD; 57 min Filtration	• Recovery at 93.15%

Please see enclosed the Membrane Projections specific for this project.

2 Key Specifications of Toray HFU-2020AN Ultra Filtration Membrane

Membrane Projections	
7 modules; Flux Rate: 30 GFD; 41.45 min Filtration	• Recovery at 95.97%

Please see enclosed the Membrane Projections specific for this project.



B. Preliminary Design of MF System

B.4 MF Membrane Projections

Dupont MF Membrane



WATER APPLICATION VALUE ENGINE

WATER SOLUTIONS

WAVE Program Version: 1.82.824

Calculation Engine Version: 01.12.20.03

Database Version: 39



93.15% Recovery

Project Name: BiWater 4511_RFQ_UF Membrane
Case Name: Case 1
Customer: BiWater
Prepared by: Joseph Kelly
Company: DuPont
Country:
Date Created: October 11, 2022
Project Notes:

Case #: 1 of 1
Case Notes: Case 1

Keywords:

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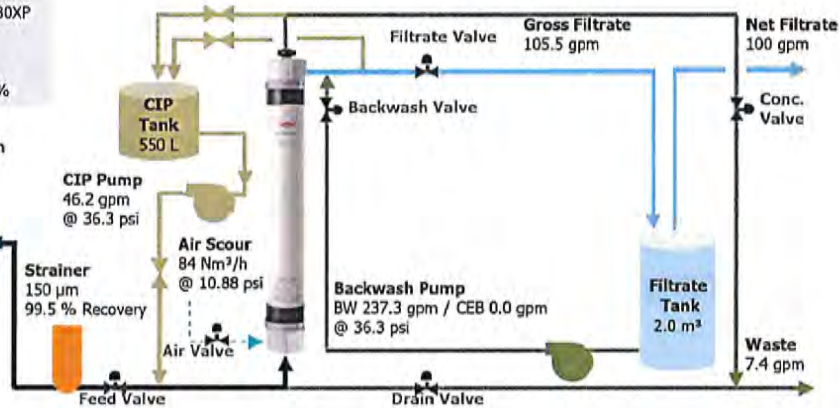


UF Detailed Report

Module: IntegraFlux SFD-2880XP
 Total UF Trains: 1
 UF Modules: 1 x 7 = 7
 Operating Flux: 29.0 gfd
 UF System Recovery: 93.2%

Feed Water
 Average Feed Flow: 107.9 gpm
 Type: Surface Water
 TSS: 0.0 mg/L
 TOC: 6.0 mg/L
 Turbidity: 2.0NTU

Feed Pump
 Max 121.5 gpm
 @ 48.3 psi



UF System Overview

Module Type	IntegraFlux SFD-2880XP		
# Trains	Online = 1	Standby = 0	Redundant = 0
# Modules	Per Train = 7	Total = 7	
System Flow Rate (gpm)	Gross Feed = 107.9	Net Product = 100.0	
Train Flow Rate (gpm)	Gross Feed = 107.9	Net Product = 100.0	
UF System Recovery (%)	93.15		
TMP (psi)	5.75 @ 50.0 °F		3.92 @ 77.0 °F
Utility Water	Forward Flush: Pretreated water	Backwash: UF filtrate water	CIP Water Source: UF filtrate water
	CEB Water Source: UF filtrate water		

UF Operating Conditions

	Duration	Interval	Flux/Flow
Filtration:	40.0 min	43.0 min	-
Instantaneous			
1 Online Trains			29 gfd
1 Total Trains			29 gfd
Average			26 gfd
Net			25 gfd
Backwash	3.0 min	43.0 min	59 gfd
mini-CIP	68.9 min	7 d	6.60 gpm
CIP	311.1 min	60 d	6.60 gpm
Membrane Integrity Testing	12.0 min	24 h	-

UF Water Quality

Stream Name		Stream 1	
Water Type		Surface Water (50.0 - 104.0 °F)	
		Feed	Expected UF Product Water Quality
Temperature	(°F)	77.0	77.0
Turbidity	(NTU)	2.0	≤ 0.1
Organics (TOC)	(mg/L TOC)	6.0	5.4
pH		7.0	7.0

UF Configuration Options

Standby Option:	Constant module flux, variable plant filtrate flow
Storage Tank Option:	Storage Tank sized to maintain constant net filtrate flow
Forward Flush Water Source:	Pretreated water
BW Water Source:	UF filtrate water
mini-CIP Water Source:	UF filtrate water
CIP Water Source:	UF filtrate water

UF System Size and Module Details

Trains		Module Details		
		Name: IntegraFlux SFD-2880XP		
Online Trains	1	Membrane Area	77 m ²	829 ft ²
Standby Trains	0	Length	2.360 m	92.9 in
Redundant Trains	0	Diameter	0.225 m	8.9 in
Total Trains	1	Weight (empty)	61 kg	134 lb
Max Offline Trains	1	Weight (water filled)	100 kg	220 lb
Modules/Train	7	Water Volume	39.0 L	10.3 gal
Total Modules	7			


UF Flow Details

Stream		Maximum Flow*	Average Flow
Feed (Gross)	(gpm)	121.5	107.9
Feed Water Used for	(gpm)		
Pretreatment	(gpm)		0.5
Forward Flush & Process Streams	(gpm)		1.9
Feed (Net)	(gpm)	115.4	105.5
Filtrate (Gross)	(gpm)	115.4	105.5
Filtrate Used for Cleaning	(gpm)		5.5
Filtrate (Net)	(gpm)		100.0
Air	(N m ³ /h)	84.0	2.8
Backwash (BW)	(gpm)	237.3	5.5
Forward Flush Flowrate	(gpm)	120.9	1.8
mini-CIP Recycle	(gpm)	46.2	0.0
CIP Recycle	(gpm)	46.2	0.0
mini-CIP HCl (32%) Metering Pump	(L/h)	56.5	
mini-CIP Citric Acid(100%) Metering Pump	(L/h)	126.0	
mini-CIP NaOH (50%) Metering Pump	(L/h)	13.8	
mini-CIP NaOCl(12%) Metering Pump	(L/h)	153.9	
CIP HCl (32%) Metering Pump	(L/h)	56.5	
CIP Citric Acid(100%) Metering Pump	(L/h)	126.0	
CIP NaOH (50%) Metering Pump	(L/h)	13.8	
CIP NaOCl(12%) Metering Pump	(L/h)	153.9	

Footnotes:

* Maximum possible flow rate


UF Pump Hydraulics and Electrical Cost

Pump	Peak Flowrate (gpm)	Average Pressure (psi)	Mechanical Power (kW)	Electrical Power (kW)	Energy (kWh/d)	Cost (\$/d)
Feed	121.50	18.42	0.95	1.28	28.18	2.54
Backwash	237.31	15.31	1.58	2.15	1.19	0.11
mini-CIP	46.20	44.88	0.90	1.23		
HCl (32%) Metering Pump	0.25		0.01	0.01		
Citric Acid(100%) Metering Pump	0.55		0.02	0.02		
NaOH (50%) Metering Pump	0.06		0.00	0.00		
NaOCl(12%) Metering Pump	0.68		0.02	0.02		
CIP	46.20	36.26	0.73	0.99	0.03	0.00
HCl (32%) Metering Pump	0.25		0.00	0.01		
Citric Acid(100%) Metering Pump	0.55		0.01	0.02		
NaOH (50%) Metering Pump	0.06		0.00	0.00		
NaOCl(12%) Metering Pump	0.68		0.01	0.02		
mini-CIP Solution Heating				0.00	0.00	0.00
CIP Solution Heating				37.92	0.21	0.02
Air Compressor	369.84	10.88	1.43	3.12	0.57	0.05
Electrical Valves				0.00	0.00	0.00
PLC and Instrumentation				0.10	2.40	0.22
Total Electrical Cost					32.68	2.94

UF Pressure Ratings

Process	T (*F)	TMP* (psi)	Fouling Max ΔP (psi)	Piping ΔP (psi)	Filtrate Pres. (psi)	Feed Pres. ^b (psi)	Pres. Rating (psi)	OK? ^c
Filtration								
Minimum Temp.	50.0	5.75	0.00	10.64	7.25	23.64	90.65	√
Design Temp.	77.0	3.92	0.00	7.25	7.25	18.42	87.02	√
Maximum Temp.	104.0	2.87	0.00	5.32	7.25	15.44	68.89	√
BW	77.0	8.06	0.00	7.25		15.31	87.02	√
mini-CIP	77.0			44.88		44.88	87.02	√
CIP	95.0			36.26		36.26	76.14	√

Footnotes:

^a At actual, average flux

^b Sum of TMP, fouling ΔP, piping ΔP and filtrate pressure. Does not include pressure drop at the strainer. Pressure drops are based on user inputs. Default values should not be used for pump sizing

^c Comparison of Feed Pressure to Pressure Rating—a conservative comparison due to piping losses between the feed pump and module inlet.

UF Storage Tanks

Name	Bulk Conc. (%)	Minimum Recommended Volume (m ³)
Water ^a		2.03
CIP Tank		0.55
Chemical Storage ^b		
Citric Acid (C ₆ H ₈ O ₇)	100%	0.028
Hydrochloric Acid (HCl)	32%	0.012
Sodium Hypochlorite (NaOCl)	12%	0.034
Sodium Hydroxide (NaOH)	50%	0.003

Footnotes:

^a Storage tank sized to maintain constant net filtrate flow

^b The minimum recommended volume for chemical storage tanks is sized for 30 days of storage.

UF Design Warnings

None

Filtration Mode and Backwash Parameters

Normal Operation	Process Mode of Operation	Operation		Backwash (B/W)					Return to Operation ^d	Stop ^e
Operating Steps	Steps	1 Forward Flush at Start-up ^b	2 Filtration Mode	3 Air Inlet ^c	4 Drain	5 Backwash 1	6 Backwash 2	7 Forward Flush (FF)	2 Filtration Mode	- Stop
Pump and Valve Conditions	Feed Pump	o	o					o	o	
	Backwash Pump					o	o			
	Chem. Dosing Pump ^a									
	CEB Dosing Pump									
	CIP Recycle Pump									
	Feed Valve	o	o					o	o	
	Filtrate Valve		o						o	
	Conc. Valve	o		o	o	o			o	
	Backwash Inlet Valve					o	o			
	Drain Valve				o		o			
	Air Inlet Valve			o						
	Duration	~2.0-3.0 min.	40.0 min.	20 s	30 s	30 s	30 s	30 s	40 s	40.0 min.
Flow Rate	17.3 gpm	29 gfd	12.0 N m ³ /h	By gravity	59 gfd	59 gfd	17.3 gpm	29 gfd		
Remarks	1. The filtration mode follows Steps 2-3-4-5-6-7-8. Backwash can be repeated several times according to the fouling degree of UF membrane modules. 2. The valve opening and closing time for each process step should be considered when programming is designed. 3. "o" = valve or pump is opened or operating.									
Footnotes	^a Use of chemical dosing pump during backwash is based on feed water source and quality. Refer to DuPont UF Design Guidelines. ^b Forward flush flow rate displayed on per-module basis. ^c Use of air scour and frequency is based on feed water source and quality. Air flow rate displayed on per-module basis. ^d May need to waste a portion of permeate to remove residual chemicals, depending on design and application. ^e If taken out of operation, add preservative and close all valves. Stop should occur only after backwash.									

CIP Parameters

CIP	CIP Mode of Operation	Operation	Backwash (B/W) ^b					CIP ^c				Backwash (B/W) ^b				Return to Operation ^d
			1	2	3	4	5	6	7	8	9	10	11	12	13	
	Steps	Filtration Mode	Air Inlet ^e	Drain	Backwash 1	Backwash 2	Drain	CIP Recycle ^d	Soak ^e	CIP Recycle ^d	Drain	Backwash 1	Backwash 2	Forward Flush (FF) ^f	Filtration Mode	
Pump and Valve Conditions	Feed Pump	o												o	o	
	Backwash Pump				o	o						o	o			
	Chem. Dosing Pump															
	CEB Dosing Pump															
	CIP Recycle Pump							o		o						
	Feed Valve	o												o	o	
	Filtrate Valve	o													o	
	Conc. Valve		o	o	o		o		o		o	o		o		
	Backwash Inlet Valve				o	o						o	o			
	Drain Valve			o		o	o				o		o			
	Air Inlet Valve		o													
	Duration	40.0 min.	20 s	30 s	30 s	30 s	30 s	30.0 min.	90.0 min.	30.0 min.	30 s	30 s	30 s	40 s	40.0 min.	
Flow Rate	29 gfd	12.0 N m ³ /h	By gravity	59 gfd	59 gfd	By gravity	6.6 gpm	0.0 gpm	6.6 gpm	By gravity	59 gfd	59 gfd	17.3 gpm	29 gfd		
Remarks	1. Frequency of CIP is 1-3 months, adjusted according to operating conditions. 2. Start CIP with backwash sequence; complete CIP with backwash sequence. 3. CIP is done manually. 4. "o" = valve or pump is opened or operating.															
Footnotes	^a Air flow rate displayed on per-module basis. ^b This step should be repeated 2 times. ^c This step and duration is shown for a single chemical cleaning. If acid and base cleaning are both required, repeat Steps 6-13. ^d CIP recycle flow rate displayed on a per-module basis. ^e The duration of this step might be longer, up to overnight (12 hours), if the fouling is severe. ^f Forward flush flow rate displayed on per-module basis. ^g May need to waste a portion of permeate to remove residual chemicals, depending on design and application.															

Mini-CIP Parameters

Mini-CIP	Mini-CIP Mode of Operation	Operation	Backwash (B/W) ^b				Mini-CIP ^c				Backwash (B/W) ^b				Return to Operation ^d
			1	2	3	4	5	6	7	8	9	10	11	12	
	Steps	Filtration Mode	Air Inlet ^a	Drain	Backwash 1	Backwash 2	Drain	Mini-CIP Recycle ^d	Soak ^e	Mini-CIP Recycle ^d	Drain	Backwash 1	Backwash 2	Forward Flush (FF) ^f	Filtration Mode
Pump and Valve Conditions	Feed Pump	o												o	o
	Backwash Pump				o	o						o	o		
	Chem. Dosing Pump														
	CEB Dosing Pump														
	CIP Recycle Pump							o		o					
	Feed Valve	o												o	o
	Filtrate Valve	o													o
	Conc. Valve		o	o	o		o		o		o	o		o	
	Backwash Inlet Valve				o	o						o	o		
	Drain Valve			o		o	o				o		o		
	Air Inlet Valve		o												
Duration	40.0 min.	20 s	30 s	30 s	30 s	30 s	30 s	10.0 min.	10.0 min.	10.0 min.	30 s	30 s	30 s	40 s	40.0 min.
Flow Rate	29 gfd	12.0 N m ³ /h	By gravity	59 gfd	59 gfd		By gravity	6.6 gpm	0.0 gpm	6.6 gpm	By gravity	59 gfd	59 gfd	17.3 gpm	29 gfd
Remarks	1. Due to relatively high frequency of mini-CIP (i.e. typically from 1 to 3 times per week), it is recommended to automate the process in order to reduce labor. 2. The existing auxiliary system used for the standard CIP is employed to perform more frequent but shorter chemical cleanings or mini-CIP, so there is no need of additional installation or hardware. 3. The total duration of the mini-CIP is typically 30 minutes and includes a regular Backwash pre-cleaning, a heated chemical solution recirculation step with a soaking period in between (with intermittent Air Scour), and a final Backwash post-cleaning. 4. Note that the mini-CIP substitutes the CEB, not the standard intensive CIP program which still might be needed regularly.														
Footnotes	^a Air flow rate displayed on per-module basis. ^b This step should be repeated 2 time. ^c This step and duration is shown for a single chemical cleaning. If acid and base cleaning are both required, repeat Steps 6-13. ^d Mini-CIP recycle flow rate displayed on a per-module basis. ^e The duration of this step might be longer, up to overnight (12 hours), if the fouling is severe. ^f Forward flush flow rate displayed on per-module basis. ^g May need to waste a portion of permeate to remove residual chemicals, depending on design and application.														

UF Utility and Chemical Costs
Service Water



	Average Flowrate (gpm)	Unit Cost (\$/m ³)	Hourly Cost (\$/h)	Daily Cost (\$/d)
Non-Product Feed Water	7.35	0.1400	0.23	5.61
Waste Water Disposal	7.35	0.6900	1.15	27.64
Total Service Water Cost				33.25

Electricity

Peak Power	(kW)	44.3
Energy	(kWh/d)	32.68
Electricity Unit Cost	(\$/kWh)	0.0900
Electricity Cost	(\$/d)	2.94
Specific Energy	(kWh/m ³)	0.06

Chemicals

Chemical	Unit Cost (\$/kg)	Dose 100% (mg/L)	Volume (L/d)	Cost (\$/d)
Citric Acid (100%)	1.520		0.9	2.33
CIP		20000		
mini-CIP		20000		
HCl (32%)	0.100		0.4	0.05
CIP		2000		
mini-CIP		2000		
NaOCl (12%)	0.330		1.1	0.42
CIP		2000		
mini-CIP		2000		
NaOH (50%)	0.258		0.1	0.04
CIP		1000		
mini-CIP		1000		
Total Chemical Cost				2.84

Utility and Chemical Cost	(\$/d)	39.03
Specific Water Cost	(\$/m ³)	0.072

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WATER APPLICATION VALUE ENGINE WATER SOLUTIONS

WAVE Program Version: 1.82.824

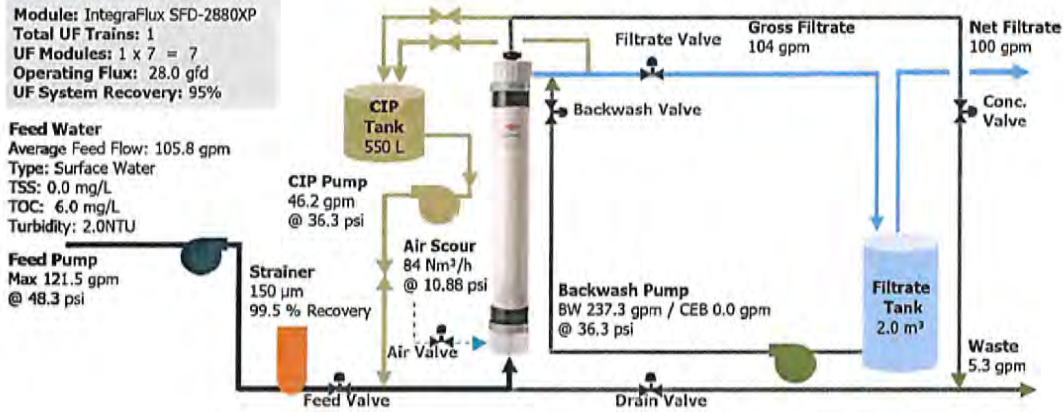
Calculation Engine Version: 01.12.20.03

Database Version: 39

95% Recovery**Project Name:** BiWater 4511_RFQ_UF Membrane**Case Name:** Case 1**Customer:** BiWater**Prepared by:** Joseph Kelly**Company:** DuPont**Country:****Date Created:** October 11, 2022**Project Notes:****Case #:** 1 of 1**Case Notes:** Case 1**Keywords:**

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UF Detailed Report



UF System Overview

Module Type	IntegraFlux SFD-2880XP	
# Trains	Online = 1	Standby = 0
		Redundant = 0
# Modules	Per Train = 7	Total = 7
System Flow Rate (gpm)	Gross Feed = 105.8	Net Product = 100.0
Train Flow Rate (gpm)	Gross Feed = 105.8	Net Product = 100.0
UF System Recovery (%)	94.98	
TMP (psi)	5.55 @ 50.0 °F	3.78 @ 77.0 °F
Utility Water	Forward Flush: Pretreated water	Backwash: UF filtrate water
	CEB Water Source: UF filtrate water	CIP Water Source: UF filtrate water

UF Operating Conditions

	Duration	Interval	Flux/Flow
Filtration:	57.0 min	60.0 min	-
Instantaneous			
1 Online Trains			28 gfd
1 Total Trains			28 gfd
Average			26 gfd
Net			25 gfd
Backwash	3.0 min	60.0 min	59 gfd
mini-CIP	68.9 min	7 d	6.60 gpm
CIP	311.1 min	60 d	6.60 gpm
Membrane Integrity Testing	12.0 min	24 h	-


UF Water Quality

Stream Name		Stream 1	
Water Type		Surface Water (50.0 - 104.0 °F)	
		Feed	Expected UF Product Water Quality
Temperature	(°F)	77.0	77.0
Turbidity	(NTU)	2.0	≤ 0.1
Organics (TOC)	(mg/L TOC)	6.0	5.4
pH		7.0	7.0

UF Configuration Options

Standby Option:	Constant module flux, variable plant filtrate flow
Storage Tank Option:	Storage Tank sized to maintain constant net filtrate flow
Forward Flush Water Source:	Pretreated water
BW Water Source:	UF filtrate water
mini-CIP Water Source:	UF filtrate water
CIP Water Source:	UF filtrate water

UF System Size and Module Details

Trains		Module Details		
		Name: IntegraFlux SFD-2880XP		
Online Trains	1	Membrane Area	77 m ²	829 ft ²
Standby Trains	0	Length	2.360 m	92.9 in
Redundant Trains	0	Diameter	0.225 m	8.9 in
Total Trains	1	Weight (empty)	61 kg	134 lb
Max Offline Trains	1	Weight (water filled)	100 kg	220 lb
Modules/Train	7	Water Volume	39.0 L	10.3 gal
Total Modules	7			

UF Flow Details

Stream		Maximum Flow*	Average Flow
Feed (Gross)	(gpm)	121.5	105.8
Feed Water Used for	(gpm)		
Pretreatment	(gpm)		0.5
Forward Flush & Process Streams	(gpm)		1.3
Feed (Net)	(gpm)	111.4	104.0
Filtrate (Gross)	(gpm)	111.4	104.0
Filtrate Used for Cleaning	(gpm)		4.0
Filtrate (Net)	(gpm)		100.0
Air	(N m ³ /h)	84.0	2.0
Backwash (BW)	(gpm)	237.3	3.9
Forward Flush Flowrate	(gpm)	120.9	1.3
mini-CIP Recycle	(gpm)	46.2	0.0
CIP Recycle	(gpm)	46.2	0.0
mini-CIP HCl (32%) Metering Pump	(L/h)	56.5	
mini-CIP Citric Acid(100%) Metering Pump	(L/h)	126.0	
mini-CIP NaOH (50%) Metering Pump	(L/h)	13.8	
mini-CIP NaOCl(12%) Metering Pump	(L/h)	153.9	
CIP HCl (32%) Metering Pump	(L/h)	56.5	
CIP Citric Acid(100%) Metering Pump	(L/h)	126.0	
CIP NaOH (50%) Metering Pump	(L/h)	13.8	
CIP NaOCl(12%) Metering Pump	(L/h)	153.9	

Footnotes:

* Maximum possible flow rate


UF Pump Hydraulics and Electrical Cost

Pump	Peak Flowrate (gpm)	Average Pressure (psi)	Mechanical Power (kW)	Electrical Power (kW)	Energy (kWh/d)	Cost (\$/d)
Feed	121.50	18.28	0.90	1.22	27.43	2.47
Backwash	237.31	15.31	1.58	2.15	0.85	0.08
mini-CIP	46.20	44.88	0.90	1.23		
HCl (32%) Metering Pump	0.25		0.01	0.01		
Citric Acid(100%) Metering Pump	0.55		0.02	0.02		
NaOH (50%) Metering Pump	0.06		0.00	0.00		
NaOCl(12%) Metering Pump	0.68		0.02	0.02		
CIP	46.20	36.26	0.73	0.99	0.03	0.00
HCl (32%) Metering Pump	0.25		0.00	0.01		
Citric Acid(100%) Metering Pump	0.55		0.01	0.02		
NaOH (50%) Metering Pump	0.06		0.00	0.00		
NaOCl(12%) Metering Pump	0.68		0.01	0.02		
mini-CIP Solution Heating				0.00	0.00	0.00
CIP Solution Heating				37.92	0.21	0.02
Air Compressor	369.84	10.88	1.43	3.12	0.41	0.04
Electrical Valves				0.00	0.00	0.00
PLC and Instrumentation				0.10	2.40	0.22
Total Electrical Cost					31.44	2.83

UF Pressure Ratings

Process	T (*F)	TMP ^a (psi)	Fouling Max ΔP (psi)	Piping ΔP (psi)	Filtrate Pres. (psi)	Feed Pres. ^b (psi)	Pres. Rating (psi)	OK? ^c
Filtration								
Minimum Temp.	50.0	5.55	0.00	10.64	7.25	23.44	90.65	✓
Design Temp.	77.0	3.78	0.00	7.25	7.25	18.28	87.02	✓
Maximum Temp.	104.0	2.77	0.00	5.32	7.25	15.34	68.89	✓
BW	77.0	8.06	0.00	7.25		15.31	87.02	✓
mini-CIP	77.0			44.88		44.88	87.02	✓
CIP	95.0			36.26		36.26	76.14	✓

Footnotes:

^a At actual, average flux

^b Sum of TMP, fouling ΔP, piping ΔP and filtrate pressure. Does not include pressure drop at the strainer. Pressure drops are based on user inputs. Default values should not be used for pump sizing

^c Comparison of Feed Pressure to Pressure Rating—a conservative comparison due to piping losses between the feed pump and module inlet.

UF Storage Tanks

Name	Bulk Conc. (%)	Minimum Recommended Volume (m ³)
Water ^a		2.03
CIP Tank		0.55
Chemical Storage ^b		
Citric Acid (C ₆ H ₈ O ₇)	100%	0.028
Hydrochloric Acid (HCl)	32%	0.012
Sodium Hypochlorite (NaOCl)	12%	0.034
Sodium Hydroxide (NaOH)	50%	0.003

Footnotes:

^a Storage tank sized to maintain constant net filtrate flow

^b The minimum recommended volume for chemical storage tanks is sized for 30 days of storage.

UF Design Warnings

None

Filtration Mode and Backwash Parameters

Normal Operation	Process Mode of Operation	Operation		Backwash (B/W)					Return to Operation ^d	Stop ^e
Operating Steps	Steps	1 Forward Flush at Start-up ^b	2 Filtration Mode	3 Air Inlet ^c	4 Drain	5 Backwash 1	6 Backwash 2	7 Forward Flush (FF)	2 Filtration Mode	- Stop
Pump and Valve Conditions	Feed Pump	o	o					o	o	
	Backwash Pump					o	o			
	Chem. Dosing Pump ^a									
	CEB Dosing Pump									
	CIP Recycle Pump									
	Feed Valve	o	o					o	o	
	Filtrate Valve		o						o	
	Conc. Valve	o		o	o	o		o		
	Backwash Inlet Valve					o	o			
	Drain Valve				o		o			
Air Inlet Valve			o							
	Duration	~2.0-3.0 min.	57.0 min.	20 s	30 s	30 s	30 s	40 s	57.0 min.	
	Flow Rate	17.3 gpm	28 gfd	12.0 N m ³ /h	By gravity	59 gfd	59 gfd	17.3 gpm	28 gfd	
Remarks	1. The filtration mode follows Steps 2-3-4-5-6-7-8. Backwash can be repeated several times according to the fouling degree of UF membrane modules. 2. The valve opening and closing time for each process step should be considered when programming is designed. 3. "o" = valve or pump is opened or operating.									
Footnotes	^a Use of chemical dosing pump during backwash is based on feed water source and quality. Refer to DuPont UF Design Guidelines. ^b Forward flush flow rate displayed on per-module basis. ^c Use of air scour and frequency is based on feed water source and quality. Air flow rate displayed on per-module basis. ^d May need to waste a portion of permeate to remove residual chemicals, depending on design and application. ^e If taken out of operation, add preservative and close all valves. Stop should occur only after backwash.									

CIP Parameters

CIP	CIP Mode of Operation	Operation	Backwash (B/W) ^b					CIP ^c				Backwash (B/W) ^b				Return to Operation ^g
			1	2	3	4	5	6	7	8	9	10	11	12	13	
	Steps	Filtration Mode	Air Inlet ^a	Drain	Backwash 1	Backwash 2	Drain	CIP Recycle ^d	Soak ^e	CIP Recycle ^d	Drain	Backwash 1	Backwash 2	Forward Flush (FF) ^f	Filtration Mode	
Pump and Valve Conditions	Feed Pump	o												o	o	
	Backwash Pump				o	o						o	o			
	Chem. Dosing Pump															
	CEB Dosing Pump															
	CIP Recycle Pump							o		o						
	Feed Valve	o												o	o	
	Filtrate Valve	o													o	
	Conc. Valve		o	o	o		o		o		o	o		o		
	Backwash Inlet Valve				o	o						o	o			
	Drain Valve			o		o	o				o		o			
	Air Inlet Valve		o													
	Duration	57.0 min.	20 s	30 s	30 s	30 s	30 s	30 s	30.0 min.	90.0 min.	30.0 min.	30 s	30 s	30 s	40 s	57.0 min.
Flow Rate	28 gfd	12.0 N m ³ /h	By gravity	59 gfd	59 gfd	By gravity	6.6 gpm	0.0 gpm	6.6 gpm	By gravity	59 gfd	59 gfd	17.3 gpm	28 gfd		
Remarks	1. Frequency of CIP is 1-3 months, adjusted according to operating conditions. 2. Start CIP with backwash sequence; complete CIP with backwash sequence. 3. CIP is done manually. 4. "o" = valve or pump is opened or operating.															
Footnotes	^a Air flow rate displayed on per-module basis. ^b This step should be repeated 2 times. ^c This step and duration is shown for a single chemical cleaning. If acid and base cleaning are both required, repeat Steps 6-13. ^d CIP recycle flow rate displayed on a per-module basis. ^e The duration of this step might be longer, up to overnight (12 hours), if the fouling is severe. ^f Forward flush flow rate displayed on per-module basis. ^g May need to waste a portion of permeate to remove residual chemicals, depending on design and application.															

Mini -CIP Parameters

Mini-CIP	Mini-CIP Mode of Operation	Operation		Backwash (B/W) ^b			Mini-CIP ^c				Backwash (B/W) ^b				Return to Operation ^f
		1	2	3	4	5	6	7	8	9	10	11	12	13	1
	Steps	Filtration Mode	Air Inlet ^a	Drain	Backwash 1	Backwash 2	Drain	Mini-CIP Recycle ^d	Soak ^e	Mini-CIP Recycle ^d	Drain	Backwash 1	Backwash 2	Forward Flush (FF) ^f	Filtration Mode
Pump and Valve Conditions	Feed Pump	o												o	o
	Backwash Pump				o	o						o	o		
	Chem. Dosing Pump														
	CEB Dosing Pump														
	CIP Recycle Pump							o		o					
	Feed Valve	o												o	o
	Filtrate Valve	o													o
	Conc. Valve		o	o	o			o		o		o	o		o
	Backwash Inlet Valve				o	o							o	o	
	Drain Valve			o		o	o					o	o		
	Air Inlet Valve		o												
	Duration	57.0 min.	20 s	30 s	30 s	30 s	30 s	30 s	10.0 min.	10.0 min.	10.0 min.	30 s	30 s	30 s	40 s
Flow Rate	28 gfd	12.0 N m ³ /h	By gravity	59 gfd	59 gfd	59 gfd	By gravity	6.6 gpm	0.0 gpm	6.6 gpm	By gravity	59 gfd	59 gfd	17.3 gpm	28 gfd
Remarks	1. Due to relatively high frequency of mini-CIP (i.e. typically from 1 to 3 times per week), it is recommended to automate the process in order to reduce labor. 2. The existing auxiliary system used for the standard CIP is employed to perform more frequent but shorter chemical cleanings or mini-CIP, so there is no need of additional installation or hardware. 3. The total duration of the mini-CIP is typically 30 minutes and includes a regular Backwash pre-cleaning, a heated chemical solution recirculation step with a soaking period in between (with intermittent Air Scour), and a final Backwash post-cleaning. 4. Note that the mini-CIP substitutes the CEB, not the standard intensive CIP program which still might be needed regularly.														
Footnotes	^a Air flow rate displayed on per-module basis. ^b This step should be repeated 2 time. ^c This step and duration is shown for a single chemical cleaning. If acid and base cleaning are both required, repeat Steps 6-13. ^d Mini-CIP recycle flow rate displayed on a per-module basis. ^e The duration of this step might be longer, up to overnight (12 hours), if the fouling is severe. ^f Forward flush flow rate displayed on per-module basis. ^g May need to waste a portion of permeate to remove residual chemicals, depending on design and application.														

UF Utility and Chemical Costs
Service Water



	Average Flowrate (gpm)	Unit Cost (\$/m ³)	Hourly Cost (\$/h)	Daily Cost (\$/d)
Non-Product Feed Water	5.29	0.1400	0.17	4.04
Waste Water Disposal	5.29	0.6900	0.83	19.90
Total Service Water Cost				23.94

Electricity

Peak Power	(kW)	44.3
Energy	(kWh/d)	31.44
Electricity Unit Cost	(\$/kWh)	0.0900
Electricity Cost	(\$/d)	2.83
Specific Energy	(kWh/m ³)	0.06

Chemicals

Chemical	Unit Cost (\$/kg)	Dose 100% (mg/L)	Volume (L/d)	Cost (\$/d)
Citric Acid (100%)	1.520		0.9	2.33
CIP		20000		
mini-CIP		20000		
HCl (32%)	0.100		0.4	0.05
CIP		2000		
mini-CIP		2000		
NaOCl (12%)	0.330		1.1	0.42
CIP		2000		
mini-CIP		2000		
NaOH (50%)	0.258		0.1	0.04
CIP		1000		
mini-CIP		1000		
Total Chemical Cost				2.84

Utility and Chemical Cost	(\$/d)	29.60
Specific Water Cost	(\$/m ³)	0.054

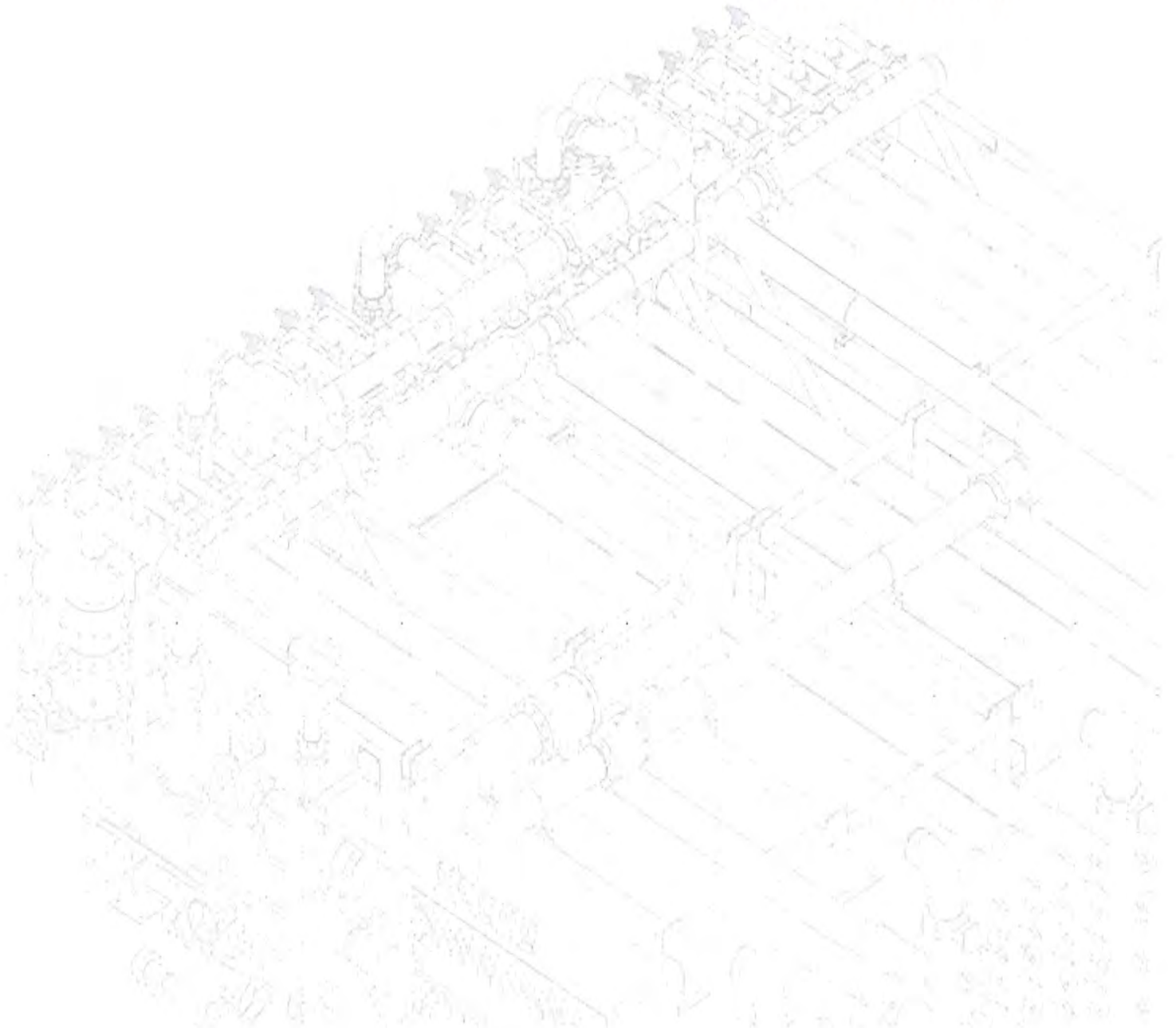
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B. Preliminary Design of MF System

B.4 MF Membrane Projections

Toray MF Membrane



Toray UF Design Tool - Rev. 37.8

Project name & design version:	Palmdale Pure Water AWDF
Date:	3-Oct-22
Project Number:	TBD

Water Category:	Tertiary Municipal Effluent
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Feed Water Quality	Text field	
Maximum Turbidity:	1.8 NTU	UF feedwater is tertiary filtered (cloth disk filter) municipal wastewater with chloramination (3-5mg/L) as pretreatment. UF feedwater quality for TSS, manganese, and O&G have been assumed.
Average Turbidity:	0.9 NTU	
Maximum TSS:	4.0 mg/L	
Average TSS:	2.0 mg/L	
Color	-	
Dissolved Iron:	0.040 mg/L	
Dissolved Manganese:	0.015 mg/L	
Maximum TOC:	6.9 mg/L	
UV Transmittance:	-	
Oil & Grease:	0.0 mg/L	
Minimum Design Temperature :	19.2°C	67°F

Plant Configuration		
Type of Modules	HFU-2020AN	
Membrane area per module:	72 m ² /module	775 ft ² /module
Feed-side hold-up water volume in modules*	0.034 m ³ /module	8.98 gallon/module
Estimated Hold-up in feed piping	0.014 m ³ /module	3.653 gallon/module
Total hold-up	0.048 m ³ /module	12.64 gallon/module
N# of Trains in operation:	1	Trains
Total N# of Trains:	1	Trains
Redundancy:	1 x 100%	= 100%
No. of Modules per Train:	7	Modules/train
Spare Spaces per Train	1	Spaces / train
Maximum Number including spare spaces	8	
Number of Installed Modules	7	Modules/system
Total Membrane Area Installed (duty)	504 m ² /plant	5,425 ft ² /plant
Time in operation per day	24 h/day	24 h/day

Operational Conditions			
Filtration:	Instantaneous Flux:	50.93 l/m ² /h	30.00 gfd
	Duration:	38.00 min	38.00 min
Backwash (BW):	Instantaneous Flux:	56.02 l/m ² /h	33.00 gfd
	Duration:	30 sec	30 sec
Air Scrubbing:	Air Flow:	100 NL/min,module	3.53 scfm
	Duration:	30 sec	30 sec
Drain:	Duration:	45 sec	45 sec
Refill:	Duration:	57 sec	57 sec
Control Loss:	Duration:	45 sec	45 sec

Total cycle time:	Duration:	41.45 min	0.69 h
Cycles per day:		33.83	cycles/day
Filtration Time / Time in Operation:		89.3	%
Net operating (ie Filtration Mode) Time per day:		21.43	h / day

Calculation of Water Balance:			
Filtrated Water:	550.0 m ³ /day	145,286 gal/day	
Overflow sent to drain during BW:	8.0 m ³ /day	2,103 gal/day	
Overflow sent to drain during Refill:	2.4 m ³ /day	637 gal/day	
Water drained from modules after BW	11.3 m ³ /day	2,992 gal/day	
TMC - Feed & Filtrate sent to drain	1.0 m ³ /day	269 gal/day	
TMC - Filtrate used for backwashing	0.7 m ³ /day	180 gal/day	
Drainage:	22.7 m ³ /day	6,001 gal/day	
Product Water:	541.3 m ³ /day	143,003 gal/day	
	22.555 m ³ /h NET	0.14 MGD	
Filtrated Water (instantaneous):	26 m ³ /h	113.01 gpm	
UF Feed:	564.0 m ³ /day	149,004 gal/day	
	23.502 m ³ /h NET	0.15 MGD	
UF Feed Pump:	26 m ³ /h	113.01 gpm	
Total Feedwater Sent to Drain:	14.07 m ³ /day	3,718 gal/day	
Backwash Flowrate (instantaneous) per train	28.23 m ³ /h	124.31 gpm	
Recovery:	95.97 %	95.97 %	
Scrubbing Air flowrate per train:	700.00 NL/min.train	24.72 scfm/train	
Maximum scrubbing air pressure:	40 kPa	6 psi	

Toray UF Design Tool - Rev. 37.8

Project: Palmdale Pure Water AWDF

Membrane Integrity Test (MIT)	Yes
Total Number of MIT's per day:	1
Total Time / MIT:	Duration: 10 min
Total time /d / MIT:	Duration: 0.17 h

To be verified by OEM

Estimated Pretreatment Chemicals and Consumption

Polyaluminum-chloride (PAC) dosage	0 mg/L as Al ³⁺	
Concentration as Al ³⁺	12.2 %	
Density of Coagulant Solution	1.34 kg/L	
Metering pump flow	- mL/min	- gpm
Daily consumption	- L/d	- gal/d
Annual consumption	- L/year	- gal/year

Ferric-chloride dosage	0 mg/L as FeCl ₃	
Concentration as Fe ³⁺	38 %	
Density of Coagulant Solution	1.38 kg/L	
Metering pump flow	- mL/min	- gpm
Daily consumption	- L/d	- gal/d
Annual consumption	- kg/year as FeCl ₃	- lbs/year as FeCl ₃

Powdered Activated Carbon (PAC) dosage	0 mg/L	
Daily consumption	- kg/d	- lbs/d
Number of days used per year	28 days	
Annual consumption	- kg/year	- lbs/year

Estimated Backwash (BW) volumes and chemical consumption

Filtrate used in one BW in one train	0.24 m ³ /BW.train	62.16 gal/BW.train
Wastewater generated in one BW in one train	0.57 m ³ /BW.train	150.61 gal/BW.train
Filtrate used in Backwashes per day:	7.96 m ³ /day	2,102.82 gal/day
Sodium Hypochlorite concentration:	0 mg/l as Cl ₂	
Sodium Hypochlorite consumption:	- kg/year as Cl ₂	- lbs/year as Cl ₂

Toray Maintenance Cleaning (TMC) Procedure

Number of Sodium Hypochlorite TMC's per week:	7 times per Week
Sodium hypochlorite dosage:	300 mg/L as Cl ₂
Number of Citric Acid TMC's per week:	0 times per Week
Citric Acid dosage:	1,000 mg/L

Step 1: Drain feedwater (conc.) from Modules (1 train)	Volume: 0.33 m ³	88 gal
	Estimated Duration: 45 sec	45 sec
Step 2: BW with NaOCl or Citric acid and filtrate	Flux: 56.02 l/m ² /h	33.00 gfd
	Estimated Duration: 57 sec	56.96 sec
Step 3: Soak modules in cleaning solution:	Duration: 20 min	20 min
Step 4: Air scrub during soak (30 sec every 5 min)		
Step 5: Drain cleaning solution from one train of modules:	Volume: 0.45 m ³	118.0 gal
	Estimated Duration: 45 sec	45 sec
Step 6: BW with filtrate	Flux: 56.02 l/m ² /h	33.00 gfd
	Duration: 30 sec	30 sec
Step 7: Air scrub after BW	30 sec	30 sec
Step 8: Drain filtrate from one train modules	Volume: 0.24 m ³	62 gal
	Estimated Duration: 45 sec	45 sec

*Repeat steps 6 to 8 until overflow meets required water quality.

Total Estimated Control Loss Time	3.5 min
Total Time for one (1) TMC	27.70 min / TMC
Total Time (min.) based on # of citric & NaOCl TMC's / d	27.70 min / day on average
Total Time (hrs.) based on # of citric & NaOCl TMC's / d	0.46 hours per day on average
Total Volume feed & filtrate sent to drain for one TMC / train:	1.02 m ³ 269 gallons
Total Filtrate used for backwashing for one TMC / train:	0.68 m ³ 180 gallons
Total Feed send to drain for one (1) TMC / train:	0.33 m ³ 88 gallons

Toray UF Design Tool - Rev. 37.8

Project:	Palmdale Pure Water AWDF
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Chemical Consumption for One TMC per Train:

Total filtrate used during backwash with NaOCl or Citric/train:	0.45	m ³ /TMC	118	gal/TMC
Sodium Hypochlorite dosage:	300	mg/l as Cl ₂		
Sodium Hypochlorite consumption per TMC:	0.13	kg/TMC as Cl ₂	0.30	lbs/TMC as Cl ₂
Sodium Hypochlorite Concentration:	13	%		
Concentration of sodium hypochlorite solution:	146,000	mg/l as Cl ₂		
Sodium hypochlorite consumption per TMC:	0.92	L / TMC	0.24	gal / TMC
Total sodium hypochlorite consumption per year:	335.02	L / year	88.51	gal / year

Citric Acid dosage:	1,000	mg/L		
Citric Acid consumption per TMC:	0.45	kg/TMC of citric	0.98	lbs/TMC of citric
Citric Acid Concentration:	50	%		
Concentration of 50% citric acid solution:	620,000	mg/L		
50% citric acid consumption per TMC:	0.72	L / TMC	0.19	gal / TMC
Total 50% citric acid consumption per year:	-	L / year	-	gal / year

Estimated TMC Neutralization Chemical Consumption

Sodium Hydroxide concentration:	1,000	mg/l	1,000	mg/l
Sodium Hydroxide consumption:	-	kg/yr	-	lbs/yr
Sodium Bisulfite concentration:	290	mg/l	290	mg/l
Sodium Bisulfite consumption:	47.12	kg/yr	103.85	lbs/yr

Estimated CIP Cleaning

Flux during CIP	40	l/m ² /h	23.7	gfd
CIP Flowrate per train (installed modules)	20.16	m ³ /h	88.8	gpm
CIP Flowrate per train (maximum # modules)	23.04	m ³ /h	101.4	gpm

Citric Acid CIP Frequency:	12	times/year	12	times/year
Phosphoric Acid CIP Frequency:	0	times/year	0	times/year
Sodium Hypochlorite CIP Frequency:	12	times/year	12	times/year
Cleaning Solution (CIP) Volume (empiric):	0.46	m ³ /cleaning	121.17	gal/cleaning
Wastewater generated per CIP:	0.92	m ³ /cleaning	242.33	gal/cleaning

Citric Acid concentration:	5,000	mg/l	5,000	mg/l
Citric Acid consumption:	27.52	kg/yr	60.65	lbs/yr
Phosphoric Acid concentration:	250	mg/l as H ₃ PO ₄	250	mg/l as H ₃ PO ₄
Phosphoric Acid consumption:	-	kg/yr as H ₃ PO ₄	-	lbs/yr as H ₃ PO ₄
Sodium Hypochlorite concentration:	3,000	mg/l as Cl ₂	3,000	mg/l as Cl ₂
Sodium Hypochlorite consumption:	16.51	kg/yr as Cl ₂	36.39	lbs/yr as Cl ₂

Estimated CIP Neutralization Chemical Consumption

Sodium Hydroxide concentration:	5,000	mg/l	5,000	mg/l
Sodium Hydroxide consumption:	27.52	kg/yr	60.65	lbs/yr
Sodium Hydroxide concentration:	250	mg/l	250	mg/l
Sodium Hydroxide consumption:	-	kg/yr	-	lbs/yr
Sodium Bisulfite concentration:	2,898	mg/l	2,898	mg/l
Sodium Bisulfite consumption:	15.95	kg/yr	35.15	lbs/yr

Note: Above CIP chemical consumption assumes the CIP solution can be re-used to clean each train. Small amounts of chemical may be required to maintain the pH and / or free chlorine residual.

Palmdale Pure Water AWWF
3-Oct-22

UF feedwater is tertiary filtered (cloth disk filter) municipal wastewater with chloramination (3-5mg/L) as pretreatment. UF feedwater quality for TSS, manganese, and O&G have been assumed.

Feed Pump 5200 micron strainer

Feed (net)	
594.04	m ³ /d
23.50	m ³ /h
0.15	MGD
103.49	gpm
2.00	mg/l TSS
1.13	kg/d TSS

Feed Quality	
Maximum Turbidity:	1.50 NTU
Average Turbidity:	0.90 NTU
Maximum TSS:	4.00 mg/L
Average TSS:	2.00 mg/L
Dissolved Manganese:	0.015 mg/L
Dissolved Iron:	0.04 mg/L
Maximum TOC:	6.90 mg/L
Temperature (min):	18.2 deg C

Filtrate	
Flux	50.93 l/m ² /h
Flux	30.00 gfd
Flow (Instantaneous)	25.67 m ³ /h
Flow (Instantaneous)	113.01 gpm

Backwash Cycle

Filtration:	36.00 min
Backwash:	30.00 sec
Air Scrub:	30 sec
Drain Modules:	45 sec
Rinse:	57 sec
Control Loss:	45 sec

Backwash

Flux	56.02 l/m ² /h
Flux	33.00 gfd
Flow	28.23 m ³ /h
Flow	124.31 gpm
Cl ₂ Addition	0 mg/L



Product Water (net)

541.33	m ³ /d
22.56	m ³ /h
0.14	MGD
59.31	gpm

Overflow, Drainage

22.72	m ³ /d
0.01	MGD
4.17	gpm
49.56	mg/l TSS
1.13	kg/d TSS

UF System Design	
Total Number of Trains:	1
Number of Trains in Operation:	1
Number of Modules / Train:	7
Type of Module:	HFU-202DAN
Module Surface Area (m ²):	72
Module Surface Area (ft ²):	775
Spare Space / Train:	1
Total Number of Modules:	7
Redundancy:	1 x 100%
Toray Maintenance Cleans (TMC)	
Sodium hypochlorite 300mg/L as Cl ₂ :	7 per week
Citric Acid 1000mg/L:	0 per week
Chemically Enhanced Backwashes (CEB)	
Sodium hypochlorite:	0 mg/L as Cl ₂
CIP	
Sodium hypochlorite 3000mg/l as Cl ₂ :	12 per year
Citric Acid 5000mg/l:	12 per year
Membrane Integrity Test (MIT):	1 per day

Recovery:	96.0	%
Concentration Factor:	25	
Maximum Solids Loading:	99	mg/L TSS
Hours in Operation per day:	24	hours per day

To be confirmed by OEM:

Estimated volume in feed piping per module:	0.014	m ³ /module
	0.65	gallon/module

Disclaimer: This projection is the expected system performance and not automatically guaranteed. Toray shall not be liable for any calculation errors or operating parameters (i.e. flux, trans-membrane pressure, recovery, cleaning interval). Values provided are for guidance only. Customer is responsible for the overall design and all associated parameters.



B. Preliminary Design of MF System

B.5 List of Key Equipment & Instrument



B.5.1 MF System - List of Key Equipment

Items	Description	Quantity	Key Specifications	Manufacturers	Lead Time after Release
UF FEED					
1	STATIC MIXER AND QUILL FOR NACLO ₃ DOSING	1	4", PVC	KOFLO	3 weeks
2	STATIC MIXER AND QUILL FOR NH ₃ DOSING	1	4", PVC	KOFLO	3 weeks
UF SKIDS					
3	UF SKID FRAMES	2	STEEL FRAME PAINTED	BIWATER	10 - 12 weeks
4	UF MEMBRANE MODULES (SKID 1)	7	TORAY HFU-2020N	TORAY	10 - 14 weeks
5	UF MEMBRANE MODULES (SKID 2)	7	DUPONT SFD-2880XP	DUPONT	10 - 14 weeks
6	UF FEED PUMP, WITH VFD	2	HORIZONTAL ANSI TYPE, SS 316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
7	AUTOMATIC STRAINERS	2	300 MICRON, SELF CLEANING	AMIAD	10 weeks
8	UF BACKWASH PUMPS, WITH VFD	2	HORIZONTAL ANSI TYPE, SS 316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
9	BACKWASH TANKS	2	HDPE	CHEM-TAINER	14 weeks
10	UF CIP TANKS	2	HDPE	CHEM-TAINER	14 weeks
11	UF CIP HEATERS	2	FLANGED IMMERSION TYPE, SS316	VULCAN	12 - 14 weeks
12	PLC CONTROL PANELS	2	NEMA 4 STEEL PANEL ALLEN BRADLEY PLC SYSTEM	SOFFA	14 - 16 weeks
UF COMPRESSOR					
13	COMPRESSORS C/W AIR RECEIVERS	1	ELECTRIC-DRIVEN, TWO-STAGE, RECIPROCATING	INGERSOLL RAND	10 weeks
UF CHEMICAL METERING PUMP SKIDS					
14	UF CHEMICAL PUMP SKIDS	6	PP	BIWATER	10 weeks
15	UF - AMMONIUM SULFATE (10%) METERING PUMP (UF FEED)	1	PERISTALTIC TYPE ^(SEE NOTE)	BLUE WHITE	6 - 8 weeks
16	UF - SODIUM HYPOCHLORITE (12%) METERING PUMP (UF FEED)	1	PERISTALTIC TYPE ^(SEE NOTE)	BLUE WHITE	6 - 8 weeks
17	UF - SODIUM HYPOCHLORITE (12%) METERING PUMPS	2	PERISTALTIC TYPE ^(SEE NOTE)	BLUE WHITE	6 - 8 weeks
18	UF - CAUSTIC (25%) METERING PUMPS	2	PERISTALTIC TYPE ^(SEE NOTE)	BLUE WHITE	6 - 8 weeks
19	UF - CITRIC ACID (30%) METERING PUMPS	2	DIAPHRAGM ^(SEE NOTE)	ARO	4 - 6 weeks
20	UF - SODIUM BISULFITE (40%) METERING PUMPS	2	PERISTALTIC TYPE ^(SEE NOTE)	BLUE WHITE	6 - 8 weeks
21	UF - HCL (32%) METERING PUMPS	2	PERISTALTIC TYPE ^(SEE NOTE)	BLUE WHITE	6 - 8 weeks

NOTE: Due to the scale, nature and other specific project conditions of this Project, the selected types of pumps as shown are only preliminary, and is subject to review. As part of the design service, Biwater will be review with PWD and the Engineer to decide the most cost-effective types of pumps to be utilized for each specific application.



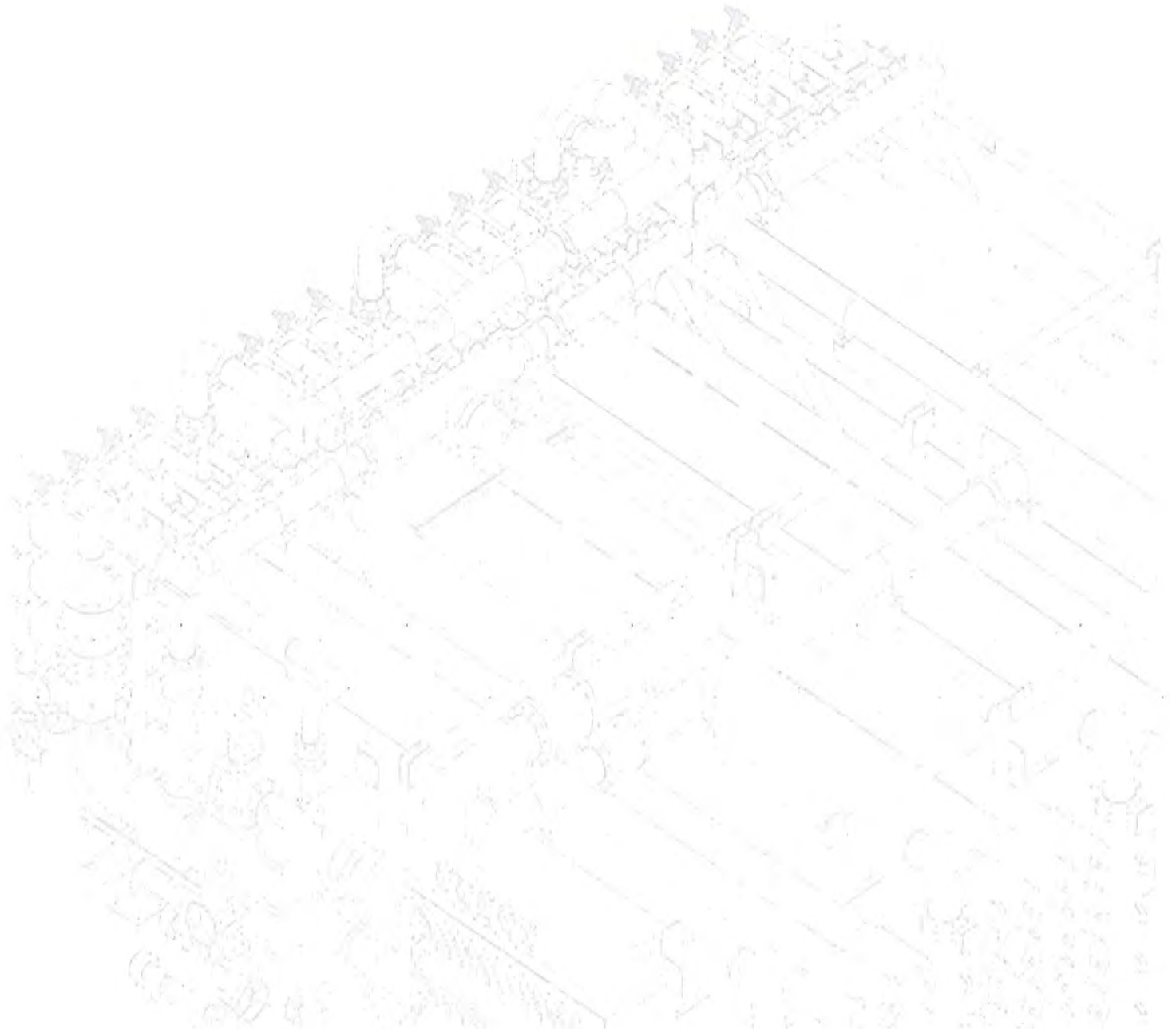
B.5.2 UF System - List of Instrument

Items	Description	Quantity	Key Specifications	Manufacturers	Lead Time after Release
UF SKIDS					
1	MAGNETIC FLOW METER	2	UF FEED	ROSEMONT	10 - 14 weeks
2	MAGNETIC FLOW METER	2	UF FILTRATE	ROSEMONT	10 - 14 weeks
3	MAGNETIC FLOW METER	2	BACKWASH	ROSEMONT	10 - 14 weeks
4	TOTAL CHLORINE	2	FEED	HACH	10 - 14 weeks
5	PH WITH TEMP	2	FEED	HACH	10 - 14 weeks
6	PH WITH TEMP	2	CIP TANK	HACH	10 - 14 weeks
7	PH	2	NEUTRALIZATION	HACH	10 - 14 weeks
8	DIFF PRESSURE SWITCH	2	AUTO STRAINER	AMIAD	10 - 14 weeks
9	PRESSURE GAUGE	2	AUTO STRAINER OUTLET	ASHCROFT	10 - 14 weeks
10	TURBIDITY	2	UF FEED	HACH	10 - 14 weeks
11	LOW RANGE TURBIDITY	2	UF FILTRATE	HACH	10 - 14 weeks
12	PRESSURE TRANSMITTER	2	AUTO STRAINER FEED	ROSEMONT	10 - 14 weeks
13	PRESSURE TRANSMITTER	2	UF FEED	ROSEMONT	10 - 14 weeks
14	PRESSURE TRANSMITTER	2	UF FEED	ROSEMONT	10 - 14 weeks
15	PRESSURE TRANSMITTER	2	AIR SCOUR	ROSEMONT	10 - 14 weeks
16	PRESSURE TRANSMITTER	2	UF FILTRATE	ROSEMONT	10 - 14 weeks
17	TEMPERATURE TRANSMITTER	2	UF FILTRATE	ROSEMOUNT	10 - 14 weeks
18	TEMPERATURE TRANSMITTER	2	CIP	ROSEMOUNT	10 - 14 weeks
19	LEVEL TRANSMITTER	2	CIP TANK	SIEMENS	10 - 14 weeks
20	LEVEL TRANSMITTER	2	BACKWASH TANK	SIEMENS	10 - 14 weeks
21	ROTAMETER	4	FOR TURB	KING	10 - 14 weeks
22	PRESSURE GAUGE	2	BACKWASH PUMP	ASHCROFT	10 - 14 weeks
AIR COMPRESSOR SKID					
23	PRESSURE SWITCH	2	AIR RECEIVER TANK	IR	10 - 14 weeks
24	PRESSURE SWITCH	2	AIR RECEIVER TANK	IR	10 - 14 weeks
25	PRESSURE GAUGE	2	AIR RECEIVER TANK	IR	10 - 14 weeks
26	PRESSURE TRANSMITTER	2	AIR SUPPLY	ROSEMONT	10 - 14 weeks
27	ROTAMETER	2	AIR SUPPLY	KING	10 - 14 weeks



B. Preliminary Design of MF System

B.6 List of Spare Parts





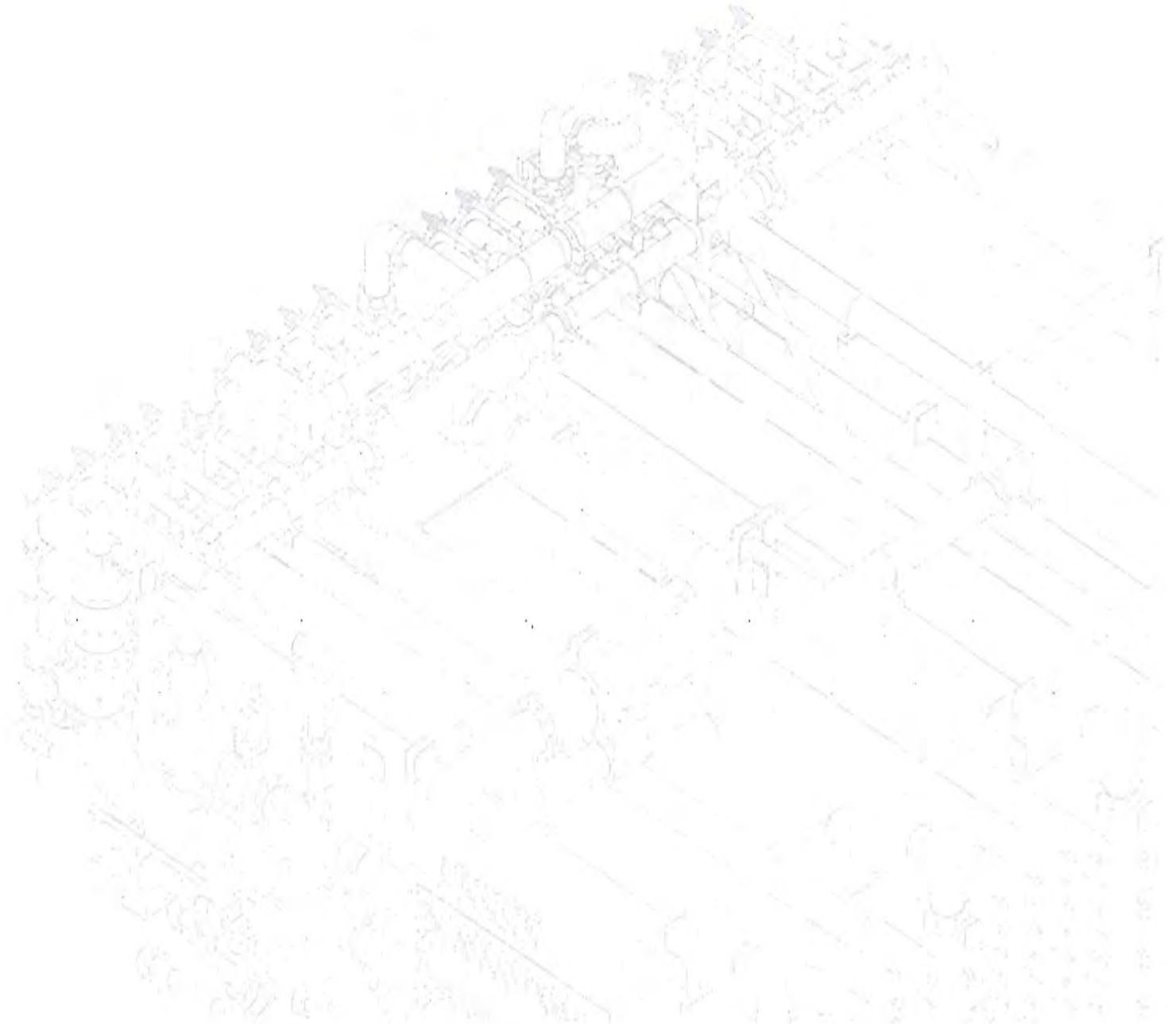
B.6 SPART PARTS AND TOOLS TO BE SUPPLIED

Items	Description	Key Specifications	Quantity
UF SKIDS			
1	UF FEED PUMP, WITH VFD	SEAL KIT	2
2	AUTOMATIC STRAINERS	Cylinder O-ring	2
3	UF BACKWASH PUMPS, WITH VFD	SEAL KIT	2
UF COMPRESSOR			
4	COMPRESSORS C/W AIR RECEIVERS	MAINTENANCE KIT	1
UF CHEMICAL METERING PUMP SKIDS			
5	UF - AMMONIUM SULFATE (10%) METERING PUMP (UF FEED)	ROLLER ASSEMBLY	1
6	UF - SODIUM HYPOCHLORITE (12%) METERING PUMP (UF FEED)	ROLLER ASSEMBLY	1
7	UF - SODIUM HYPOCHLORITE (12%) METERING PUMPS	ROLLER ASSEMBLY	2
8	UF - CAUSTIC (25%) METERING PUMPS	ROLLER ASSEMBLY	2
9	UF - CITRIC ACID (30%) METERING PUMPS	REPAIR KIT	2
10	UF - SODIUM BISULFITE (40%) METERING PUMPS	ROLLER ASSEMBLY	2
11	UF - HCL (32%) METERING PUMPS	ROLLER ASSEMBLY	2

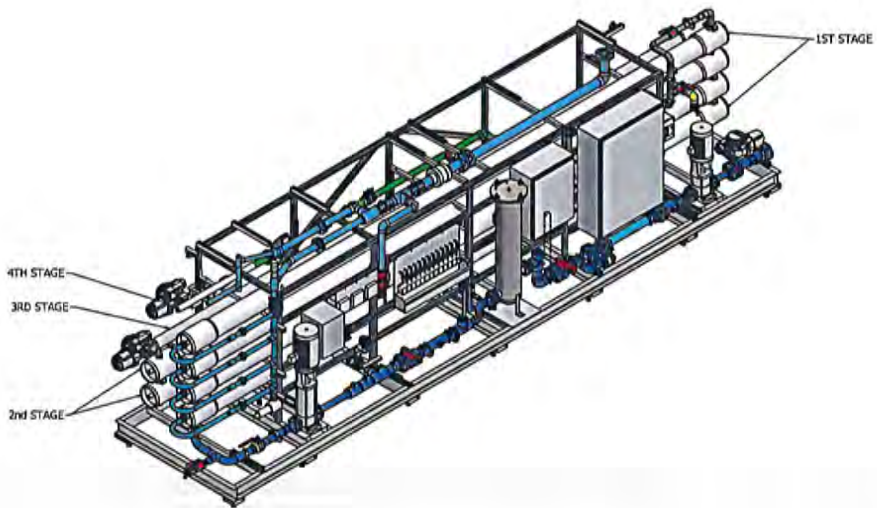


C. Preliminary Design of RO System

C.1 General Arrangement Drawings



PROJECT	4511
DATE	05/20/11
DESIGNER	STANTEC
CHECKER	STANTEC
SCALE	AS SHOWN



REV.	DATE	DESCRIPTION	BY	CHKD.



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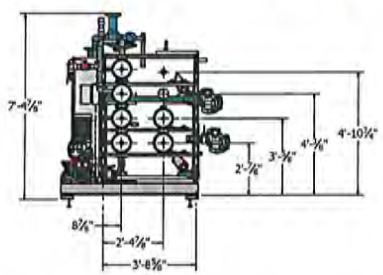
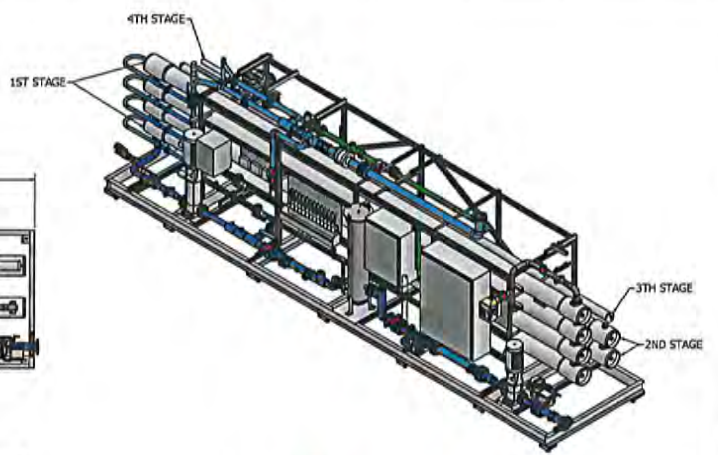
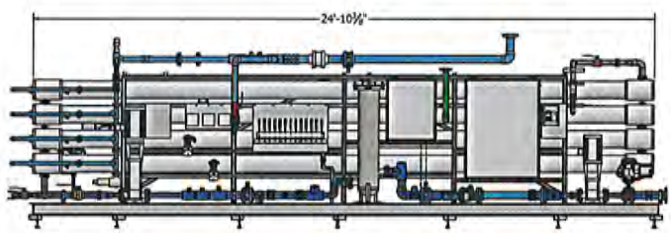
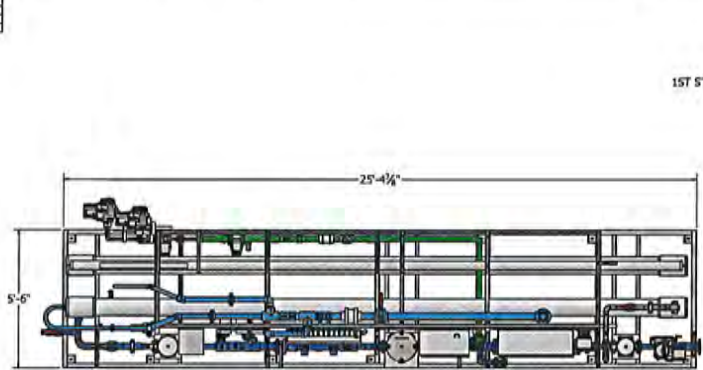
DATE	10/22/09	DATE	05/20/11
PROJECT	4511	PROJECT	4511
DESCRIPTION	RO SYSTEM	DESCRIPTION	RO SYSTEM
TOLERANCE	UNLESS OTHERWISE SPECIFIED	TOLERANCE	UNLESS OTHERWISE SPECIFIED
BLOCK	PER 10/22/09	BLOCK	PER 10/22/09

DRAFT FOR BID SUBMISSION
 STANTEC

PALMDALE WATER DISTRICT
 PURE WATER AND ADVANCED WATER
 TREATMENT DEMONSTRATION FACILITY

RO SYSTEM	
GENERAL ARRANGEMENT	
NO. 4511-M-101	REV. 1

DESIGNED	W. COOK
DRAWN	W. COOK
CHECKED	W. COOK
APPROVED	W. COOK
DATE	12/11/07
BY	W. COOK



REV.	DATE	DESCRIPTION	BY



BIWATER INC.
 111 E. WASHINGTON STREET, SUITE 7000 CHICAGO, IL 60601
 Phone: (312) 364-4100 Fax: (312) 364-4111

DATE	12/02/07	DESCRIPTION	REVISION
DATE	12/05/07	DESCRIPTION	REVISION
DATE	12/05/07	DESCRIPTION	REVISION
DATE	12/05/07	DESCRIPTION	REVISION

DRAFT FOR BID SUBMISSION
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PALMDALE WATER DISTRICT
 PURE WATER AV ADVANCED WATER
 TREATMENT DEMONSTRATION FACILITY

RO SYSTEM
 GENERAL ARRANGEMENT
 8511-M-101

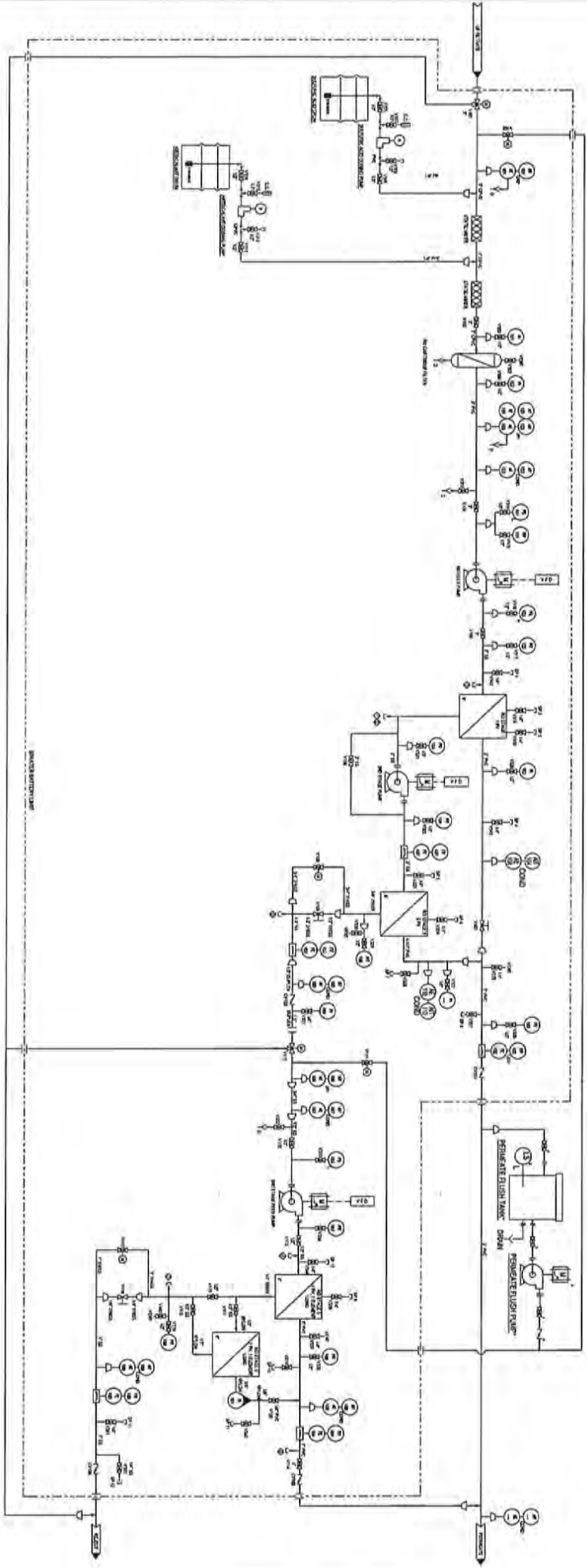


C. Preliminary Design of RO System

C.2 Process & Instrumentation Diagram



DRAFT ONLY
 ALL COMPONENTS AND INFORMATION ARE SUBJECT TO
 CHANGE TO MEET MINIMUM CONTRACT REQUIREMENTS.



NOTES:
 1. OPERATIONAL SET POINTS FOR CONNECTIONS
 2. OPERATIONAL SET POINTS FOR CONNECTIONS
 3. OPERATIONAL SET POINTS FOR CONNECTIONS
 4. OPERATIONAL SET POINTS FOR CONNECTIONS
 5. OPERATIONAL SET POINTS FOR CONNECTIONS

NO.	DESCRIPTION	DATE	BY	APP'D.



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STANTEC

PALMDALE WATER DISTRICT
PURE WATER AN ADVANCED WATER
TREATMENT DEMONSTRATION FACILITY

RO SYSTEM
P&ID
 4511-RO-011
 N/S 1 OF 1



C. Preliminary Design of RO System

C.3 RO Membrane Specifications & Projections



C.3 RO Membrane Specifications

Reverse Osmosis Membrane Specifications

Biwater will provide the following Reverse Osmosis (RO) membranes for the ITS.

- Toray TMG20D-400

Enclosed please see their Specifications and Product Data Sheet.

Key Specifications of Reverse Osmosis Membrane Element

Key Specifications	
Brand	<ul style="list-style-type: none">• Toray
Model & Type	<ul style="list-style-type: none">• Low-Pressure Brackish Water Reverse Osmosis (RO) Membrane Element with Enhanced Chemical Tolerance<ul style="list-style-type: none">○ Toray TMG20D-400 (8" for Stage 1 & Stage 2)○ Toray TMG10D (4" for Stage 3)
Membrane Surface Area	<ul style="list-style-type: none">• Toray TMG20D-400: 400 sq feet• Toray TMG10D: 87 sq feet
Nominal Salt Rejection	99.7%
Product Flow Rate	<ul style="list-style-type: none">• Toray TMG20D-400: 12,100 GPD• Toray TMG10D: 2,650 GPD
Max Operating Pressure	<ul style="list-style-type: none">• 600 psi
Max Feed Water Temperature	<ul style="list-style-type: none">• 113 degree F

TMG(D) Series

Low-Pressure Brackish Water Reverse Osmosis (RO) Membrane Element with Enhanced Chemical Tolerance

Toray's reverse osmosis membrane technology applies decades of R&D and precision automated manufacturing under ISO 9001 for consistency in product quality. State-of-the-art cross-linked fully aromatic polyamide composite membranes produce high-quality permeate and robust membrane chemistry for improved performance and longer membrane life.



Product Specifications	Unit	TMG10D	TMG20D-400	TMG20D-440
Size		4040	8040	8040
Membrane Area	ft ² (m ²)	87 (8)	400 (37)	440 (41)
Nominal Salt Rejection	%	99.7	99.7	99.7
Minimum Salt Rejection	%	99.5	99.5	99.5
Product Flow Rate	gpd (m ³ /d)	2,650 (10.0)	12,100 (45.8)	13,300 (50.3)
Minimum Product Flow Rate	gpd (m ³ /d)	2,120 (8.0)	10,300 (39.0)	11,200 (42.4)
Feed spacer thickness	mil	34	34	28

Test Conditions: Feed water pressure 150 psi (1.03 MPa); Feed water temperature 77 °F (25°C); Feed water concentration 2,000 mg/L as NaCl; Recovery rate 15%; Feed water pH 7

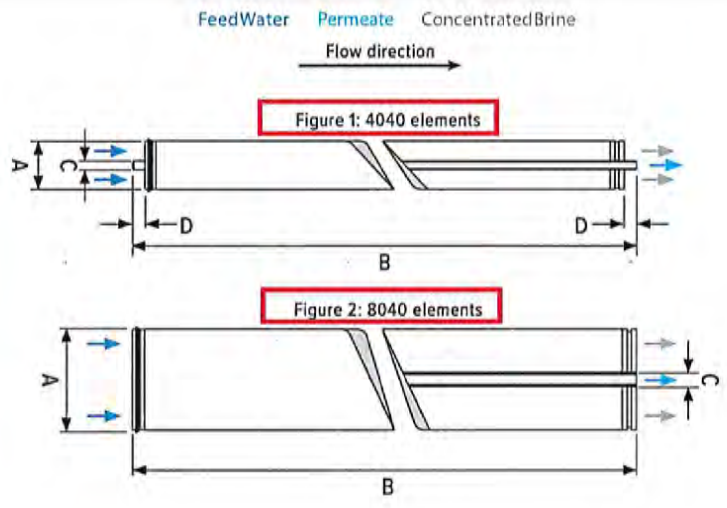
Applications

Municipal drinking water, Industrial process water, Water reuse



Products manufactured at our U.S. facility (TMUS) are certified to NSF/ANSI 61 for drinking water applications.

Dimensions in. (mm)		
Size	4040	8040
A	4.0 (101)	7.9 (201)
B	40 (1,016)	40 (1,016)
C	0.75 (19)	1.125 (29)
D	1.05 (26)	—



TMG(D) Series

Low Pressure Brackish Water Reverse Osmosis (RO)
Membrane Element with Enhanced Chemical Tolerance

Operating Limits	Unit	Value
Maximum operating pressure ^{6,7}	psi (MPa)	600 (4.1)
Maximum feed water temperature	°F (°C)	113 (45)
Maximum feed water SDI ₁₅		5
Feed water chlorine concentration	ppm	< 0.1
Feed water pH range	Continuous operation	2–11
	Chemical cleaning	1–13
Maximum pressure drop per element	psi (MPa)	15 (0.10)
Maximum pressure drop per vessel	psi (MPa)	50 (0.34)

Operating Information

1. Please consult the latest Toray technical bulletin, design guidelines, computer design program, or call an application specialist for the recommended design range. Not strictly following the operating limits stated in this bulletin will void and nullify the Limited Warranty.
2. All RO elements are wet tested treated with a 1 percent by weight sodium bisulfite storage solution. Afterward, the RO elements are vacuum packed in oxygen barrier bags or treated with a tested feed water solution, and then vacuum sealed in oxygen barrier bags with deoxidant inside. Toray recommends flushing Toray RO elements for 30 to 60 minutes once every two days with sufficient quality flushing water, such as pre-treated feed water, to prevent biological growth during system shutdown. Please refer to the Toray RO Handling Manual for suggested flushing water quality.
3. The presence of free chlorine and other oxidizing agents under certain conditions, such as heavy metals that act as oxidation catalysts in the feed water, will cause unexpected oxidation of the membrane. Toray strongly recommends removing these oxidizing agents contained in feed water before operating the RO system.
4. Permeate from the first hour of operation shall be discarded.
5. The customer is fully responsible for the effects of chemicals that are incompatible with the elements. Their use will void the element Limited Warranty.
6. Recommended process / operation pressure is < 2.0 MPa (for details, and in special cases, please consult the projection design guideline or contact your membrane supplier).
 - a) Low-pressure elements will perform best with low salinity brackish water
 - b) Maintain the above pressure range at low temperatures.
7. Maximum operating pressure will vary depending on feed temperature. Please ask for detailed information from Toray if needed.

Toray accepts no responsibility for results obtained by the application of this information or the safety or suitability of Toray's products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each product combination for their own purposes.

All data may change without prior notice, due to technical modifications or production changes. Please be sure to inquire about the latest product specifications.

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C. Preliminary Design of RO System

C.4 RO Membrane Projection





C.4 RO Membrane Projections

Reverse Osmosis Membrane Projections

Biwater will provide the following Reverse Osmosis (RO) membranes for the ITS.

- Toray TMG20D-400

Membrane Projections	
1 st stage & 2 nd stage, at 27.5 degree C	<ul style="list-style-type: none">• 80% Recovery
1 st stage & 2 nd stage, at 19.2 degree C	<ul style="list-style-type: none">• 80% Recovery
1 st , 2 nd and 3 rd stage, at 19.5 degree C	<ul style="list-style-type: none">• Overall 90% Recovery with feed flow to the 3rd stage at 21.73 gpm* <p>[*Note: Max feed flow to 3rd stage is specified 15 gpm. See comment below.]</p>

Comment: Based on the design criteria stipulated in **Article 2.3 of Specification 46 63 23**, with the 1st +2nd stages (Primary RO) at max 80% recovery, and the 3rd stage (Recovery RO) at max 80% recovery, the recovery that is achievable as designed is 85%. Higher recovery cannot be obtained due to the fact that the max feed flow of 3rd stage at 15 gpm. This means the max permeate produced from the 3rd stage is 12 gpm. Taking into account of the raw water quality (pH will need to be adjusted in order to manage CaPO₄ scaling potential), in fact to maintain 85% recovery would be very challenging. In our discussion with membrane supplier, higher recovery of the RO System may be achievable if the RO design is remodelled (e.g. no split flow to 3rd stage).

Please see enclosed the Membrane Data Sheet and Projections specific for this project.

System Overview Report

Project	TORAYMEM\CharlesW 131:Palmdale Pure Water AWDF
Case	1 Primary 80RR - 19.2C
Revision	1 T=19.2 deg C, Recov=80.0%, FF(Elem1)=0.77, SPI(Elem1)=0.15, Tertiary Waste MF/UF, Feed: 180.0 gal/min, TDS: 689.2, Perm: 144.0, TDS: 13, Tot Elem: 42, 1st Elem: TMG20D-400
Calculation Mode	Feed Water Type: Tertiary Waste MF/UF; AutoBalance is ON
Errors, Warnings, Cautions and Notices	Errors:0, Warnings:0,Cautions:0,Notices:5. See Important Notes at end /E
Database Info :	Project Database :C:\Users\charlesw\Documents\TorayDS2_v3\App_Data\DS2.mdf(Ver:2.8) Membrane Database (V.20161) :C:\Users\charlesw\Documents\TorayDS2_v3\App_Data\TorayMembrane.mdf.

		Overall	Pass 1
Raw water TDS	mg/l	689.2	689.2
EC @25C / @19.20C	uS	1,133.6 / 983.8	1,133.6 / 983.8
Feed Pressure	psi	0.0	127.5
Temperature	deg C	19.200	
Total DP	psi	17.960	17.960
Brine Pressure	psi	106.5	106.5
Flow Allowance	3.00 yrs		0.650
SP % Increase (Max)	3.00 yrs		52.09%
Recovery	%	80.00%	80.0%
Feed Flow	gal/min	180.0	180.0
Product Flow	gal/min	144.0	144.0
Average Flux	gfd	12,340	12,340
Concentrate Flow	gal/min	36.00	36.00
Product TDS	mg/l	13.121	13.121
Concentrate TDS	mg/l	3,391	3,391
Primary HP Pump kW	kilowatt	12.480	12.480
Power Consumption	kWh/m ³	0.382	0.382

Ions		Feed	Net Feed	Conc	Product
Ca	mg/l	40.00	40.00	198.2	0.454
Mg	mg/l	13.000	13.000	64.79	0.0526
Na	mg/l	139.8	139.8	688.6	2.664
K	mg/l	16.000	16.000	78.77	0.309
Ba	mg/l	0.03	0.03	0.149	0.0003
Sr	mg/l	0.0	0.0	0.0	0.0
NH4	mg/l	6.800	6.800	32.92	0.270
Fe	mg/l	0.0	0.0	0.0	0.0
HCO3	mg/l	150.0	150.0	726.5	2.526
Cl	mg/l	180.0	180.0	891.7	2.064
SO4	mg/l	79.00	79.00	394.4	0.150
NO3	mg/l	40.00	40.00	184.2	3.945
F	mg/l	0.0	0.0	0.0	0.0
Br	mg/l	0.0	0.0	0.0	0.0
B(Boron)	mg/l	0.0	0.0	0.0	0.0
SiO2	mg/l	21.10	21.10	102.8	0.685
PO4	mg/l	1.900	1.900	9.493	0.0018
CO3	mg/l	1.502	1.502	18.068	0.0002
CO2	mg/l	1.531	1.531	4.040	2.636
TDS	mg/l	689.2	689.2	3,391	13.121
EC @25C / @19.20C	uS	1,134 / 984	1,134 / 984	4,896 / 4,260	21.4 / 18.5
pH	pH	8.200	8.200	8.420	6.232
Osmotic Press (DS1 / Pilzer)	psi	6.194 / 5.47	6.194 / 5.47	30.073 / 25.68	0.116 / 0.10
LSI / SDSI		0.42 / 0.36	0.42 / 0.36	1.82 / 1.76	-5.07 / -5.29
CaSO4 / SrSO4 %	%	0.8% / 0.0%	0.8% / 0.0%	10.0% / 0.0%	0.0% / 0.0%
BaSO4 / SiO2 %	%	74.9% / 14.3%	74.9% / 14.3%	688.8% / 63.0%	
Pitzer % Solubility	Calcite/Dolomite	130% / 342%	130% / 342%	2,834% / 164,965%	
Pitzer % Solubility	CaSO4/SrSO4	1% / 0%	1% / 0%	11% / 0%	

Stage/Bank Data	Pass1	Stage 1	Stage 2
Lead Element Type		TMG20D-400	TMG20D-400

Last Element Type		TMG20D-400	TMG20D-400
Total Elements	42	28	14
Total Vessels	6	4	2
Elements per Vessel		7	7
Feed Flow	gal/min	180.0	82.02
Product Flow	gal/min	97.98	46.02
Average Flux	gfd	12.594	11.830
Brine Flow	gal/min	82.02	36.00
Recovery %	%	54.43 %	56.11 %
Feed Pressure	psi	127.5	114.9
dP Elements	psi	9.611	8.349
Boost Pressure	psi	0.0	0.0
Piping Loss	psi	0.0	-3.000
Net (Boost - dP piping)	psi	0.0	-3.000
Brine Pressure	psi	117.9	106.5
Permeate Pressure	psi	25.00	5.000
Feed TDS	mg/l	689.2	1,502
Perm TDS	mg/l	7.618	24.84
Lead Element	Pass1	Stage 1	Stage 2
Feed Flow	gal/min	45.00	41.01
Product Flow	gal/min	3.801	3.726
Product TDS	mg/l	4.341	13.110
Flux	gfd	13.680	13.412
Last Element	Pass1	Stage 1	Stage 2
Product Flow	gal/min	3.182	2.779
Product TDS	mg/l	13.027	47.87
Brine/Product Ratio	ratio	6.444	6.477
Brine Flow	gal/min	20.50	18.000
Net Driving Pressure	psi	78.31	68.81
Beta		1.208	1.194

Chemicals 100%. Disclaimer: These estimated dose rates are provided as a courtesy to Toray DS2 users and are not guaranteed.

No Chemicals Added

Errors

Warnings

Cautions

Notices

1. Pass 1, Stage1, Module7 Brine to Permeate Ratio is below Lower Limit,Reference Value =7,000 , Actual =6.444
 2. Pass 1, Stage2, Module6 Brine to Permeate Ratio is below Lower Limit,Reference Value =7,000 , Actual =6.974
 3. Pass 1, Stage2, Module7 Brine to Permeate Ratio is below Lower Limit,Reference Value =7,000 , Actual =6.477
 4. Pass 1 Conc LSI =1.82 Warning - High LSI. LSI > zero. Concentrate CaCO3 greater than saturation.Scale inhibitor required.
 5. Pass 1 Conc Stiff Davis Index =1.76 Warning - the Stiff Davis Index (SDSI) is greater than 0.Scale inhibitor required.
- See <https://rpicalc.ropur.com> for detailed calculation

Disclaimer : The program is intended to be used by persons having technical skill, at their own discretion and risk. The projections, obtained with the program, are the expected system performance, based on the average, nominal element-performance and are not automatically guaranteed.Toray shall not be liable for any error or miscalculation in the program.The obtained results cannot be used to raise any claim for liability or warranty. It is the users responsibility to make provisions against fouling, scaling and chemical attacks, to account for piping and valve pressure losses, feed pump suction pressure and permeate backpressure. For questions please contact us:

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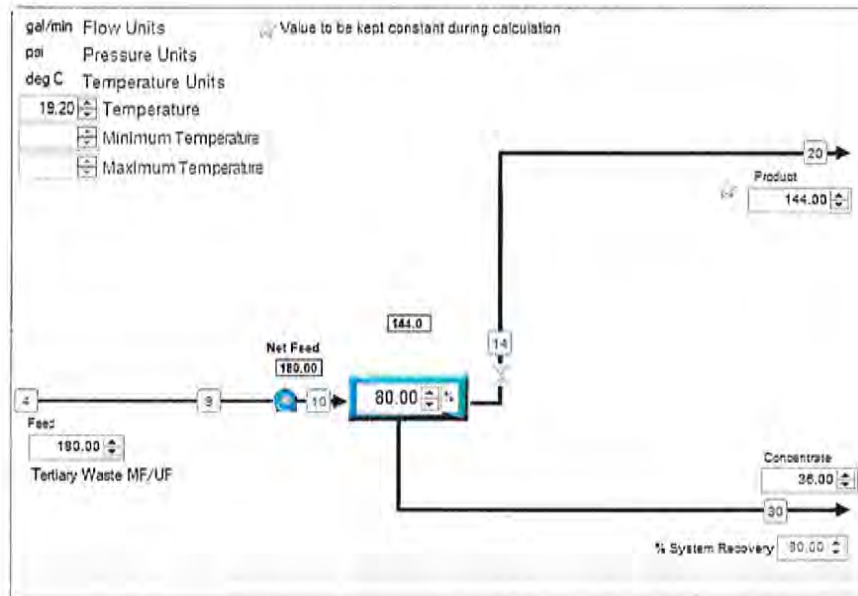
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<http://www.toraywater.com/>

Date/Time :	9/29/2022 3:06:17 PM
Project	TORAYMEM\CharlesW 131:Palmdale Pure Water AWDF
Case :	1:Primary 80RR - 19.2C
Revision :	1:T=19.2 deg C, Recov=80.0%, FF(Elem1)=0.77, SPI(Elem1)=0.15, Tertiary Waste MF/UF, Feed: 180.0 gal/min, TDS: 689.2, Perm: 144.0, TDS: 13, Tot Elem: 42, 1st Elem: TMG20D-400
User name :	TORAYMEM\CharlesW
Prepared for :	
Notes :	
Membrane Database	
Version Number:	20161
ReleaseDate:	12/8/2021
UpdateBy:	YK
Toray DS2 version :	2.3.1.205(1.2.6.121)

Flow Diagram:



Stream Details					
Stream Number	Flow	Pressure	TDS	Est uS	pH
20. Final Product	144.0	5.000	13.121	18.4	6.232
4. Feed Net	180.0	0.0	689.2	978.6	8.200
10. Feed to Pass 1	180.0	127.5	689.2	978.6	8.200
30. Conc to brine	36.00	106.5	3,390.59	4,237.7	8.420

Element Details in Pass 1

Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	15	15	15	15	15
SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	8.447	8.982	9.607	10.340	11.204
Feed Flow(gal/min)	45.00	41.20	37.50	33.90	30.39
Perm Flow(gal/min)	3.801	3.701	3.603	3.505	3.405
Conc Flow(gal/min)	41.20	37.50	33.90	30.39	26.99
Flux(gfd)	13.680	13.319	12.966	12.615	12.255
Beta	1.166	1.170	1.176	1.182	1.190

Feed Press(psi)	127.5	125.5	123.8	122.3	120.9
DP(psi)	1.967	1.745	1.538	1.345	1.166
Conc Press(psi)	125.5	123.8	122.3	120.9	119.7
Perm Press(psi)	25.00	25.00	25.00	25.00	25.00
PI_Feed(psi)	6.194	6.758	7.416	8.192	9.122
PI_Memb(psi)	7.537	8.280	9.160	10.214	11.499
PI_Conc(psi)	6.759	7.417	8.194	9.125	10.257
PI_Perm(psi)	0.0378	0.0442	0.0522	0.0621	0.0749
Net Press(psi)	94.02	91.42	88.91	86.42	83.89
Pass 1 Stage 1	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m^2 / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	15.000	15.000			
SPI Applied	52.09	52.09			
Flow Allowance	0.650	0.650			
Recovery %	12.225	13.434			
Feed Flow(gal/min)	26.99	23.69			
Perm Flow(gal/min)	3.299	3.182			
Conc Flow(gal/min)	23.69	20.50			
Flux(gfd)	11.873	11.453			
Beta	1.198	1.208			
Feed Press(psi)	119.7	118.7			
DP(psi)	1.001	0.848			
Conc Press(psi)	118.7	117.9			
Perm Press(psi)	25.00	25.00			
PI_Feed(psi)	10.253	11.656			
PI_Memb(psi)	13.091	15.103			
PI_Conc(psi)	11.660	13.435			
PI_Perm(psi)	0.0918	0.115			
Net Press(psi)	81.22	78.31			

Perm mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.144	0.170	0.201	0.240	0.291
Mg	0.0166	0.0195	0.0231	0.0277	0.0335
Na	0.851	1.000	1.184	1.415	1.712
K	0.0983	0.116	0.137	0.164	0.198
Ba	0.0001	0.0001	0.0002	0.0002	0.0002
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.0867	0.102	0.121	0.144	0.174
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	0.848	0.984	1.145	1.353	1.628
Cl	0.649	0.764	0.906	1.084	1.314
SO4	0.0469	0.0552	0.0654	0.0783	0.095
NO3	1.283	1.506	1.781	2.125	2.565
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.316	0.354	0.400	0.456	0.526
PO4	0.0006	0.0007	0.0008	0.001	0.0012
CO3	3.61E-05	4.90E-05	6.38E-05	8.44E-05	0.0001
CO2	1.531	1.518	1.574	1.661	1.765
pH	6.013	6.080	6.128	6.175	6.228
TDS	4.341	5.069	5.964	7.089	8.539

Perm mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1
Ca	0.358	0.448	0.259
Mg	0.0413	0.0518	0.0298
Na	2.104	2.635	1.523
K	0.243	0.305	0.176
Ba	0.0003	0.0003	0.0002
Sr	0.0	0.0	0.0
NH4	0.214	0.267	0.155
Fe	0.0	0.0	0.0

HCO3	1.994	2.480	1.459
Cl	1.618	2.031	1.169
SO4	0.117	0.147	0.0845
NO3	3.144	3.927	2.283
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	0.616	0.733	0.478
PO4	0.0014	0.0018	0.001
CO3	0.0002	0.0002	0.0001
CO2	1.893	2.050	1.703
pH	6.285	6.343	6.159
TDS	10.451	13.027	7.618

Feed mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	40.00	43.68	47.97	53.05	59.14
Mg	13.000	14.198	15.597	17.252	19.239
Na	139.8	152.7	167.6	185.3	206.5
K	16.000	17.467	19.179	21.20	23.63
Ba	0.03	0.0328	0.036	0.0398	0.0444
Sr	0.0	0.0	0.0	0.0	0.0
NH4	6.800	7.419	8.142	8.994	10.015
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	150.0	163.8	179.7	198.4	220.9
Cl	180.0	196.5	215.9	238.7	266.1
SO4	79.00	86.28	94.79	104.9	116.9
NO3	40.00	43.57	47.72	52.61	58.43
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	21.10	23.02	25.25	27.90	31.06
PO4	1.900	2.075	2.280	2.522	2.813
CO3	1.502	1.630	1.910	2.231	2.631
CO2	1.531	1.518	1.574	1.661	1.765
pH	8.200	8.238	8.260	8.278	8.295
TDS	689.2	752.4	826.1	913.1	1,017.46

Feed mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1
Ca	66.56	75.78	40.00
Mg	21.66	24.67	13.000
Na	232.4	264.5	139.8
K	26.59	30.26	16.000
Ba	0.0499	0.0568	0.03
Sr	0.0	0.0	0.0
NH4	11.256	12.794	6.800
Fe	0.0	0.0	0.0
HCO3	248.2	282.0	150.0
Cl	299.5	341.0	180.0
SO4	131.7	150.0	79.00
NO3	65.48	74.16	40.00
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	34.91	39.69	21.10
PO4	3.168	3.609	1.900
CO3	3.140	3.801	1.502
CO2	1.893	2.050	1.531
pH	8.313	8.330	8.200
TDS	1,144.59	1,302.33	689.2

Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3

SPI %/yr	15	15	15	15	15
SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	9.087	9.644	10.268	10.963	11.726
Feed Flow(gal/min)	41.01	37.28	33.69	30.23	26.91
Perm Flow(gal/min)	3.726	3.595	3.459	3.314	3.156
Conc Flow(gal/min)	37.28	33.69	30.23	26.91	23.76
Flux(gfd)	13.412	12.940	12.450	11.927	11.358
Beta	1.172	1.176	1.180	1.184	1.188
Feed Press(psi)	114.9	113.2	111.6	110.3	109.1
DP(psi)	1.735	1.528	1.337	1.162	1.002
Conc Press(psi)	113.2	111.6	110.3	109.1	108.1
Perm Press(psi)	5.000	5.000	5.000	5.000	5.000
PI_Feed(psi)	13.429	14.747	16.291	18.117	20.30
PI_Memb(psi)	16.478	18.209	20.25	22.69	25.62
PI_Conc(psi)	14.751	16.295	18.123	20.31	22.94
PI_Perm(psi)	0.115	0.136	0.161	0.196	0.250
Net Press(psi)	92.64	89.29	85.84	82.18	78.21
Pass 1 Stage 2	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m ² / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	15.000	15.000			
SPI Applied	52.09	52.09			
Flow Allowance	0.650	0.650			
Recovery %	12.541	13.374			
Feed Flow(gal/min)	23.76	20.78			
Perm Flow(gal/min)	2.979	2.779			
Conc Flow(gal/min)	20.78	18.000			
Flux(gfd)	10.723	10.002			
Beta	1.192	1.194			
Feed Press(psi)	108.1	107.3			
DP(psi)	0.857	0.727			
Conc Press(psi)	107.3	106.5			
Perm Press(psi)	5.000	5.000			
PI_Feed(psi)	22.93	26.13			
PI_Memb(psi)	29.15	33.43			
PI_Conc(psi)	26.15	30.07			
PI_Perm(psi)	0.322	0.424			
Net Press(psi)	73.80	68.81			

Perm mg/l Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.453	0.534	0.635	0.773	0.989
Mg	0.0524	0.0618	0.0737	0.0898	0.115
Na	2.658	3.131	3.725	4.531	5.791
K	0.308	0.363	0.432	0.525	0.671
Ba	0.0003	0.0004	0.0005	0.0006	0.0007
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.269	0.317	0.377	0.458	0.584
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	2.517	2.953	3.513	4.264	5.448
Cl	2.054	2.424	2.890	3.522	4.514
SO4	0.149	0.176	0.209	0.255	0.327
NO3	3.947	4.640	5.507	6.681	8.512
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.700	0.799	0.920	1.072	1.266
PO4	0.0018	0.0021	0.0026	0.0031	0.004
CO3	0.0002	0.0003	0.0004	0.0005	0.0008
CO2	2.249	2.384	2.542	2.726	2.943
pH	6.310	6.353	6.400	6.453	6.525
TDS	13.110	15.399	18.284	22.18	28.22

Perm mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2
Ca	1.283	1.693	0.870
Mg	0.149	0.198	0.101
Na	7.504	9.896	5.093
K	0.870	1.149	0.591
Ba	0.001	0.0013	0.0007
Sr	0.0	0.0	0.0
NH4	0.756	0.995	0.514
Fe	0.0	0.0	0.0
HCO3	7.044	9.321	4.796
Cl	5.866	7.764	3.970
SO4	0.426	0.564	0.288
NO3	10.985	14.415	7.485
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	1.522	1.868	1.127
PO4	0.0052	0.0069	0.0035
CO3	0.0012	0.0019	0.0007
CO2	3.239	3.593	2.768
pH	6.593	6.670	6.445
TDS	36.41	47.87	24.84

Feed mg/l Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	87.48	96.17	106.4	118.5	133.0
Mg	28.49	31.34	34.68	38.63	43.38
Na	305.1	335.3	370.8	412.8	463.0
K	34.90	38.36	42.42	47.22	52.97
Ba	0.0656	0.0721	0.0798	0.0889	0.0997
Sr	0.0	0.0	0.0	0.0	0.0
NH4	14.738	16.185	17.878	19.881	22.27
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	324.8	356.6	393.9	437.9	490.6
Cl	393.6	432.8	478.7	533.2	598.4
SO4	173.3	190.6	210.9	235.0	263.9
NO3	85.06	93.16	102.6	113.7	126.9
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	45.74	50.24	55.51	61.76	69.23
PO4	4.169	4.585	5.074	5.654	6.350
CO3	4.679	5.384	6.242	7.300	8.623
CO2	2.249	2.384	2.542	2.726	2.943
pH	8.348	8.360	8.373	8.385	8.398
TDS	1,502.15	1,650.79	1,825.12	2,031.63	2,278.76

Feed mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2
Ca	150.5	171.9	87.48
Mg	49.13	56.15	28.49
Na	523.8	597.8	305.1
K	59.92	68.39	34.90
Ba	0.113	0.129	0.0656
Sr	0.0	0.0	0.0
NH4	25.15	28.65	14.738
Fe	0.0	0.0	0.0
HCO3	554.2	631.7	324.8
Cl	677.3	773.5	393.6
SO4	298.9	341.7	173.3
NO3	142.6	161.5	85.06
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	78.26	89.27	45.74
PO4	7.193	8.224	4.169

CO3	10.179	12.160	4.679
CO2	3.239	3.593	2.249
pH	8.405	8.413	8.348
TDS	2,577.29	2,941.14	1,502.15

System Overview Report

Project	TORAYMEM\CharlesW 131:Palmdale Pure Water AWDF
Case	2 Primary 80RR - 27.5C
Revision	0 T=27.5 deg C, Recov=80.0%, FF(Elem1)=0.65, SPI(Elem1)=0.15, Tertiary Waste MF/UF, Feed: 180.0 gal/min, TDS: 689.7, Perm: 144.0, TDS: 19, Tot Elem: 42, 1st Elem: TMG20D-400
Calculation Mode	Feed Water Type: Tertiary Waste MF/UF; AutoBalance Is ON
Errors, Warnings, Cautions and Notices	Errors:0, Warnings:0,Cautions:0,Notices:4. See Important Notes at end /E
Database Info :	Project Database :C:\Users\charlesw\Documents\TorayDS2_v3\App_Data\DS2.mdf(Ver:2.8) Membrane Database (V.20161) :C:\Users\charlesw\Documents\TorayDS2_v3\App_Data\TorayMembrane.mdf.

		Overall	Pass 1
Raw water TDS	mg/l	689.7	689.7
EC @25C / @27.50C	uS	1,134.6 / 1,199.3	1,134.6 / 1,199.3
Feed Pressure	psi	0.0	105.7
Temperature	deg C	27.50	
Total DP	psi	15.665	15.665
Brine Pressure	psi	87.05	87.05
Flow Allowance	3.00 yrs		0.650
SP % Increase (Max)	3.00 yrs		52.09%
Recovery	%	80.00%	80.0%
Feed Flow	gal/min	180.0	180.0
Product Flow	gal/min	144.0	144.0
Average Flux	gfd	12.340	12.340
Concentrate Flow	gal/min	36.00	36.00
Product TDS	mg/l	19.299	19.299
Concentrate TDS	mg/l	3,369	3,369
Primary HP Pump kW	kilowatt	10.344	10.344
Power Consumption	kWh/m^3	0.316	0.316

Ions		Feed	Net Feed	Conc	Product
Ca	mg/l	40.00	40.00	197.3	0.673
Mg	mg/l	13.000	13.000	64.68	0.0785
Na	mg/l	140.1	140.1	684.6	3.944
K	mg/l	16.000	16.000	78.17	0.457
Ba	mg/l	0.03	0.03	0.148	0.0005
Sr	mg/l	0.0	0.0	0.0	0.0
NH4	mg/l	6.800	6.800	32.41	0.397
Fe	mg/l	0.0	0.0	0.0	0.0
HCO3	mg/l	150.0	150.0	721.5	3.741
Cl	mg/l	180.0	180.0	887.7	3.073
SO4	mg/l	79.00	79.00	394.1	0.223
NO3	mg/l	40.00	40.00	176.9	5.780
F	mg/l	0.0	0.0	0.0	0.0
Br	mg/l	0.0	0.0	0.0	0.0
B(Boron)	mg/l	0.0	0.0	0.0	0.0
SiO2	mg/l	21.10	21.10	101.8	0.928
PO4	mg/l	1.900	1.900	9.489	0.0027
CO3	mg/l	1.792	1.792	20.18	0.0005
CO2	mg/l	1.378	1.378	3.827	2.419
TDS	mg/l	689.7	689.7	3,369	19,299
EC @25C / @27.50C	uS	1,135 / 1,199	1,135 / 1,199	4,871 / 5,144	31.3 / 33.2
pH	pH	8.200	8.200	8.395	6.393
Osmotic Press (DS1 / Pitzer)	psi	6.375 / 5.62	6.375 / 5.62	30.737 / 26.20	0.175 / 0.15
LSI / SDSI		0.54 / 0.55	0.54 / 0.55	1.91 / 1.90	-4.45 / -4.58
CaSO4 / SrSO4 %	%	0.8% / 0.0%	0.8% / 0.0%	10.0% / 0.0%	0.0% / 0.0%
BaSO4 / SiO2 %	%	74.9% / 12.5%	74.9% / 12.5%	687.5% / 55.0%	
Pitzer % Solubility	Calcite/Dolomite	171% / 735%	171% / 735%	3,389% / 295,271%	
Pitzer % Solubility	CaSO4/SrSO4	1% / 0%	1% / 0%	11% / 0%	

Stage/Bank Data	Pass1	Stage 1	Stage 2
Lead Element Type		TMG20D-400	TMG20D-400

Last Element Type		TMG20D-400	TMG20D-400
Total Elements	42	28	14
Total Vessels	6	4	2
Elements per Vessel		7	7
Feed Flow	gal/min	180.0	82.12
Product Flow	gal/min	97.88	46.12
Average Flux	gfd	12.582	11.856
Brine Flow	gal/min	82.12	36.00
Recovery %	%	54.38 %	56.16 %
Feed Pressure	psi	105.7	94.31
dP Elements	psi	8.408	7.257
Boost Pressure	psi	0.0	0.0
Piping Loss	psi	0.0	-3.000
Net (Boost - dP piping)	psi	0.0	-3.000
Brine Pressure	psi	97.31	87.05
Permeate Pressure	psi	25.00	5.000
Feed TDS	mg/l	689.7	1,497
Perm TDS	mg/l	11.262	36.36
Lead Element	Pass1	Stage 1	Stage 2
Feed Flow	gal/min	45.00	41.06
Product Flow	gal/min	3.867	3.843
Product TDS	mg/l	6.324	18.778
Flux	gfd	13.917	13.833
Last Element	Pass1	Stage 1	Stage 2
Product Flow	gal/min	3.107	2.669
Product TDS	mg/l	19.509	72.04
Brine/Product Ratio	ratio	6.607	6.744
Brine Flow	gal/min	20.53	18.001
Net Driving Pressure	psi	57.96	50.05
Beta		1.156	1.143

Chemicals 100%. Disclaimer: These estimated dose rates are provided as a courtesy to Toray DS2 users and are not guaranteed.

No Chemicals Added

Errors

Warnings

Cautions

Notices

1. Pass 1, Stage1, Module7 Brine to Permeate Ratio is below Lower Limit.Reference Value =7.000 , Actual =6.607
 2. Pass 1, Stage2, Module7 Brine to Permeate Ratio is below Lower Limit.Reference Value =7.000 , Actual =6.744
 3. Pass 1 Conc LSI =1.91 Warning -High LSI. LSI > zero. Concentrate CaCO3 greater than saturation.Scale inhibitor required.
 4. Pass 1 Conc Stiff Davis Index =1.90 Warning - the Stiff Davis Index (SDSI) is greater than 0.Scale inhibitor required.
- See <https://rpicalc.ropur.com> for detailed calculation

Disclaimer : The program is intended to be used by persons having technical skill, at their own discretion and risk. The projections, obtained with the program, are the expected system performance, based on the average, nominal element-performance and are not automatically guaranteed.Toray shall not be liable for any error or miscalculation in the program.The obtained results cannot be used to raise any claim for liability or warranty. It is the users responsibility to make provisions against fouling, scaling and chemical attacks, to account for piping and valve pressure losses, feed pump suction pressure and permeate backpressure. For questions please contact us:

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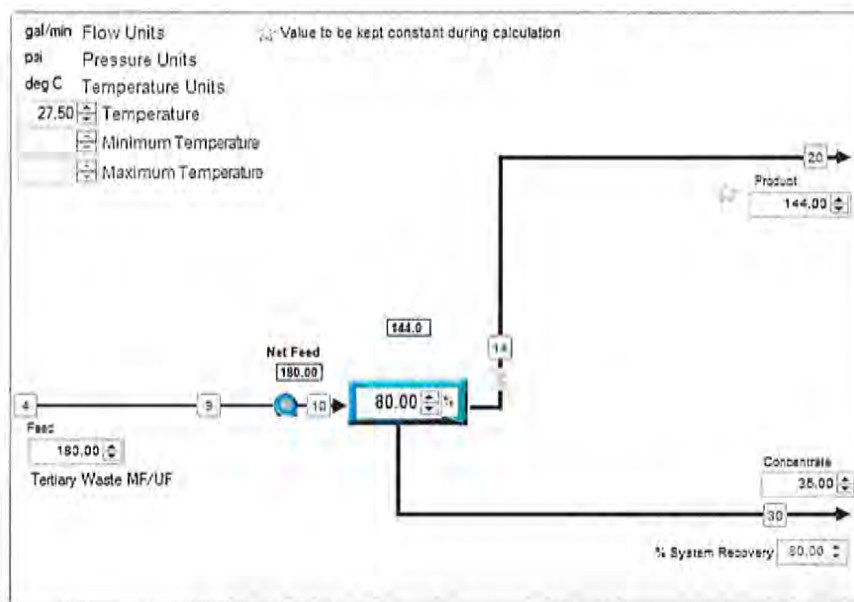
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<http://www.toraywater.com/>

Date/Time :	9/29/2022 3:07:22 PM
Project	TORAYMEM\CharlesW 131:Palmdale Pure Water AWDF
Case :	2:Primary 80RR - 27.5C
Revision :	0:T=27.5 deg C, Recov=80.0%, FF(Elem1)=0.65, SPI(Elem1)=0.15, Tertiary Waste MF/UF, Feed: 180.0 gal/min, TDS: 689.7, Perm: 144.0, TDS: 19, Tot Elem: 42, 1st Elem: TMG20D-400
User name :	TORAYMEM\CharlesW
Prepared for :	
Notes :	
Membrane Database	
Version Number:	20161
ReleaseDate:	12/8/2021
UpdateBy:	YK
Toray DS2 version :	2.3.1.205(1.2.6.121)

Flow Diagram:



Stream Number	Flow	Pressure	TDS	Est uS	pH
20. Final Product	144.0	5.000	19.299	33.5	6.393
4. Feed Net	180.0	0.0	689.7	1,212.2	8.200
10. Feed to Pass 1	180.0	105.7	689.7	1,212.2	8.200
30. Conc to brine	36.00	87.05	3,368.89	5,199	8.395

Element Details in Pass 1

Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	15	15	15	15	15
SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	8.593	9.100	9.688	10.371	11.165
Feed Flow(gal/min)	45.00	41.13	37.39	33.77	30.27
Perm Flow(gal/min)	3.867	3.743	3.622	3.502	3.379
Conc Flow(gal/min)	41.13	37.39	33.77	30.27	26.89
Flux(gfd)	13.917	13.471	13.037	12.605	12.162
Beta	1.131	1.133	1.137	1.141	1.145
Feed Press(psi)	105.7	104.0	102.4	101.1	99.92

DP(psi)	1.742	1.536	1.347	1.172	1.012
Conc Press(psi)	104.0	102.4	101.1	99.92	98.91
Perm Press(psi)	25.00	25.00	25.00	25.00	25.00
PI_Feed(psi)	6.375	6.965	7.650	8.456	9.415
PI_Memb(psi)	7.530	8.271	9.141	10.177	11.426
PI_Conc(psi)	6.966	7.653	8.459	9.419	10.579
PI_Perm(psi)	0.0569	0.067	0.0795	0.0952	0.115
Net Press(psi)	72.36	69.98	67.68	65.40	63.07
Pass 1 Stage 1	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m^2 / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	15.000	15.000			
SPI Applied	52.09	52.09			
Flow Allowance	0.650	0.650			
Recovery %	12.086	13.146			
Feed Flow(gal/min)	26.89	23.64			
Perm Flow(gal/min)	3.249	3.107			
Conc Flow(gal/min)	23.64	20.53			
Flux(gfd)	11.695	11.184			
Beta	1.150	1.156			
Feed Press(psi)	98.91	98.04			
DP(psi)	0.866	0.733			
Conc Press(psi)	98.04	97.31			
Perm Press(psi)	25.00	25.00			
PI_Feed(psi)	10.574	11.995			
PI_Memb(psi)	12.954	14.851			
PI_Conc(psi)	12.001	13.775			
PI_Perm(psi)	0.141	0.177			
Net Press(psi)	60.63	57.96			

Perm mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.213	0.252	0.300	0.360	0.437
Mg	0.0245	0.029	0.0346	0.0416	0.0506
Na	1.256	1.485	1.766	2.120	2.573
K	0.145	0.172	0.204	0.245	0.298
Ba	0.0002	0.0002	0.0002	0.0003	0.0003
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.128	0.151	0.179	0.215	0.261
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	1.214	1.426	1.690	2.019	2.435
Cl	0.958	1.135	1.352	1.626	1.979
SO4	0.0692	0.0819	0.0977	0.118	0.143
NO3	1.893	2.234	2.650	3.173	3.840
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.422	0.476	0.541	0.620	0.719
PO4	0.0008	0.001	0.0012	0.0014	0.0017
CO3	8.86E-05	0.0001	0.0002	0.0002	0.0003
CO2	1.378	1.368	1.436	1.516	1.612
pH	6.168	6.240	6.293	6.345	6.398
TDS	6.324	7.441	8.817	10.539	12.737
Perm mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1		
Ca	0.539	0.676	0.386		
Mg	0.0624	0.0785	0.0446		
Na	3.169	3.971	2.271		
K	0.367	0.460	0.263		
Ba	0.0004	0.0005	0.0003		
Sr	0.0	0.0	0.0		
NH4	0.321	0.401	0.230		
Fe	0.0	0.0	0.0		
HCO3	2.988	3.740	2.157		

Cl	2.443	3.072	1.746
SO4	0.177	0.223	0.126
NO3	4.710	5.876	3.389
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	0.845	1.009	0.648
PO4	0.0022	0.0027	0.0015
CO3	0.0004	0.0006	0.0003
CO2	1.726	1.866	1.545
pH	6.455	6.517	6.322
TDS	15.623	19.509	11.262

Feed mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	40.00	43.74	48.09	53.22	59.34
Mg	13.000	14.220	15.640	17.314	19.313
Na	140.1	153.1	168.3	186.2	207.5
K	16.000	17.490	19.224	21.26	23.70
Ba	0.03	0.0328	0.0361	0.0399	0.0445
Sr	0.0	0.0	0.0	0.0	0.0
NH4	6.800	7.427	8.156	9.011	10.029
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	150.0	164.0	180.1	199.0	221.5
Cl	180.0	196.8	216.4	239.5	267.0
SO4	79.00	86.42	95.06	105.2	117.4
NO3	40.00	43.58	47.72	52.56	58.27
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	21.10	23.04	25.30	27.96	31.12
PO4	1.900	2.079	2.287	2.532	2.824
CO3	1.792	1.948	2.259	2.640	3.114
CO2	1.378	1.368	1.436	1.516	1.612
pH	8.200	8.238	8.255	8.273	8.290
TDS	689.7	754.0	828.6	916.4	1,021.12

Feed mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1
Ca	66.74	75.84	40.00
Mg	21.73	24.71	13.000
Na	233.2	264.8	140.1
K	26.64	30.25	16.000
Ba	0.0501	0.0569	0.03
Sr	0.0	0.0	0.0
NH4	11.257	12.760	6.800
Fe	0.0	0.0	0.0
HCO3	248.6	282.0	150.0
Cl	300.3	341.3	180.0
SO4	132.2	150.3	79.00
NO3	65.11	73.42	40.00
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	34.94	39.63	21.10
PO4	3.179	3.616	1.900
CO3	3.712	4.483	1.792
CO2	1.726	1.866	1.378
pH	8.308	8.325	8.200
TDS	1,147.70	1,303.14	689.7

Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m^2 / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	15	15	15	15	15

SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	9.361	9.883	10.455	11.069	11.709
Feed Flow(gal/min)	41.06	37.22	33.54	30.03	26.71
Perm Flow(gal/min)	3.843	3.678	3.507	3.324	3.127
Conc Flow(gal/min)	37.22	33.54	30.03	26.71	23.58
Flux(gfd)	13.833	13.238	12.620	11.964	11.255
Beta	1.137	1.139	1.141	1.143	1.144
Feed Press(psi)	94.31	92.78	91.44	90.28	89.27
DP(psi)	1.531	1.338	1.163	1.004	0.862
Conc Press(psi)	92.78	91.44	90.28	89.27	88.41
Perm Press(psi)	5.000	5.000	5.000	5.000	5.000
PI_Feed(psi)	13.767	15.158	16.781	18.692	20.96
PI_Memb(psi)	16.419	18.161	20.20	22.61	25.46
PI_Conc(psi)	15.163	16.788	18.700	20.97	23.67
PI_Perm(psi)	0.170	0.202	0.243	0.297	0.382
Net Press(psi)	72.25	69.10	65.84	62.39	58.67
Pass 1 Stage 2	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m ² / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	15.000	15.000			
SPI Applied	52.09	52.09			
Flow Allowance	0.650	0.650			
Recovery %	12.342	12.913			
Feed Flow(gal/min)	23.58	20.67			
Perm Flow(gal/min)	2.910	2.669			
Conc Flow(gal/min)	20.67	18.001			
Flux(gfd)	10.474	9.606			
Beta	1.144	1.143			
Feed Press(psi)	88.41	87.68			
DP(psi)	0.736	0.624			
Conc Press(psi)	87.68	87.05			
Perm Press(psi)	5.000	5.000			
PI_Feed(psi)	23.65	26.88			
PI_Memb(psi)	28.84	32.82			
PI_Conc(psi)	26.89	30.74			
PI_Perm(psi)	0.497	0.657			
Net Press(psi)	54.59	50.05			

Perm mg/l Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.653	0.777	0.933	1.147	1.479
Mg	0.076	0.0906	0.109	0.134	0.174
Na	3.833	4.558	5.468	6.714	8.647
K	0.444	0.528	0.634	0.779	1.004
Ba	0.0005	0.0006	0.0007	0.0009	0.0011
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.387	0.459	0.550	0.674	0.867
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	3.624	4.306	5.179	6.361	8.177
Cl	2.978	3.549	4.269	5.259	6.798
SO4	0.216	0.258	0.310	0.382	0.494
NO3	5.643	6.687	7.993	9.774	12.526
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.920	1.060	1.233	1.452	1.734
PO4	0.0026	0.0031	0.0038	0.0047	0.006
CO3	0.0005	0.0007	0.001	0.0013	0.002
CO2	2.063	2.193	2.370	2.575	2.814
pH	6.460	6.507	6.555	6.607	6.675
TDS	18.778	22.28	26.68	32.68	41.91
Perm mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2		

Ca	1.933	2.567	1.282
Mg	0.227	0.303	0.150
Na	11.287	14.963	7.494
K	1.312	1.742	0.871
Ba	0.0014	0.0019	0.001
Sr	0.0	0.0	0.0
NH4	1.129	1.492	0.751
Fe	0.0	0.0	0.0
HCO3	10.713	14.225	7.103
Cl	8.912	11.877	5.891
SO4	0.649	0.866	0.428
NO3	16.249	21.38	10.856
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	2.105	2.604	1.522
PO4	0.0079	0.0106	0.0052
CO3	0.0032	0.0051	0.0018
CO2	3.095	3.423	2.594
pH	6.752	6.830	6.596
TDS	54.53	72.04	36.36

Feed mg/l Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	87.22	96.16	106.6	119.0	133.6
Mg	28.44	31.37	34.80	38.85	43.67
Na	304.3	335.4	371.6	414.4	465.1
K	34.76	38.30	42.44	47.33	53.12
Ba	0.0654	0.0721	0.08	0.0892	0.100
Sr	0.0	0.0	0.0	0.0	0.0
NH4	14.631	16.102	17.817	19.834	22.22
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	323.5	356.1	394.2	439.1	492.2
Cl	392.5	432.7	479.8	535.3	601.2
SO4	173.0	190.9	211.8	236.5	265.8
NO3	83.64	91.69	101.0	111.9	124.6
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	45.48	50.08	55.46	61.79	69.30
PO4	4.163	4.592	5.096	5.690	6.398
CO3	5.431	6.268	7.204	8.346	9.754
CO2	2.063	2.193	2.370	2.575	2.814
pH	8.338	8.350	8.358	8.365	8.373
TDS	1,497.16	1,649.66	1,827.90	2,037.93	2,287.20
Feed mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2		
Ca	151.1	172.2	87.22		
Mg	49.44	56.37	28.44		
Na	525.7	598.1	304.3		
K	60.03	68.30	34.76		
Ba	0.113	0.129	0.0654		
Sr	0.0	0.0	0.0		
NH4	25.05	28.42	14.631		
Fe	0.0	0.0	0.0		
HCO3	555.6	631.3	323.5		
Cl	680.1	774.6	392.5		
SO4	301.0	343.3	173.0		
NO3	139.4	156.8	83.64		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	78.26	88.98	45.48		
PO4	7.246	8.265	4.163		
CO3	11.503	13.690	5.431		

CO2	3.095	3.423	2.063
pH	8.380	8.388	8.338
TDS	2,584.59	2,940.37	1,497.16

System Overview Report

Project	TORAYMEM\CharlesW 131:Palmdale Pure Water AWDF
Case	3 3 Stage Max Recovery
Revision	1 T=19.5 deg C, Recov=90.0%, FF(Elem1)=0.65, SPI(Elem1)=0.15, Tertiary Waste MF/UF, Feed: 180.0 gal/min, TDS: 689.7, Perm: 162.0, TDS: 21, Tot Elem: 49, 1st Elem: TMG20D-400
Calculation Mode	Feed Water Type: Tertiary Waste MF/UF; AutoBalance is ON
Errors, Warnings, Cautions and Notices	Errors:0, Warnings:0,Cautions:5,Notices:14. See Important Notes at end /E
Database Info :	Project Database :C:\Users\charlesw\Documents\TorayDS2_v3\App_Data\DS2.mdf(Ver:2.8) Membrane Database (V.20161) :C:\Users\charlesw\Documents\TorayDS2_v3\App_Data\TorayMembrane.mdf.

		Overall	Pass 1
Raw water TDS	mg/l	689.7	689.7
EC @25C / @19.50C	uS	1,134.7 / 992.5	1,134.7 / 992.5
Feed Pressure	psi	0.0	121.7
Temperature	deg C	19.500	
Total DP	psi	55.58	55.58
Brine Pressure	psi	103.1	103.1
Flow Allowance	3.00 yrs		0.650
SP % Increase (Max)	3.00 yrs		52.09%
Recovery	%	90.00%	90.0%
Feed Flow	gal/min	180.0	180.0
Product Flow	gal/min	162.0	162.0
Average Flux	gfd	13.396	13.396
Concentrate Flow	gal/min	18.004	18.004
Product TDS	mg/l	21.30	21.30
Concentrate TDS	mg/l	6,698	6,698
Primary HP Pump kW	kilowatt	12.786	12.786
Power Consumption	kWh/m ³	0.348	0.348

Ions		Feed	Net Feed	Conc	Product
Ca	mg/l	40.00	40.00	393.2	0.749
Mg	mg/l	13.000	13.000	129.2	0.0875
Na	mg/l	140.1	140.1	1,361	4.385
K	mg/l	16.000	16.000	155.4	0.508
Ba	mg/l	0.03	0.03	0.295	0.0006
Sr	mg/l	0.0	0.0	0.0	0.0
NH4	mg/l	6.800	6.800	64.02	0.440
Fe	mg/l	0.0	0.0	0.0	0.0
HCO3	mg/l	150.0	150.0	1,423	4.154
Cl	mg/l	180.3	180.3	1,772	3.443
SO4	mg/l	79.00	79.00	787.6	0.250
NO3	mg/l	40.00	40.00	342.5	6.379
F	mg/l	0.0	0.0	0.0	0.0
Br	mg/l	0.0	0.0	0.0	0.0
B(Boron)	mg/l	0.0	0.0	0.0	0.0
SiO2	mg/l	21.10	21.10	202.9	0.899
PO4	mg/l	1.900	1.900	18.968	0.003
CO3	mg/l	1.512	1.512	48.45	0.0003
CO2	mg/l	1.524	1.524	6.897	4.157
TDS	mg/l	689.7	689.7	6,698	21.30
EC @25C / @19.50C	uS	1,135 / 993	1,135 / 993	9,033 / 7,930	34.8 / 30.4
pH	pH	8.200	8.200	8.453	6.246
Osmotic Press (DS1 / Pitzer)	psi	6.207 / 5.48	6,207 / 5.48	58,986 / 49.71	0.189 / 0.17
LSI / SDSI		0.42 / 0.36	0.42 / 0.36	2.34 / 2.18	-4.63 / -4.84
CaSO4 / SrSO4 %	%	0.8% / 0.0%	0.8% / 0.0%	24.4% / 0.0%	0.0% / 0.0%
BaSO4 / SiO2 %	%	74.9% / 14.2%	74,9% / 14.2%	1540.2% / 121.9%	
Pitzer % Solubility	Calcite/Dolomite	131% / 353%	131% / 353%	8,610% / 1,537,061%	
Pitzer % Solubility	CaSO4/SrSO4	1% / 0%	1% / 0%	26% / 0%	

Stage/Bank Data	Pass1	Stage 1	Stage 2	Stage 3
Lead Element Type		TMG20D-400	TMG20D-400	TMG10D

Last Element Type		TMG20D-400	TMG20D-400	TMG10D
Total Elements		49	28	7
Total Vessels		7	4	1
Elements per Vessel			7	7
Feed Flow	gal/min	180.0	67.09	21.73
Product Flow	gal/min	112.9	45.36	3.729
Average Flux	gfd	14,513	11,661	8,814
Brine Flow	gal/min	67.09	21.73	18.004
Recovery %	%	62.73 %	67.61 %	17.16 %
Feed Pressure	psi	121.7	122.8	144.1
dP Elements	psi	8,894	5,735	40,95
Boost Pressure	psi	0.0	13,000	30,00
Piping Loss	psi	0.0	-3,000	-3,000
Net (Boost - dP piping)	psi	0.0	10,000	27,00
Brine Pressure	psi	112.8	117.1	103.1
Permeate Pressure	psi	5,000	5,000	5,000
Feed TDS	mg/l	689.7	1,835	5,563
Perm TDS	mg/l	8,112	45,23	129,5
Lead Element	Pass1	Stage 1	Stage 2	Stage 3
Feed Flow	gal/min	45,00	33,55	21,73
Product Flow	gal/min	4,372	3,894	0,715
Product TDS	mg/l	4,071	17,466	91,40
Flux	gfd	15,736	14,016	11,831
Last Element	Pass1	Stage 1	Stage 2	Stage 3
Product Flow	gal/min	3,637	2,378	0,365
Product TDS	mg/l	15,634	113,6	196,5
Brine/Product Ratio	ratio	4,612	4,569	49,34
Brine Flow	gal/min	16,773	10,866	18,004
Net Driving Pressure	psi	89,42	58,73	41,00
Beta		1,267	1,218	1,048

Chemicals 100%. Disclaimer: These estimated dose rates are provided as a courtesy to Toray DS2 users and are not guaranteed.

No Chemicals Added

Errors

Warnings

Cautions

1. Pass1 Average Flux exceeds Recommended Range.Reference Value =12.37 gfd, Actual =13.40
2. Pass 1, Stage1 Lead Element Flux exceeds Recommended Range.Reference Value =14,721 gfd, Actual =15,736
3. Pass 1, Stage2, Module6 Brine Flow in Element is below Recommended Range.Reference Value =15,777 gal/min, Actual =13,245
4. Pass 1, Stage2, Module7 Brine Flow in Element is below Recommended Range.Reference Value =15,777 gal/min, Actual =10,866
5. Pass 1, Stage3 Lead Element Feed Flow exceeds Recommended Range.Reference Value =12,292 gal/min, Actual =21,73

Notices

1. Pass 1, Stage1, Module4 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =6,945
2. Pass 1, Stage1, Module5 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =6,152
3. Pass 1, Stage1, Module6 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =5,370
4. Pass 1, Stage1, Module7 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =4,612
5. Pass 1, Stage2, Module2 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =6,951
6. Pass 1, Stage2, Module3 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =6,318
7. Pass 1, Stage2, Module4 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =5,734
8. Pass 1, Stage2, Module5 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =5,222
9. Pass 1, Stage2, Module6 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =4,817
10. Pass 1, Stage2, Module7 Brine to Permeate Ratio is below Lower Limit.Reference Value =7,000 , Actual =4,569
11. Pass 1 Conc LSI =2.34 Warning - High LSI. LSI > zero. Concentrate CaCO3 greater than saturation.Scale inhibitor required.
12. Pass 1 Conc Stiff Davis Index =2.18 Warning - the Stiff Davis Index (SDSI) is greater than 0.Scale inhibitor required.
See <https://rpicalc.ronpur.com> for detailed calculation
13. Conc BaSO4 % Sat'n =1540.23 Warning - concentrate barium sulfate exceeds saturation.
14. Conc SiO2 % Sat'n =121.92 Warning - concentrate silica exceeds saturation.

Disclaimer : The program is intended to be used by persons having technical skill, at their own discretion and risk. The projections, obtained with the program, are the expected system performance, based on the average, nominal element-performance and are not automatically guaranteed.Toray shall not be liable for any error or miscalculation in the program.The obtained results cannot be used to raise any claim for liability or warranty. It is the users responsibility to make provisions against fouling, scaling and chemical attacks, to account for piping and valve pressure losses, feed pump suction pressure and permeate backpressure. For questions please contact us:

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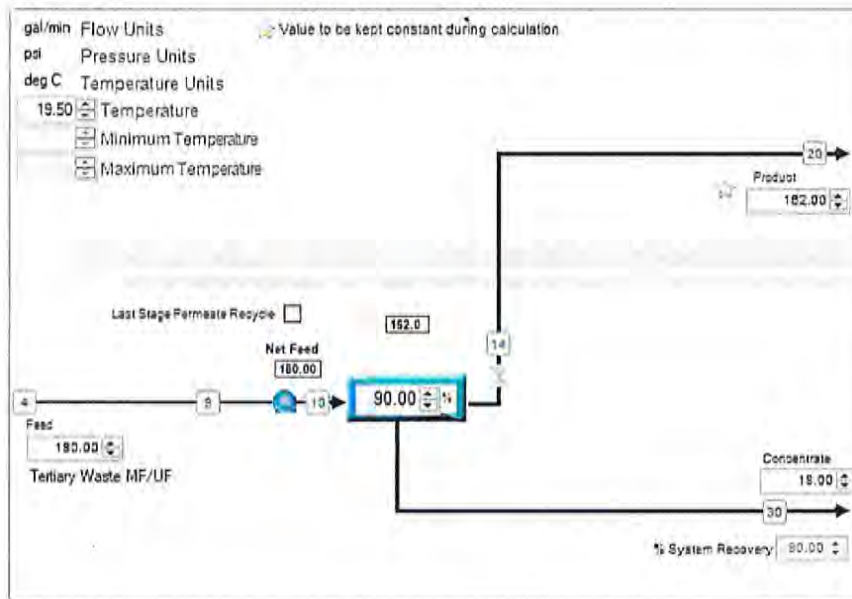
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Date/Time :	10/10/2022 2:15:40 PM
Project	TORAYMEM\CharlesW 131:Palmdale Pure Water AWDF
Case :	3:3 Stage Max Recovery
Revision :	1:T=19.5 deg C, Recov=90.0%, FF(Elem1)=0.65, SPI(Elem1)=0.15, Tertiary Waste MF/UF, Feed: 180.0 gal/min, TDS: 689.7, Perm: 162.0, TDS: 21, Tot Elem: 49, 1st Elem: TMG20D-400
User name :	TORAYMEM\CharlesW
Prepared for :	
Notes :	
Membrane Database	
Version Number:	20161
ReleaseDate:	12/8/2021
UpdateBy:	YK
Toray DS2 version :	2.3.1.205(1.2.6.121)

Flow Diagram:



Stream Details					
Stream Number	Flow	Pressure	TDS	Est uS	pH
20. Final Product	162.0	5.000	21.30	30.8	6.246
4. Feed Net	180.0	0.0	689.7	1,005.4	8.200
10. Feed to Pass 1	180.0	121.7	689.7	1,005.4	8.200
30. Conc to brine	18.004	103.1	6,698.27	8,030.3	8.453

Element Details in Pass 1

Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400

Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	15	15	15	15	15
SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	9.716	10.502	11.445	12.587	13.982
Feed Flow(gal/min)	45.00	40.63	36.36	32.20	28.15
Perm Flow(gal/min)	4.372	4.267	4.162	4.053	3.935
Conc Flow(gal/min)	40.63	36.36	32.20	28.15	24.21
Flux(gfd)	15.736	15.356	14.978	14.587	14.164
Beta	1.192	1.200	1.209	1.220	1.234
Feed Press(psi)	121.7	119.8	118.1	116.6	115.4
DP(psi)	1.941	1.688	1.453	1.236	1.036
Conc Press(psi)	119.8	118.1	116.6	115.4	114.4
Perm Press(psi)	5.000	5.000	5.000	5.000	5.000
PI_Feed(psi)	6.207	6.867	7.661	8.637	9.861
PI_Memb(psi)	7.776	8.697	9.830	11.256	13.093
PI_Conc(psi)	6.868	7.663	8.639	9.864	11.440
PI_Perm(psi)	0.0355	0.0424	0.0514	0.0633	0.0796
Net Press(psi)	108.0	105.3	102.6	99.82	96.85
Pass 1 Stage 1	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m ² / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	15.000	15.000			
SPI Applied	52.09	52.09			
Flow Allowance	0.650	0.650			
Recovery %	15.699	17.818			
Feed Flow(gal/min)	24.21	20.41			
Perm Flow(gal/min)	3.801	3.637			
Conc Flow(gal/min)	20.41	16.773			
Flux(gfd)	13.680	13.089			
Beta	1.249	1.267			
Feed Press(psi)	114.4	113.5			
DP(psi)	0.853	0.687			
Conc Press(psi)	113.5	112.8			
Perm Press(psi)	5.000	5.000			
PI_Feed(psi)	11.436	13.526			
PI_Memb(psi)	15.529	18.862			
PI_Conc(psi)	13.532	16.408			
PI_Perm(psi)	0.103	0.138			
Net Press(psi)	93.49	89.42			
Perm mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.135	0.163	0.198	0.245	0.309
Mg	0.0155	0.0187	0.0228	0.0282	0.0356
Na	0.797	0.959	1.167	1.443	1.822
K	0.092	0.111	0.135	0.167	0.210
Ba	0.0001	0.0001	0.0001	0.0002	0.0002
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.0811	0.0975	0.119	0.147	0.185
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	0.806	0.942	1.134	1.384	1.728
Cl	0.609	0.733	0.893	1.107	1.400
SO4	0.0439	0.0529	0.0644	0.0798	0.101
NO3	1.201	1.443	1.752	2.163	2.724
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.289	0.329	0.380	0.444	0.529
PO4	0.0005	0.0006	0.0008	0.001	0.0012
CO3	3.30E-05	4.51E-05	6.22E-05	8.69E-05	0.0001
CO2	1.524	1.514	1.594	1.695	1.823

pH	5.993	6.060	6.118	6.175	6.238
TDS	4.071	4.849	5.866	7.207	9.046
Perm mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1		
Ca	0.402	0.541	0.277		
Mg	0.0464	0.0625	0.0319		
Na	2.364	3.180	1.630		
K	0.273	0.367	0.188		
Ba	0.0003	0.0004	0.0002		
Sr	0.0	0.0	0.0		
NH4	0.240	0.322	0.165		
Fe	0.0	0.0	0.0		
HCO3	2.233	2.984	1.559		
Cl	1.822	2.458	1.253		
SO4	0.132	0.178	0.0904		
NO3	3.525	4.724	2.436		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	0.645	0.814	0.480		
PO4	0.0016	0.0022	0.0011		
CO3	0.0002	0.0003	0.0001		
CO2	1.989	2.210	1.750		
pH	6.310	6.388	6.157		
TDS	11.684	15.634	8.112		

Feed mg/l Pass 1 Stage 1	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	40.00	44.29	49.47	55.84	63.84
Mg	13.000	14.397	16.085	18.160	20.77
Na	140.1	155.1	173.1	195.4	223.3
K	16.000	17.712	19.777	22.32	25.51
Ba	0.03	0.0332	0.0371	0.0419	0.0479
Sr	0.0	0.0	0.0	0.0	0.0
NH4	6.800	7.523	8.394	9.464	10.806
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	150.0	166.1	185.2	208.7	238.2
Cl	180.3	199.7	223.0	251.7	287.8
SO4	79.00	87.50	97.76	110.4	126.3
NO3	40.00	44.18	49.19	55.32	62.98
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	21.10	23.34	26.04	29.36	33.52
PO4	1.900	2.104	2.351	2.655	3.037
CO3	1.512	1.687	2.015	2.438	2.996
CO2	1.524	1.514	1.594	1.695	1.823
pH	8.200	8.243	8.265	8.288	8.310
TDS	689.7	763.6	852.5	961.8	1,099.04

Feed mg/l Pass 1 Stage 1	Element 6	Element 7	Stage 1
Ca	74.17	87.91	40.00
Mg	24.14	28.63	13.000
Na	259.3	307.1	140.1
K	29.62	35.08	16.000
Ba	0.0556	0.0659	0.03
Sr	0.0	0.0	0.0
NH4	12.532	14.821	6.800
Fe	0.0	0.0	0.0
HCO3	276.1	326.4	150.0
Cl	334.4	396.3	180.3
SO4	146.8	174.1	79.00
NO3	72.77	85.66	40.00
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0

SIO2	38.88	46.00	21.10
PO4	3.531	4.188	1.900
CO3	3.755	4.823	1.512
CO2	1.989	2.210	1.524
pH	8.333	8.355	8.200
TDS	1,275.99	1,511.13	689.7

Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400	TMG20D-400
Area m ² / dia inch	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8	37.16 / 8
Age	3	3	3	3	3
SPI %/yr	15	15	15	15	15
SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	11.609	12.576	13.664	14.851	16.073
Feed Flow(gal/min)	33.55	29.65	25.92	22.38	19.057
Perm Flow(gal/min)	3.894	3.729	3.542	3.324	3.063
Conc Flow(gal/min)	29.65	25.92	22.38	19.057	15.994
Flux(gfd)	14.016	13.422	12.749	11.963	11.024
Beta	1.205	1.212	1.219	1.224	1.228
Feed Press(psi)	122.8	121.5	120.4	119.5	118.7
DP(psi)	1.312	1.117	0.940	0.782	0.643
Conc Press(psi)	121.5	120.4	119.5	118.7	118.0
Perm Press(psi)	5.000	5.000	5.000	5.000	5.000
PI_Feed(psi)	16.398	18.508	21.11	24.38	28.51
PI_Memb(psi)	20.96	23.93	27.61	32.25	38.10
PI_Conc(psi)	18.515	21.12	24.39	28.53	33.84
PI_Perm(psi)	0.154	0.193	0.255	0.344	0.476
Net Press(psi)	96.33	92.18	87.51	82.08	75.63
Pass 1 Stage 2	Element 6	Element 7			
Model	TMG20D-400	TMG20D-400			
Area m ² / dia inch	37.16 / 8	37.16 / 8			
Age	3.000	3.000			
SPI %/yr	15.000	15.000			
SPI Applied	52.09	52.09			
Flow Allowance	0.650	0.650			
Recovery %	17.191	17.957			
Feed Flow(gal/min)	15.994	13.245			
Perm Flow(gal/min)	2.750	2.378			
Conc Flow(gal/min)	13.245	10.866			
Flux(gfd)	9.896	8.560			
Beta	1.227	1.218			
Feed Press(psi)	118.0	117.5			
DP(psi)	0.522	0.420			
Conc Press(psi)	117.5	117.1			
Perm Press(psi)	5.000	5.000			
PI_Feed(psi)	33.81	40.60			
PI_Memb(psi)	45.42	54.37			
PI_Conc(psi)	40.63	49.19			
PI_Perm(psi)	0.681	1.009			
Net Press(psi)	67.88	58.73			

Perm mg/l Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	0.607	0.763	1.011	1.369	1.903
Mg	0.0704	0.0885	0.117	0.159	0.222
Na	3.567	4.478	5.927	8.018	11.134
K	0.412	0.518	0.686	0.928	1.290
Ba	0.0005	0.0006	0.0008	0.001	0.0014
Sr	0.0	0.0	0.0	0.0	0.0
NH4	0.360	0.452	0.597	0.806	1.117
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	3.344	4.201	5.543	7.520	10.463
Cl	2.767	3.483	4.622	6.274	8.750

SO4	0.200	0.252	0.335	0.455	0.635
NO3	5.272	6.600	8.704	11.722	16.180
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	0.863	1.025	1.241	1.540	1.970
PO4	0.0024	0.0031	0.0041	0.0055	0.0077
CO3	0.0003	0.0005	0.0008	0.0013	0.0023
CO2	2.541	2.763	3.033	3.366	3.824
pH	6.375	6.438	6.515	6.603	6.690
TDS	17.466	21.86	28.79	38.80	53.68

Perm mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2
Ca	2.732	4.066	1.603
Mg	0.320	0.479	0.187
Na	15.961	23.71	9.374
K	1.852	2.756	1.087
Ba	0.002	0.003	0.0012
Sr	0.0	0.0	0.0
NH4	1.597	2.363	0.940
Fe	0.0	0.0	0.0
HCO3	15.056	22.45	8.825
Cl	12.614	18.869	7.379
SO4	0.916	1.373	0.536
NO3	23.02	33.84	13.592
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	2.613	3.615	1.698
PO4	0.0112	0.0168	0.0065
CO3	0.0042	0.0082	0.0021
CO2	4.398	5.112	3.443
pH	6.787	6.895	6.557
TDS	76.70	113.6	45.23

Feed mg/l Pass 1 Stage 2	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	106.8	120.8	138.1	159.8	187.4
Mg	34.82	39.39	45.04	52.15	61.22
Na	373.0	421.6	481.6	556.8	652.6
K	42.61	48.15	55.00	63.60	74.53
Ba	0.0801	0.0906	0.104	0.120	0.141
Sr	0.0	0.0	0.0	0.0	0.0
NH4	17.965	20.28	23.13	26.70	31.21
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	395.7	446.5	509.3	587.9	687.8
Cl	481.7	544.6	622.4	720.2	844.7
SO4	211.8	239.6	274.0	317.3	372.6
NO3	103.2	116.1	131.8	151.3	175.7
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	55.80	63.01	71.93	83.12	97.35
PO4	5.095	5.764	6.593	7.636	8.967
CO3	6.321	7.527	9.088	11.148	13.761
CO2	2.541	2.763	3.033	3.366	3.824
pH	8.373	8.385	8.398	8.410	8.418
TDS	1,834.92	2,073.30	2,368.04	2,737.80	3,207.90

Feed mg/l Pass 1 Stage 2	Element 6	Element 7	Stage 2
Ca	222.9	268.6	106.8
Mg	72.90	87.97	34.82
Na	775.4	933.1	373.0
K	88.55	106.6	42.61
Ba	0.167	0.201	0.0801
Sr	0.0	0.0	0.0

NH4	36.97	44.32	17.965
Fe	0.0	0.0	0.0
HCO3	815.9	979.9	395.7
Cl	1,004.80	1,210.78	481.7
SO4	443.8	535.8	211.8
NO3	206.2	244.2	103.2
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	115.6	139.1	55.80
PO4	10.683	12.898	5.095
CO3	17.304	22.14	6.321
CO2	4.398	5.112	2.541
pH	8.425	8.433	8.373
TDS	3,811.17	4,585.44	1,834.92

Pass 1 Stage 3	Element 1	Element 2	Element 3	Element 4	Element 5
Model	TMG10D	TMG10D	TMG10D	TMG10D	TMG10D
Area m ² / dia inch	8.08 / 4	8.08 / 4	8.08 / 4	8.08 / 4	8.08 / 4
Age	3	3	3	3	3
SPI %/yr	15	15	15	15	15
SPI Applied	52.09	52.09	52.09	52.09	52.09
Flow Allowance	0.650	0.650	0.650	0.650	0.650
Recovery %	3.290	3.089	2.880	2.663	2.442
Feed Flow(gal/min)	21.73	21.02	20.37	19.782	19.255
Perm Flow(gal/min)	0.715	0.649	0.587	0.527	0.470
Conc Flow(gal/min)	21.02	20.37	19.782	19.255	18.785
Flux(gfd)	11.831	10.742	9.705	8.718	7.779
Beta	1.087	1.080	1.074	1.067	1.060
Feed Press(psi)	144.1	137.3	131.0	124.9	119.1
DP(psi)	6.751	6.385	6.062	5.779	5.530
Conc Press(psi)	137.3	131.0	124.9	119.1	113.6
Perm Press(psi)	5.000	5.000	5.000	5.000	5.000
PI_Feed(psi)	49.14	50.76	52.32	53.82	55.24
PI_Memb(psi)	54.24	55.63	56.92	58.13	59.23
PI_Conc(psi)	50.76	52.33	53.83	55.25	56.58
PI_Perm(psi)	0.814	0.917	1.035	1.172	1.331
Net Press(psi)	82.12	74.25	66.82	59.81	53.18

Pass 1 Stage 3	Element 6	Element 7
Model	TMG10D	TMG10D
Area m ² / dia inch	8.08 / 4	8.08 / 4
Age	3.000	3.000
SPI %/yr	15.000	15.000
SPI Applied	52.09	52.09
Flow Allowance	0.650	0.650
Recovery %	2.215	1.987
Feed Flow(gal/min)	18.785	18.369
Perm Flow(gal/min)	0.416	0.365
Conc Flow(gal/min)	18.369	18.004
Flux(gfd)	6.886	6.038
Beta	1.054	1.048
Feed Press(psi)	113.6	108.3
DP(psi)	5.314	5.126
Conc Press(psi)	108.3	103.1
Perm Press(psi)	5.000	5.000
PI_Feed(psi)	56.57	57.80
PI_Memb(psi)	60.22	61.10
PI_Conc(psi)	57.81	58.93
PI_Perm(psi)	1.521	1.748
Net Press(psi)	46.92	41.00

Perm mg/l Pass 1 Stage 3	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	3.291	3.709	4.188	4.746	5.398

Mg	0.390	0.440	0.498	0.564	0.642
Na	19.135	21.56	24.34	27.56	31.34
K	2.230	2.513	2.837	3.214	3.656
Ba	0.0025	0.0028	0.0031	0.0036	0.004
Sr	0.0	0.0	0.0	0.0	0.0
NH4	1.898	2.138	2.412	2.730	3.102
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	18.223	20.56	23.21	26.33	29.94
Cl	15.368	17.335	19.589	22.21	25.29
SO4	1.121	1.265	1.430	1.622	1.847
NO3	26.95	30.32	34.17	38.64	43.86
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	2.769	3.106	3.494	3.945	4.474
PO4	0.0137	0.0154	0.0175	0.0198	0.0225
CO3	0.0044	0.0056	0.007	0.0089	0.0114
CO2	6.054	6.200	6.337	6.464	6.581
pH	6.727	6.770	6.812	6.860	6.907
TDS	91.40	103.0	116.2	131.6	149.6

Perm mg/l Pass 1 Stage 3	Element 6	Element 7	Stage 3
Ca	6.171	7.099	4.670
Mg	0.735	0.846	0.555
Na	35.82	41.19	27.13
K	4.179	4.808	3.163
Ba	0.0046	0.0053	0.0035
Sr	0.0	0.0	0.0
NH4	3.543	4.072	2.686
Fe	0.0	0.0	0.0
HCO3	34.25	39.45	25.90
Cl	28.93	33.31	21.86
SO4	2.114	2.435	1.597
NO3	50.03	57.43	38.02
F	0.0	0.0	0.0
Br	0.0	0.0	0.0
B	0.0	0.0	0.0
SiO2	5.101	5.858	3.885
PO4	0.0258	0.0297	0.0195
CO3	0.0149	0.0198	0.0092
CO2	6.686	6.779	6.390
pH	6.960	7.017	6.834
TDS	170.9	196.5	129.5

Feed mg/l Pass 1 Stage 3	Element 1	Element 2	Element 3	Element 4	Element 5
Ca	326.5	337.5	348.1	358.3	368.0
Mg	107.1	110.7	114.3	117.6	120.8
Na	1,132.08	1,169.95	1,206.55	1,241.60	1,274.82
K	129.3	133.6	137.8	141.8	145.6
Ba	0.245	0.253	0.261	0.269	0.276
Sr	0.0	0.0	0.0	0.0	0.0
NH4	53.50	55.26	56.95	58.57	60.09
Fe	0.0	0.0	0.0	0.0	0.0
HCO3	1,186.76	1,225.91	1,263.73	1,299.93	1,334.22
Cl	1,471.64	1,521.19	1,569.12	1,615.06	1,658.64
SO4	652.7	674.9	696.4	717.0	736.5
NO3	290.3	299.2	307.8	315.9	323.5
F	0.0	0.0	0.0	0.0	0.0
Br	0.0	0.0	0.0	0.0	0.0
B	0.0	0.0	0.0	0.0	0.0
SiO2	168.7	174.4	179.8	185.1	190.0
PO4	15.717	16.251	16.769	17.265	17.737
CO3	28.36	29.73	31.07	32.40	33.68
CO2	6.054	6.200	6.337	6.464	6.581

pH	8.435	8.438	8.440	8.443	8.445
TDS	5,562.91	5,748.85	5,928.61	6,100.76	6,263.93
Feed mg/l Pass 1 Stage 3	Element 6	Element 7	Stage 3		
Ca	377.1	385.5	326.5		
Mg	123.8	126.6	107.1		
Na	1,305.94	1,334.71	1,132.08		
K	149.1	152.4	129.3		
Ba	0.283	0.289	0.245		
Sr	0.0	0.0	0.0		
NH4	61.52	62.83	53.50		
Fe	0.0	0.0	0.0		
HCO3	1,366.32	1,395.99	1,186.76		
Cl	1,699.52	1,737.37	1,471.64		
SO4	754.9	772.0	652.7		
NO3	330.5	336.9	290.3		
F	0.0	0.0	0.0		
Br	0.0	0.0	0.0		
B	0.0	0.0	0.0		
SiO2	194.7	198.9	168.7		
PO4	18.181	18.592	15.717		
CO3	34.92	36.10	28.36		
CO2	6.686	6.779	6.054		
pH	8.448	8.450	8.435		
TDS	6,416.81	6,558.20	5,562.91		



C. Preliminary Design of RO System

C.5 List of Key Equipment and Instrument



C5.1 RO System - List of Key Equipment

Items	Description	Quantity	Key Specifications	Manufacturers	Lead Time after Release
RO FEED					
1	RO TRANSFER PUMP (SHIPPED LOOSE)	1	HORIZONTAL END SUCTION, SS316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
RO SKIDS					
2	RO SKID FRAME	1	STEEL FRAME PAINTED	BIWATER	10 - 12 weeks
3	STATIC MIXER AND QUILL FOR SULFURIC ACID DOSING	1	3", CPVC	KOFLO	3 week
4	STATIC MIXER AND QUILL FOR ANTISCALANT DOSING	1	3", PVC	KOFLO	3 week
5	CARTRIDGE HOUSING WITH FILTER ELEMENTS	1	FILTER ELEMENT - 5 MICRONS HOUSING SS316	FIL-TREK	8 - 10 week
6	RO FEED PUMP, WITH VFD	1	VERTICAL MULTISTAGE TYPE, SS316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
7	RO MEMBRANES (8" FOR STAGE 1 & 2)	42	TORAY TMG20D-400	TORAY	3 - 6 week
8	RO MEMBRANES (4" FOR STAGE 3) AND CANARY VESSEL	8	TORAY TMG10D	TORAY	3 - 6 week
9	RO VESSELS 8" FOR STAGE 1& 2	6	8" IN DIA, TO HOUSE 7 ELEMENTS. 300 PSI	CODELINE	8 - 10 week
10	RO VESSELS 4" FOR STAGE 3	1	4" IN DIA, TO HOUSE 7 ELEMENTS. 300 PSI	CODELINE	8 - 10 week
11	RO VESSELS 4" FOR CANARY	1	4" IN DIA, TO HOUSE 1 ELEMENT	CODELINE	8 - 10 week
11	RO STAGE 2 INTERSTAGE BOOSTER PUMP, WITH VFD	1	HORIZONTAL END SUCTION TYPE, DUPLEX SS ^(SEE NOTE)	AMPCO	13 - 14 weeks
12	RO STAGE 3 INTERSTAGE BOOSTER PUMP, WITH VFD	1	HORIZONTAL MULTISTAGE TYPE, DUPLEX SS ^(SEE NOTE)	AMPCO	13 - 14 weeks
13	CONTROL PANEL	1	NEMA 4 STEEL PANEL ALLEN BRADLEY PLC SYSTEM	SOFFA	14 - 16 weeks
14	INSTRUMENT PANEL	1	PP	BIWATER	5 - 8 week
15	SAMPLE PANEL	1	PP	BIWATER	5 - 8 week
RO CIP SKID					
16	RO CIP SKID FRAME	1	STEEL FRAME PAINTED	BIWATER	10 - 12 weeks
17	RO CIP TANK	1	HDPE	CHEM-TAINER	14 weeks
18	RO CIP TANK CIRCULATION PUMP	1	HORIZONTAL END SUCTION TYPE, SS316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
19	RO CIP HEATER	1	FLANGED IMMERSION TYPE, SS316	VULCAN	12 - 14 weeks
20	RO CIP PUMP, WITH VFD	1	VERTICAL MULTISTAGE TYPE, SS316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
21	RO CIP CARTRIDGE HOUSING WITH FILTER ELEMENTS	1	FILTER ELEMENT - 5 MICRONS HOUSING SS316	FIL-TREK	8 - 10 week
RO FLUSH					
22	RO FLUSH PUMP (SHIPPED LOOSE)	1	VERTICAL MULTISTAGE TYPE, SS316 ^(SEE NOTE)	GOULDS	13 - 14 weeks
RO CHEMICAL METERING PUMP SKIDS					
23	UF CHEMICAL PUMP SKIDS	2	PP	BIWATER	10 weeks
24	RO - ANTISCALANT (100%) METERING PUMP	1	PERISTALTIC TYPE ^(SEE NOTE)	CHEM-TECH	6 - 8 weeks
25	RO - SULFURIC ACID (93%) METERING PUMP	1	STEPPING MOTOR DIAPHRAGM ^(SEE NOTE)	GRUNDFOS	6 - 8 weeks

NOTE: Due to the scale, nature and other specific project conditions of this Project, the selected types of pumps as shown are only preliminary, and is subject to review. As part of the design service, Biwater will be review with PWD and the Engineer to decide the most cost-effective types of pumps to be utilized for each specific application.



C.5.2 RO System - List of Instrument

Items	Description	Quantity	Key Specifications	Manufacturers	Lead Time after Release
RO SKID					
1	ORP	1	RO FEED	HACH	10 - 14 weeks
2	PH WITH TEMP	1	RO FEED PUMP	HACH	10 - 14 weeks
3	CONDUCTIVITY	1	RO FEED PUMP SUCTION	ROSEMOUNT	10 - 14 weeks
4	CONDUCTIVITY	1	RO TOTAL PERMEATE	ROSEMOUNT	10 - 14 weeks
5	CONDUCTIVITY	1	1ST STAGE PERM	ROSEMOUNT	10 - 14 weeks
6	CONDUCTIVITY	1	1ST STAGE CONC	ROSEMOUNT	10 - 14 weeks
7	CONDUCTIVITY	1	2ND STAGE PERM	ROSEMOUNT	10 - 14 weeks
8	CONDUCTIVITY	1	2ND STAGE CONC	ROSEMOUNT	10 - 14 weeks
9	CONDUCTIVITY	1	3RD STAGE PERM	ROSEMOUNT	10 - 14 weeks
10	CONDUCTIVITY	1	3RD STAGE CONC	ROSEMOUNT	10 - 14 weeks
11	PRESSURE GAUGE	2	CF IN/OUT	ASHCROFT	10 - 14 weeks
12	PRESSURE GAUGE	1	RO TRANSFER PUMP OUT	ASHCROFT	10 - 14 weeks
13	PRESSURE GAUGE	3	3 STAGES PERMEATES	ASHCROFT	10 - 14 weeks
14	PRESSURE SWITCH	1	RO FEED PUMP OUT	ASHCROFT	10 - 14 weeks
15	PRESSURE SWITCH	3	INTERSTAGE PUMP SUCTION	ASHCROFT	10 - 14 weeks
16	MAGNETIC FLOW METER	1	S1 & S2 COMBINE PERMEATE	ROSEMONT	10 - 14 weeks
17	MAGNETIC FLOW METER	1	STAGE2 FEED	ROSEMONT	10 - 14 weeks
18	MAGNETIC FLOW METER	1	STAGE 2 CONC	ROSEMONT	10 - 14 weeks
19	MAGNETIC FLOW METER	1	STAGE 3 PERM	ROSEMONT	10 - 14 weeks
20	MAGNETIC FLOW METER	1	STAGE 3 CONC	ROSEMONT	10 - 14 weeks
21	ROTAMETER	1	STAGE 4	--	10 - 14 weeks
22	PRESSURE TRANSMITTER	2	RO FEED IN/OUT	ROSEMONT	10 - 14 weeks
23	PRESSURE TRANSMITTER	1	2ND STAGE FEED	ROSEMONT	10 - 14 weeks
24	PRESSURE TRANSMITTER	1	3RD STAGE FEED	ROSEMONT	10 - 14 weeks
25	PRESSURE TRANSMITTER	2	COMBINED & 3RD PERM	ROSEMONT	10 - 14 weeks
26	PRESSURE TRANSMITTER	3	CONCENTRATES	ROSEMONT	10 - 14 weeks
RO CIP					
27	TEMPERATURE INDICATOR	1	RO CIP	ASHCROFT	10 - 14 weeks
28	TEMPERATURE SWITCH	1	RO CIP	ASHCROFT	10 - 14 weeks
29	PRESSURE GAUGE	2	RO CIP PUMP	ASHCROFT	10 - 14 weeks
30	DIFF PRESSURE INDICATOR	1	CF	ASHCROFT	10 - 14 weeks
31	ROTAMETER	1	RO CIP	KING	10 - 14 weeks
32	LEVEL SWITCH	1	RO CIP	MAGNETROL	10 - 14 weeks
RO CHEMICAL METERING PUMP SKIDS					
33	ROTAMETER	6	Caustic 25%, SBS, 20% HCl	GF	10 - 14 weeks
34	ROTAMETER	2	30% Citric acid	GF	10 - 14 weeks
35	PRESSURE GAUGE	8	AIR DIAPHRAGM PUMP REGULATOR	IR/ARO	10 - 14 weeks
RO FLUSH					
36	PRESSURE GAUGE	1	RO FLUSH PUMP	ASHCROFT	10 - 14 weeks
37	ROTAMETER	1	RO FLUSH	KING	10 - 14 weeks
38	LEVEL SWITCH	1	RO FLUSH TANK	MAGNETROL	10 - 14 weeks



C. Preliminary Design of RO System

C.6 List of Spare Parts



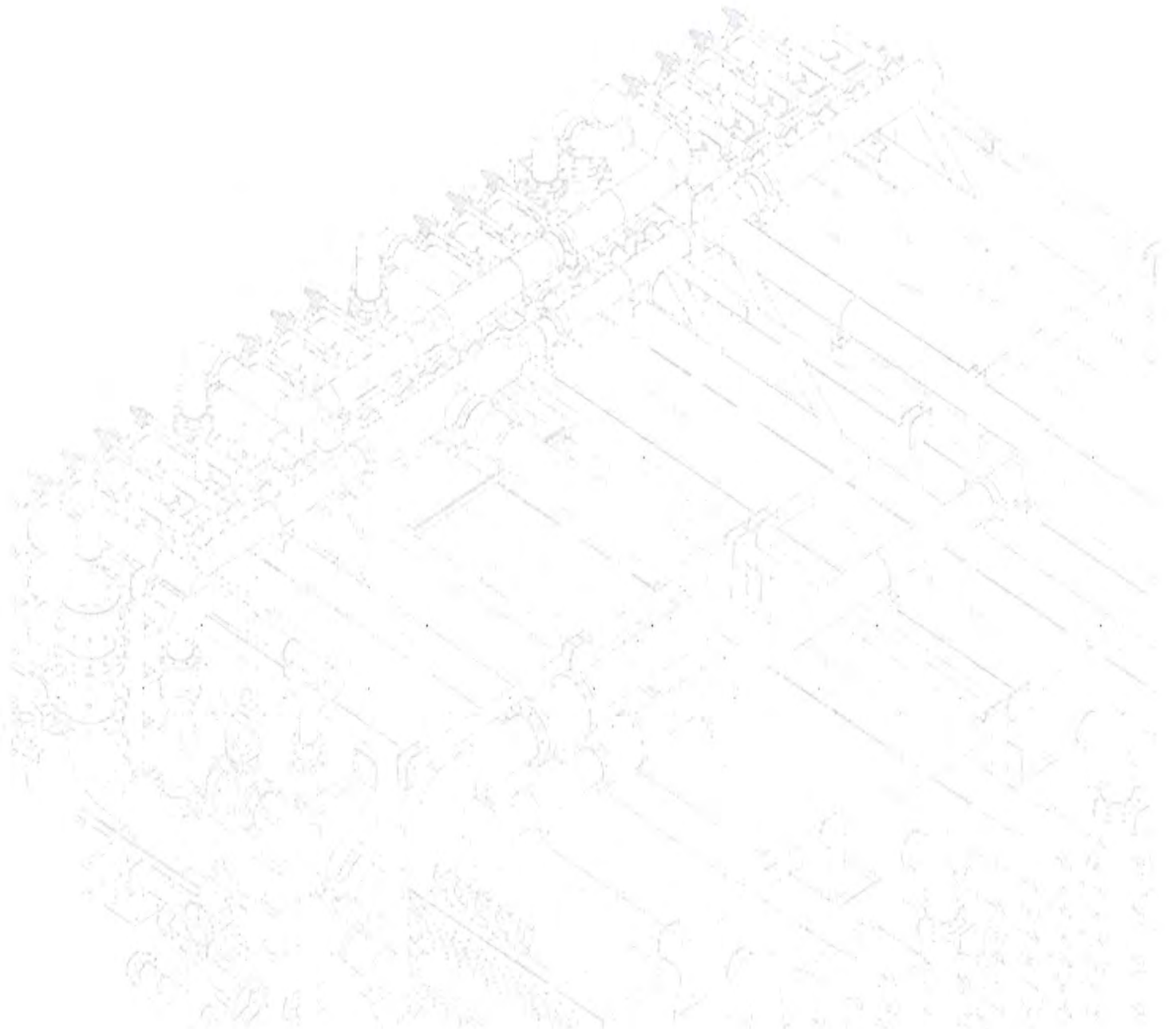


C.6 SPART PARTS AND TOOLS TO BE SUPPLIED

Items	Description	Key Specifications	Quantity
UF SKIDS			
1	UF FEED PUMP, WITH VFD	SEAL KIT	2
2	AUTOMATIC STRAINERS	Cylinder O-ring	2
3	UF BACKWASH PUMPS, WITH VFD	SEAL KIT	2
4	UF CIP TANK RECIRCULATION PUMPS	SEAL KIT	2
UF COMPRESSOR			
5	COMPRESSORS C/W AIR RECEIVERS	MAINTENANCE KIT	2
UF CHEMICAL METERING PUMP SKIDS			
6	UF - AMMONIUM SULFATE (10%) METERING PUMP (UF FEED)	ROLLER ASSEMBLY	1
7	UF - SODIUM HYPOCHLORITE (12%) METERING PUMP (UF FEED)	ROLLER ASSEMBLY	1
8	UF - SODIUM HYPOCHLORITE (12%) METERING PUMPS	ROLLER ASSEMBLY	2
9	UF - CAUSTIC (25%) METERING PUMPS	ROLLER ASSEMBLY	2
10	UF - CITRIC ACID (30%) METERING PUMPS	REPAIR KIT	2
11	UF - SODIUM BISULFITE (40%) METERING PUMPS	ROLLER ASSEMBLY	2
12	UF - HCL (32%) METERING PUMPS	ROLLER ASSEMBLY	2
RO FEED			
13	RO TRANSFER PUMP (SHIPPED LOOSE)	SEAL KIT	1
RO SKIDS			
14	CATRIDGE HOUSING WITH FILTER ELEMENTS	FILTER ELEMENT	10
15	RO FEED PUMP, WITH VFD	SEAL KIT	1
16	RO STAGE 2 INTERSTAGE BOOSTER PUMP, WITH VFD	SEAL KIT	1
17	RO STAGE 3 INTERSTAGE BOOSTER PUMP, WITH VFD	SEAL KIT	1
18	MEMBRANE ELEMENTS	BRINE SEALS & O-RINGS	3
19	PRESSURE VESSELS	ADAPTORS SEALS, HEAD SEALS, RETAINING RINGS, PRODUCT WATER TUBE SHIMS, HEAD ASSEMBLY	2
20	PRESSURE VESSELS - SPECIAL TOOLS	VESSEL HEAD REMOVAL PLIERS	2
RO CIP SKID			
21	RO CIP CIRCULATING PUMP	SEAL KIT	1
22	RO CIP PUMP, WITH VFD	SEAL KIT	1
23	RO CIP CARTRIDGE HOUSING WITH FILTER ELEMENTS	FILTER ELEMENT	6
RO FLUSH			
24	RO FLUSH PUMP (SHIPPED LOOSE)	SEAL KIT	1
RO CHEMICAL METERING PUMP SKIDS			
25	RO - ANTISCALANT (100%) METERING PUMP	ROLLER ASSEMBLY	1
26	RO - SULFURIC ACID (93%) METERING PUMP	SPARE DIAPHRAGM & GASKET	1



D. Support Services





D Support Services

Below support and supervision services are included in Biwater's lump-sum price as set forth herein. Below duration of support and supervision services is based on per Membrane Filtration (MF) System, and Reverse Osmosis (RO) System. If Biwater is awarded for design and supply of both MF System and RO System, there would be savings on manpower; and price could be reduced (See **Chapter C – Pricing Proposal**).

Table C.1 Support Services provided by Biwater

Support Services	Means	Durations	Participants from Biwater
Design Phase			
Project Meetings			
Conference Calls	Virtual	8 x 2-hour meetings, total 16 hours	Project Manager, Project Engineer and a technical staff
Construction Phase			
Project Meetings			
Coordination Meeting	Virtual	20 x 1-hour meetings, total 20 hours	Project Manager, Project Engineer and a technical staff
Start-Up and other Meetings	Virtual	4 x 4-hour meetings, total 16 hours	Project Manager, Project Engineer and a technical staff
Kick off Meeting	Virtual	1 x 4-hour meeting, Total 4 hour	Project Manager, Project Engineer and a technical staff
Services at Jobsite			
On Site Installation Supervision	In person	5 man-days in total	Field Services Engineer/ Supervisor
24/7 On Call Services	Remote, or virtual	24/7 on-call during testing, startup and commissioning, 7-day Plant Wide Performance Test.	Field Services Engineer/ Supervisor
Equipment Inspection	In person	3 man-days in total	Field Services Engineer/ Supervisor
Start Up Checks	In person	2 man-days in total	Field Services Engineer/ Supervisor
Field Testing of Equipment	In person	3 man-days in total	Field Services Engineer/ Supervisor
System Functional Testing	In person	2 man-days in total	Field Services Engineer/ Supervisor
2-day Plant Wide Clean Water Test	In person	2 man-days in total	Field Services Engineer/ Supervisor
7-day System Performance Test	In person	7 man-days in total	Field Services Engineer/ Supervisor
7-day Plant Wide Performance Test	In person	7 man-days in total	Field Services Engineer/ Supervisor
Training	In person	3 man-days in total	Field Services Engineer/ Supervisor
Follow-up Training	In person	2 x 2-man-days in total	Field Services Engineer/ Supervisor
12-month Operation Phase			
Weekly Technical Assistance	In person	First 2 months: 1 man-	Field Services Engineer/ Supervisor



PALMDALE WATER DISTRICT
PURE WATER AV- DEMONSTRATION FACILITY
MEMBRANE FILTRATION AND
REVERSE OSMOSIS SYSTEM

Support Services	Means	Durations	Participants from Biwater
Monthly Technical Assistance	In person	day per week The rest of the 10 months: 1 man-day per month	Field Services Engineer/ Supervisor
Remote Assistance During Office Hours	Remote, or virtual	Available for the first month of operation	Field Services Engineer/ Supervisor



E. Pricing Proposal



E. PRICING PROPOSAL

A. PHASE 1 - MEMBRANE FILTRATION ENGINEERING SUBMITTALS

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
1	Engineering Submittals	1	Lump Sum		\$60,000.00
Total for A					\$60,000.00

B. PHASE 1 - REVERSE OSMOSIS ENGINEERING SUBMITTALS

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
1	Engineering Submittals	1	Lump Sum		\$30,000.00
Total for B					\$30,000.00

C. PHASE 1 - BID DEDUCTION FOR SINGLE SUPPLIER OF BOTH MEMBRANE AND REVERSE OSMOSIS FILTER ENGINEERING SUBMITTALS

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
1	Deduction for single SUPPLIER MF and RO system	1	Lump Sum		\$5,000.00
Total for C					\$5,000.00

D. PHASE 2 - MEMBRANE FILTER SYSTEMS

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
1	Membrane Filtration System Equipment Purchase	1	Lump Sum		\$696,372.00
2	Sales Tax on Equipment	1	Lump Sum		\$71,378.13
3	Shipping	1	Lump Sum		\$5,000.00
4	Equipment Installation Assistance	1	Lump Sum		\$3,000.00
5	Control System Testing	1	Lump Sum		\$3,000.00
6	O&M Manuals and Operator Training	1	Lump Sum		\$3,000.00
7	Plant Startup and Testing Assistance	1	Lump Sum		\$3,000.00
8	12 Months Operations Support	1	Lump Sum		\$3,000.00
Total for D					\$787,750.13

E. PHASE 2 - REVERSE OSMOSIS SYSTEMS

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
1	RO Filtration System Equipment Purchase	1	Lump Sum		\$418,803.00
2	Sales Tax on Equipment	1	Lump Sum		\$42,927.31
3	Shipping	1	Lump Sum		\$3,000.00
4	Equipment Installation Assistance	1	Lump Sum		\$3,000.00
5	Control System Testing	1	Lump Sum		\$3,000.00
6	O&M Manuals and Operator Training	1	Lump Sum		\$3,000.00
7	Plant Startup and Testing Assistance	1	Lump Sum		\$3,000.00
8	12 Months Operations Support	1	Lump Sum		\$3,000.00
Total for E					\$479,730.31

F. PHASE 2 - BID DEDUCTION FOR SINGLE SUPPLIER OF MEMBRANE AND REVERSE OSMOSIS FILTER SYSTEMS

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
1	Deduction for single SUPPLIER MF and RO system	1	Lump Sum		\$20,000.00
Total for F					\$20,000.00

GRAND TOTAL FOR A, B, D & E, Deducting C & F **\$1,332,480.44**

P A L M D A L E W A T E R D I S T R I C T
B O A R D M E M O R A N D U M

DATE: December 6, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Scott Rogers, Engineering Manager
VIA: Mr. Adam Ly, Assistant General Manager
Mr. Dennis LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 8.7 – CONSIDERATION AND POSSIBLE ACTION ON AUTHORIZING STAFF TO NEGOTIATE AND EXECUTE A SERVICES CONTRACT WITH DUPONT (DESALITECH, INC.) FOR ENGINEERING SUBMITTALS FOR A SECONDARY REVERSE OSMOSIS SYSTEM FOR THE PURE WATER AV DEMONSTRATION FACILITY AND AGREE TO THE PRICING TERMS FOR THE PURCHASE OF THE EQUIPMENT. (\$375,157.00 NOT-TO-EXCEED – BUDGETED – ENGINEERING MANAGER ROGERS)***

Recommendation:

Staff recommends that the Board authorizes staff to negotiate and execute a services contract with Dupont (Desalitech, Inc.) for engineering submittals for a Secondary Reverse Osmosis System for the Pure Water AV Demonstration Facility and agree to the pricing terms for the purchase of equipment in the not-to-exceed amount of \$375,157.00.

Alternative Options:

Reject all proposals and rebid the project.

Impact of Taking No Action:

It will delay the Pure Water AV Demonstration Facility project that includes demonstration testing for permitting approval and full-scale design criteria development.

Background:

Staff and the District’s program manager, Stantec, have been pursuing the implementation of Pure Water Antelope Valley (Pure Water AV), which will be a regional recycled water program to address and improve water supply resiliency and groundwater aquifer management. Pure Water AV is planned to be an indirect potable reuse (IPR) project to be permitted under Title 22 Code of California Regulations for groundwater augmentation via direct injection. The District has plans to construct an Advanced Water Treatment Demonstration Facility (Demonstration Facility) to provide a place for public education, training and tours, demonstration testing for permitting approval, and full-scale design criteria development.

BOARD OF DIRECTORS
PALMDALE WATER DISTRICT

VIA: Mr. Adam Ly, Assistant General Manager
Mr. Dennis D. LaMoreaux, General Manager

December 6, 2022

Staff prepared a solicitation and collected proposals from vendors that meet the technical specifications for the secondary reverse osmosis system. The proposals collected provide treatment technology that is required for demonstration testing and regulatory approval. Ultimately, the treatment systems from demonstration testing will be incorporated into the full-scale design.

Staff received two proposals from vendors and plan to negotiate with the first and second proposers. Staff plans to preselect a vendor and execute a contract for the design submittal production (Phase 1) and establish a guaranteed price for the equipment, construction, and startup support services (Phase 2). The services contract for Phase 1 will require the Phase 2 price to be a guaranteed not-to-exceed amount with an adjustment factor based on the contract terms and California Construction Cost Index as produced by Engineering News Record. The general construction contract will be brought to the Board for approval.

When the District requests bids for the Demonstration Facility (between June and July 2023), the approved design submittal package from the selected vendor is intended to be included in the general construction contract. At that time, the selected vendor would be required to supply the Phase 2 equipment and services at the guaranteed price under a subcontract or purchase order to the selected contractor that will construct the Demonstration Facility.

The vendor's experience related to the Pure Water AV project has been utilized to evaluate the general competency of the vendor for the equipment needed to meet technical specifications, purchasing costs, and life cycle costs. Dupont (Desalitech, Inc.) is the qualified bidder by meeting the criterion set forth in the solicitation with a price of \$375,157.00.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 3 – Systems Efficiency.
This item directly relates to the District's Mission Statement.

Budget:

This item is budgeted and will be covered as part of Work Order No. 22-653.

Supporting Documents:

- Proposal Package from Dupont (Desalitech, Inc.)



Water Solutions



Proposal

Closed Circuit Reverse Osmosis (CCRO)

Trussell Tech

Attn: Keel Robinson

Palmdale RWA – Potable Reuse Facility Pilot

One (1) SOAR CCRO System(s)

Model No. S1

5 - 15 gpm Permeate Production

November 4, 2022

Valid for 30 days

Proposal Ref./No. A-096258-N2 r.1

Client Ref./RFP No.

Date	Rev.	Revision Description
November 4, 2022	1	Firm S1 CCRO Pilot Proposal based on Request for Proposal – Pure Water AV – Demonstration Facility Secondary Reverses Osmosis System
August 19, 2022	0	Firm Pilot Proposal – S1 CCRO Pilot – Containerization Optional

v.2022.10.17

This proposal contains confidential information and must only be shared with intended



EXECUTIVE SUMMARY

Thank you for this opportunity to provide reverse osmosis (RO) capability to Trussell Tech for the Palmdale RWA Potable Reuse Facility Pilot. We understand the demonstration facility has room for one (1) system capable of producing 5 – 15 gpm of permeate at the highest possible recovery rate.

We are pleased to present this proposal to supply one (1) SOAR CCRO system, model no. S1, featuring the DesaliTec Closed Circuit Reverse Osmosis (CCRO) technology.

We would like to thank you again for your interest in working with Desalitech on this critical advanced water purification facility. We believe that every project comes with more than just equipment – it includes the expansive knowledge of the dedicated team of membrane scientists, engineers, and technicians who stand behind every installation. We are eager to share this expertise with those responsible for providing the world with clean, consistent, and high-quality water in the most efficient and reliable manner.

To initiate work, please issue a purchase order to Desalitech in accordance with the quoted payment terms.

If you have any questions, please don't hesitate to contact me via cell or email to discuss further.

Best Regards,

Chris Morrow

Chris Morrow, Ph.D

Technical Sales Manager

Memcor UF and MBR

DesaliTec CCRO

DuPont Water Solutions

Mobile +1 (408) 771-6202

Email: christopher.morrow@dupont.com

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Tables

Table 5-1	System Design Basis / Summary
Table 5-2	Required Feed Water Quality
Table 5-3	Utility Summary (connections, FLA, footprint)

Appendix/Attachments

- A. Order Acceptance
- B. Sample/Generic P&ID
- C. Sample/Generic GA
- D. SOAR5000i Membrane Element Technical Data Sheet



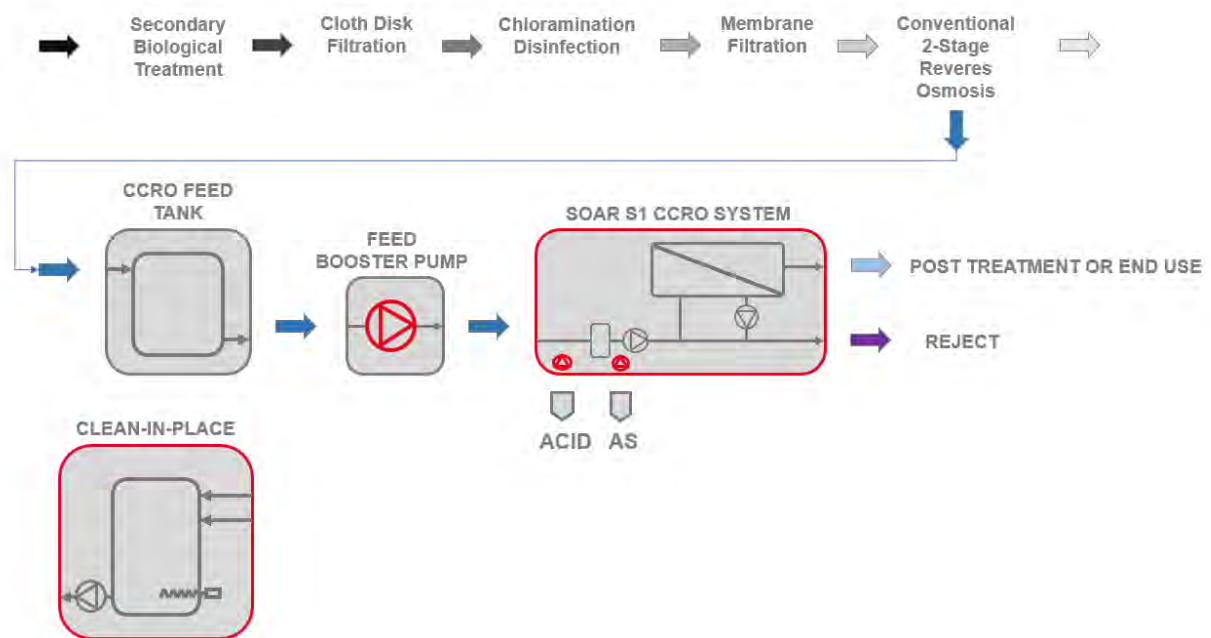
1. Project Description

1.1. Overview

Trussell Tech is working with the Palmdale RWA on a demonstration pilot for full-scale potable water reuse project. The demonstration project requires one (1) CCCRO system capable of producing 5 – 15 gpm of permeate flow at the highest water recovery rate possible.

1.2. PFD/Block Diagram

The proposed CCRO pilot will be utilized as a brine concentrator during the pilot and will demonstrate the flexibility and ease of operation if the technology. The process flow diagram below shows the expected treatment train, outlining the DesaliTec scope of supply in red.



The Desalitech scope includes a standard pilot sized CCRO system/skid, as well as the two chemical dosing systems (one for acid, one for antiscalant). A separate CIP tank (HDPE or equal material of construction) with heater is also provided and utilizes the CCRO feed booster pump for CIP. The CIP system will also be used for the shutdown permeate flush feature and may also be used for automatic permeate flushes (helpful in reducing scaling and biofouling potential). When used for automatic permeate flushing, the system will automatically flush every X hours, based on the internal setpoint (HMI). The feed pump installed on the CCRO skid requires flooded suction for a maximum flow rate of 50 gpm.

The Motor Control Panel (MCP) / load panel, supplied by Desalitech, includes a transformer, allowing for a single 3-phase power drop. Remote monitoring is included (with Ethernet access provided by customer). The power and control cables for the chemical dosing pumps are included (up to 5m max.). The heater in the CIP tank will be wired to the MCP / load panel in the field (by others).

The chemical dosing pumps are provided/shipped loose and powered by others. The digital dosing pumps come with containment shelf (polyethylene). The control cables are supplied by DesaliTec (16.5 ft), wired to CCRO panel. The chemical tanks/drums and containment quoted upon request, they are typically supplied by the chemical supplier.

In the event a containerized system is selected, all equipment within the container will be wired to the MCP/load panels, including the chemical dosing pumps and CIP heater. The only necessary connections to the containerized pilot system will be a single point 3-phase power drop, external signals for control, and plumbing/manifolds for the feed, permeate, and reject streams.

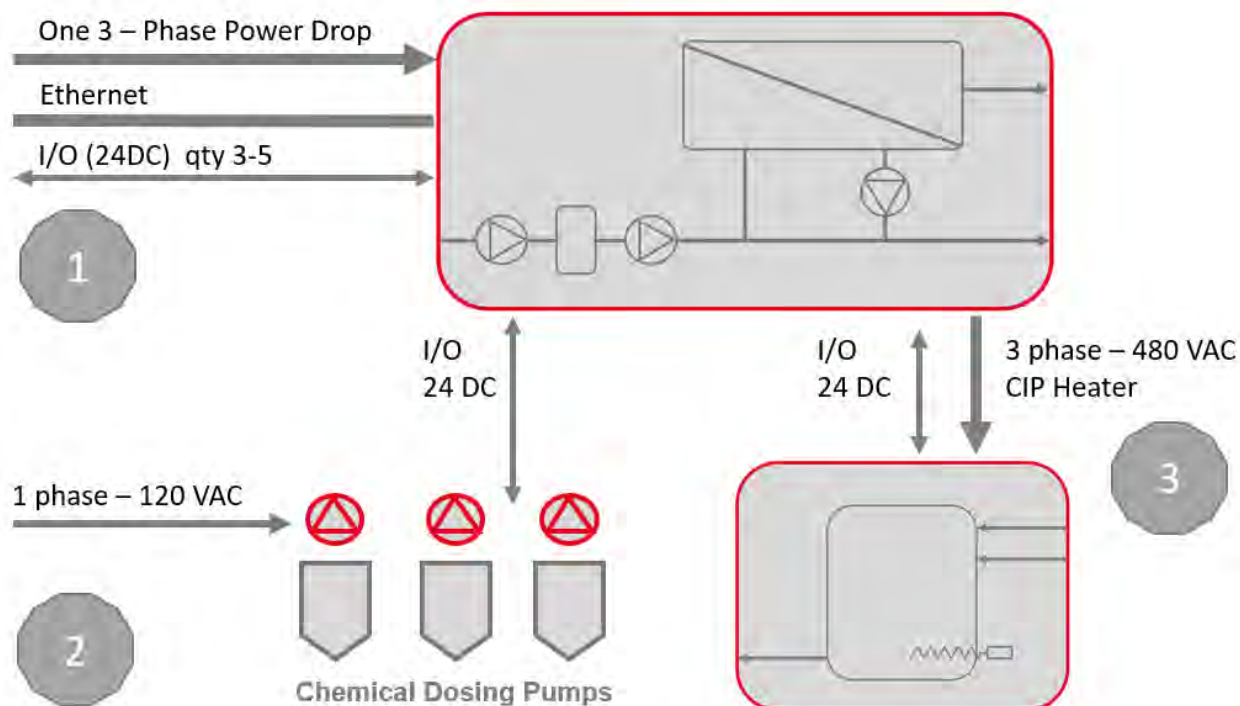
The Desalitech Pilot System proposed is based on supplier specifications. Desalitech shall take exception to all Bid Specifications that are inconsistent with the supplier specification, as provided in this proposal. Additional exceptions and exclusions to the Owner-supplied specifications can be found in section 8 of this proposal.

1.3. Interconnecting Wiring

The diagrams below provide a generic overview of the electrical connections needed during installation and proposed controls architecture scheme (next section). Please note, these are for illustrative purposes only, the systems electrical drawings always supersede these illustrations.

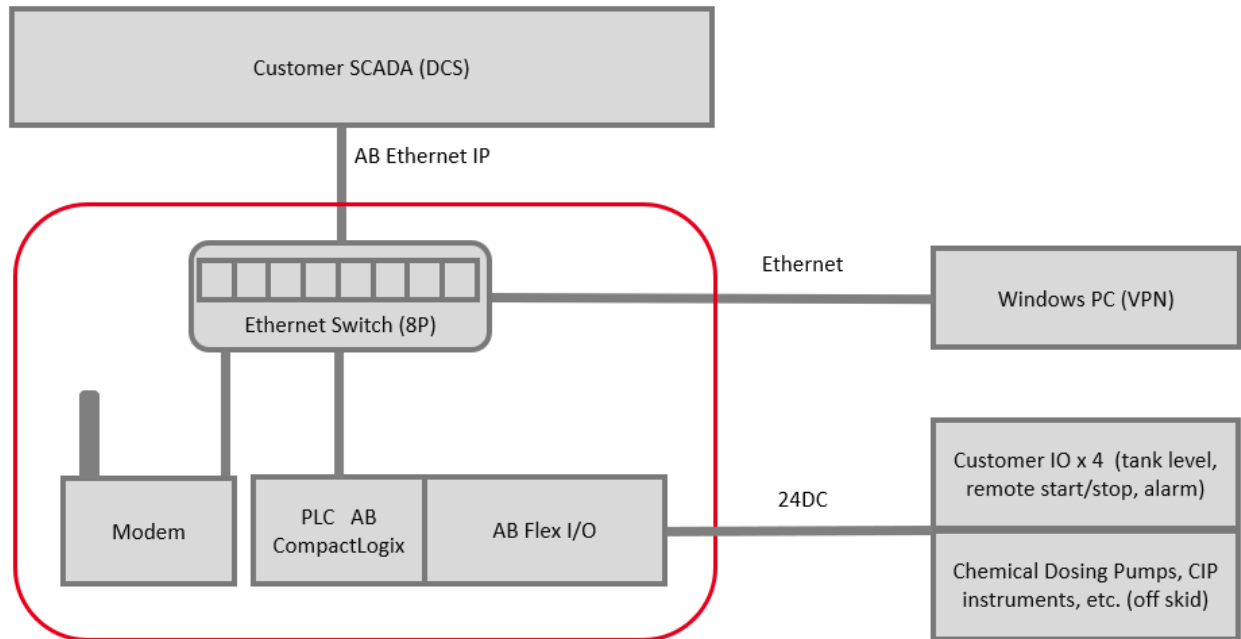
The red boxes define the scope boundary (skid or cabinets), all the wiring within is in the Desalitech scope. Desalitech will prewire all skids to the greatest practical extent. The customer's scope of anticipated wiring is shown as grey arrows (outside the red boundary). Summary of connections:

1. Motor Control Panel (MCP) / Load panel is included on each CCRO skid, one 3 phase power drop per skid. VFD's/starters are located/installed on skid. Note MCP And VFD's are optional cost adders. Each CCRO skid is connected via Ethernet. Input/Output (I/O) limited to basic hardwired interface with customer: Feed Tank Level (analog input), Customer Permeate Tank Level (analog input). Remote Start (Digital Input) and Alarm (dry contact relay).
2. Power supply to the chemical dosing pumps is by others; note pump comes with plug (5 ft). The control cables for the dosing pumps are included (up to 16 ft). Control cables are wired to control panel on CCRO skid.
3. CIP tank I/O are wired to CCRO skid. Three phase power supply for CIP heater is from the MCP/Load panel.



1.4. Controls Architecture

See below generic block diagram for controls architecture:



It is proposed that the CCRO skid (master PLC) communicate with customer SCADA system via Allen Bradley (AB) messaging over Ethernet IP (using produced and consumed tags). Desalitech will provide tag list to communicate all data that is not hardwired. Again, a small number of I/O will be hardwired for direct control (run, tank levels, alarm, etc.). Total I/O per skid is not to exceed five (5), optional IO can be quoted upon request.

For Desalitech to provide remote service and support, customer must provide internet access via an external Ethernet connection. If Ethernet connection/access is not available/permited, access via cellular network is a secondary option (additional adder). For enhanced security (if required), Desalitech recommends as a minimum to provide access for the first three (3) months and for remote troubleshooting (when required), during which time the customer may physically disconnect the Ethernet/SCADA connection.

Additional control notes:

- Additional trains will be remote I/O (RIO)
- VFDs are hardwired I/O (Ethernet connection available for data)
- Ethernet switch is unmanaged on single IP address/network

2. Value Proposition

In addition to providing higher recovery and reducing brine production, the installation of DesaliTec SOAR CCRO technology in this application offers numerous distinct advantages over a traditionally designed reverse osmosis system including:

Less Cleaning: CCRO systems combine a more normalized flux with adjustable cross flows and semi-batch salinity cycling to reduce cleaning frequency.

Longer Membrane Life: CCRO systems operate at a lower average pressure and provide much more favorable hydraulic conditions for the lead and lag elements. This combined with fewer cleanings provides longer membrane life.

Reduced Energy Consumption: CCRO systems reduce the average specific energy in reverse osmosis by 5-35% (function of water quality and system design) when compared to a traditional, multi-stage configuration.

Flexible Operation: CCRO systems allow the operator to independently adjust recovery, cross flow and flux to optimize system operation to changing field conditions. Each system can be adjusted to increase recovery while adapting to unexpected changes in feed TDS levels.

Stand-Alone Operation: CCRO systems can operate 'Stand-Alone' without the need for a primary RO. Each system is capable of operating from a raw water feed up to 98%+ recovery (scaling potential and operating pressure permitting).

Remote Monitoring (optional adder): Our SOAR Smart remote monitoring system provides cloud-based data storage and regular performance reports from Desalitech. This allows Desalitech process engineers to analyze system performance and optimize the system configuration for your specific application. This includes the following options:

- 24/7 Monitoring: Your SOAR system will collect and store performance data on the cloud at all times
- Enhanced Data Trending: Access current and historical data from your computer to assess system performance
- Remote Access to HMI: View and control the HMI screen from a computer, tablet or mobile phone
- Remote Support: Resolve issues quickly with remote support from Desalitech
- E-mail Alerts: Get notifications to your e-mail in the case of system issues
- Performance Reports: Receive performance analysis reports to help maintain peak efficiency & avoid potential issues
- Assigned Advisor: Get tailored recommendations from a Desalitech specialist who knows your specific system

3. Performance Testing

3.1. Performance Test

While pilot, performance, and other testing and demonstration of the CCRO system will be performed by others, Desalitech shall supply start-up and commissioning support for a performance test as delineated in this section. Prior to this performance test all instruments will be calibrated and the feed water will be evaluated to ensure that the appropriate conditions for the test will be met. These feed water conditions are set forth in Table 4-2 of the proposal. If the actual feedwater chemistry differs from that shown in Table 4-2, this may result in a lower recovery guarantee.

The performance test documenting the recovery rate will run immediately after startup of the system. Note, the performance test is for recovery only, permeate quality guarantee is not included. During this period the following procedures will be followed:

- System volumetric recovery will be monitored over the course of several hours to ensure stable consistent operation at set volumetric recovery setting.
- Once the system has reached consistent operation at the set recovery, the system should operate continuously for 24 hour period without any external interventions. In the event the client is unable to operate the system continuously for 24 hours, the performance test will conclude when consistent operation is achieved.
- End of CC parameters will be reviewed to ensure that there are no unexpected rise in feed pressures and differential pressures.

If this test is unsuccessful under appropriate design conditions, Desalitech shall be given 30 days, or up to 90 days in the event long-lead-time parts are required, to rectify any issues and repeat testing. Performance testing requiring more than a 24 hour period testing timeframe shall be billed a daily rate of \$2,950 per day per Desalitech representative.

4. Design Basis

4.1. Design Summary

See table below, summary of the project and design basis (flows are AVERAGE):

Table 4-1: System Design Basis / Summary

Parameter	Unit	Design Value
Total Required FEED Flowrate	gpm	5 – 25
Total Required PERMEATE Flowrate	gpm	5 – 15
FEED Flowrate (per train)	gpm	15
PERMEATE Flowrate (per train)	gpm	10
Required Permeate Quality (TDS)	mg/l	-
Required Permeate Quality (conductivity)	uS/cm	-
Water Temperature Range	°C	10 – 35
CCRO Recovery	%	70 – 98
Number of Trains (CCRO Skids)	-	One (1) x 100%
Feed Source	-	Various
Application	-	Various

4.2. Required Feed Water Quality

Influent water quality guidelines. Pre-treatment may be required if any constituents are exceeded.

Table 4-2: Required Feed Water Quality

Feed Constituents	Unit	Max. Level	Comment
SDI	1	3	Ideally < 1 Recommend UF >90% recovery
Turbidity	NTU	0.5	Ideally < 0.1, SDI required
Particle Count	1	100	Per ml (2-50 micron range), SDI required
TSS	mg/l	~0	Post treatment use above measures
Free chlorine	mg/l	0.1	Oxidation not covered by membrane warr.
O&G	mg/l	0.1	Ideally 0.0
TOC	mg/l	3	Higher values will increase CIP frequency
COD	mg/l	10	Higher values will increase CIP frequency
Total Iron	mg/l	0.05	Assume all iron is oxidized
H ₂ S	mg/l	0.0	Recommend degass
Colloidal Silica	mg/l	0.0	Recommend UF

4.3. Utility/Connection Summary

Desalitech proposes to supply **one (1) S2 CCRO system(s)**. See below table for summary of flows, connection schedule, footprint, weights and FLA's for each CCRO system skid.

Table 4-3: Utility/Connection Summary			
CCRO Flow Rates (per train)	Unit	Typical (CC/PF)	Maximum/Range
Influent Flow Rate Required (CC/PF)	gpm	15	25
Permeate Flow Rate (CC)	gpm	10	15
Drain	gpm	20	25
Pressure	Unit	Typical	Maximum/Range
Feed Pressure	psi	50	90
Permeate Pressure	psi	15	< 30
Drain	psi	0 (open)	< 10
CCRO Skid Connections	P&ID Ref.	Size	Flange Rating
RO Feed Inlet	A1	2"	150# ANSI Flange
RO Permeate Outlet	A2	1"	150# ANSI Flange
RO Drain (Brine/Reject)	A3	2"	150# ANSI Flange
CIP/Flush Feed (from tank)	C1	2"	150# ANSI Flange
CIP Brine Outlet (to tank)	C2	2"	150# ANSI Flange
CIP/Flush Permeate (to tank)	C3	1"	150# ANSI Flange
Compressed Air (instrument gr.)	F1	3/8" (80 psig)	Tube Adapter
Footprint & Weight (per CCRO skid)			
Length	228 (+/- 12) inches		
Width	42 (+/- 12) inches		
Height	84 (+/-12) inches		
Weight w/o Membranes	4000 lb		
Weight of Membranes	500 lb		
Wet Weight	5000 lb		
Electrical	Unit	FLA	Voltage/Freq.
CCRO Skid (each)	Amps	32	480V / 3 ph. / 60
Plant/Skid Room Temperature	°C (°F)	< 35°C (95°F)	

5. Equipment Specifications

5.1. Main CCRO Equipment (per train)

5.1.1. Design Summary (per train)

SOAR Model No.	S1
Unit Design Permeate Flow rate (average)	5 - 15 gpm
Unit Design Permeate Flow rate (CC Mode)	5 - 15 gpm
Operating Pressure (CC – first cycle)	-
Operating Pressure (CC – last cycle)	-
Total Sequence Time (CC + PF)	-
Average Flux Rate	-
No. of Membranes	4
No. of Pressure Vessels	1

5.1.2. Feed (booster) Pump [Shipped Loose – Installed by Others]

Quantity (per train)	1
Type	Vertical Multistage
Wetted Material	316SS
Manufacturer	Grundfos
Model No. / Series	CRN10-1
Motor	0.75 HP
Motor Type	TEFC
Starter Type	VFD
Starter Manufacturer (model)	Rockwell

5.1.3. Cartridge Filters

Quantity (per train)	1 x 100%
Housing Design Pressure	150 PSI
Housing/Wetted Material	316SS
Housing Manufacturer	Fil-Trek (or equal)
Housing Model No.	EGL
ASME Design/Stamp	Adder upon request
Cartridge Micron Rating	1 micron
Cartridge Filter Size / MOC	2.5" dia.x 40"/PP melt blown
Cartridge Type	SOE Fin End 222 Open End
Cartridge Quantity	3 filters

5.1.4. High Pressure Pump (P2-A)

Quantity (per train)	1
Type	Vertical Multistage
Wetted Material	316SS
Manufacturer	Grundfos
Model No. / Series	CRN10-3
Motor	3 HP
Motor Type	TEFC
Starter Type	VFD
Starter Manufacturer (model)	Rockwell

5.1.5. Circulation Pump

Quantity (per train)	1
Type	Vertical Multistage
Wetted Material	316SS
Manufacturer	Grundfos
Model No. / Series	CRN15-2
Motor	5 HP
Motor Type	TEFC
Starter Type	VFD
Starter Manufacturer (model)	Rockwell

5.1.6. Pressure Vessels (Membrane Housing)

Quantity (per train)	1
Design Pressure	450
Material	FRP (white)
Manufacturer	Protec
Model No. / Series	PRO-8-450-SP-5
Length (No. of membranes)	5M
Diameter	8"

5.1.7. Membranes

Quantity (per train)	4
Type	TFC / Low Energy
Diameter x Length	8" x 40"
Manufacturer	FilmTec™
Model No. / Series	SOAR-5000
Maximum Pressure Rating	600 psi
Feed Spacer	34 mil
Active Area	400 ft ²

5.2. Mechanical Details

5.2.1. Piping Specification

Low Pressure Piping

Material	PVC Sch 80
Specification	D1785 (ASTM)

High Pressure Piping

Material	Sch 10 316/316L SS
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Pipe Finish

Mechanical polish	Standard
Passivation	Included*
Electropolishing	Optional adder
Pipe Inspection / Quality Assurance (QA)	Visual Inspection ONLY

*note: *in-situ passivation done after installation, during commissioning. Citric acid by others.*

5.2.2. Skid(s)

Material	Mild Steel
Frame	C-channel
Surface Preparation (sandblast)	SSPC-SP-6
Paint (green)	Epoxy
Lifting Lugs	Included

5.3. CIP Skid/System

Pump

Quantity	1 x 100%
Pump Type	Horizontal end suction
Wetted Material	316SS
Manufacturer	Goulds, equal
Model No. / Series	4SH2K55C0
Motor	7.5
Motor Type	TEFC
Starter Type	VFD
Starter Manufacturer	Rockwell

Tank

Material	LLDPE (flat bottom)
Volume	250 gal
Heater	6 kW
Connections x 3 (feed, brine return & permeate return)	Bulk head fittings (<6")

Cartridge Filter

Housing Design Pressure	10 bar
Housing/Wetted Material	316SS
Housing Manufacturer	Fil-Trek (or equal)
Housing Model No.	EGL
ASME Design/Stamp	Adder upon request
Micron Rating	Five (5) micron nominal
Filter Quantity	TBD

Note: CIP tank/system utilized for permeate flushing. Optional CIP automation adder available.

5.4. Chemical Feed Systems

5.4.1. Antiscalant

Quantity (common to all trains)	1
Dosing Pump Type	Positive Displacement
Manufacturer	Grundfos
Model No. / Series	DDA 7.5-16 FCM
Control	4-20mA (automatic)
Control Variant	FCM
Power	100-240VAC, 1ph, 50/60 Hz
Tank: By Others (Shelf provided)	
Power supply: By Others. 16.5 ft (5m) of control cable provided	
Run command by Desalitech	

5.4.2. Acid

Quantity (common to all trains)	1
Dosing Pump Type	Positive Displacement
Manufacturer	Grundfos (or equal)
Model No. / Series	DDA 7.5-16 AR
Control	4-20mA (automatic)
Power	100-240VAC, 1ph, 50/60 Hz
Tank: By Others (Shelf provided)	
Power supply: By Others. 16.5 ft (5m) of control cable provided	
Run command by Desalitech	

5.5. Valves

Butterfly Valves

Body Style	Wafer / Swing
Material (Body / Disc / Seat)	CI / 316SS / EPDM
Manufacturer	Sharpe
Model No. / Series	Series 17

Ball Valves

Body Style	1 Piece / Threaded
Material	316SS
Manufacturer	Bray, Sharpe
Model No. / Series	S40

Brine Valve (<4")

Type	V-Notch Ball
Body Style	3-Piece
Material	316SS
Manufacturer	Sharpe
Model No. / Series	Series 7000/8000

Check Valves (high pressure)

Body Style	Wafer / Swing
Material	316SS
Manufacturer	Bray
Model No. / Series	Series Rite Pro 210

Actuator (low pressure)

Type	Pneumatic
Manufacturer	Sharpe
Model No. / Series	SPN II

Air Lines

Air Tubing	Polyethylene (or equal)
Solenoids, Pressure Switch & Filter Regulator	Included

5.6. Instrumentation

Flow Meters

Quantity (feed & circulation)	2
Type / Connection	Mag / Wafer
Output	4-20 mA
Liner Material	PTFE
Manufacturer	Rosemount
Model No. / Series Sensor (mag)	Series 8711
Model No. / Series Analyzer (transmitter)	Series 8732

Pressure Transmitter

Quantity	6
Type / Connection	Blind / NPT
Output	4-20 mA
Material	316SS
Manufacturer	IFM
Model No. / Series	PT2424

Conductivity (TDS)

Quantity (feed & permeate)	2
Output	4-20 mA
Manufacturer	Rosemount
Model No. / Series Sensor (probe)	400VP
Model No. / Series Analyzer (transmitter)	Series 1056

Conductivity – circulation high pressure

Quantity	1
Output	4-20 mA
Manufacturer	ASTI
Model No. / Series Sensor (probe)	AST41

pH/ORP

Quantity	2
Output	4-20 mA
Manufacturer	Rosemount
Model No. / Series Sensor (probe)	3900VP
Model No. / Series Analyzer (transmitter)	Series 1057
Temperature sensor/output	Included

5.7. Electrical

Master Control Panel

Quantity	One (1)
Location	CCRO Skid
PLC	CompactLogix (1769-L33ER)
HMI	Panel PC (10") Advantech PPC series
External Communications	4 hardwired I/O's Rockwell Ethernet/IP with single IP address/network
Ethernet Switch	Phoenix Contact SFNB XTX or equal (8 port, unmanaged)
Power Supply (1 phase)	120V / 1 ph. / 60 Hz
Low Voltage Signal Wire	Shielded multi-conductor cable (or equal)
Enclosure / Spec*	CS
	NEMA 12
	UL 508A Design (no stamp)

*all panels

Load Panel/MCP

Quantity	One (1) Per Train/Skid
Power supply, Disconnect, Distribution & Breakers	Included
Power Supply (3 phase)	480V / 3 ph. / 60 Hz
VFDs/Motor Starters	Included
Skid Cabling/Conduit	PVC

*VFDs mounted on skid near pump (NEMA12). For smaller systems, the VFDs will be installed in the load panel. VFD's are operated by I/O (i.e. not via Ethernet connection)

Note/disclaimer:

Equipment selection is preliminary, Desalitech reserves the right to update/change equipment sizing during detailed design (at no cost or savings to the purchaser) to meet the specified design criteria. For example, the pump model number may change from CRN95-5 to 95-6 (adding 6th stage to increase pressure). Lastly, all major equipment has been highlighted, this represents our complete offering.

6. Scope of Supply

Desalitech will supply the following system(s) as follows:

6.1. CCRO Skid/System(s)

Desalitech will supply one (1) complete skid mounted CCRO system(s), SOAR Model No. S1. Each skid will include the following:

- Cartridge Filter Housing w/ 1 μ nominal rated PP cartridges
- Pressure Vessels - Fiber Reinforced Polymer (FRP), 8" diameter
- High Pressure Pump - vertical multistage centrifugal
- Circulation Pump - vertical multistage centrifugal
- All manifolds, piping, valves, and instrumentation
- PLC/HMI control panel
- Factory Skid Mounting on a structural steel frame
- Engineering Support detailed design phase
- System Warranty
- Lifetime Technology License

6.2. Additional Scope Included

- Feed (booster) Pump
- Automatic Permeate Flush
- Antiscalant Chemical Feed System with Skid
- Acid Chemical Feed System with Skid
- Clean-In-Place (CIP) System w/heater
- Variable Frequency Drives (VFDs)
- MCP/Load Panel (power distribution/breakers/disconnect)
- Load & Control Panel AC/Cooling Sys. (required room temp. $>95^{\circ}\text{F} / 35^{\circ}\text{C}$)

6.3. Membranes

- Filmtec™ SOAR Membranes

6.4. Aftersales

Additional adders (not included in above scope):

- Factory Acceptance Test (FAT) witnessed by client
- Commissioning
- SOAR SMART (remote monitoring package)
- Annual Service/Maintenance Package(s)

6.5. Documentation

Desalitech will supply the following documentation (electronic format only):

First Submittal

1. Project Schedule
2. P&ID
3. One-line Diagram
4. Equipment List (Long-Lead items)

Second Submittal

5. Equipment List (all tagged items)
6. General Arrangements (GA) – excluding external interconnecting
7. GA (web model)
8. Electrical Drawings
 - Panel Layout
 - Schematic Diagrams
 - Bill of Materials (BOM)
9. Pre-Commissioning Check List (filled out by customer)

Third Submittal (with System Delivery)

10. Operations and Maintenance Manual (O&M)
11. PLC Ladder Logic included (locked)
12. Hydrotest Reports
13. Shipping and Storage Instructions
14. BOL and Packing List

It is Desalitech's understanding that drawing/cut sheet approvals are required prior to procurement/fabrication. The schedule has been updated accordingly, depending on approval turnaround, schedule may be further extended.

Submittal schedule:

- | | |
|------------------|---|
| First submittal | six (6) weeks from Kickoff Meeting |
| Second submittal | six (6) weeks, upon/after submittal/approval of first |

6.6. Scope by Others

The following, but not limited to is provided by others (customer, contractor, etc.):

- Installation (including loose ship items)
- Interconnecting Piping and Wiring (including loose ship items)
- Pre-treatment Equipment
- Post treatment (if applicable)
- Storage Tanks
- Loading Membranes & Media
- Chemicals and Consumables (including startup/commissioning)
- Mounting & Wiring of Chemical Dosing Pumps + Shelf (shipped loose)
- Power Supply to Chemical Dosing Pumps
- CIP Chemical Feed (eductor or pumps)
- Air Supply - instrument grade (to each skid)
- Anchoring/Civil and Seismic Calculations

7. Commercial

7.1. Equipment Price

The price for the proposed scope of work is as follows (base offering):

Qty.	Description	Unit Price	Extended Price
1	SOAR CCRO Model No. S1 – Base Scope (per section 4.1 scope)	\$219,597	\$219,597
Adders:			
1	SOAR CCRO Model No. S1 – Additional Scope (per section 4.2 scope)	\$90,150	\$90,150
4	Filmtec SOAR-5000 Membrane Elements (per section 4.3 scope)	\$565	\$2,260
Total Price – Standard Pilot System (EXW designated factory)			\$312,007

Pricing is valid for thirty (30) days

7.2. Aftersales Services

Additional adders (not included in above scope/price):

Qty	Description	Unit	Unit Price	Total
1	Factory Acceptance Test (FAT) witnessed by customer	day	\$4,500	\$4,500
11	Commissioning/Startup (+travel expenses) Last day for SS pipe passivation	days	\$2,950	\$32,450
2	Travel Expenses (hotel, flight, etc.)	per trip	\$2,950	\$5,900
24	Extended Warranty (number of years includes/counting first year)*	years	\$0	\$20,300
1	Critical Spare Parts List	Lot	To Be Quoted	

**Extended Warranty, Buyer understands and acknowledges paragraph Limited Warranties of Desalitech's Terms and Conditions of Sale remains in effect and does not negate the Buyers responsibility to operate and maintain the CCRO system(s) in accordance with Seller's written instructions. Buyer also understands and acknowledges consumables (such as membranes, cartridge filters, probes and cells, etc.) are not included.*

7.3. Payment Terms

- 10% with issue of a purchase order.
- 50% with the submittal of the drawings.
- 35% with the delivery of the system (Ex Works).
- 5% upon water production/usage, 30 days after delivery for US installations, or 45 days after delivery for international installations, whichever comes first.

Note the price and payment terms are valid for 30 days from the date of this document. Pricing is only valid for specified project (i.e. this proposal). Payment terms are NET 30 unless otherwise specified in above-listed payment terms. Factory Acceptance Test (FAT) will be completed at the fabrication site before delivery.

7.4. Delivery Schedule

Estimated 30 – 40 weeks (7 – 10 months) after acceptance of an order and submittals are approved (if required). Delivery schedule to be coordinated with the purchaser and will be confirmed at the time of order.

Please note: Lead times for delivery of components manufactured by sub-suppliers are subject to worldwide factors and conditions that may impact the material availability and lead time beyond DuPont's control. Project schedule to be coordinated with the purchaser based on the equipment lead time at the time of order.

7.5. Assumptions/Clarifications

The following assumptions and clarifications apply unless stated explicitly elsewhere in the proposal:

- Customer is responsible for paying applicable taxes, permits and insurance.
- Customer is responsible for supply of pretreated feed water to the unit as stated or flooded suction if a feed (booster) pump is included.
- Post water treatment by others unless explicitly stated in proposal; including pH, LSI, remineralization, etc.
- Regarding commissioning schedule, signed pre-commissioning checklist required 4 weeks prior to travel (7 weeks outside USA). While items will be pending, client is committing to the site being ready upon arrival. Rebooking fees apply to reschedule and/or charged for additional days onsite.
- Customer is responsible for power supply distribution, protection and disconnect.
- Customer is responsible for supplying both one and three phase power (115/480 VAC).
- PLC integration/communication with plant PLC or DCS is an additional adder; hourly rate applies: \$250/hr + travel expenses (min. 4 hour charge). Four (4) I/O's are provided/reserved for external communication. PLC code is locked.
- Permeate piping isolation during CIP in addition to the check valve by others (spool piece or block and bleed, the latter requires PRV).
- Customer is responsible for design and supply of all interconnecting wiring, piping and tubing (including CIP and chemical dosing systems).
- Scope boundary (battery limits) are the skid(s).
- Drawings provided during proposal stage are NOT FOR CONSTRUCTION.
- Documentation package stated in proposal, additional Vendor Documentation Requirements (VDR) quoted separately.
- Minimum room/ambient temperature of 41 °F (5 °C).
- Assumed adequate overhead protection supplied, not all components are compatible with exposure to the elements (rain & UV).
- Cable run between VFD and pump not to exceed 40 ft (to avoid reflective wave damage).
- Design/pricing based on proposed membrane (and min. temperature), equivalent membranes are acceptable; price adders/credit apply if the pump selections change (to accommodate the pressure with a different membrane or lower temp.).
- System will automatically adapt to varying feed conductivity (TDS), increasing or decreasing recovery. However, in order to maximize recovery, the specific ion(s) limiting the recovery would have to be monitored separately. For example, silica. While the TDS may decrease or increase by a factor of two, it does not mean the silica concentration proportionally changed.
- If customer is responsible for shipping, pick up must be scheduled for within one week of notice of availability to ship. If this cannot be arranged, storage fees may apply.
- If Desalitech is responsible for shipping, customer must be able to take delivery as soon as notice of availability to ship. If this cannot be arranged in a timely manner, storage fees may apply.
- FAT per Desalitech standard (documentation available upon request). I/O testing only (pumps will not be powered) and wet test (low pressure).
- Customer is responsible for ancillary equipment not specifically mentioned in this proposal.
- This proposal is subject to Desalitech's Standard Terms and Conditions of Sale below.

8. Specification Exceptions and Exclusions

The following specification exceptions and exclusions shall be taken:

Request for Proposal

Pure Water AV – Demonstration Facility Secondary Revere Osmosis System

Document Page	Section	Summary	Exception/Exclusion
6	II.E	Funding Requirements – American Resure Plan Act (ARPA) State & Local Fiscal Recovery Funds (SLFRF)	Desalitech shall take full exception to ARPA and SLFRF. Owner/Contractor may issue Desalitech a change order for compliance to the same.
6 – 7	II.F	Water Infrastructure Financing and Improvement Act (WIFIA) and State Revolving Fund (SRF)	Desalitech shall take full exception to WIFIA and SRF. Owner/Contractor may issue Desalitech a change order for compliance to the same.
8	III.A	Phase 1 Payment and major approval milestones	Payment terms may be negotiated upon award of contract
8 – 9	III.B	Phase 2 Payment and major approval milestones	Payment terms may be negotiated upon award of contract
9	III.C	Funding	Desalitech shall take full exception to ARPA, SLFRF, WIFIA, SRF, and other funding related requirements. Owner/Contractor may issue Desalitech a change order for compliance to the same.
10 – 17	IV (Section in entirety)	Product Terms and Conditions	Terms and Conditions may be negotiated upon award of contract.

Request for Proposal

Pure Water AV – Demonstration Facility Secondary Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
18	V	Pricing Proposal Phase 1 and Phase 2 Work	See Desalitech Proposal for pricing and payment terms of pilot scale system for demonstration facility.
18 – 19	V	Pricing Proposal Alternate Closed Circuit Reverse Osmosis Process System Equipment Rental	See Desalitech Lease Agreement for pricing and terms of pilot scale rental systems.

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Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 2	1.2 C	Access to the RO System control logic shall be provided to OWNER or ENGINEER	Desalitech provides a locked copy of system PLC programing to the Owner or Engineer. Owner or Engineer will have the ability to make changes to non-essential code in the PLC. Essential code is locked and remains property of Desalitech.
46 63 24 – 2 46 63 24 – 3	1.2 F 1-4, 6	Equipment, services, and all WORK shall be in accordance with all Contract Documents including Specifications in Division 1 though 46, including but not limited to the following: 1 – 4, 6	Desalitech (SUPPLIER) shall take exception to any and all Contract Documents including specifications in direct conflict with SUPPLIER Standard Equipment and Product offered as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 3	1.2 F 5	SUPPLIER is responsible for structural design calculations...	Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 63 24 – 5 46 63 24 – 6	1.5 A 1 – 5	The following information by the proposing SUPPLIER shall be provided at the time of bid for the OWNER: 1 – 5	Desalitech shall supply SUPPLIER Standard General P&ID, GA, and Membrane Data Sheet as part of the detailed SUPPLIER standard CCRO Proposal. Owner/Contractor may issue Desalitech a change order for additional or more detailed submittal information, or to meet contract documents/specification requirements.
46 63 24 – 6	1.5 B 1 – 11	The following information by the awarded SUPPLIER shall be provided as part of Phase 1 submittal requirements (see Request for Proposal and Agreement including attachments, Section 01 33 00 – SUPPLIER Submittals, and SUPPLIER submittal requirements in all Specifications) at a 100% design level, including, but not limited to: 1 - 11	Desalitech shall supply SUPPLIER Standard documentation as part of the Phase 1 Submittal package. Owner/Contractor may issue Desalitech a change order for additional or more detailed submittal information, or to meet contract documents/specification requirements.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 6 46 63 24 – 7	1.5 C 1 – 7	The following information by the awarded SUPPLIER shall be provided as part of Phase 2 submittal requirements (see Request for Proposal and Agreement including attachments, Section 01 33 00 – SUPPLIER Submittals, and SUPPLIER submittal requirements in all Specifications) at a 100% design level, including, but not limited to: 1 – 7	Desalitech shall supply SUPPLIER Standard documentation as part of the Phase 2 Submittal package. Owner/Contractor may issue Desalitech a change order for additional or more detailed submittal information, or to meet contract documents/specification requirements.
46 63 24 – 7	1.6	CCRO System Equipment Warranty	Desalitech shall offer a two-year warranty, per SUPPLIER terms, as an after market offering. See Desalitech proposal section 7.2 for warranty pricing.
46 63 24 – 7 46 63 24 – 8	2.1 A 1 – 2	The CCRO system shall be compatible with the following membranes: 1 – 2	Desalitech will offer and support only FILMTEC membranes for use in the CCRO system.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 8	2.1 B	An RO Membrane Module, subject to approval by the OWNER, from the list above shall be provided with the CCRO system.	Desalitech will offer and support only FILMTEC membranes for use in the CCRO system. OWNER must purchase separately, at the OWNERS expense, membranes by any other manufacturer.
46 63 24 – 8	2.2 E	Timing of the CC and PF modes shall be operator-adjustable so that the CCRO system can be operated at different recovery values.	The CCRO operation does not allow for operator-adjustable timing of the CC or PF modes. The CC and PF modes are internally adjusted by the PLC based on recovery and flow settings. The recovery and flow settings are operator adjustable.
46 63 24 – 8	2.2 G	CCRO Flush pump shall be designed and shipped loose by SUPPLIER and installed by CONTRACTOR.	The Desalitech system, as proposed, does not include a flush pump. Owner/Contractor may issue Desalitech a change order for the CCRO Flush pump.
46 63 24 – 10	2.4 D	The feed pump type shall be vertical inline pump and meet the requirements of Section 43 23 31.	Desalitech shall provide a SUPPLIER Standard feed pump as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 10	2.6 C	The feed pump shall be stainless steel vertical multistage pumps and meet the requirements of Section 43 23 31. If alternate pump type is recommended by SUPPLIER it shall meet the requirements of Division 43 pump specifications.	Desalitech shall provide a SUPPLIER Standard feed pump as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 63 24 – 12	2.7 C	The circulation pump shall be super-duplex stainless steel vertical multistage pumps and rated for 460V, 3 phase and meet requirements of Section 43 23 31. If alternate pump type is recommended by SUPPLIER it shall meet the requirements of Division 43 pump specifications.	Desalitech shall provide a SUPPLIER Standard circulation pump as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 62 24 – 13	2.10 A	The antiscalant chemical addition system supplied by SUPPLIER shall consist of a chemical metering pump, static mixer, and ability to interface with and control chemical dosing pump.	Desalitech shall provide a SUPPLIER Standard antiscalant chemical additions system as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 62 24 – 13	2.10 D	The antiscalant chemical dosing pump skid shall be according to Section 46 33 00 and 46 33 01	Desalitech shall provide a SUPPLIER Standard antiscalant chemical dosing pumps as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 62 24 – 13	2.11 A	The sulfuric acid chemical addition system supplied by SUPPLIER shall consist of a chemical metering pump in accordance with Division 46 specifications, chemical quill (compatible with 93% sulfuric acid), static mixer, and ability to interface with and control chemical dosing pump.	Desalitech shall provide a SUPPLIER Standard sulfuric acid chemical additions system as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 62 24 – 13	2.11 D	The sulfuric acid chemical dosing pump skid shall be according to Section 46 33 00 and 46 33 01	Desalitech shall provide a SUPPLIER Standard sulfuric acid chemical dosing pumps as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 14	2.14	VALVES (Section in entirety)	Desalitech shall provide SUPPLIER Standard valves as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 63 24 – 14 46 63 24 – 15	2.15	PIPING (Section in entirety)	Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 63 24 – 15	2.16 B 1 – 3	CCRO VESSEL skid and supporting structure shall be one of the following and shall meet the requirements of 05 50 00 Miscellaneous Metalwork and 09 96 00 Protective Coatings, where applicable: 1 – 3	Desalitech shall provide SUPPLIER Standard vessel skid as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 63 24 – 16	2.17	SAMPLE PANEL (Section in entirety)	Owner/Contractor may issue Desalitech a change order to meet specification requirements.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 16 46 63 24 – 17	2.18 A 1 – 3 2.18 A 1 – 9	A minimum of the following instrumentation must be provided for the CCRO System to allow smooth operation of the system. All instruments shall be provided by SUPPLIER in accordance with Division 40 Specifications: 1 – 3 1 – 9	Desalitech shall provide SUPPLIER Standard instrumentation as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements.
46 63 24 – 18	2.18 D	CCRO Control Panels (Section in entirety)	Desalitech shall provide SUPPLIER Standard Control Panel as part of the Desalitech proposal herein. Owner/Contractor may issue Desalitech a change order to meet specification requirements. Interface with Plant PLC/SCADA systems outside of Desalitech SUPPLIER Standard protocol (See Sections 1.3 and 1.4 of proposal) may require a change order.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
46 63 24 – 19	2.18 E 2	The CCRO System PLC shall calculate and log normalized data.	<p>Desalitech does not offer normalization as part of the PLC program. Desalitech does offer a cloud-based platform, available by subscription service, to provide normalized data. Subscription service is offered as After Market and can be made available to the OWNER.</p> <p>For PLC based normalization, Owner/Contractor may issue Desalitech a change order to meet specification requirements.</p>
46 63 24 – 19 46 63 24 – 20	2.19	SPARE PARTS AND SPECIAL TOOLS (Section in entirety)	Desalitech shall make spare parts available as an After Market offering and is not included as part of this proposal.

Section 46 63 24 – Closed Circuit Reverse Osmosis System

Document Page	Section	Summary	Exception/Exclusion
<p>46 63 24 – 20 46 63 24 – 21 46 63 24 – 22</p>	<p>3.2</p>	<p>STARTUP AND TRAINING (Section in entirety)</p>	<p>Desalitech offers SUPPLIER Standard Start-up, commissioning, and training services as After Market services, as shown in Section 7.2 of this proposal.</p> <p>SUPPLIER standard start-up, commissioning, and training services are not to exceed 11 days, after which, additional daily chargers shall be incurred by OWNER or CONTRACTOR.</p> <p>Owner/Contractor may issue Desalitech a change order to meet specification requirements for the purposes of start-up, pre-commissioning testing, and commissioning testing as outlined in the specification.</p>

TECHNICAL SPECIFICATIONS

Pure Water AV – Advanced Water Treatment Demonstration Facility

Document Page	Section	Summary	Exception/Exclusion
In Entirety	ALL	Procurement Package Specification	<p>Desalitech shall take general exception to any and all sections of the Technical Specifications package which are inconsistent with the Desalitech (SUPPLIER) Standard for the proposed CCRO system.</p> <p>Owner/Contractor may issue Desalitech a change order to meet specification requirements.</p>

9. Terms and Conditions of Sale

1. **Exclusive Terms and Conditions.** Together with any other terms the parties agree to in writing, these Terms and Conditions of Sale form the exclusive terms ("Agreement") whereby Buyer agrees to purchase, and DesaliTec/Desalitech ("Seller") agrees to sell Goods and provide advice, instruction and other services in connection with the sale of those Goods ("Services"). Notwithstanding any provisions communicated in any way by Buyer to Seller prior to this Agreement including any terms contained in any request for quote by Buyer, Buyer agrees that this Agreement will control the relationship by accepting Goods and Services from Seller, even if Buyer sends to Seller other terms and conditions to which Seller may not respond. Seller objects in advance to any additional or different terms proposed in Buyer's order.

2. **Buyer Obligations.** Unless otherwise specifically agreed in writing, installation of Goods shall be the responsibility of Buyer. Goods and Services provided hereunder are based upon the information Buyer makes available to Seller, and Seller reserves the right to utilize the most compact and feasible design compatible with sound engineering practices, and to make changes in details of design, construction and arrangement of Goods unless precluded by limitations (including, but not limited to actual space and feedwater/substance quality specifications) specified by Buyer in writing at the time an order is placed. If no such limitations are specified, Seller shall not be held responsible for incompatibility of the Goods and Services due to changes in feedwater/substance quality specifications or site conditions nor for incompatibility with actual space or design limitations, which were not initially disclosed by Buyer and become apparent at a later date. For Services to be accurate and Goods to work as intended, Buyer must fulfill the following obligations ("Obligations"): (a) provide Seller complete and accurate information and data relevant to the scope of work to be provided, such as information related to Buyer's site conditions, systems, related equipment and processes, feedwater or other substances to be treated or measured with the Goods, including any hidden, unapparent, or changing conditions that may affect the effectiveness of the Goods; (b) operate all related systems and the Goods within the agreed to control parameters or, if none, within industry customary operating conditions; (c) maintain all related systems and Goods in good operating condition and repair; and (d) maintain and handle Goods in a proper and safe manner. If Buyer fails to fulfill the foregoing Obligations, Seller shall be relieved of any obligations with respect to warranties or any other commitments made to Buyer in writing, and Seller shall have no liability for any loss, damage or injury which Buyer may sustain or for which Buyer may be liable.

3. **Delivery.** Title and risk of loss or damage to Goods shall pass to Buyer at the Seller's designated premises or factory. The Buyer bears all responsibility for transporting the goods from the Seller's place of business to their destination. Delivery dates indicated by Seller are only approximate. Quotations and proposal drawings provided by Seller show only general style, arrangement and approximate dimensions and weight.

4. **Payment and Prices.** Unless otherwise specified in writing, payment is due net thirty (30) days from the date of Seller's invoice. If Seller shall have any doubt at any time as to Buyer's ability to pay, Seller may decline to make deliveries except on receipt of satisfactory security. The prices quoted herein do not include taxes. Buyer shall be directly responsible, and reimburse Seller, for the gross amount of any present or future sales, use, excise, value-added, or other similar tax applicable to the price, sale of delivery of any products or services furnished hereunder. Buyer shall furnish Seller with evidence of exemption acceptable to the taxing authorities if applicable. For multi-year agreements, pricing stated shall remain firm for 12 months, after which Seller shall be entitled to adjust pricing upward on an annual basis according to the designated formula used by Seller in Buyer's country and which shall be notified to Buyer.

The foregoing notwithstanding, Seller shall have the right to adjust its price at any time, after providing Buyer with 30 (thirty) day written notice, when facing economical changes beyond Seller's reasonable control, including but not limited to changes in currency regulations, duties or taxes, raw materials costs and/or energy costs by more than 10 % in a given calendar year. Unless otherwise specified, all prices are Ex Works point of fabrication. Buyer agrees to reimburse Seller for collection costs, including 2% interest per month, should Buyer fail to timely pay. Buyer shall have no rights to any setoffs of any nature relating to any payments due under the Agreement.

5. **Payment for Excessive Usage; Lost and Damaged Goods.** If payment for Goods is based on some factor other than the actual amount of Goods delivered (e.g., payment is for a fixed amount, or based on usage or production), then Buyer agrees to pay for all Goods (a) consumed as a result of Buyer's failure to comply with Obligations as set forth in Section 2; or (b) lost or damaged after delivery to Buyer. Buyer shall provide Seller all information necessary to calculate amounts due and enable Seller to audit those records.

6. **Consigned Goods.** Buyer shall bear all risk of loss and damage to all consigned Goods in Buyer's possession or control, notwithstanding Buyer's exercise of reasonable care. Seller shall have the right to enter Buyer's premises at all reasonable times to inspect such Goods and related records. Upon request, Buyer agrees to return such Goods to Seller pursuant to Seller's shipping instructions.

7. **Limited Warranties.** Seller warrants that the Goods shall conform to published specifications and shall be free from defects in material and workmanship when at all times operated in accordance with Seller's written instructions; and that the Services will be performed with the degree of skill which can reasonably be expected from a seller engaged in a comparable business and providing comparable services under comparable circumstances. Unless otherwise provided in any Warranty Schedule that may be attached hereto, the foregoing warranties are valid for Goods other than Chemicals and Consumables, the earlier of, 15 months from receipt, or 12 months from start-up/first use. Unless expressly agreed in a "Performance Warranty Document" signed between the parties on a separate basis, there is no performance warranty on Goods and Services or warranty on process results. For Goods not manufactured by Seller, the warranty shall be the manufacturer's transferable warranty only. Any claim for breach of these warranties must be promptly notified in writing or the claim will be void. Seller's sole responsibility and Buyer's exclusive remedy arising out of or relating to the Goods or Services or any breach of these warranties is limited to, at Seller's option: (a) replacement of non-conforming Goods or refund of the amount paid for the non-conforming Goods; and (b) re-performance of the Services at issue, or a refund of the amount paid for the Services at issue. No allowance will be made for repairs or alterations made by Buyer without Seller's written consent or approval. Goods may not be returned to Seller without Seller's written permission. Seller will provide Buyer with a "Return Material Order" number to use for returned goods. Buyer, as the original purchaser, is not entitled to extend or transfer this warranty to any other party. The foregoing warranties are in lieu of and exclude all other warranties, statutory, express or implied, including any warranty of merchantability or of fitness for a particular purpose.

8. **Use of Equipment, Tanks, and Containers.** Title to, and ownership of, all equipment, product containers (e.g., pails, drums, recyclable intermediate bulk containers "IBC"), and tanks supplied to Buyer shall pass upon delivery to Buyer unless otherwise stated in Seller's documentation. Use of the IBC manufacturer's suggested recyclers is solely at the Buyer's discretion

9. Compliance with Laws; Permits. Buyer is responsible for compliance with all laws and regulations applicable to the storage, use, handling, installation, maintenance, removal, registration and labeling of all Goods from and after Buyer's receipt of the Goods, as well as for the proper management and disposal of all wastes and residues associated with the Goods (including but not limited to containers, excess or off-spec product, testing wastes, e.g., spent or expired lab reagents and test kits). Buyer agrees to ensure that all Goods and Services provided to Buyer for export are exported only in compliance with applicable export control laws and regulations. Permits and licenses, or which are required to operate apparatus or equipment or to use the Goods, shall be procured by Buyer at Buyer's sole expense.

10. Licensed IP. The Seller reserves all rights to the intellectual property rights, including, inter-alia, U.S. Patent No. 7,628,921 (SWRO- CCD process) and/or 7,695,614 (BWRO-CCD process) or any other corresponding patent and to all other proprietary rights, including but not limited to copyrights, trade secrets, formulas, research data, operating data, know-how, software, and specifications related to the inventions commonly known as the Closed Circuit Desalination process as well as the tradename "DesaliTec" and other tradenames by the Seller (all together: "Licensed IP"). Seller grants to Buyer non-exclusive, non-transferable end-user license to make, use, and exploit the Licensed IP, solely in connection with the operation of the Goods and for no other purpose. Buyer undertakes not to challenge the Licensed IP during the term of this Agreement or thereafter, and not to support third parties in a challenge of the validity of the Licensed IP in any jurisdiction worldwide.

11. Force Majeure. Neither party will be responsible to the other (and no event of default will be deemed to have occurred) if uncontrollable events make it impracticable or commercially unreasonable for either party to perform under the terms of this Agreement, provided no force majeure shall apply to Buyer's obligation to pay in a timely manner for Goods and Services. Scheduled delivery dates are subject to extension when a force majeure event occurs.

12. Confidentiality and Intellectual Property. Both parties agree to keep confidential the other party's proprietary non-public information, if any, which may be acquired in connection with this Agreement. Buyer will not, without Seller's advance written consent, subject Goods to testing, analysis, or any type of reverse engineering. Seller retains all intellectual property rights including copyright which it has in all drawings and data or other deliverables supplied or developed under this Agreement, subject to Buyer's right to use such drawings and data for its own use without additional cost. Buyer shall be fully liable for any infringement of patent rights of third parties arising out of the products supplied hereunder where the construction, and other characteristics of such products including modification of the Goods and Services, is prescribed to the Seller, or completed independently, by the Buyer or agent(s). Buyer shall fully defend and indemnify the Seller in case of such claim(s). Buyer shall defend and indemnify Seller in respect of any claim or liability suffered by Seller in connection with infringement of any third party rights based on design, specifications or requirements prescribed by Buyer or its agent.

13. Limitation on Liability. Except where expressly communicated to Seller, Seller shall have no liability for incompatibility of Goods with Buyer's actual space or design limitations. To the extent permitted by law, the total liability of the Seller for all claims arising out of or relating to the performance or breach of this Agreement or use of any Goods or Services shall not exceed the annual contract value of this Agreement. Seller shall not be liable for any advice, instruction, assistance or any services that are not required under this Agreement or for which Seller does not charge Buyer. In no event will either party

be liable to the other for lost profits or revenues, cost of capital or replacement or increased operating costs, lost or decreased production, claims of Buyer's customers for such damages or any similar or comparable damages, or for any incidental, special, consequential or indirect damages of any type or kind, irrespective of whether arising from actual or alleged breach of warranty, indemnification, product liability or strict liability, or any other legal theory. If Buyer is supplying Seller's Goods or Services to a third party, Buyer shall require the third party to agree to be bound by this clause. If Buyer does not obtain this agreement for Seller's benefit for any reason, Buyer shall indemnify and hold Seller harmless from all liability arising out of claims made by the third party in excess of the limitations and exclusion of this clause.

14. Conflicts; Survival, Assignment. If there is any conflict between this Agreement and any written proposal or quotation provided by Seller, then the terms and conditions set forth in the proposal or quotation shall prevail. If any term or condition of this Agreement or any accompanying terms and conditions are held invalid or illegal, then such terms and conditions shall be reformed to be made legal or valid, or deleted, but the remaining terms and conditions shall remain in full force and effect, and the Agreement shall be interpreted and implemented in a manner which best fulfills our intended agreement. This Agreement may only be assigned by Seller to any affiliate.

15. Termination and Cancellation. This Agreement and any performance pursuant to it may be terminated or suspended by either party if the other party (a) is the subject of bankruptcy or insolvency proceedings; or (b) defaults in its material obligations under this Agreement, and such default is not cured within sixty, (60) days. Upon the termination of this Agreement: (a) Buyer agrees to pay for all Goods in Buyer's possession or for which title has passed to Buyer, at current prices or at such other prices as have been agreed to in writing; and (b) all amounts owing, if any, for the unamortized value of equipment and tanks relating to those Goods shall immediately become due and shall be paid within thirty (30) days of receipt of an invoice. In the event of cancellation of an order by Buyer, a cancellation charge will be made against the Buyer, in proportion to the work completed by Seller, or obligated against the order, plus any cancellation charges assessed against Seller by Seller's suppliers.

16. Governing Law and Dispute Resolution. This Agreement shall be governed by the substantive laws of the State of Massachusetts. The UN Convention on the International Sale of Goods shall not apply. In the event of a dispute concerning this Agreement, the complaining party shall notify the other party in writing thereof. Management level representatives of both parties shall meet at an agreed location to attempt to resolve the dispute in good faith. Should the dispute not be resolved within thirty (30) days after such notice, the complaining party shall seek remedies exclusively through arbitration. The seat of arbitration shall be the federal district court in Boston, MA, and the rules of the arbitration will be the Commercial Arbitration Rules of the American Arbitration Association, which are incorporated by reference into this clause.

Appendix/Attachments

- A. Order Acceptance
- B. Sample/Generic P&ID
- C. Sample/Generic GA
- D. SOAR5000i Membrane Element Technical Data Sheet

A. Order Acceptance Form

For accurate and timely processing, please sign and send this page with the purchase order (PO). Upon receiving the PO, Desalitech, Inc. send back signed and dated.

Please ensure the PO contains the following:

Reference proposal no.: A-096258-N2 r.1, dated November 4, 2022

1. List as separate line items base price plus adders and options selected per Equipment Pricing section of the proposal.
2. Communication:
 - a. Email Christopher.morrow@dupont.com
 - b. Email shuai.shao@dupont.com
 - c. Address DuPont (Desalitech, Inc.)
455 Forest St
Marlborough, MA 01752
United States
3. Payment Terms (per commercial section of the proposal)
4. Delivery Location (shipping by others unless otherwise specified/agreed)
5. Shipping Date Required (from Desalitech shop) – date to be confirmed.

By signing this page, the buyer approves Desalitech, Inc. to immediately proceed with procurement and fabrication of our standard SOAR system(s) per this proposal to ensure timely product delivery. No approval of equipment data sheets or production drawings are required.

Buyer

Name _____

Signature _____

Date _____

Desalitech, Inc.

Name Bruce Alderman (VP Sales)

Signature 

Date November 4, 2022

**PALMDALE WATER DISTRICT
BOARD MEMORANDUM**

DATE: December 7, 2022 **December 12, 2022**
TO: BOARD OF DIRECTORS **Board Meeting**
FROM: Mr. Peter Thompson II, Resource and Analytics Director
VIA: Mr. Dennis D. LaMoreaux, General Manager
RE: ***AGENDA ITEM NO. 8.8 – CONSIDERATION AND POSSIBLE ACTION ON
SENDING A LETTER SUPPORTING THE DELTA CONVEYANCE PROJECT
AND THE CERTIFICATION OF ITS DRAFT ENVIRONMENTAL IMPACT
REPORT. (NO BUDGET IMPACT – RESOURCE AND ANALYTICS
DIRECTOR THOMPSON)***

Recommendation:

Staff recommends the Board sign and authorize staff to send the attached letter of support for the Delta Conveyance Project (DCP) and the certification of its Draft Environmental Impact Report.

Background:

The District contracts with the Department of Water Resources for the delivery of water through the State Water Project (SWP). The SWP receives its water through runoff that enters the northern portion of the Bay Delta and makes its way through a system of levees to the southern Bay Delta where it is pumped into the SWP. The DCP provides a modernized improvement to the conveyance through the delta. The intakes for DCP will be placed off of the Sacramento River north of the Bay Delta and a single underground tunnel will convey the water through the Bay Delta and into SWP facilities. This improvement will allow for increased capture of excess water during high flow storm events and will also provide protection from disruptions due to seismic activity. If the project had been operational during the big storms in October and December of 2021, DWR could have captured and moved about 236,000 acre-feet of water. That is enough for about 2.5 million people for a year.

On November 9, 2020, the District Board approved Resolution No. 20-20 authorizing a level of participation in the DCP, entering into a funding agreement for the DCPs environmental planning costs, and entering into the Delta Conveyance Design and Construction Authority Joint Powers Agreement.

The Draft Environmental Impact Report public comment period ends December 16th. This is an opportunity for the District to send in a comment to express support for the DCP as a critical project for statewide water resiliency.

Strategic Plan Initiative/Mission Statement:

This item is under Strategic Initiative No. 1 – Water Resource Reliability.
This item directly relates to the District’s Mission Statement.



PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

December 12, 2022

BOARD OF DIRECTORS

W. SCOTT KELLERMAN

Division 1

DON WILSON

Division 2

GLORIA DIZMANG

Division 3

KATHY MAC LAREN-GOMEZ

Division 4

VINCENT DINO

Division 5

DENNIS D. LaMOREAUX

General Manager

ALESHIRE & WYNDER LLP

Attorneys



Department of Water Resources
ATTN: Ms. Carolyn Buckman,
Environmental Program Manager,
Delta Conveyance Office
P. O. Box 942836
Sacramento, CA 94236-0001

Dear Ms. Buckman:

As the Board of Directors of Palmdale Water District (PWD), we are writing to express support for the Delta Conveyance Project (DCP). The DCP is the right project at this time for the modernization of California's water transport infrastructure. In the face of climate change, rising sea levels, more extreme weather cycles, and warming trends accelerating snow runoff, the project will provide the necessary tools to increase the flexibility of our water system. It will allow for better collection of excess storm flows that can be transported and stored to improve the stability of the state's water supply while reducing future risks of disruption due to seismic activity. We also laud the mindful way the DCP is being developed to reduce impacts on the environment and the communities in the Delta.

PWD is a provider of safe and affordable water to over 126,000 residents and a wide range of businesses and industries. For more than a century, PWD has had to adapt its strategies and infrastructure to provide water security in the midst of everchanging environment and population. As we foresee California's continuing water struggles, we know it is a wise choice and good governance to modernize the State Water Project (SWP) to deal with these challenges and protect the water security of over 27 million residents and hundreds of thousands of businesses in California.

Like water agencies across the state, PWD actively invests in conservation, water storage, water re-use and modernizing our local infrastructure to improve water security for our community. We recommend and encourage that the state join our local efforts by enabling the modernization of the SWP, certifying the DCP Draft Environmental Impact Report and supporting the continued development of the DCP. The modernization of the Delta infrastructure will help PWD and agencies like us ensure the future of water for residents and businesses for many generations.

Department of Water Resources
ATTN: Ms. Carolyn Buckman,
Environmental Program Manager,
Delta Conveyance Office

-2-

December 12, 2022

Thank you for considering our support for the DCP.

Very truly yours,

GLORIA DIZMANG, President

VINCENT DINO, Vice President

DON WILSON, Treasurer

KATHY MAC LAREN-GOMEZ, Secretary

SCOTT KELLERMAN, Director

PT/JS/dd



Conference/Training Request

Event Name/Date(s):

AVEDGE Holiday Breakfast/December 13, 2022

REQUESTED BY:

First Name

Last Name

Date

ACCOMMODATION INFORMATION (If applicable)

Rooms and rates are subject to availability. Complete and submit this form as soon as possible as reservation blocks at host hotels book quickly. In the event that the host hotel is full, every effort will be made to secure a room at the nearest hotel within comparable rates.

Arrival Date

Departure Date

No. of
Guests

Room Type

Dietary Restrictions?

If yes, please provide specifics in additional info. box

Smoking Room?

Yes No

Yes No

Flight Needed?

If yes, please provide DL# and D.O.B. in additional info. box

Flight Numbers

Departure/Return
Times

Yes No

**ADDITIONAL INFORMATION/
REQUESTS**

Supervisor Approval
(If applicable)

Processed By:

JOIN US FOR AN
Old Fashioned
Holiday Breakfast

HOSTED BY:
AVEDGE

.....
TUESDAY BREAKFAST AT
DEC 13 7:30 am

.....
JOHN P. ELIOPULOS HELLENIC CENTER



TICKETS AVAILABLE SOON @ AVEDGECA.ORG

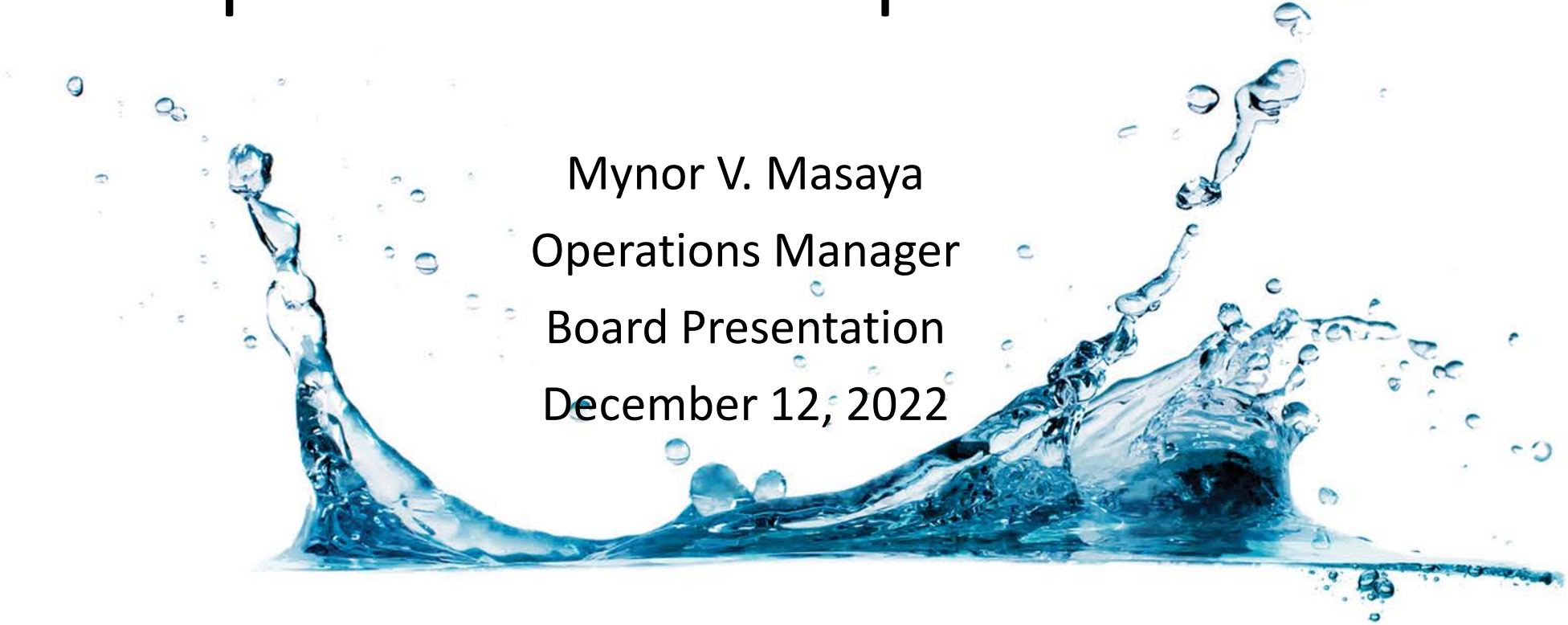
\$35.00 per person



PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

AGENDA ITEM NO. 9.2.a.1

Operations Department

A large, dynamic splash of clear blue water is centered at the bottom of the slide. The water is captured in mid-air, with many droplets and bubbles, creating a sense of movement and freshness. The splash is wider on the right side and tapers off towards the left.

Mynor V. Masaya
Operations Manager
Board Presentation
December 12, 2022

Staffing

- Six State Certified Treatment Plant Operators
Operations is 24/7 responsible for quantity and quality of water.
- Three State Certified Laboratory Technicians and
- 1- State Certified Lab Supervisor.
Lab Staff are responsible for sampling, analyzing and reporting to State Regulators.
- Operations Manager, State Reporting.



Operators Responsibilities

- Manage Lake levels and water flows from DWR, LRD & Avek.
- Operate Groundwater wells and LOCWTP to meet production targets and water demands via SCADA.
- Check all treatment processes, Once every shift.
- Log important daily information, daily reports.
- Daily checks Treatment Chemicals supplies.
- Check water treatment process at lab sink every 4 hours (State Mandated).
- Backwash filters and GAC Contactors as needed.
- Turbidimeters, pH, and chlorine analyzers weekly/ monthly verifications
- Follow PWD safety and standard operating procedures
- Lake Management, Algae control
- Identify deficiencies and needs of repairs.



Palmdale Water District Control Room



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Managing Flows



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Chemical Feed Systems & Facilities



Chemical Supplies



Verification, Calibration



Algae Blooms



Lab Staff Responsibilities

- Maintain inventory of laboratory supplies to perform necessary testing
- Perform and coordinate routine maintenance of laboratory equipment
- Follow safety and standard laboratory operating procedures, ELAP State certified
- Prepare and/or assist in preparation of required internal and external report regarding water quality
- Ensure reports are accurate and submitted in a timely manner
- Investigate customers water quality complaints and recommend corrective action
- Provide information to the public
- Participate in development of improved water treatment process
- Recommend changes in monitoring programs, treatment methods or process control
- Facilitate training district staff related to water quality
- Keep up-to-date on current and upcoming State water quality regulations
- Responsible for taking 3,000 required samples and over 1,800 for over 80 regulated contaminants per year.



Palmdale Water District Laboratory



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Performing Analysis





PALMDALE WATER DISTRICT
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Thank you!





PALMDALE WATER DISTRICT

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AGENDA ITEM NO. 9.2.a.2

Human Resources Department

Angelica Garcia, SPHR, SHRM-CP

HR Domains



Talent Acquisition



Staffing/Recruitment

- 7 Recruitment Campaigns
 - 2 Service Worker
 - 2 Plant Operators
 - Public Affairs Specialist
 - Facilities Manager
 - Purchasing Technician
- Current & Future Campaigns
 - Operations Supervisor - Construction
 - HR Analyst
 - IT Technician
 - Associate/Senior Engineer

Employee Engagement

- ❖ All-Hands
- ❖ PACE Award
- ❖ Job Well Done

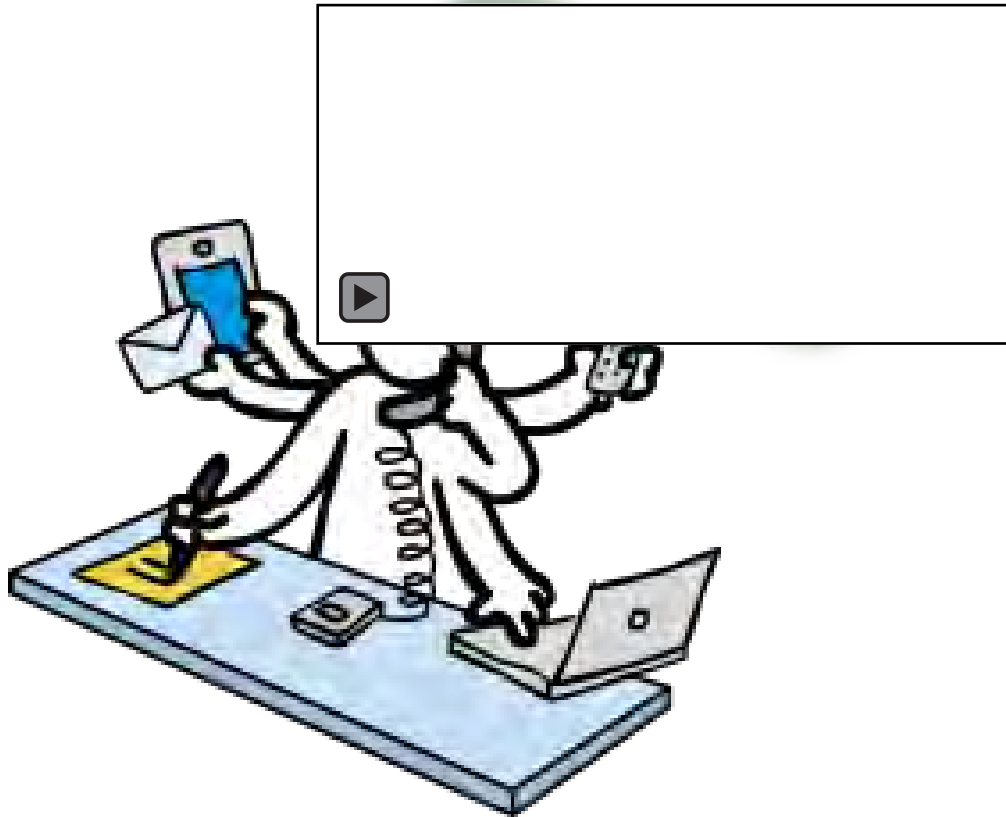


- ❖ Water Professionals Appreciation Week
- ❖ Holiday Event



PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

Administrative Responsibilities



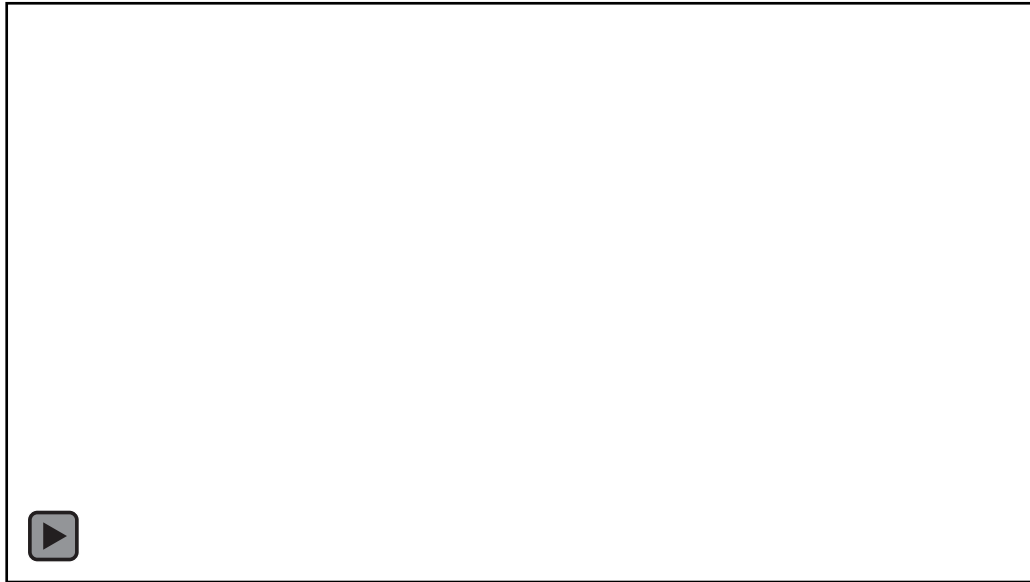
- Employee Life Cycle
- Onboarding
- Benefits
- Employee Relations
- Leave of Absence

Compliance

- Safety & Workers' Compensation
- Risk Management
- Legal & Regulatory
- Emergency Preparedness



Organization Effectiveness



- Employee Handbook
- Performance Assessment
- Job Descriptions
- HRIS



RECRUITING · HR · TALENT · TIME · PAYROLL · ANALYTICS



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Total Rewards & Training

Development

- Education Assistance
- Bonus Pay
- Leadership Academy
- EAP

Training



Internship Program



- The Palmdale Water District has an active internship program.
- College of the Canyons
 - Resource and Analytics
 - Customer Care
- Palmdale Aerospace Academy
 - Information Technology



Looking Ahead

- Support leadership training and professional development programs.
- Focus on emergency preparedness and risk management.
- Enhance the Palmdale Water District's Internship Program through outreach.



HR Director



Safety & Training
Tech





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Thank you



PALMDALE WATER DISTRICT
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AGENDA ITEM NO. 9.2.a.3

Public Affairs Department

Judy Shay

Public Affairs Director

PWD Board Meeting

December 12, 2022



What is Public Affairs?

Communicating and building relationships with the public

Community Outreach

Media Relations

Advertising

Government/Community Relations

Marketing

Social Media & Website

Internal Communications



Community Outreach



- ## Events/Publications
- ✓ Water Ambassadors Academy & Jr. Water Ambassadors Academy
 - ✓ Let's Talk H2O!
 - ✓ Water-Wise Workshops
 - ✓ Open House
 - ✓ Tours
 - ✓ Customer Appreciation Day
 - ✓ Imagine a Day Without Water
 - ✓ Coffee with a Director
 - ✓ Reading Across America
 - ✓ Earth Day
 - ✓ National Night Out
 - ✓ AV Fair
 - ✓ *The Pipeline* newsletter
 - ✓ *Palmdale Magazine*



PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

Media Relations

State grants could help PWD projects Board approves application to gain additional funding

By ALLISON GATLIN Valley Press Staff Writer Nov 30, 2022 Updated 1 hr ago



The Pure Water AV demonstration and learning facility is one project for which the Palmdale Water District is applying for \$42 million in state grants.
Artist concept courtesy of Palmdale Water District.



PALMDALE — The Palmdale Water District could see financial help for several pending projects, should all or part of its application for \$42 million in state grants be awarded.

The Board of Directors, on Monday, unanimously approved the application for the grant under the state's 2022 Urban Community Drought Relief Grant Program.

The funding would go toward the following District projects: drilling and equipping two new wells, the Pure Water AV demonstration and learning facility, a recycled water line on Avenue Q to supply water to the Pure Water AV facility for advanced treatment and the District's turf reduction program, which nabs for customers to remove water-hunerv turf.

Press Releases

- Issue about 30 per year
- Send to 35 media outlets/individuals
- Average 100 stories in *AV Press* per year



PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

Advertising



- Print ads – *AV Press*' Welcome to the AV & A Place to Call Home editions, Palmdale School District Foundation program, CSDA magazine
- Digital ads – 2022 Drought messaging: 450,000 impressions, 5,100 engagements
- Café con Leche Radio interviews: target Spanish-speaking audience



PALMDALE WATER DISTRICT
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Government/Community Relations

- Special Districts Association of North L.A. County (SDANLA), CSDA's 1st L.A. chapter
- ACWA – Communications Committee
- AV EDGE
- Chambers of Commerce
- AV Conservation Roundtable
- San Gabriel Mountains Community Collaborative
- Community Emergency Response Team (CERT)



PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

Marketing



Campaigns – Luv Our H2O

- Buckets
- T-shirts
- Tote bags
- Banners
- Lawn signs

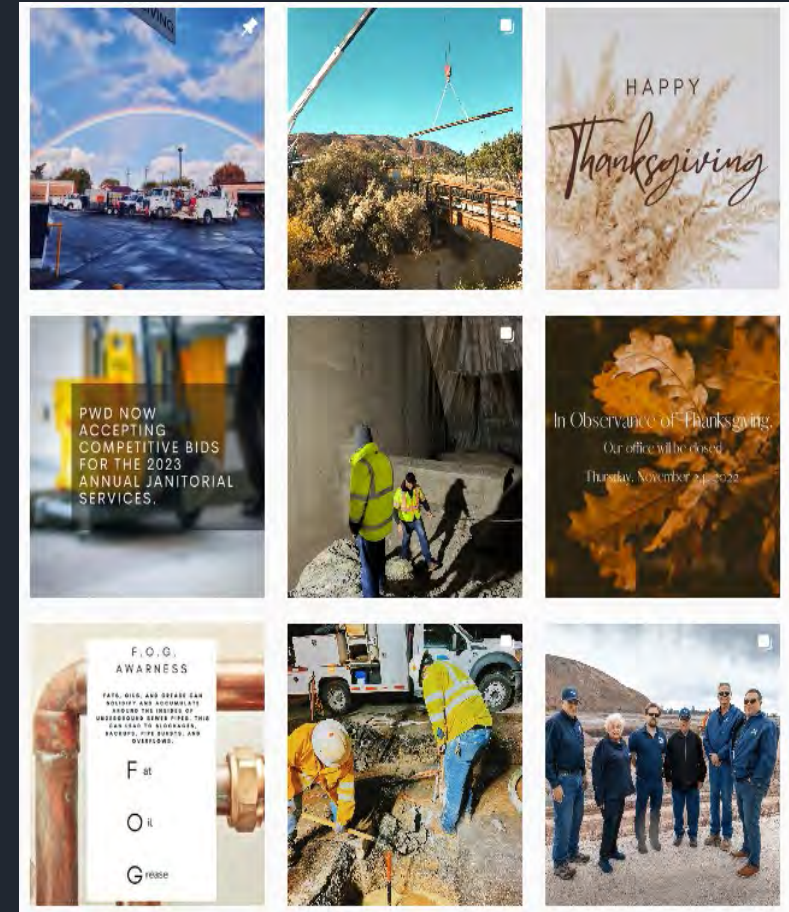
Received 2022 PRISM Award
from PRSA-LA for Community
Relations/Government



PALMDALE WATER DISTRICT
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Social Media & Website

- Facebook: 2,000 followers
- Instagram: 389 followers
- Twitter: 781 followers
- LinkedIn: 661 followers
- Nextdoor: 11,000 residents
- Constant Contact: 6,000 subscribers
- Introduced new website in 2022



PALMDALE WATER DISTRICT
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Internal Communications

- Employee Buzz
- Employee Communications Committee
- Water Professionals Appreciation Week

THE EMPLOYEE BUZZ

District Finances Stable, Too Early to Predict 2023 COLA

Despite inflation, drought and unpaid bills due to COVID-19, PWD finances were balanced at the midpoint of the year. However, there continues to be challenging factors that could shake the financial stability and affect next year's cost-of-living adjustment (COLA).

"With inflation nearing 10%, I know a lot of people want to know if that's going to be the COLA for 2023," said Finance Manager/CFO Dennis Hoffmeyer. "The COLA really will be dependent on the drought and revenue, so it's just too early to gauge what the recommended number might be."

Traditionally, PWD's COLA is based on the previous year's Consumer Price Index (CPI) for Southern California. On Jan. 1 of this year, staff received a 4.6% COLA, which was the September 2021 CPI.

Currently, the Finance Department is collecting COLA information for the past five years from the cities of Palmdale and Lancaster and 12 water districts with similar facilities, staff or customer base to compare them to PWD's stats. The figures are expected to be ready for review at the Finance Committee meeting on Aug. 17.

According to the quarterly reports, the District has \$16.7 million in cash and investments as of this past June 30. One year ago, that number was \$13.1 million. The \$3.6 million difference is due to bills that were pushed into July and increased capital improvement fees and above average tax assessments.

The cushion, however, could be compromised by the uncertainty in the economy and the ongoing drought.

"We are feeling the inflation," Dennis said. "We are seeing expenses up about 10%. Materials have gone up from 18% to 25%, and the lag time for supplies makes it even more expensive."

One example of increased costs for materials is the fire hydrant, which is 25% more expensive. A hydrant cost \$2,083 last year but is now \$2,773.

Adding to the financial uncertainty is the drought. Asking for 20% conservation from customers means reduced income. A 5% water allocation from the State Water Project calls for more groundwater supply, which burdens the wells and increases energy costs. Also, if more water needs to be purchased to meet demand, the supply will be extremely expensive.

AUGUST 2022
Volume 6 Issue 8

MARK YOUR CALENDAR!

Water-Wise Workshop: Composting
Tuesday, Aug. 2
@ 5 p.m.
Legacy Commons
811 East Avenue Q-9

Board Meetings
Monday, Aug. 8
Monday, Aug. 22
@ 6 p.m.
Teleconference info available on agenda.

Class Training
Aug. 9
Aug. 16-18
Conduct Safety & Training
Tech Heather dates for more details.

New Employee Tours
Thursday, Aug. 11
Thursday, Sept. 1
@ 8:30 a.m.

Anti-Harassment Training
Wednesday, Aug. 24
Employee: 9-9 a.m.
Management: 1-3 p.m.
Main board room

Target Solutions Training
Deadline: Sept. 30



PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

Staff



- Michelle Trejo, Public Affairs Specialist
- Judy Shay, Public Affairs Director



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Thank you!

