

AGENDA
IRVINE RANCH WATER DISTRICT
ENGINEERING AND OPERATIONS COMMITTEE
MONDAY, AUGUST 20, 2018

CALL TO ORDER 7:30 a.m., IRWD's Operations Center, First Floor Committee Room
3512 Michelson Drive, Irvine, California 92612

ATTENDANCE Committee Chair: John Withers _____
Committee Member: Mary Aileen Matheis _____

ALSO PRESENT

Paul Cook	_____	Jose Zepeda	_____	Harry Cho	_____
Kevin Burton	_____	Eric Akiyoshi	_____	Paul Weghorst	_____
Rich Mori	_____	Scott Toland	_____	Tom Roberts	_____
Kelly Lew	_____	Ken Drake	_____	Ken Pfister	_____
Lars Oldewage	_____	Arseny Kalinsky	_____	Steve Malloy	_____
Malcolm Cortez	_____	Barkev Meserlian	_____	_____	_____
John Dayer	_____	Bruce Newell	_____	_____	_____

COMMUNICATIONS

1. Notes: Akiyoshi
2. Public Comments
3. Determine the need to discuss and/or take action on item(s) introduced that came to the attention of the District subsequent to the agenda being posted.
4. Determine which items may be approved without discussion.

INFORMATION

5. UPCOMING PROJECTS STATUS REPORT – CORTEZ / AKIYOSHI / LEW / MALLOY / MORI / BURTON

Recommendation: Receive and file.

6. RESEARCH BUSINESS PLAN UPDATE – SPANGENBERG / OLDEWAGE / BURTON

Recommendation: Receive and file.

ACTION

7. SEWER SIPHON IMPROVEMENTS CONSULTANT SELECTION –
MURPHY / CORTEZ / BURTON

Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of \$289,300 for engineering design services for the Sewer Siphon Improvements, Project 07886.

8. POWER PURCHASE AGREEMENT FOR BAKER SOLAR PROJECT –
BENNETT / WELCH / MORI / JACOBSON / ZEPEDA / SANCHEZ /
WEGHORST / CLARY

Recommendation: That the Board authorize the General Manager to execute a Power Purchase Agreement with Solar Star IRWD Baker, LLC to own, design, construct, operate and maintain a photovoltaic system at the Baker Water Treatment Plant subject to non-substantive changes.

9. IRWD 2018 SEWER SYSTEM MANAGEMENT PLAN – PHAM /
MCELROY / ZEPEDA

Recommendation: That the Board approve and certify the IRWD 2018 Sewer System Management Plan.

OTHER BUSINESS

10. Directors' Comments

11. Adjourn

Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the above-named Committee in connection with a matter subject to discussion or consideration at an open meeting of the Committee are available for public inspection in the District's office, 15600 Sand Canyon Avenue, Irvine, California ("District Office"). If such writings are distributed to members of the Committee less than 72 hours prior to the meeting, they will be available from the District Secretary of the District Office at the same time as they are distributed to Committee Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available at the entrance of the meeting room at the District's Operations Committee Room at 3512 Michelson, Irvine, California. The Irvine Ranch Water District's Committee Room is wheelchair accessible. If you require any special disability-related accommodations (e.g., access to an amplified sound system, etc.), please contact the District Secretary at (949) 453-5312 during business hours at least seventy-two (72) hours prior to the scheduled meeting.

August 20, 2018

Prepared by: M. Cortez/E. Akiyoshi/

K. Lew/S. Malloy/R. Mori

Submitted by: K. Burton 

Approved by: Paul A. Cook 

ENGINEERING AND OPERATIONS COMMITTEE

UPCOMING PROJECTS STATUS REPORT

SUMMARY:

A status report of Irvine Ranch Water District's Upcoming Projects is presented to the Committee for information.

BACKGROUND:

The information, which is attached as Exhibit "A", is a status report submitted quarterly to the Committee for review.

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Upcoming Projects Status Report

EXHIBIT "A"

IRWD UPCOMING PROJECTS STATUS REPORT

Project Name	Start	Start	Construction	Construction
	Planning	Design	Award	Final Acceptance
Lake Forest RW Services on Bake and Toledo				Fall 2018
Main Street SMH Rehabilitation/Replacement			Summer 2018	
Riparian View DW Pipeline Replacement				Winter 2019
Culver Drive RW Pipeline Replacement				Winter 2019
Vault Lid Replacement				Winter 2019
Michelson Force Main Rehabilitation				Winter 2019
Coastal Zone 4-2 PRV			Summer 2018	Winter 2019
Oso Reservoir Strainer and Meter		Summer 2018		
Rockfield Flow Control Facility			Summer 2018	Winter 2019
Vactor Access to SMH on MWRP Berm				Summer 2018
DRWF Surge Tanks				Fall 2018
San Joaquin Reservoir Filtration Facility		Winter 2019		
Santiago Canyon Pump Station Improvements		Fall 2018		
Sewer Siphon Improvements		Summer 2018	Winter 2019	
Elderwood Sewer Upsizing				Fall 2018
Lake Forest Zone B Floating Reservoir Cover			Fall 2018	Winter 2019
Ladd Canyon Road DW Pipeline Replacement		Summer 2018		
DW Vault Lid Replacement on Irvine Blvd		Fall 2018		
Laguna Canyon Road RW Pipeline Corrosion Repair			Summer 2018	Winter 2019
Turtle Ridge DW, RW Pipeline Rehabilitation			Winter 2018	
Seawatch RW Pipeline Replacement				Summer 2018
University Drive Widening Appurtenance Relocations (RA w/ Irvine)				Fall 2018
Santiago Creek Dam Sloped Outlet PDR and Final Design			Spring 2019	
Wells 2, 17 and 52 Rehabilitation				Fall 2018
Wells 10 and 16 Rehabilitation			Fall 2018	
MWRP Odor Scrubber Platforms			Fall 2018	
MWRP Headworks Screening Area Diverter Chute			Fall 2018	
IIC East Zone A-B BPS Upgrades			Fall 2018	
PA 51 Reach A Phase II Sewer Improvements			Summer 2018	
Zone 1 Reservoir No. 2				Winter 2020
Eastwood Pump Station: Zone A-B BPS and Zone A-C BPS				Winter 2020
ILP North Conversion - Pipelines				Summer 2018
Zone A-B and Zone A-C BPS Offsite Pipelines and ILP Bottom Drains				Winter 2020
Zone A to Rattlesnake Reservoir BPS		Fall 2018		
ILP North Conversion - Reservoir				Winter 2019
Sewage Treatment Plant Master Plan	Summer 2018			
PDF Sodium Hypochlorite Storage and Feed System		Fall 2018		
Energy Storage Systems				Fall 2018
Syphon Reservoir Improvements		Spring 2019		

IRWD UPCOMING PROJECTS STATUS REPORT

Project Name	Start	Start	Construction	Construction
	Planning	Design	Award	Final Acceptance
Newport Coast SLS and SFM Improvements				Fall 2018
Santiago Canyon Fleming Reservoir and Pump Station Improvements		Fall 2018		
MWRP Emergency Recycled Water Diversion			Fall 2018	Fall 2019
MWRP Transformer T-1 Replacement		Fall 2018		
MWRP Biosolids and Energy Recovery Facilities				Summer 2020
PA 1, Orchard Hills Neighborhood 1 RW (RA w/ICDC)				Fall 2018
PA 1, Orchard Hills Neighborhood 3 RW (RA w/ICDC)				Fall 2018
PA 1, Orchard Hills Neighborhood 3 DW and RW (RA w/ICDC)				Fall 2018
PA 1, Orchard Hills Neighborhood 3 "F" Street RW (RA w/ICDC)				Fall 2018
PA 6, Neighborhood 4B RW (RA w/ICDC)				Fall 2018
PA 6, Neighborhood 5A RW (RA w/ICDC)				Fall 2018
PA 6, Neighborhood 5B and C RW (RA w/ICDC)				Spring 2019
PA 6, Neighborhood 5B and C Phase 2 RW (RA w/ICDC)				Spring 2019
Tustin Legacy, Moffett at Peters Canyon Channel DW, RW (RA w/Tustin)				Winter 2019
Tustin Legacy, Flight Drive RW (RA w/Tustin)				Winter 2019
Tustin Legacy, Moffett Dr and Legacy DW, RW (RA w/Tustin)				Fall 2018
PA 18 South, Hidden Canyon DW RW (RA w/Toll Brothers)				Fall 2018
PA 51, Marine Way DW, RW (RA w/Heritage Fields)				Summer 2019
PA 51, Ridge Valley, Marine to Trabuco, DW, S (RA w/Heritage Fields)				Fall 2018
PA 51, C St from Trabuco Rd to LQ St, S (RA w/Heritage Fields)				Fall 2018
PA 51, LQ St from Ridge Valley to LY St, S, RW (RA w/Heritage Fields)				Fall 2018
PA 51, LN St from C St to LY St, DW, RW (RA w/Heritage Fields)				Fall 2018
PA 51, South C St and LY St, S, RW (RA w/Heritage Fields)				Fall 2018
PA 51, Alton Pkwy from Technology to Muirlands, DW S, RW (RA w/Heritage Fields)				Spring 2019
PA 51, Marine Way from Barranca Pkwy to Alton Pkwy, DW S, RW (RA w/Heritage Fields)				Fall 2018
PA 51, Cadence from Bosque to Z Street, S, RW (RA w/Heritage Fields)				Fall 2018
PA 51, Alton Interceptor Sewer (RA w/Heritage Fields)				Spring 2019
PA 51, Marine Way from Alton to Barranca Sewer (RA w/Heritage Fields)				Winter 2019
PA 51, Sociable from Z St to B St, RW (RA w/Heritage Fields)				Fall 2018
PA 51, Benchmark and Prospective, DW, S, RW (RA w/Heritage Fields)				Fall 2018
PA 51, GP1 St DW, S, RW (RA w/Heritage Fields)				Spring 2019
PA 51, GP2 St, DW, S, RW (RA w/Heritage Fields)				Winter 2019
PA 51, Benchmark DW, RW (RA w/Heritage Fields)				Fall 2018
PA 51, Cultivate Sewer (RA w/Heritage Fields)				Fall 2018
PA 51, Benchmark and Modjeska DW, RW (RA w/Heritage Fields)				Fall 2018
PA 51, Magnet from Ridge Valley to Bosque RW (RA w/Heritage Fields)				Fall 2018
PA 51, Episode from Frame to Pusan RW (RA w/Heritage Fields)				Fall 2018
PA 51, District 7, Z St and A St RW (RA w/Heritage Fields)				Fall 2018
PA 51, Cadence South DW, S, RW (RA w/Heritage Fields)				Fall 2018
PA 51, District 5 A St DW, RW (RA w/Heritage Fields)				Winter 2019

IRWD UPCOMING PROJECTS STATUS REPORT

Project Name	Start	Start	Construction	Construction
	Planning	Design	Award	Final Acceptance
PA 51, Chinon from Cadence South to Cadence (RA w/Heritage Fields)				Winter 2019
PA 51, Marine Way and Bake Parkway RW (RA w/Heritage Fields)				Winter 2019
PA 51, Marine Way Reach C Sewer (RA w/Heritage Fields)			Fall 2018	
PA 51, Reach B East Sewer (RA w/Heritage Fields)			Fall 2018	
Serrano Summit Phase 2 DW, RW				Winter 2019
MWDOC South County Agencies Emergency Supply	In-Process			
Update Comprehensive Non-Potable Hydraulic Model	In-Process			
Potable Reuse Alternatives Analysis	In-Process			
Update to Replacement Planning Model, Phase 2	Fall 2018			
			Category	Months
			Winter	Jan. Feb. & Mar.
			Spring	Apr. May & June
			Summer	Jul. Aug. & Sep.
			Fall	Oct. Nov. & Dec.

August 20, 2018

Prepared by: C. Spangenberg/L. Oldewage

Submitted by: K. Burton

Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

RESEARCH BUSINESS PLAN UPDATE

SUMMARY:

Staff will provide an update on the research projects in which IRWD is currently involved.

BACKGROUND:

Periodically IRWD receives requests to participate in various research projects pertaining to emerging technologies through either direct funding or dedication of in-kind staff resources. Guidelines were developed to assist staff with its evaluation and response to those requests. These guidelines were incorporated into the IRWD Research Business Plan, which also provides a tracking mechanism for the various requests and ongoing research projects and programs in which IRWD participates. The underlying purpose of the Research Business Plan is to ensure that IRWD's research resources are being prioritized and utilized effectively.

One of the components of the Research Business Plan is for staff to provide a status update on the research projects to the Engineering and Operations Committee on a quarterly basis. A status update on the current research projects is attached as Exhibit "A".

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Research Projects Summary Table

Exhibit "A"

Research Projects Summary Table

No.	Project Title	Project Description	IRWD Contact	Organizations Involved	Type of Research	IRWD Participation Resource	Start Date	Projected Completion Date	Comments/Next Steps
1	Predicting RO Removal of Toxicologically Relevant Unique Organics (WRRF-14-19)	Predict removal efficiency of compounds identified by state or federal regulatory agencies of potential public health concern by reverse osmosis (RO), and predict removal of compounds that may be precursors of disinfection byproducts (DBPs) of potential health concern using quantitative models and recommendations for future research.	Spangenberg	University of New Mexico, Dr. Kerry Howe/WateReuse Research Foundation (WRRF)	Literature review, model development and prediction	In kind service @ \$5K (staff time and travel expenses reimbursed)	Jan-16	Sep-18	Final report is being finalized. Staff reviewed and commented on Excel spreadsheet selective organic removal model. Project is essentially complete with final report publication remaining.
2	Ensuring Stable Microbial Water Quality in Direct Potable Reuse Distribution Systems (WRRF-14-18)	Determine if DPR presents unique risks to the stability of the DWDS microbiome due to differences in the seed organisms, the type and amount of organic carbon and nutrients and the effect of blending different water types (e.g., blending with raw waters and blending with finished waters).	Oldewage	WateReuse Research Foundation (WRRF)	Workshop, literature review, and bench - or pilot-scale testing	In kind service @ \$5K (staff time and travel expenses reimbursed)	Nov-15	Jan-19	Staff attended the expert workshop held November 10 - 11, 2015 at West Basin MWD. This project is currently idle.
3	Battery Storage System Guidance for Water and Wastewater Utilities (WRF 4718)	Provide case study examples of deployment experiences and develop guidance documents for water and wastewater utilities on leading practices for evaluation and implementation of battery storage system options.	Zepeda	Stantec/MWH & Water Research Foundation	Literature review, case studies, technical and regulatory requirements, benefits, costs and risks.	In kind service @ \$5K (staff time for peer review of reports, sharing information)	Nov-17	Apr-19	Staff participated in the kickoff meeting/workshop with multiple utilities that was held in March at Stantec's facility located in Pasadena, CA. A summary of the workshop was submitted to staff. Stantec has requested that the District consider participation as a case study.

August 20, 2018

Prepared by: A. Murphy/M. Cortez

Submitted by: K. Burton *sa for*

Approved by: Paul A. Cook *[Signature]*

ENGINEERING AND OPERATIONS COMMITTEE

SEWER SIPHON IMPROVEMENTS CONSULTANT SELECTION

SUMMARY:

The Sewer Siphon Improvements project will perform a condition assessment and rehabilitation of four of the District's sewer siphons and is currently in the initial stages of design. Staff recommends that the Board authorize the General Manager to execute a Professional Services Agreement in the amount of \$289,300 with Woodard & Curran for engineering design services for the Sewer Siphon Improvements project.

BACKGROUND:

The District's sewer system includes 19 inverted siphons in various locations. In 2016, the District completed a preliminary condition assessment and ranked the siphons using criticality analysis (i.e. risk and consequence of failure). The criticality analysis prioritized the 19 siphons based on factors such as preliminary condition assessment, flow capacity, proximity to waterways, and age. This project will evaluate the four top priority siphons and design the necessary rehabilitation improvements. The four siphons are located at: 1) San Diego Creek at Harvard Avenue, 2) Harvard Avenue and Barranca Parkway, 3) Orange County Transit Authority at Jamboree Road, and 4) Main Street and Veneto as shown on the location map attached as Exhibit "A". Staff issued a Request for Proposal to six design consultants: AKM Consulting Engineers, Lee & Ro, Stantec, Kennedy/Jenks, West Yost Associates, and Woodard & Curran. The scope of work includes a detailed condition assessment including closed circuit television inspection and recommendation and design for improvements including repairs to the vaults, site access, hatches, air jumpers, sluice gates and stop logs, and siphon barrels. After the completion of this project, the remaining sewer siphons will be rehabilitated through similar future projects.

Consultant Selection:

Staff received a total of three proposals from AKM Consulting Engineers, Lee & Ro and Woodard & Curran. The other consultants declined to submit a proposal due to lack of available staff to devote to the project. Staff selected Woodard & Curran due to its superior understanding of the project, applicable siphon design and rehabilitation experience, and innovative proposal as shown in the Consultant Selection Matrix attached as Exhibit "B". The proposal, which is attached as Exhibit "C", includes scope for preliminary and final engineering design and bid phase support commensurate with the requirements of the project.

Staff reviewed Woodard & Curran's scope of work and fee and recommends that the Board authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of \$289,300 for engineering design services.

FISCAL IMPACTS:

Project 07886 for the Sewer Siphon Improvements is included in the FY 2018-19 Capital Budget. The existing budget is sufficient to fund the design.

ENVIRONMENTAL COMPLIANCE:

This project is subject to the California Environmental Quality Act (CEQA). In conformance with the California Code of Regulations Title 14, Chapter 3, Section 15004, the appropriate environmental document will be prepared when additional, meaningful information becomes available.

RECOMMENDATION:

That the Board authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of \$289,300 for engineering design services for the Sewer Siphon Improvements, Project 07886.

LIST OF EXHIBITS:

Exhibit "A" – Location Map

Exhibit "B" – Consultant Selection Matrix

Exhibit "C" – Woodard & Curran Proposal for Engineering Design Services

EXHIBIT "A"

EXHIBIT A-SEWER SIPHON IMPROVEMENTS LOCATION MAP



EXHIBIT "B"
Sewer Siphon Improvements Project 07886
Consultant Selection Matrix

	Weights	AKM	Lee & Ro	Woodard & Curran
TECHNICAL APPROACH	60%	1	3	2
*Project Approach	40%	1	3	2
*Scope of Work	30%	2	3	1
*Man Hour Estimates	30%	3	2	1
Weighted Score (Technical Approach)		1.90	2.70	1.40
EXPERIENCE	40%			
*Firm/Team	20%	1	3	2
*Project Manager	40%	2	3	1
*Project Engineer	20%	2	3	1
*Project Engineer	20%	2	3	1
Weighted Score (Experience)		1.80	3.00	1.20
COMBINED WEIGHTED SCORE				
		Man-hours	Man-hours	Man-hours
Task 1 Preliminary Design		633	600	524
Task 2 Final Design		1928	670	600
TOTAL Project HOURS		2561	1270	1,124
Sheet Count				
General		5	6	3
Civil /Mechanical/Structural		48	24	14
TOTAL SHEETS		53	30	17
FD HRS/SHT		36.38	22	35
Review Meetings				
Total Meetigs				
FEE				
Preliminary Design		\$310,920	\$152,267	\$174,482
Final Design		\$305,920	\$100,890	\$114,818
Grand Total- Preliminary and Final Design		\$616,840	\$253,157	\$289,300
Number of Drawings		53 dwgs	30 dwgs	17 dwgs
Final Design Unit Prices (\$/dwg)		\$11.638	\$3.363	\$6.754
Professional Liability Insurance				
General Liability Insurance				
		3	2	1
FORCED RANKINGS:				
1 - First				
2 - Second				
3 - Third				

EXHIBIT "C"

COMMITMENT & INTEGRITY DRIVE RESULTS

24422 Avenida de la Carlota, Suite 180
Laguna Hills, CA 92653
www.woodardcurran.com

T 949.420.5300



August 2, 2018

Mr. Alex Murphy
Irvine Ranch Water District
Michelson Water Recycling Plant
3512 Michelson Drive
Irvine, CA 92612

Subject: Proposal for Design Phase Engineering Services for the Sewer Siphon Improvements Project

Dear Mr. Murphy:

Irvine Ranch Water District (IRWD) is seeking engineering services for the sewer siphon improvements project. Woodard & Curran has a full understanding of IRWD's project and unmatched qualifications for sewer siphon design. Based on our review of the request for proposal, our site visits, discussions and meetings with IRWD staff, we have developed a comprehensive proposal to meet IRWD's needs and goals.

Woodard & Curran offers a team of highly-qualified engineers with the technical expertise and local experience to address IRWD's needs for the project. We propose **Rich Bichette** to serve as project manager and **Glenn Hermanson** as project engineer, both are experts in sewer siphon rehabilitation and design. Rich has over 18 years of project management and sewer design experience, and Glenn has 28 years of sewer and sewer siphon analysis and design. They will be supported by **Andy Baldwin**, an expert in hydraulic modeling who has recently completed modeling work for IRWD. In addition, we have partnered with two specialty subconsultants: Calvada for surveying, and Downstream Services for condition assessment, CCTV, and flow monitoring.

Woodard & Curran's team members have extensive experience in sewer siphon rehabilitation and design projects throughout California. Our team members have assessed capacity and condition or provided design of siphon improvements for several agencies, including Orange County Sanitation District, Padre Dam Municipal Water District, City of Santa Clara, City of San Jose and many more. Our team members' thorough understanding of the unique challenges associated with siphons will make this project a long-term success for IRWD, by providing siphons that are easier to operate and maintain, with components that will endure in a highly corrosive environment.

We are committed to working with IRWD to make this important project a success and have included acknowledgement of Addendum No. 1 in our proposal. If you have any questions about our proposal, please contact Rich Bichette at rbichette@woodardcurran.com, or (213) 223-9477.

Sincerely,

Rich Bichette, P.E.
Project Manager

Kathleen Higgins, P.E.
Principal-in-Charge

SECTION ONE | Scope

Understanding and Introduction

In 2016, Irvine Ranch Water District (IRWD / District) completed a preliminary assessment of its 19 inverted sewer siphons and ranked the siphons for rehabilitation considering the risk of failure. This project will include hydraulic evaluation and condition assessment of the four most critical siphons, recommendations to address deficiencies, and design of improvements. The four critical siphons are summarized in the table below:

Siphon	Air Jumper	Barrel	Material	Status
San Diego Creek/Harvard (S2)	No	30"	ACP	Open, partially blocked
		24"	ACP	Open, flowing
		15"	ACP	Open, flowing
Main/Veneto (S4)	Yes – 21"	42"	VCP	Open, flowing
		24"	VCP	Closed by gate
		18"	VCP	Open, flowing
Harvard/Barranca (S6)	No	24"	VCP	Open, blocked, not flowing
		24"	VCP	Open, flowing
		24"	VCP	Open, blocked, not flowing
OCTMA/Jamboree (S10)	No	24"	VCP	Open, flowing
		18"	VCP	Closed by gate
		24"	VCP	Open, blocked, not flowing

The term “self-cleaning siphon” is inaccurate and misleading. Some inverted siphons have better hydraulic characteristics than other siphons and therefore less debris collects in these siphons, but no siphon will convey a ¾-inch piece of aggregate from one side to the other. Because there is no “maintenance free siphon”, many decisions require a balancing of advantages and disadvantages. Also, there is no “national standard” for siphon design and engineers with less experience tend to make decisions with impacts that aren’t apparent for years. The Woodard & Curran team has the deep knowledge and experience to provide solutions for rehabilitating the siphons that will serve the District for decades into the future.

Inverted siphons are typically designed to provide for adequate cleansing velocities, typically 3-4 ft/s to keep sands and silts suspended. However, due to the geometry of a siphon, the low spot is a trap for heavier sediment such as gravel and grit. Once a small amount of sediment is deposited, additional sediment is captured at a faster rate. Some engineers believe that wet weather events clean partially clogged siphons. While a high flow event can remove the smaller sand particles, the larger sediment will not be removed and over time the capacity of the siphon is reduced and eventually a clog and sewer overflow will occur. Siphons must be periodically cleaned. Unfortunately, most siphons, including IRWD’s siphons are difficult to clean due to a variety of factors including access, working area, and siphon structure configuration. Woodard & Curran will not only make recommendations to reduce cleaning frequency and reduce odors but will also recommend improvements to make cleaning easier and improve worker safety.

The physical condition of the siphon barrels is critical to their successful operation. VCP is inert and not subject to corrosion, but other conditions can result in failures of VCP. Common failure modes for VCP siphons are open joints due to differential settlement and cracked crowns due to channel maintenance. ACP is more commonly used in pressure pipe applications. ACP failure modes include hydrogen sulfide corrosion at the transition points and calcium hydroxide (calcite) leaching due to water chemistry.

SCOPE OF WORK

Task 1.1 | Topographic Survey, Data Collection and Review

Woodard & Curran will prepare an initial data request list and submit the list to IRWD ahead of the project kickoff meeting. We will review available documents relative to the project, including but not limited to: as built drawings, siphon evaluation reports, atlas maps, IRWD's InfoSWMM hydraulic model, O&M records, flow monitoring data for the Main and Veneto Siphon Upstream Structure. The data request list will be updated and sent to IRWD as needed as information is received, and as new information is requested.

Our surveying subconsultant, Cal Vada, will perform a topographic survey of the inlet and outlet siphon structures of each siphon (8 total locations) to be used to verify record drawings and to be used for base mapping for preliminary and final design. The invert elevations of each inlet and outlet pipe will be surveyed. Survey shots will be taken and used to create a topographic map with 1-foot contours at the location of each siphon's inlet/outlet structure.

Task 1.2 | Condition Assessment

Woodard & Curran's subconsultant, Downstream Services Inc. (DSI), will perform the field work as the first step of the condition assessment. DSI will make a confined space entry into all 8 siphon structures (4 inlet and 4 outlet). During this entry, all surfaces and components will be inspected and photographed. All PVC t-lock lining will be visually inspected. If any lining is missing, the concrete at this location will be inspected. Any other exposed concrete in the structure will be inspected. Concrete inspection will consist of a penetration test (aka the screwdriver test) to evaluate depth of deteriorated material, hammer taps to listen for shallow subsurface discontinuities, and pH measurements. Existing PVC liner will not be removed. For the metal components, pit depth measurements will be performed at areas where significant metal pitting is observed. Photographs of the defects and components will be taken. While photographs of defects are important, Woodard & Curran requires that photographs of walls without defects are also taken and cataloged. DSI will also perform a CCTV inspection of the air jumper at the Main/Veneto siphon; if camera is blocked going downstream, a reverse pull will be attempted. CCTV will also be performed on the air jumpers Harvard/Barranca and OCTA/Jamboree, if present.

After the field data are collected, Woodard & Curran will use it to assess the condition of the structures and make recommendations for repairs. The recommendations will include removing all the frozen sluice gates. Recommendations for flow control will be developed in the following subtasks and then combined into a complete list of recommendations in task 1.5.

Task 1.3 | Hydraulic Analysis

Our team will utilize IRWD's sewer hydraulic model (InfoSWMM) to conduct a hydraulic capacity analysis of the siphons as defined in the RFP.

USE BEST MODELING PRACTICES TO ACCURATELY EVALUATE SIPHON CAPACITIES

We will review the accuracy and stability of the District's InfoSWMM model prior to conducting the siphon capacity analysis and if necessary adjust the headlosses and pipe configuration to improve the model accuracy and capacity predictions. Our modeling approach is summarized

SCOPE OF WORK

below:

- Evaluate the InfoSWMM model accuracy and adjust the model reflecting the hydraulic characteristics of the siphons (including, gravity flow, pressurized flow, flow splits and transitions, and entry and exit losses).
- Collect dry weather flow data from temporary flows meters and the District's flow meter located upstream of the Main and Veneto Siphon. Flow data will be collected for a 2-week period.
- Evaluate siphon performance for single and multiple barrel operation for dry and wet weather flow conditions.
- Evaluate siphon performance with proposed weir boards set at various heights to determine if weir boards can stay installed 12-months per year or if the weir boards will need to be adjusted seasonally. This evaluation will be performed assuming two conditions: the siphons are clean (no debris) and the siphons are partially filled with debris.
- Evaluate the impact debris has on hydraulic capacity. The model will be run at various "levels of debris". The goal is to determine the impact of 1-inch of debris, 3-inches of debris, 6-inches of debris, etc. This is a critical analysis because the critical depth of debris for a peak wet weather event may not significantly impact the performance of the siphon during dry weather.

EVALUATE BYPASS PUMPING/DIVERSION FLOWS FOR MAINTENANCE CONSTRUCTION

After the hydraulic model has been verified against flow monitoring data, we will use the model to evaluate bypass pumping and diversion flow requirements during dry weather flow. The analysis will determine bypass flows for week and weekend days accounting for diurnal flow patterns to plan and design suitable pumping or flow diversion strategies. The analysis will evaluate the capacities of each diversion barrel and explore options for diverting flow through single or multiple barrels during inspection / construction projects. Diverting flow through single barrels may cause backup leading to potential surcharging. Therefore, we will use the model to evaluate the impact on upstream pipes specifically resulting from restricted flow through single barrels and provide recommendations on suitable flow diversions.

DEVELOP OPERATIONAL SIPHON STRATEGIES

Our team will use the model to develop operational strategies for siphons under both dry and peak wet weather flows. Firstly, we will determine the capacities of each siphon for single and multiple barrels in operation with and without debris. We will estimate siphon capacities impacted by sediment and develop operational strategies accordingly.

Siphon capacities will be compared with existing and future dry and wet weather flows (as modeled) to determine operational strategies for normal conditions (dry weather), wet weather conditions, maintenance needs and shut-down scenarios. We will work closely with the District to obtain feedback and refinement with consideration on costs, operational risks, and maintenance needs. To facilitate the siphon review and decision support phase, we will:

SCOPE OF WORK

- Develop a comprehensive flow scenario table summarizing siphon capacities, peak and daily average flows and peak wet weather flows.
- Develop operational recommendations for managing siphon operation and maintenance strategies.
- Present operational and maintenance strategies at the Preliminary Design Review meeting.

Task 1.4 | Siphon Operation and Maintenance Program

Woodard & Curran will develop a siphon operation and maintenance program for each of the four siphons including recommended configurations based on hydraulic analysis and flow monitoring for various flow conditions (wet and dry weather) and recommendations for maintenance and cleaning procedures of the siphons. For example, Woodard & Curran will recommend weir boards set at a specific elevation, if applicable, to control flow through barrels. These weir boards would not need to be adjusted seasonally. Instead, during wet weather events, the water surface elevation would rise, flow over the top of the weir boards, and continue through the siphon without excess surcharging. We will also consider grit traps upstream of the siphons to reduce the cleaning frequency of the siphons. Finally, we will recommend “cleaning triggers” based on two criteria; (1) time between cleaning operations, and (2) dry weather water surface elevation (as an indicator of partial clogs).

Task 1.5 | Develop Recommendations for Final Design

Woodard & Curran will develop recommendations for siphon improvements to be included in final design. Improvements may consist of the following:

- **Grit Trap Structures:** W&C will evaluate the feasibility and benefits of adding grit traps upstream of the four siphons, including identifying a suitable location, long term maintenance of the siphons, construction and O&M costs.
- **Siphon Structures and Lining:** W&C will address deficiencies of upstream and downstream siphon structures identified during the condition assessment through recommendations for the repair of degraded concrete and corroded structures and repair or replacement of existing liners.
- **Vault Hatches:** W&C will make recommendations for hatch replacement or repair considering corrosion resistance and the prevention of escaping odors, precluding the need of applying a silicone sealant “gasket” each time the vault is closed. W&C will evaluate and recommend a temporary and removable fall protection system when the hatch is opened that will allow access for jetter hoses and vactor suction pipes.
- **Flow Control Equipment/Modifications:** W&C will evaluate existing flow control systems and alternatives such as sluice gates or weir boards to provide flow control. W&C will provide recommendations for equipment based on durability and reliability in a corrosive environment and minimizing or eliminating confined space entries. Consideration will also be given to allowing IRWD to adjust the equipment to allow for

SCOPE OF WORK

changes in operational flow conditions.

Alternatives to be Considered Include	
Plastic Slide Gates	Extend Slide Gate Frames up to Ground Surface
Fiberglass Slide Gates	On-site Underground Storage Vault for Slide Gate Storage
Redwood Weir Boards	Rectangular Hatches with Improved Seals
Plastic Weir Boards	Circular Openings with Composite Lids
Fiberglass Weir Boards	Combination of Rectangular and Circular Openings
Equipment Work Pads	Double Slots for Ability to "Double Plug" a Barrel

- **Air Jumpers:** W&C will recommend repairs or improvements to the existing air jumpers and other improvements to reduce odors emanating from the siphon structures where it is a concern. There have been many odor complaints concerning the siphon at main & Veneto. One of the possible solutions we will evaluate for this siphon would be have an air vent on the west end of the air jumper that would vent to the atmosphere. This location is not near homes or businesses. Currently this air jumper connects to the trunk sewer, but it appears that back pressure from the Peter's Canyon Diversion flow is restricting the air movement in the air jumper and may be forcing air "backwards" to the inlet structure. If there is air escaping from the inlet structure, it is a short distance from the residents in the San Marco apartment complex. Due to the pump station upstream diverting most of the dry weather flow away from this siphon, the small amount of local flow remaining does not provide a lot of "driving energy" to move the air downstream and across the air jumper. This siphon has complicated air flow issues. We will draw upon our experience with other projects to develop a wide range of solutions.
- **Approach for cleaning, closed circuit television inspection, and rehabilitation of siphon barrels:** During the preliminary design phase Woodard & Curran will present our overall strategy for cleaning, CCTV, and rehabilitation of the siphon barrels. We will develop the list of bid items and the language to be used in the bid items. For example, there are different approaches to paying for siphon cleaning (lump sum, per foot, owner per day, per cubic yard, etc.) with advantages and disadvantages. Often the approach that provides the agency the best value is a bid item for mobilization (moving in debris bins, etc.), a second bid item for hazardous waste testing, then a third and fourth bid item which pays for disposal to either a Class 1 landfill or a Class 3 landfill depending on the results of the lab test. The Contractor would be required to remove frozen sluice gates and then dewater and perform CCTV inspection on the barrels. We will also develop optional bid items for point repairs and for full pipe cured-in-place-pipe (CIPP) rehabilitation that would be used depending on the results of the CCTV inspection.

Task 1.6 | Preliminary Design Report

W&C will summarize the work of Tasks 1.1 to 1.5. into a Draft Preliminary Design Report (PDR). The PDR will also include a summary of next steps for implementation, including: Permit requirements; CEQA compliance requirements; Preliminary list of drawings; Preliminary list of specifications; Preliminary Construction Cost Estimate and Construction Schedule.

SCOPE OF WORK

The draft report will be submitted to IRWD for review, and a Final PDR will be prepared to address comments received.

Task 1.7 | Project Management and Meetings (Task 1)

W&C will provide regular project coordination, communication and updates to IRWD and track the project scope, budget and schedule. Progress will be tracked and submitted in monthly progress reports submitted with each invoice. W&C will maintain and update a log of key action items and decisions, which will include key outstanding decisions as well as a record of key decisions made at meetings or in other forums with IRWD. W&C will prepare for and attend two project meetings under Task 1, including the kickoff meeting and preliminary design review (two additional meetings are included in Task 2, below). The W&C project manager and one support staff will attend all meetings in person. The project engineer will attend one meeting in person and one meeting via teleconference. W&C will prepare an agenda and meeting notes for each meeting and be distributed to the IRWD Project Manager within 5 working days of meetings. W&C will implement its quality assurance program for the project, which will include an internal Senior Technical Approach Review (STAR) Workshop at the onset of the project, as well as a senior level technical review (quality control reviews) of project deliverables. Our quality assurance (QA) program includes tracking of all major deliverables, assigning reviewers and documenting reviews in the project files.

Task 1 Assumptions:

- IRWD will unbolt all locked lids for survey and condition assessment and IRWD will reseal lids for odor control as necessary.
- Task 1 - Preliminary Design duration is estimated to be approximately 3 months.
- Up to two face-to-face meetings are included.

Task 1 Deliverables:

- Data Request List (electronic copy, via email)
- Meeting Agendas and Minutes (PDF or Microsoft Word files via email)
- Monthly Progress Report and Updated Schedule (hard copy with invoice)
- Draft and Final Preliminary Design Report (electronic copy, up to 8 hard copies), including appendices for the Hydraulic Model Run Results, Condition Assessment Report, and CCTV Inspection of the Main/Veneto Air Jumper.

TASK 2 FINALDESIGN

The final design scope of work includes the improvements listed below, which are based on the RFP and the 2016 AKM Sewer Siphon Evaluation Report with comments and updates by IRWD. If the scope of improvements changes substantially from those listed below, it is anticipated that the scope and associated fee for final design will be revisited to implement the recommendations of the PDR.

San Diego Creek/Harvard (S2) Site/access improvements at upstream structure (no access improvements required at the downstream structure); Replacement or rehabilitation of vault access hatches and/or addition of fall protection and provisions to reduce odors at upstream structure (downstream hatch was recently replaced); Concrete and/or liner rehabilitation at

SCOPE OF WORK

upstream and downstream structure; Flow control equipment installation, replacement or rehabilitation at upstream and downstream structures; odor control recommendations recommended in the PDR

Main/Veneto (S4) Site/access improvements at downstream structure (no access improvements required at the upstream structure); Replacement or rehabilitation of vault access hatches and/or addition of fall protection and provisions to reduce odors at upstream and downstream structures; Flow control equipment installation, replacement or rehabilitation at upstream and downstream structures; Replacement of leaking couplings on the 21" PVC air jumper on Main/Vento Siphon (S4); odor control recommendations recommended in the PDR.

Harvard/Barranca (S6) Replacement or rehabilitation of vault access hatches and/or addition of fall protection and provisions to reduce odors at upstream and downstream structures; Concrete and/or liner rehabilitation at upstream and downstream structure; Flow control equipment installation, replacement or rehabilitation at upstream and downstream structures; odor control recommendations recommended in the PDR. No access improvements are required at this site.

OCTA/Jamboree (S10) Site/access improvements at upstream and downstream structure; Replacement or rehabilitation of vault access hatches and/or addition of fall protection at upstream and downstream structures; Concrete and/or liner rehabilitation at upstream and downstream structure; Flow control equipment installation, replacement or rehabilitation at upstream and downstream structures; odor control recommendations recommended in the PDR.

In addition to the improvements above, it is assumed all siphon designs will include addition of an upstream grit trap, specifications for CCTV of siphon barrels, and plans and specifications for cured in place pipe (CIPP) lining of siphon barrels, to be included as alternate bid items where applicable. Plans for CIPP lining will use the existing as-built drawings with additional notation to depict the extent of the work. It is anticipated that flow bypass can be accomplished with flow through plugs or other flow control devices within the structures; therefore, bypass pumping plans will not be required.

Sheet	Drawing No.	Title
1	G-1	Cover Sheet, Location Map and Vicinity Map, List of Drawings
2	G-2	General Notes and Siphon Location Map with Sheet Index
3	G-3	Abbreviations, General Notes, Legend
4	C-1	S2 Site Plan and Access Improvements
5	C-3	S2 Structure Rehabilitation Plans and Details 1
6	C-4	S2 Structure Rehabilitation Plans and Details 2
7	C-5	S4 Site Plan, Access Improvements and Air Jumper Coupling Replacement
8	C-7	S4 Structure Rehabilitation Plans and Details 1
9	C-8	S4 Structure Rehabilitation Plans and Details 2
10	C-9	S6 Site Plan
11	C-11	S6 Structure Rehabilitation Plans and Details 1
12	C-12	S6 Structure Rehabilitation Plans and Details 2

SCOPE OF WORK

13	C-13	S10 Site Plan and Access Improvements
14	C-15	S10 Structure Rehabilitation Plans and Details 1
15	C-16	S10 Structure Rehabilitation Plans and Details 2
16	GC-1	General Civil/Rehabilitation Details 1
17	GC-2	General Civil/Rehabilitation Details 2
Appendices*		Existing Siphon As-Built Drawings

*CIPP lining specifications for bid alternates to address pipeline defects will include design criteria for liner materials and thickness and will refer to the existing siphon as-built drawings (with added notations) for configuration.

Task 2.1 | 75% Design

W&C will prepare 75% design documents based on the recommendations of the PDR. The 75% submittal will include a draft set of plans for the entire project. Plans will show layouts of each component of the design including site plans and structure improvements. The 75% submittal will include all sections of the Project Manual including draft technical specification sections (prepared in CSI Division 1 through 16 format). The General Provisions will not be included. An itemized engineer's estimate of probable construction cost will be submitted. A project schedule will be submitted for the construction project that reflects coordination items, date of completed plans, critical path issues, IRWD review times, shop drawing approval, manufacturing and delivery.

Task 2.2 | 100% Design

W&C will prepare 100% design documents reflecting IRWD comments on the 75% design submittal, including all drawing sheets and the Project Manual including technical specifications. The General Provisions do not need to be included. The engineer's estimate of probable construction cost and project schedule will be updated. W&C will assist in calculating liquidated damages value for each construction project, should the contract time be exceeded using IRWD's standard liquidated damage calculation form.

Task 2.3 | Final Bid Documents

W&C will prepare and submit stamped and signed reproducible plans (mylars), bond paper set of final plans and original signed Project Manual for IRWD signatures. An updated engineer's estimate and schedule will be submitted.

Task 2.4 | Bid Period Assistance

During the bidding period, W&C will assist with providing information and clarification of bid documents to prospective bidders and prepare one (1) addendum for prospective bidders, if requested by IRWD. W&C will attend the pre-bid meeting.

Task 2.5 | Project Management and Meetings (Task 2)

SCOPE OF WORK

Woodard & Curran will provide the same project management scope for Task 2 as described under Task 1. Under Task 2, we will prepare for and attend up to two project meetings, including a 75% design review meeting and a 100% design review meeting. The W&C project manager and one support staff will attend all meetings in person. The project engineer will attend one meeting in person and one meeting via teleconference.

Task 2 Assumptions:

- Flow control devices are assumed to be one of those listed in the table above that will be evaluated. Structural modifications or additions for flow control and automated or electronically controlled flow control devices are not included in this scope.
- IRWD will be responsible for producing and distributing Bid Documents and maintaining a plan holders list.
- Construction phase support is not included; however, we can provide these services at a negotiated scope and fee.
- Bid support assumes most questions answered via addenda can be answered with written responses. Up to 16 hours of CAD time and 8 hours of engineering time are included for drawing revisions.
- A single bid package will be provided that includes all four siphon improvements.
- IRWD will provide easement documentation for the existing easements. This documentation will either be a title report for each parcel or will be in AutoCAD format that can be “dropped” into the survey AutoCAD file.
- If grit traps are recommended, the location will be immediately upstream of the inlet structure (and not
- located at a remote location that would require additional surveying).
- Scope assumes liner replacement and concrete rehabilitation, and structural rebar remains intact at siphon structures. Major structural rehabilitation or structure replacement is not anticipated.
- Based on the locations of the siphon structures (outside of City streets), traffic control plans are not required.
- Requirements for minor traffic control on bike paths, private properties and similar locations will be included in the specifications for contractor implementation.
- Geotechnical exploration/recommendations for grit traps is not included.
- Final design duration is estimated to be approximately 4 months.
- Woodard & Curran will not evaluate the bids.

Task 2 Deliverables:

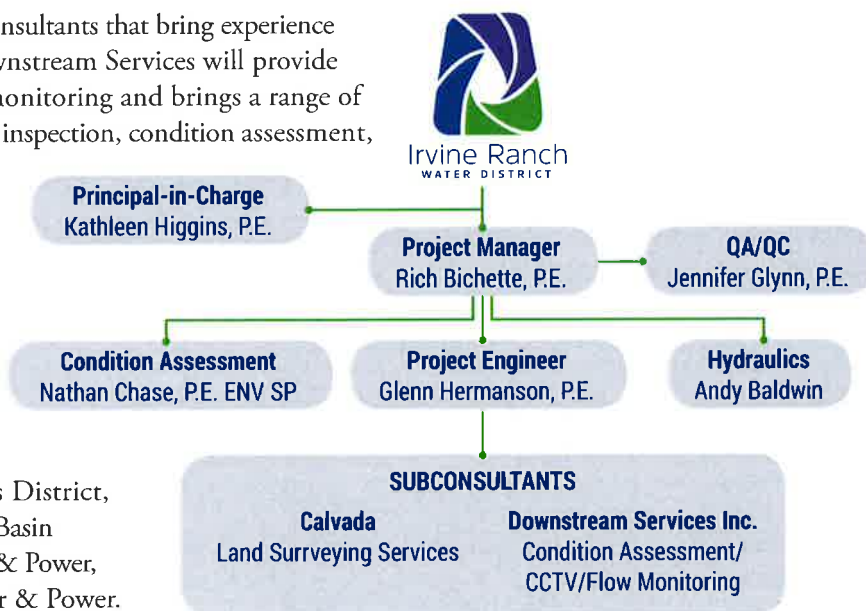
- Project Management Deliverables (see Task 1 deliverables)
- 75% Design Drawings, Project Manual, Engineer’s Estimate and Schedule (electronic copies, up to 8 half-size hard copies)
- 100% Design Drawings, Project Manual, Engineer’s Estimate and Schedule (electronic copies, up to 8 hard copies)
- Final Bid Design Drawings, Project Manual, Engineer’s Estimate and Schedule (electronic copies in PDF, AutoCAD files, one set of full-size drawings on bond paper and one full-size set of drawings on reproducible mylar, one original signed project manual)

SECTION TWO | Team

Since 1979, Woodard & Curran has assisted our clients in solving complex wastewater management challenges through our strong commitment to client service and technical excellence. Woodard & Curran provides access to over 1000 highly qualified professionals from 27 locations across the U.S. and has successfully assisted many southern California cities and agencies in implementing sewer rehabilitation projects. Our team members have assessed capacity and condition or provided design of siphon improvements for several agencies, including Orange County Sanitation District, Padre Dam Municipal Water District, City of Santa Clara, City of San José and many more. Our team members' thorough understanding of the unique challenges associated with siphons will make this project a long-term success for IRWD, by providing siphons that are easier to operate and maintain, with components that will endure in a highly corrosive environment.

Woodard & Curran has selected two subconsultants that bring experience in siphon assessment and surveying. Downstream Services will provide condition assessment, CCTV and flow monitoring and brings a range of sewer services in pipeline maintenance and inspection, condition assessment, and sewer repair and rehabilitation.

Downstream Services has worked with Woodard & Curran on previous projects where they provided sewer inspection services for Cities of El Cajon and Downey. Calvada will provide surveying services for the project. Calvada and Woodard & Curran have worked together on more than 25 projects for clients including Inland Empire Utilities District, Orange County Sanitation District, West Basin Municipal Water District, Burbank Water & Power, Encina Water Agency, and Pasadena Water & Power.



Rich Bichette, P.E. | Project Manager, 10% of time on project

Rich has 19 years of wastewater experience in sewer rehabilitation and design, including 15 projects involving trenchless pipeline installation. Rich is currently managing the Padre Dam siphon assessment project, which is scheduled to be completed in August 2018. An experienced project manager, Rich is known for his responsiveness and dedication to his clients and his ability to manage teams of staff and subconsultants to ensure a high-quality, cost effective project delivered on schedule. Rich was also recently involved in designs for sewer rehabilitation projects for IEUA, OCSD, and cities of San Mateo and Santa Clara, two of which included siphons.



Kathleen Higgins, P.E. | Principal-in-Charge, 2% of time on project

Kathleen has over 30 years of experience leading a variety of water projects including sewer and water design and management, BMP analysis and design, and preparation of final design plans for water and sewer systems. She has served as principal-in-charge and project manager on a variety of projects throughout Southern California including IRWD's San Diego Creek Dry Weather Flow Diversion and San Joaquin Marsh Site 62 Wetlands projects. Kathleen will be responsible to ensure that the right staff are committed to the project and that IRWD's needs are met.



Glenn Hermanson, P.E. | Project Engineer, 20% of time on project

Glenn's 28 years of experience with infrastructure engineering have provided him with significant expertise in trenchless technologies and genuine enthusiasm working on sewer siphon projects, pipeline condition assessment, rehabilitation, and design. His experience includes projects that minimize disturbance to residents and businesses, reduce risk, and save costs. Glenn's experience has focused on sewer facilities evaluation, hydraulic analysis, pipeline rehabilitation, condition assessment, and design and construction of sewer improvements. He has completed more than 13 sewer condition assessment projects, including over 43 miles of pipeline and evaluation of over 30 sewer siphons. Glenn's work includes analysis and design of rehabilitation improvements of siphons for Padre Dam Municipal Water District, the Guadalupe River Trimble Road trunk sewer siphon; 1,200 ft crossing for East Bay Municipal District's Third Alameda Siphon; and evaluation and design of the double siphon under Alamo Creek for Dublin San Ramon Services District.



Jennifer Glynn, P.E. | QA/QC, 3% of time on project

Jennifer has 22 years of experience specializing in pipeline condition assessment, alternatives analysis, and rehabilitation design in both congested urban areas; and highly sensitive environmentally impacted locations involving various lining methods, as well as pipe bursting and conventional open-cut replacement techniques. She has assessed and designed more than 100 miles of pipeline ranging in size from 2-inches to 96-inches in diameter. Jennifer is attuned to the issues that are key to the success of sewer condition assessment and design projects, including giving special attention to sensitive issues, including endangered species habitat preservation. Jennifer is a recognized expert in the field of trenchless technology and focuses on using the most advanced technologies in the field.



Nathan Chase, P.E., ENV SP | Condition Assessment Lead, 8% of time on project

Nathan has 11 years of experience in civil/environmental engineering with unique expertise in water and wastewater infrastructure planning, design, and condition assessment. His work includes design and condition assessment of both gravity and pressure pipe systems, pump stations, and odor/emissions control facilities. He is experienced in managing multidisciplinary teams to plan for and execute challenging condition assessment activities, including those requiring flow holding/diversion activities, confined space entry, structural assessment, and visual/CCTV assessment. For IRWD, Nathan was project engineer for the design and construction support of projects including OPA Well No. 1 Wellhead Facilities and Siphon Reservoir Interim Facilities, and he is familiar with IRWD's standards and procedures.

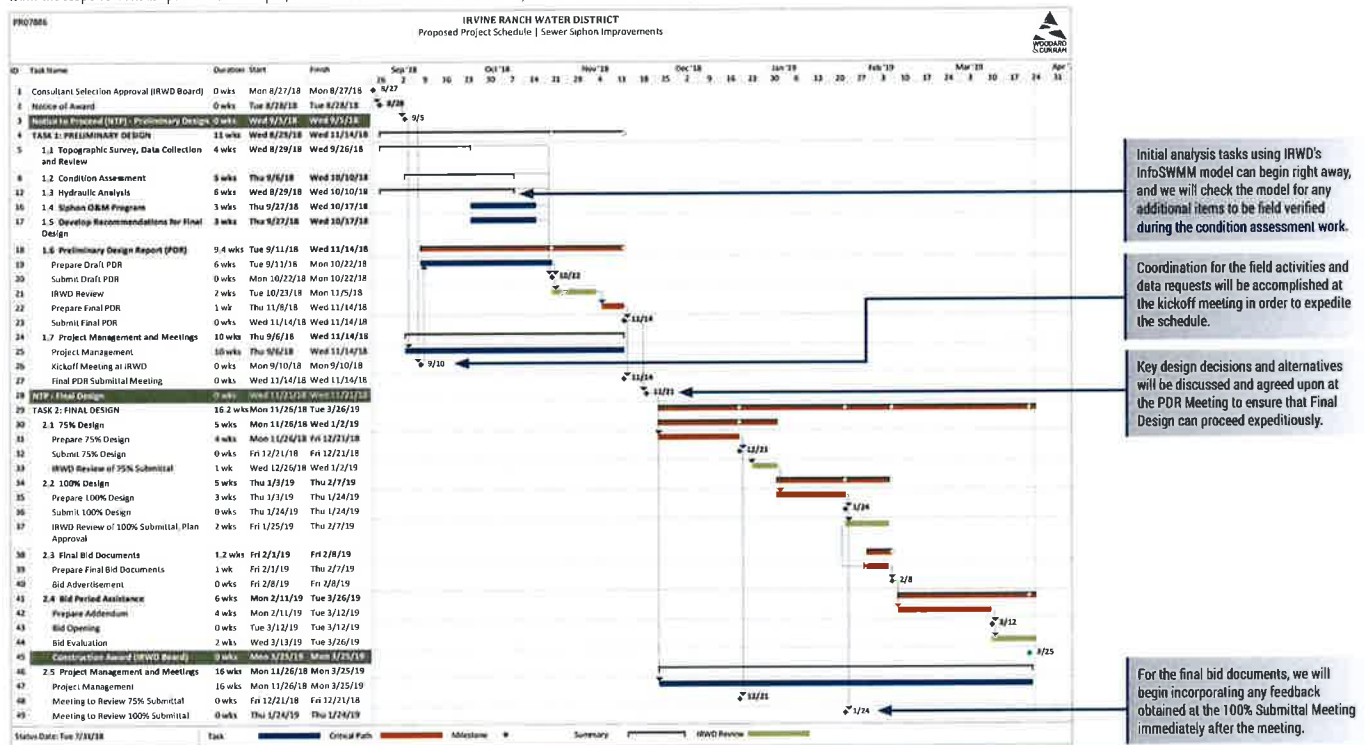


Andy Baldwin | Hydraulics Modeling Lead, 3% of time on project

Andy has 29 years of experience specializing in the planning and assessment of water and wastewater infrastructure systems including, hydraulic modeling, water/wastewater master planning, asset management, Computerized Maintenance Management System (CMMS) implementation, and development of GIS and data management applications. He has extensive experience using many hydraulic modeling software including InfoSWMM. He has utilized IRWD's InfoSWMM model and recently completed UCI – University Lift Station Hydraulic Evaluation Study for IRWD. He has modeled numerous sewer siphons throughout his career including several as part of the OCSD Collections Capacity Evaluation Study and Padre Dam Sewer Siphon evaluation project.

SECTION FOUR | Schedule

The project approach that was presented in Section 1 of our proposal was developed to meet IRWD's objective of completing the final design by within 23 weeks from the initial Notice to Proceed (NTP). Our scope of work, provided in Section 1, was applied to the development of a detailed project schedule, which is presented below. The major tasks and subtasks from the scope of work are presented on the project schedule with an identification of major deliverables and milestones.



Proposal for Design Phase Engineering Services for the Sewer Siphon Improvements Project

4.1

SECTION FIVE | Budget & Other Requirements

A fully itemized level of estimated effort for each task is outlined below. It includes the number of work hours for each employee classification required to complete each phase of work. As requested, a detailed fee to perform the work included in the scope of the Request for Proposal is included in a separate sealed envelope.

Tasks	Woodard & Curran											Total Hours
	Labor											
	Kathleen Higgins	Rich Bichette	Jennifer Glynn	Glenn Hermanson	Nathan Chase	Andy Baldwin	Chns van Lienden	Engineer - 3	Engineer - 1	CAD	Admin Assistant	
	PIC	Project Manager	QA/QC	Projed Engineer	Condition Assessment	Hydraulics Review	Hydraulics Lead	Engineering Support	Engineering Support	TECH-3	Admin	
Task 1: Preliminary Design Report												
1.1 Data Collection and Review, Topographic Survey		4		16	8				8			36
1.2 Condition Assessment		2			8							10
1.3 Hydraulic Analysis		4				24	54	72				154
1.4 Siphon Operation and Maintenance Program		2		8					16			26
1.5 Develop Recommendations for Final Design		8		40	40				20			108
1.6 Preliminary Design Report		8	8	24	24			40	24			128
1.7 Project Management and Meetings (2)	2	20		8					8		6	44
Subtotal Task 1:	2	48	8	96	80	24	54	112	76	0	6	506
Task 2: Final Design												
2.1 75% Design (approx. 17 Sheets)		12	24	40				100		120		296
2.2 100% Design (approx. 17 Sheets)		8	16	28				40		80		172
2.3 Final Bid Documents		2		8				8		16		34
2.4 Bid Period Assistance		4		8				8				20
2.5 Project Management and Meetings (2)	2	20		8					8		8	46
Subtotal Task 2:	2	46	40	92	0	0	0	156	8	216	8	568
TOTAL	4	94	48	188	80	24	54	268	84	216	14	1074

Conflict of Interest: Woodard & Curran has no conflicts of interest concerning any aspects of this project.

Standard Terms and Conditions: We have no modifications to IRWD's contract.

Woodard & Curran Insurance Coverage:

Insurance Required	Limit	Policy Number	Company
Commercial General Liability	\$1 million per occurrence	6014561812	Continental Casualty Company
Personal & Adv Injury	\$1 million per occurrence	6014561812	Continental Casualty Company
General Aggregate	\$2 million per project/location	6014561812	Continental Casualty Company
Products – COMP/OP AGG	\$2 million per project/location	6014561812	Continental Casualty Company
Automotive Liability	\$1 million per accident	6014561843	National Fire Insurance Company of Hartford
Workers Compensation	\$1 million per occurrence	6017075447	Transportation Insurance Company
Professional Liability	\$1 million per claim/ \$2 million aggregate	114135520	Continental Casualty Company

Note: Woodard & Curran's current insurance policy is effective 02/23/2018 to 02/23/2019. A submittal from our insurance carrier can be provided to IRWD upon request.



IRWD SEWER SIPHON IMPROVEMENTS PROJECT (PR 07886)
Fee Proposal

Proposal Date: 8/2/2018

Tasks	Woodard & Curran											Subconsultants				ODCs		
	Labor											Total Hours	Total Labor Costs (1)	Calvee	COTV, Condition Assessment, Flow Monitoring	Subtotal	Total Subconsultant Costs (2)	ODCs
	Kathleen Higgins	Rich Boethel	Jennifer Glynn	Glenn Hartmann	Heather Clark	Andy Baldwin	Chris van Lierden	Engineer - 2	Engineer - 1	CAD	Admin/Assistant							
	PIG	Project Manager	QA/QC	Project Engineer	Condition Assessment	Hydraulics Review	Hydraulics Lead	Engineering Support	Engineering Support	TECH-3	Admin			Survey				
Task 1: Preliminary Design Report	\$299	\$295	\$283	\$299	\$200	\$299	\$209	\$145	\$123	\$140	\$98							
1.1 Data Collection and Review, Topographic Survey		4		16	8				8			36	\$8,544	\$23,280		\$23,280	\$25,608	\$0
1.2 Condition Assessment		4			24							28	\$5,980		\$24,750	\$24,750	\$27,225	\$0
1.3 Hydraulic Analysis		4				24	54	72				154	\$30,062		\$10,150	\$10,150	\$11,165	\$0
1.4 Siphon Operation and Maintenance Program		2		8					16			26	\$4,950			\$0	\$0	\$0
1.5 Develop Recommendations for Final Design		8		40	40				20			108	\$24,780			\$0	\$0	\$0
1.6 Preliminary Design Report		8	8	24	24			40	24			128	\$25,352			\$0	\$0	\$100
1.7 Project Management and Meetings (2)	2	20		8				8			6	44	\$10,463			\$0	\$0	\$200
SubTotal Task 1	2	30	8	96	96	24	54	112	76	0	0	524	\$110,154	\$23,280	\$34,900	\$58,180	\$63,998	\$300
Task 2: Final Design																		
2.1 75% Design (approx. 17 Sheets)		12	24	40				100		120		296	\$53,592			\$0	\$0	\$290
2.2 100% Design (approx. 17 Sheets)		8	16	28				40		80		172	\$32,260			\$0	\$0	\$240
2.3 Final Bid Documents		2		8				8		16		34	\$6,382			\$0	\$0	\$500
2.4 Bid Period Assistance		8		12				16		16		52	\$10,508			\$0	\$0	\$100
2.5 Project Management and Meetings (2)	2	20		8				8			8	46	\$10,657			\$0	\$0	\$200
SubTotal Task 2	2	50	40	96	0	0	0	164	8	232	8	600	\$113,399	\$0	\$0	\$0	\$0	\$1,200
TOTAL	4	100	48	192	96	24	54	276	84	232	14	1124	\$223,553	\$23,280	\$34,900	\$58,180	\$63,998	\$1,290

1. The individual hourly rates include salary, overhead and profit based on a multiplier of 3.62 times direct salary. Rates are capped at \$299.00.
2. Subconsultants will be billed at actual cost plus 10%.
3. Other direct costs (ODCs) such as reproduction, delivery, mileage (rates will be those allowed by current IRS guidelines), and travel expenses, will be billed at actual cost plus 10% (with the exception of any permit fees, which will be billed at actual cost without surcharge).

August 20, 2018

Prepared by: R. Bennett / K. Welch/
R. Mori / R. Jacobson
J. Zepeda / F. Sanchez

Submitted by: P. Weghorst / C. Clary

Approved by: Paul A. Cook 

ENGINEERING AND OPERATIONS COMMITTEE

POWER PURCHASE AGREEMENT FOR BAKER SOLAR PROJECT

SUMMARY:

The Baker Solar Project is a proposed 1.1 megawatt (mW) photovoltaic (PV) facility to be constructed adjacent to the Baker Water Treatment Plant. The Project will supplement electricity provided by Southern California Edison (SCE) to IRWD and will operate in conjunction with an energy storage system to reduce IRWD's cost of electricity at the Baker Plant. The Project will also decrease the load on SCE's electrical distribution system. IRWD has been working with SunPower Corporation on the development of the proposed Project.

Staff has evaluated the benefits and risks of developing the Solar Project under a Power Purchase Agreement (PPA) with SunPower. Staff also evaluated alternative PV equipment ownership structures. Staff recommends that the Board authorize the General Manager to execute a PPA with Solar Star IRWD Baker, LLC (a subsidiary of SunPower) to own, design, construct, operate and maintain the PV facility at Baker Plant, subject to non-substantive changes.

BACKGROUND:

The Baker Plant is a potable water treatment facility that treats raw water to improve regional potable water supply reliability and operational flexibility. The Baker Plant has a relatively constant electrical demand of approximately 2.0 mW and currently receives electrical power solely from SCE. In 2015, staff discussed the development of a PV system to serve the Baker Plant and adjacent facilities with multiple potential solar power providers. Since that time, staff has continued discussions with SunPower as this company has exclusive access to incentive funding available from SCE. IRWD is also pursuing the installation of an energy storage system to serve these same facilities through the District's amended agreement with Advanced Microgrid Systems (AMS). The proposed solar power system would be integrated with the "grid" energy supply from SCE and the energy storage system to optimize the supply of electricity at the Baker Plant.

Solar Project Facilities:

The proposed Project will have a capacity of approximately 1.1 mW and will be located on the roof of IRWD's two existing 16 million gallon buried reservoirs adjacent to the Baker Plant site. Major components of the PV system include solar PV arrays and ancillary equipment including inverters, solar panel boards, a switchboard and a telemetry panel. The system design will reflect the following key recommendations identified in a 2017 Constraints Memorandum prepared by Michael Baker International:

- Use of IRWD's technical specifications for conduits and interconnections;

- Potential electrical tie-in locations;
- Use of a mounting system that to secure the panels; and
- SCADA and electrical equipment requirements to ensure the site's emergency backup system will operate as designed.

The PV design and interconnection requirements will be coordinated with SCE and AMS. When operating at its design capacity, the Baker Plant will be capable of utilizing all of the solar energy produced on site for IRWD's benefit. A site map showing the location of the proposed PV facility is attached as Exhibit "A".

Implementation Options:

Staff, in conjunction with special legal counsel, evaluated the following three options for implementing the Project:

- Option 1 – Long term lease under a PPA with SunPower;
- Option 2 – Ownership by IRWD through an agreement with SunPower; and
- Option 3 – Ownership by IRWD through an agreement with a third-party solar contractor.

The three options are evaluated below.

Option 1 – Power Purchase Agreement:

SunPower has provided a draft PPA for IRWD's consideration through its subsidiary, Solar Star. This agreement would provide for the design, construction, operation and maintenance of the proposed Project. The PPA is provided as Exhibit "B". Key terms negotiated with SunPower associated with the PPA include:

- SunPower would construct, operate, maintain and own the Project facilities at no cost to IRWD for a 25-year term;
- IRWD would purchase electricity produced by the facility at \$0.075/kWh (kilowatt hour) for the project term with no cost escalation;
- The facility would produce approximately 1,946,000 kWh in year one and the PV equipment performance would degrade at no more than 0.25% per year; and
- The Project is eligible to receive SCE's grandfathered time-of-use (TOU) rates for 10 years; these grandfathered TOU rates will result in additional cost savings to IRWD.

One key feature of the PPA is that the cost of electricity will reflect a Local Capacity Requirement (LCR) incentive that is available through a negotiated agreement between SCE and SunPower. SunPower was the only solar firm selected by SCE to receive LCR funding for 15 years. With LCR funding, SunPower is able to sell electricity to IRWD at a reduced rate of \$0.075/kWh, which is significantly less than the \$0.093/kWh rate paid by IRWD in 2017. (Note: the electrical account for the Baker Plant is not enrolled in the Direct Access program.)

Risks of Option 1:

Staff and legal counsel identified and evaluated several risks associated with the PPA, including the following:

- Termination: If IRWD fails to meet the terms of the PPA, SunPower will remove the PV system and IRWD will be required to pay a Termination Value that is greater than the project's fair market value;
- Downtime: The PPA allows IRWD to curtail use of up to 3.3% of the power generated by the system for maintenance and other downtime occurrences. If IRWD curtails use of more than 3.3% of the power generated by the facility, IRWD would pay a penalty of \$0.135/kWh. For example, if the Baker Plant was not operating for three weeks over a one-year period while the solar panels were producing electricity, the anticipated penalty to IRWD would be approximately \$10,000 for that year;
- Purchase Price: The PPA provides the ability to purchase the system at two dates over the 25-year term. If IRWD chooses to purchase the system before the end of the term, the purchase price would be at the termination value, which would be greater than the project's fair market value; and
- Guarantee: SunPower provides a guarantee to produce up to 95% of the Project's estimated electrical capacity. If SunPower does not meet this guarantee, it would pay IRWD a penalty. The agreement includes certain warranty and Force Majeure exclusions.

The PPA was reviewed by special legal counsel at Kronick. Staff believes that these risks have a low probability of occurrence and, therefore, are of minimal risk to IRWD.

Options 2 and 3 – Alternative Ownership Options:

As an alternative to the PPA option, SunPower provided a cost estimate for IRWD ownership of the Project in which IRWD would pay SunPower to design, construct, operate and maintain the facilities. Under Option 2, IRWD would pay a capital cost of approximately \$3,300,000 to SunPower and IRWD would pay nothing for the cost of electricity from the Project. The Project would also be eligible to receive LCR funding through SunPower. Staff also reviewed a third option whereby an alternative third-party solar contractor would design and construct the Project with IRWD owning the facilities. IRWD would also operate and maintain the system. Under the third ownership option, LCR funding would not be available to IRWD.

Economic Analysis Results:

Staff prepared an economic analysis of the three options. The results of the economic analysis are included in Exhibit "C". The results include the net present values (NPV) over the life of the project for the three options. The PPA option (Option 1) and IRWD ownership through SunPower (Option 2) are of nearly equal value at \$1.8 million. If IRWD were to contract with an alternative third-party solar contractor (Option 3), the NPV would be approximately \$0.5 million over the life of the Project.

Another advantage of Option 1 is that IRWD is not required to make a large capital outlay (over \$3.3 million) at the beginning of the project. Instead, these funds can be invested by the District and will earn interest instead of being tied up in capital. Exhibit "C" shows the net present value of the interest earned with Option 1.

Preferred Option:

Even though the NPVs of the PPA option (Option 1) and IRWD ownership option through SunPower (Option 2) are nearly equal in value, staff recommends proceeding with the PPA option. The PPA would provide a turnkey facility that requires no capital investment and that would be of minimal operational risk to the District. As shown on the graph in Exhibit "C", the benefit of the PPA option is highest during years 1 through 15. At year 16, IRWD would have the option to purchase the system and at that time, staff would perform additional analysis to decide if the purchase of the system would be beneficial.

Staff has discussed the Project and the energy storage system with the Baker Plant participants. The participants understand that the benefits of the projects will predominantly be used to offset IRWD's variable electricity costs.

FISCAL IMPACTS:

Under the PPA described above as Option 1, SunPower will own the Project and will pay to design, construct, operate and maintain the solar facilities. The estimated cost of staff time associated with design review and inspection is \$33,000. These costs are included in the FY 2018-19 Operating Budget. The NPV over the 25-year life of the Project is estimated at approximately \$1.8 million.

ENVIRONMENTAL COMPLIANCE:

The IRWD Board of Directors approved Baker Water Treatment Plant Project Final Environmental Impact Report (EIR) on April 26, 2011. Section 15164 of the California Environmental Quality Act (CEQA) Guidelines provides for the preparation of an addendum to a previously certified EIR if some changes or additions to the project are necessary but none of the conditions described in CEQA calling for preparation of a subsequent EIR have occurred. IRWD's Board of Directors approved Addendum No. 1 to the Final EIR on March 15, 2012, and Addendum No. 2 to the Final EIR was approved on March 12, 2013. Addendum No. 3 to the Final EIR, which evaluated the environmental effects of installing on-site solar and energy storage facilities, was approved by IRWD's Board on March 12, 2018. A Notice of Determination was filed with the Orange County Clerk-Recorder and the State Clearinghouse on March 13, 2018.

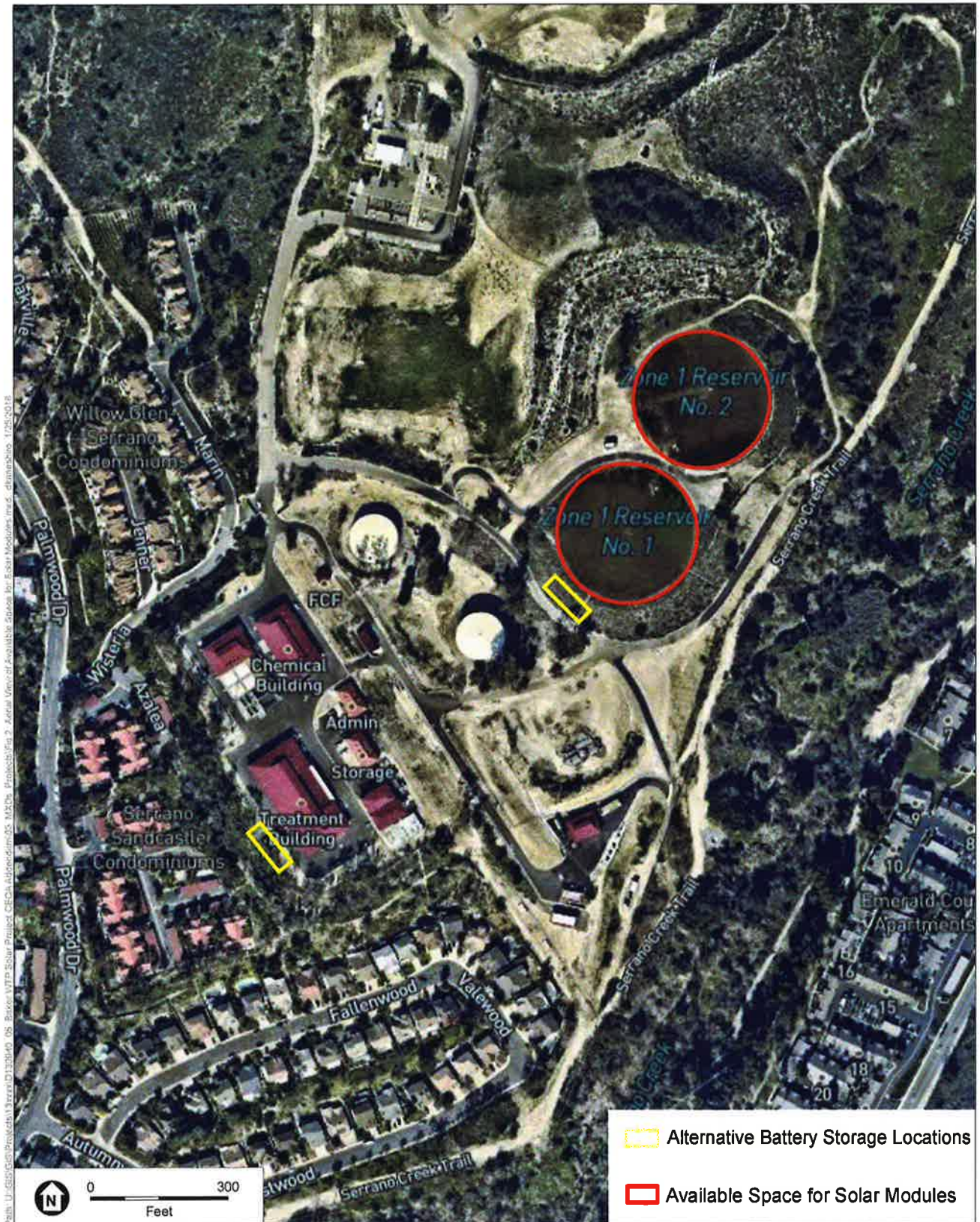
RECOMMENDATION:

That the Board authorize the General Manager to execute a Power Purchase Agreement with Solar Star IRWD Baker, LLC to own, design, construct, operate and maintain a photovoltaic system at the Baker Water Treatment Plant subject to non-substantive changes.

LIST OF EXHIBITS:

- Exhibit “A” – Baker Water Treatment Plant Proposed Energy Facilities Site Map
- Exhibit “B” – Power Purchase Agreement By and Between Solar Star IRWD Baker, LLC, as
Provider and Irvine Ranch Water District as Customer
- Exhibit “C” – Results of Economic Analysis of Baker Solar PPA and Ownership Options

EXHIBIT "A"



SOURCE: ESA, 2018

IRWD Baker WTP EIR Addendum No. 3

Aerial View of Baker WTP & Available Space for Proposed Modifications

EXHIBIT "B"

POWER PURCHASE AGREEMENT

Dated as of [____], 2018

by and between

Solar Star IRWD Baker, LLC,
as Provider

and

Irvine Ranch Water District
as Customer

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Exhibits, Schedules

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Schedule E	-	Schedule of Provider's Work

POWER PURCHASE AGREEMENT

This POWER PURCHASE AGREEMENT (as amended, amended and restated, supplemented or otherwise modified from time to time, the “Agreement”), dated as of [], 2018 (the “Effective Date”), is by and between Solar Star IRWD Baker, LLC, a limited liability company formed under the laws of the State of Delaware (“Provider”), and Irvine Ranch Water District, an independent special district formed under State of California Water District Law (California Water Code, Division 13) (“Customer”). Provider and Customer are sometimes referred to herein individually as a (“Party”) and collectively as the (“Parties”).

RECITALS:

WHEREAS, Customer owns, directly or indirectly, facilities in that certain location in California as more fully described in Appendix A to Exhibit D hereto (the “Site”);

WHEREAS, Customer desires that Provider install, maintain and operate, and Provider desires to install, maintain and operate, the System (as hereinafter defined) to be located on the Site; and

WHEREAS, Provider desires to sell, and Customer desires to purchase, the Solar Services (as hereinafter defined), consisting of the delivery of electrical energy (the “Energy”) generated by the System and other services pursuant to the terms and conditions set forth herein.

NOW THEREFORE, in consideration of the mutual promises set forth below, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

AGREEMENT:

1. Definitions.

Unless otherwise required by the context in which any term appears: (a) capitalized terms used in this Agreement shall have the respective meanings set forth in this Section 1; (b) the singular shall include the plural and vice versa; (c) the word “including” shall mean “including, without limitation”, (d) references to “Sections,” “Exhibits,” “Appendices” and the like shall be to sections, exhibits, appendices, etc. of or to this Agreement; (e) the words “herein,” “hereof” and “hereunder” shall refer to this Agreement as a whole and not to any particular section or subsection hereof; and (f) references to this Agreement shall include a reference to all exhibits hereto, as the same may be amended, modified, supplemented or replaced from time to time.

“Actual Generation” shall mean, for each Contract Year, the System’s alternating current electricity production in kilowatt-hours (“kWh”) delivered to and consumed by the Customer.

“Agreement” shall have the meaning set forth in the preamble.

“Annual Rate Escalator” shall mean the percentage set forth in Schedule C.

“Applicable Law” shall mean, with respect to any Governmental Authority, any constitutional provision, law, statute, rule, regulation, ordinance, treaty, order, decree, judgment, decision, certificate, holding, injunction, registration, license, franchise, permit, authorization, guideline, governmental approval, consent or requirement of such Governmental Authority, enforceable at law or in equity, along with the interpretation and administration thereof by any Governmental Authority.

“Capacity Product” shall mean those benefits associated with the capacity of the System that Provider is selling to the Utility pursuant to the LCR Program.

“Claim Notice” shall have the meaning set forth in Section 13.3.

“Commercial Operation Date” shall have the meaning set forth in Section 3.4.

“Confidential Information” shall have the meaning set forth in Section 15.

“Curtailment Cap” shall have the meaning set forth in Section 5.1.2.

“Customer” shall have the meaning set forth in the preamble.

“Customer-caused Outage” shall have the meaning set forth in Section 5.1.2.

“Customer Default” shall have the meaning set forth in Section 11.1.

“Customer ESS” shall mean the energy storage system located on the Site with an expected 1,000 kW / 6,000 kWh rating to be installed under a separate energy management services agreement between the Customer and a separate third party not affiliated with the Provider.

“Deemed Delivered Energy” shall mean the quantity of Energy, expressed in kWh, that is the lesser of: (i) the quantity of Energy Provider reasonably calculates would have been produced by the System and delivered to the Interconnection Point during a relevant measurement period; and (ii) the quantity of Energy the System produced for the same day and hourly period of production in the preceding year. .

“Effective Date” shall have the meaning set forth in the preamble.

“Energy” shall have the meaning set forth in the preamble.

“Contract Year” shall have the meaning set forth in Section 5.1.2.

“Environmental Attributes” includes, without limitation, Tradable Renewable Certificates, green-e tags, allowances, reductions or other transferable indicia denoting carbon offset credits or indicating generation of a particular quantity of energy from a renewable energy source by a renewable energy facility attributed to the Energy during the Term created under a renewable energy, emission reduction, or other reporting program adopted by a Governmental Authority, or for which a registry and a market exists (which, as of the Effective Date are certificates issued by Green-e in accordance with the Green-e

Renewable Electric Certification Program, National Standard Version 1.3 administered by the Center of Resource Solutions) or for which a market may exist at a future time.

“Environmental Financial Incentives” shall mean each of the following financial rebates and incentives that is in effect as of the Effective Date or may come into effect in the future: (i) performance-based incentives, rebates and any other incentive programs offered by or in the State of California (or any political subdivision thereof) under the federal government’s, any municipality’s, any utility’s or any other state’s solar program or initiative, incentive tax credits (including investment tax credits arising under the Code) other tax benefits or grants in lieu thereof (including without limitation the monetization of tax benefits), and accelerated depreciation (collectively, “incentives”), howsoever named or referred to, with respect to any and all fuel, emissions, air quality, energy generation, or other environmental or energy characteristics, resulting from the construction, ownership or operation of the System or from the use of solar generation or the avoidance of the emission of any gas, chemical or other substance into the air, soil or water attributable to the sale of Energy generated by the System; and (ii) all reporting rights with respect to such incentives.

“Estimated Year 1 Production” shall mean the amount set forth in Schedule B to this Agreement.

“Evaluator” shall mean an evaluator appointed pursuant to the LCR Program to undertake certain examinations, testing, inspections, measurement, and other review of the System and Meters at the Site pursuant to the LCR Program.

“Expected Energy” shall have the meaning set forth in Exhibit C.

“Expiration Date” shall have the meaning set forth in Section 10.1.

“Fair Market Value” shall have the meaning set forth in Section 10.3.2.

“Financing Party” means any third-party entity providing debt or equity financing to Provider with respect to the System (or any successor or assignee thereof), including without limitation a party providing construction financing, a lessor in a sale-leaseback transaction and a partner or member in a partnership flip transaction.

“Force Majeure Event” shall mean, when used in connection with the performance of a Party’s obligations under this Agreement, any of the following events to the extent not caused by such Party or its agents or employees:

- a) war, riot, acts of a public enemy or other civil disturbance;
- b) acts of God, including but not limited to, storms, floods, lightning, earthquakes, hailstorms, ice storms, tornados, typhoons, hurricanes, landslides, volcanic eruptions, range or forest fires, and objects striking the earth from space (such as meteorites), sabotage or destruction by a third party (other than any contractor retained by or on behalf of the Party) of

facilities and equipment relating to the performance by the affected Party of its obligations under this Agreement; and

- c) acts of federal, state or local government agencies, including changes in Applicable Law, that result in increasing Provider's costs of construction and installation, or continuing annual operation, of the System by 15% or more; and
- d) strikes, walkouts, lockouts or similar industrial or labor actions or disputes.

"Governmental Authority" shall mean any federal, state, regional, county, town, city, or municipal government, whether domestic or foreign, or any department, agency, bureau, or other administrative, regulatory or judicial body of any such government.

"In Lieu of Electricity Payment" means the amount for the applicable year as set forth in the following table where the change in payment in Contract Year 16 occurs because the LCR Program incentive's duration is 15 years:

Contract Year	In Lieu of Electricity Payment (\$ / kWh)
1	\$0.135
2	\$0.135
3	\$0.135
4	\$0.135
5	\$0.135
6	\$0.135
7	\$0.135
8	\$0.135
9	\$0.135
10	\$0.135
11	\$0.135
12	\$0.135
13	\$0.135
14	\$0.135
15	\$0.135
16	\$0.075
17	\$0.075
18	\$0.075
19	\$0.075
20	\$0.075
21	\$0.075
22	\$0.075
23	\$0.075

24	\$0.075
25	\$0.075

“Indemnified Party” shall have the meaning set forth in Section 13.3.

“Indemnifying Party” shall have the meaning set forth in Section 13.3.

“Interconnection Point” shall have the meaning set forth in Section 3.5.

“Invoice” shall have the meaning set forth in Section 6.3.1.

“kWh Rate” shall have the meaning set forth in Section 6.1.

“kWp” shall mean maximum kW direct current capacity.

“LCR Program” shall mean the contractual arrangements and related regulatory approvals and requirements by which Provider is selling to the Utility the Capacity Product.

“Lease” shall mean the Site Lease Agreement in respect of the Site entered into by Provider and Customer as of the date hereof and attached as Exhibit D.

“Liens” shall have the meaning set forth in Section 7.1.3.

“Load Curtailment” shall have the meaning set forth in Section 5.1.2.

“Meter” shall have the meaning set forth in Section 4.3.1.

“Monthly Period” shall mean the period commencing on the Commercial Operation Date and ending on the last day of the calendar month in which the Commercial Operation Date occurs, and, thereafter, all subsequent one (1) month periods during the Term.

“Monthly Production” shall mean, for each Monthly Period, the amount of Energy delivered during such Monthly Period.

“O&M Work” shall have the meaning set forth in Section 4.1.

“Party” shall mean each of Customer and Provider (and/or any successor or permitted assignee thereof).

“Person” shall mean any individual, corporation, partnership, company, limited liability company, joint venture, association, trust, unincorporated organization or Governmental Authority.

“Provider” shall have the meaning set forth in the preamble (and includes its successor(s) and permitted assignee(s)). For purposes of access rights and other rights necessary for Provider to perform its obligations and responsibilities hereunder, the term “Provider” shall include Provider’s authorized agents, contractors and subcontractors.

“Provider Default” shall have the meaning set forth in Section 11.2.

“Renewal Rate” shall mean the fair market price for electricity generated by solar PV systems as determined by agreement of the Parties or through the appraisal process applicable to the purchase option contained in this Agreement.

“Reporting Rights” means the right to report ownership of the Environmental Attributes or the Environmental Financial Incentives associated with the Energy to any federal, state, or local agency, authority or other party, including without limitation under Section 1605(b) of the Energy Policy Act of 1992 and provisions of the Energy Policy Act of 2005, or under any present or future domestic, international or foreign emissions trading program.

“Site” shall have the meaning set forth in the first recital.

“Solar Services” shall mean all services provided to Customer by Provider hereunder, including the provision of Energy.

“Standards” shall have the meaning set forth in Section 3.1.1.

“System” shall mean the solar photovoltaic system installed pursuant to this Agreement at the Site and more fully described in Schedule B hereto; provided, however, that the term “System” shall only include equipment and materials up to but not including the Interconnection Point of the System.

“Term” shall have the meaning set forth in Section 10.1.

“Termination Date” shall have the meaning set forth in Section 10.1.

“Termination Value” shall mean, on any date of determination (or, if such date is not a scheduled termination date, the scheduled termination date immediately preceding such date) the applicable amount specified for such date on Schedule D to this Agreement, under column 1 or 2, as applicable.

“Transfer Taxes” shall have the meaning set forth in Section 6.2.1.

2. Purchase and Sale of Solar Services

Customer engages Provider to provide the Solar Services to Customer, and Provider agrees to provide the Solar Services to Customer, all in accordance with the terms and conditions set forth herein. Customer shall provide Provider and Evaluator with access to the Site in accordance with the terms of the Lease. Provider may retain one or more contractors or

subcontractors to fulfill its obligations hereunder; provided that Provider shall remain liable for performance of its obligations hereunder.

3. Construction, Installation and Testing of System.

3.1 Installation.

Subject to Section 3.2, Provider will cause the System to be designed, engineered, installed and constructed at the Site substantially in accordance with the terms of this Agreement and the Lease. Customer shall have the right to review and approve, such approval not to be unreasonably withheld or delayed, all construction plans, including engineering evaluations of the impact of the System on the structural integrity and strength of the location where the System is installed on or near Customer's buildings. Provider shall organize the procurement of all materials and equipment for the installation work and maintain the same at the Site. Subject to the terms of the Lease, Provider shall perform installation work at the Site during the times set forth in Exhibit A and Schedule B in a manner that minimizes inconvenience to and interference with Customer's and Customer's invitees' and Customers' use of the Site to the extent commercially practical. Notwithstanding the foregoing, in the event that Provider determines in its sole discretion that it is unable to install the System at the Site, it shall be under no obligation to do so, and this Agreement shall terminate and be of no further force and effect upon written notice from Provider to Customer to that effect.

3.1.1 Standard System Design Package. Exhibit A sets forth the standard assumptions made by the Provider regarding the Site conditions, electrical conditions and System attributes (the "Standards"). Schedule B sets forth the known actual conditions for the Site and the System, including deviations from the Standards. The Standards are such that the described items for the System will not need repair, replacement, modification or construction beyond that described in Exhibit A and the applicable Schedule B in order for Provider to properly construct and install the System. If the construction and installation of the System is required for any reason to deviate from the Standards and Schedule B, Provider will notify the Customer and provide an estimate of any incremental cost to Customer and Customer will have the option to (i) pay the incremental cost at the time the cost is incurred and billed to the Customer, (ii) pay the incremental cost over the Term through a calculated increase in the kWh Rate, (iii) elect an alternative location subject to the conditions of Section 3.1.2, (iv) propose a negotiated solution, or (v) decline any of the above options. If Customer declines any of the above options, Provider will have the right to terminate the Agreement per Section 3.1 above at no cost to the Customer and no Termination Values will be due.

3.1.2 Alternative Location. Prior to the Commercial Operation Date, if the Customer's interest in the Site is a leasehold interest and the Customer is unable to obtain the landlord's consent in accordance with the Lease or Customer chooses an alternative location per Section 3.1.1, Customer will have the option to elect an alternative location if Environmental Attributes and Environmental Financial Incentives financially equivalent to or better than those associated with the original location are available for the alternative location, and if the expected

System kWh output and construction cost at the alternative location are equivalent to or superior than those associated with the originally proposed location. A system located in this alternative location must be eligible for inclusion in the LCR Program unless Provider waives such requirements in its sole discretion. Such alternative location is subject to Provider approval, not to be unreasonably withheld. If an alternative location cannot be established, Provider will have the right to terminate per Section 3.2.

3.2 Conditions Precedent to Commencement of Construction and Installation.

3.2.1 Commencement by the Provider of construction and installation activities shall be subject to the satisfaction of the following conditions precedent (in addition to the condition set forth in Section 3.3):

Provider shall have closed financing for construction and long-term ownership of the System and the Solar Services to be performed at the Site and, to the extent required pursuant to the applicable financing documentation, the third party financing institution providing such financing shall have been provided with the materials referred to in Section 14.17 and Section 16;

- (a) Provider shall have full commitment and executed LCR Program agreements with the Utility for the System which satisfy the Provider's and relevant Financing Party's expectations at the Provider's sole discretion;
- (b) Provider and Customer shall have executed a Lease for the Site and, if Customer's interest is a leasehold interest, the consent of the Customer's landlord for the Site shall have been obtained in accordance with the Lease;
- (c) Provider shall have entered into the applicable contract(s) for construction and installation of the System, subject to the terms of the applicable financing, if any;
- (d) Provider shall have obtained the permits, licenses and other approvals required by Applicable Law to be obtained by Provider prior to such commencement; and
- (e) Provider shall have received satisfactory notice that the applications for Environmental Financial Incentives for the System have been accepted and approved by the appropriate governing agency;
- (e) Provider shall have received from Customer satisfactory evidence that the project—including the System, the Lease, and the work and Solar Services described in this Agreement—is exempt from the regulatory jurisdiction of local agencies (including zoning, building, and land-use

requirements) or that all required local agency approvals and permits have been obtained.

provided, however, that if any of the foregoing conditions precedent have not been satisfied on or before June 31st, 2019, Provider shall have the option to terminate this Agreement without triggering the default provisions of this Agreement or any liability under this Agreement. Alternatively, in the event that such conditions precedent are not satisfied by such date, the Parties may mutually agree to amend this Agreement to revise the Commercial Operation Date and term of this Agreement.

3.3 Utility Approvals.

Notwithstanding that Provider shall have the primary responsibility for preparing applications and obtaining all permits, licenses and approvals required for the performance of work under this Agreement, Customer agrees to assist Provider in obtaining necessary permits, licenses and approvals in connection with the installation, operation and maintenance of the System, including the submission of applications for interconnection of the System with the local electric utility. Customer shall not make any material changes to its electrical equipment at the Site after the date on which the applicable utility interconnection application is submitted unless any such changes, individually or in the aggregate, would not adversely affect the approval by such utility of such interconnection. Should the local electric utility fail to approve the interconnection of the System or require equipment in addition to the equipment set forth in Schedule B in connection with the Site, Provider may, at Provider's option, terminate this Agreement immediately subsequent to notification from the local utility. The Parties shall not be obligated to go forward with installation of the System if the applicable utility approvals are conditioned upon material upgrades to the existing electrical infrastructure and neither Party elects to provide for such upgrades. Customer also agrees to assist Provider and make all necessary repairs or changes to the existing electrical infrastructure so that the Site and System are eligible for the Environmental Financial Incentives and participation in the LCR Program, at Provider's sole cost and expense. Notwithstanding the foregoing, Provider acknowledges that Customer may add the Customer ESS, which may impact the approval timing for the interconnection agreement and the equipment needed on the Site.

3.4 Energy Delivery.

The date on which the delivery of Energy commences (the "Commercial Operation Date") shall be the date on which all of the following shall have occurred: (a) Provider shall have certified to Customer that the System is substantially complete and available for commercial operation, (b) all permits and licenses required to be obtained under Applicable Law in connection with the operation of the System shall have been obtained and be in full force and effect, and (c) Customer shall have entered into an interconnection agreement with the local electricity utility. In no event shall Provider have any liability to Customer for a delay in the Commercial Operation Date.

3.5 Risk of Loss; Exclusive Control.

As between the Parties, Provider will be deemed to be in exclusive control (and responsible for any property damage or injuries to persons caused thereby) of the Energy up to but excluding the point where the System is interconnected to Customer's electrical intertie (the "Interconnection Point") and Customer will be deemed to be in exclusive control (and responsible for any property damage or injuries to persons caused thereby) of the Energy at and from the Interconnection Point. Risk of loss related to Energy will transfer from Provider to Customer at the Interconnection Point.

3.6 Termination Values.

The Parties acknowledge and agree that the Termination Values with respect to the System provided by Provider as of the Effective Date and set forth in Schedule D in the Appendix relevant to the System are an estimate and are subject to change by Provider pending final review by Provider's lenders of this Agreement and the credit worthiness of the Customer. Provider shall use its commercially reasonable efforts to submit to its Financing Parties within five (5) business days from the Effective Date, all documentation required by such lender to process the loan in connection with the System. Within ninety (90) days from the date of such submittal, Provider will notify Customer whether an amendment to the Termination Values set forth herein will be required, and if yes, shall provide Customer with written notice thereof, setting forth in detail the new Termination Values required by Provider. If, after the expiration of such ninety (90) day period, Provider does not notify Customer that new Termination Values shall be required, the Termination Values set forth herein shall be deemed accepted by both Parties. If Provider timely provides new Termination Values, then, upon receipt of the new Termination Values by Customer, Customer shall, within fifteen (15) business days from receipt of such new Termination Values, either accept or reject in writing such new Termination Values. If Customer fails to timely reject such new Termination Values in writing, or if Customer accepts such new Termination Values, this Agreement shall be deemed amended to incorporate such new Termination Values. If Customer timely rejects such new Termination Values, Provider may, within fifteen (15) business days from receipt of Customer's rejection, propose to (i) proceed with the Termination Values as set forth herein; or (ii) propose new Termination Values to Customer, in which case the procedure set forth above shall be repeated one time only. If the Parties are unable to reach agreement with respect to the Termination Values, either Party shall have the right to terminate this Agreement, in which case neither Party shall be deemed in default hereunder and neither Party shall have any further liability to the other Party in connection herewith. Customer agrees to confirm final Termination Values in such certificates or acknowledgments to be delivered by Customer for the benefit of the Lender as provided in Section 14.17.

3.7 Customer ESS.

As a material obligation, Customer agrees that the Customer ESS shall not directly or indirectly affect the operation or value of the System. Customer acknowledges that any interference with the System's ability to meet its requirements under the LCR Program affects its operation and value. Customer may not have any additional technologies installed at the Site if such technologies negatively impact the operation or value of the System.

4. Operation and Maintenance of System.

4.1 O&M Work.

4.1.1 O&M Work. Provider shall provide operation, repair, monitoring and maintenance services to the System during the Term of this Agreement, including the monitoring and maintenance of metering equipment determining the quantity of electricity produced by the System (collectively, the "O&M Work"). Provider shall maintain during the Term of this Agreement the capability to provide such O&M Work, either directly or indirectly (under a contract with SunPower Corporation, Systems or with another affiliate so long as such affiliate subcontracts the performance of the O&M Work to SunPower Corporation, Systems), or a third-party service provider capable of providing comparable services. Provider shall perform, or cause to be performed, the O&M Work to ensure that the System is capable of delivering Energy in accordance with the specifications set forth in Schedule B. Provider shall have the obligation to use commercially reasonable efforts to enforce the terms of any any contract for operations and maintenance services to which it is a party and System warranty agreements.

4.2 Malfunctions and Emergencies.

4.2.1 Each of Customer and Provider shall notify the other within twenty-four (24) hours following the discovery by it of (a) any material malfunction in the operation of the System or (b) an interruption in the supply of Solar Services. Provider and Customer shall each designate personnel and establish procedures such that each Party may provide notice of such conditions requiring Provider's repair or alteration at all times, twenty-four (24) hours per day, including weekends and holidays. Each Party shall notify the other Party immediately upon the discovery of an emergency condition in the System.

4.2.2 Provider shall commence repairs to any malfunctioning System and restore the supply of Energy as soon as reasonably possible after notice or upon its own discovery of any of the conditions specified in Section 4.2.1 during normal business hours and, subject to Section 2, take steps to mobilize personnel to commence repairs after notice or discovery of a condition requiring repair or other corrective action. If an emergency condition exists, Provider shall dispatch the appropriate personnel immediately upon becoming aware thereof to perform the necessary repairs or corrective action in an expeditious and safe manner. For routine and emergency repairs, the Parties shall contact the persons set forth below:

If to Provider:

Neil Bautista, Sr. Manager Field Service West Region

1414 Harbour Way South, Ste. 1901

Richmond, CA 94804

(512) 735 - 0121 or (800) 251-9728

Nathaniel.Bautista@sunpowercorp.com with a copy to: customer.service@sunpower.com

4.3 Metering.

4.3.1 Maintenance and Testing. Maintenance and Testing. Provider shall install and maintain a utility-grade kilowatt-hour (“kWh”) meter (“Meter”) at the Site for the measurement of Energy provided to Customer, which shall measure the kWh output of the System on a continuous basis. Upon Customer’s written request, Provider shall furnish a copy of all technical specifications and accuracy calibrations for the Meter, as well as all metering data and energy production calculations. Provider shall test the Meter in compliance with manufacturer’s recommendations.

4.3.2 Customer Audits and Inspections. Subject to Section 5.1.2, Customer shall have the right to audit all Meter data upon reasonable notice, and any such audit shall be at Customer’s sole cost; provided, however, that Provider shall reimburse Customer for the reasonable, documented costs actually incurred in connection with such audit if the audit reveals that bills provided to Customer were overstated by Two Percent (2%) or more. Customer shall have a right of access to all meters at reasonable times and with reasonable prior notice for the purpose of verifying readings and calibrations. Evaluator may have the right to audit all Meter data upon reasonable notice, and any such audit shall not be at the cost of the Customer.

4.3.3 Adjustments. If testing of the Meter pursuant to Section 4.3.1 or Section 4.3.2 indicates that the Meter is in error by more than two percent (2%), then Provider shall promptly repair or replace the Meter. Provider shall make a corresponding adjustment to the records of the amount of Energy based on such test results for (a) the actual period of time when such error caused inaccurate Meter recordings, if such period can be determined to the mutual satisfaction of the Parties, or (b) if such period cannot be so determined, then a period equal to one-half (1/2) of the period from the later of (i) the date of the last previous test confirming accurate metering and (ii) the date the Meter was placed into service; provided, however, that such period shall in no case exceed two (2) years.

4.3.4 Disputes. Any dispute arising out of the reading or calibration of the Meter shall be resolved in accordance with the procedures set forth in Section 6.3.2.

4.4 Title to System.

Provider, or Provider’s permitted assigns with respect to the System, shall at all time retain title to and be the legal and beneficial owner of the System, including

the right to any tax credits available under federal or state law, and the System shall remain the property of Provider or Provider's assigns. The System shall remain the personal property of Provider or Provider's assigns and shall not attach to or be deemed a part of, or fixture to, the Site. The System shall at all times retain the legal status of personal property. Provider shall be entitled to, and is hereby authorized to, file one or more precautionary UCC financing statements or fixture filings, as applicable, in such jurisdictions as it deems appropriate with respect to the System in order to protect its rights in the System. The System shall be clearly marked and identified as being the property of the Provider or Provider's assigns. The Parties intend that neither Customer nor any party related to Customer shall acquire the right to operate the System or be deemed to operate the System.

4.5 Reserved.

4.6 Compliance with Utility Specifications.

Provider shall ensure that all Energy generated by the System conforms to applicable utility specifications for energy being generated and delivered to the Site's electric distribution system, which shall include the installation of proper power conditioning and safety equipment, submittal of necessary specifications, coordination of utility testing and verification, and all related costs.

5. Purchase of Solar Services.

5.1 Purchase Requirement; Load Curtailment.

5.1.1 Purchase Requirement. Subject to Sections 5.1.2 and 9, Customer agrees to purchase one hundred percent (100%) of the Energy generated by the System during the Term of this Agreement (including Deemed Delivered Energy). While the Solar Services are calculated and billed on the basis of kWh of Energy as set forth in Section 6.1, Customer acknowledges and agrees that such Solar Services represent a package of services including the production and supply of electrical energy output from the System together with any other services associated with solar energy production that Provider may provide to Customer (e.g. including Environmental Attributes, but excluding Environmental Financial Incentives and the Capacity Product). The payment for Solar Services is calculated to include all of the above services in the price per kWh of Energy provided to the Site through the System. Neither Party may claim that by this Agreement Provider is an electric utility subject to regulation as an electric utility or subject to regulated electricity rates. Provider shall not claim to be providing electric utility services to Customer and shall not interfere with Customer's ability to select an electric utility provider except that, to the extent Customer has a choice in selecting an electric utility provider or electricity provider, Customer shall not select an electric utility provider or electricity provider that requires,

as part of their conditions for service, removal or discontinued operation of the System or the sales hereunder or that impairs or reduces the value of the System's participation in the LCR Program.

5.1.2 Limitations on Purchase Requirement. Notwithstanding Customer's obligation to purchase 100% of the Energy generated by the System during the Term, during each consecutive one-year period of the Term commencing on the Commercial Operation Date and ending on the date immediately preceding the one-year anniversary thereof, and each subsequent one-year period (each an "**Contract Year**"), in order to accommodate a certain amount of "Customer-caused Outages" (as defined below), Customer may decline to accept (and, if not accepted, decline to pay for) Energy in an amount not exceeding five and fourteen hundredth percent (3.3%) of the amount of Energy that the System would have generated during such Contract Year if there had been no Customer-caused Outages during such Contract Year, inclusive of any Outages or curtailments that are due to the operation of the Customer ESS. A "**Customer-caused Outage**" shall be the following voluntary reduction in the amount of Energy consumed by Customer from the System during any Contract Year that satisfies either of the following: (i) such reduction was for the purpose of permitting Customer to make repairs or perform maintenance or other activities at the Site (including major roof repair at the Site) and Customer notified Provider at least forty-eight (48) hours in advance of the System being taken off-line; or (ii) such reduction was the result of Customer requiring Provider to curtail deliveries of Energy by the System due to reductions in Customer's onsite load and to prevent the export of Energy generated by the System because such generation exceeds Customer's onsite load. Following the end of each such Contract Year in which any Customer-caused outages occurred, Customer shall pay the In Lieu of Electricity Payment for each kWh of Deemed Delivered Energy in excess of the [3.3%] threshold described above that Customer fails to accept during such Contract Year. The determination of whether or not any Customer-caused outages occurring during the subject Contract Year exceed the permitted [3.3%] threshold described above shall be made at the end of such Contract Year and calculated in the aggregate across the entirety of such Contract Year. Following each Contract Year described in the immediately preceding sentence, Provider will invoice Customer, at the In Lieu of Electricity Payment rate and pursuant to Article 6, for each kWh of Deemed Delivered Energy in excess of the aforesaid [3.3%] threshold. In addition unless excused by a Force Majeure event, if, during any two (2) consecutive Contract Years, Customer fails to accept at least one hundred seventy percent (170%) of the Energy that the System would have generated during the first year of said two Contract Year period but for Customer-caused Outages occurring therein, such failure will constitute a Customer Default, and if Provider terminates this Agreement based on such Customer Default, and Customer will be obligated to pay the then-applicable Termination Value as provided in Section 12.2 below.

5.1.3 Reserved

5.2 Environmental Attributes; Environmental Financial Incentives.

5.2.1 Environmental Attributes. All Environmental Attributes and associated Reporting Rights available in connection with the System are retained and owned by Customer or its assignee. Provider shall take all reasonable measures to assist Customer in obtaining all Environmental Attributes currently available or subsequently made available in connection with the System. At Customer's request and expense, Provider shall execute all such documents and instruments reasonably necessary or desirable to effect or evidence Customer's or its assignee right, title and interest in and to the Environmental Attributes. If the standards used to qualify the Environmental Attributes to which Customer is entitled under this Agreement are changed or modified, Provider shall, at Customer's request and expense, use all reasonable efforts to cause the Environmental Attributes to comply with new standards as changed or modified. If Provider fails to act in good faith in completing documentation or taking actions reasonably requested by Customer, and such failure results in the loss of an Environmental Attribute that would otherwise be available, Provider shall reimburse Customer for the full amount of such lost Environmental Attribute.

5.2.2 Environmental Financial Incentives. All Environmental Financial Incentives and associated Reporting Rights available in connection with the System are retained and owned by Provider or its assignee. Customer shall take all reasonable measures to assist Provider in obtaining all Environmental Financial Incentives currently available or subsequently made available in connection with the System. At Provider's request and expense, Customer shall execute all such documents and instruments reasonably necessary or desirable to effect or evidence Provider's or its assignee right, title and interest in and to the Environmental Financial Incentives. If the standards used to qualify the Environmental Financial Incentives to which Provider is entitled under this Agreement are changed or modified, Customer shall, at Provider's request and expense, use all reasonable efforts to cause the Environmental Financial Incentives to comply with new standards as changed or modified. If Customer fails to act in good faith in completing documentation or taking actions reasonably requested by Provider, and such failure results in the loss of an Environmental Attribute that would otherwise be available, Customer shall reimburse Provider for the full amount of such lost Environmental Attribute.

5.2.3 To avoid any conflicts with fair trade rules regarding claims of solar or renewable energy use, Customer, if engaged in commerce or trade, shall submit to Provider for approval any press releases regarding Customer's use of solar or renewable energy and shall not submit for publication any such releases without the written approval of Provider, which approval shall not be unreasonably withheld or delayed. Customer and Provider may by mutual written agreement set forth specific statements that may be used by Customer in any press releases that address Customer's use of solar or renewable energy provided pursuant to this Agreement.

5.2.4 Customer shall not take any action or suffer any omission that would have the effect of impairing the value to the Provider of the Environmental Attributes and Environmental Financial Incentives. Customer shall be solely responsible for notifying Provider of any action or omission that could impair such value and for consulting with Provider as necessary to prevent impairment of the value of Environmental Attributes and Environmental Financial Incentives.

5.2.5 Provider or its assignee will at all times retain all tax credits and related tax benefits (including depreciation) associated with the System.

6. Price and Payment.

6.1 Price.

Customer shall pay Provider for the Energy provided pursuant to the terms of this Agreement at the rate per kWh (the “kWh Rate”) set forth in Schedule C for the applicable period, plus any In Lieu of Electricity Payment or any adjustments required pursuant to Section 3.1.1, plus any additional amount required pursuant to Section 6.2. Notwithstanding the foregoing, in the event that Customer elects to renew this Agreement pursuant Section 10.3.1, Customer shall pay the Renewal Rate for Energy delivered during such renewal period.

6.2 Taxes.

6.2.1 Customer Taxes. Provider shall invoice Customer for, and Customer shall pay (and shall indemnify and hold Provider harmless on an after-tax basis from and against) all sales, use, excise, ad valorem, transfer and other similar taxes (“Transfer Taxes”), but excluding in all events taxes based on or measured by net income, that are imposed by any taxing authority arising out of or with respect to the purchase or sale of the Solar Services (regardless of whether such Transfer Taxes are imposed on Provider or Customer), together with any interest, penalties or additions to tax payable with respect to such Transfer Taxes, unless such interest, penalties or additions to tax payable with respect to such Transfer Taxes are due to Provider’s failure to timely remit any such Transfer Taxes or to file any returns required by the appropriate taxing authority, and Provider shall indemnify and hold Customer harmless in such excepted cases. If Customer shall be required to by law to withhold or deduct any Transfer Taxes or other taxes imposed by any jurisdiction or any political subdivision from or in respect of any sum payable hereunder, the sum payable shall be increased as may be necessary so that, after taking all required deductions, Provider shall have received an amount equal to the sum it would have received had no such deductions been made. Provider will pay any ad valorem property tax imposed by any taxing authority on the System.

6.2.2 Provider Taxes. Provider will pay and hold harmless Customer from any sales or use tax imposed upon Customer arising from this Agreement, other than as set forth in the preceding Section 6.2.1, including but not limited to Provider's manufacture, installation and acquisition of the System. Provider will pay and hold harmless Customer from property tax, if any, assessed on (i) Provider’s use of the portion of the Site on which the System is installed, to the extent described in the Lease; (ii) the System or Provider’s ownership, installation or use thereof; or (iii) any other aspect of this Agreement. Notwithstanding the foregoing, Customer shall pay and hold harmless Provider from sales and use taxes, if any, arising upon the transfer, if any, of both legal and beneficial ownership of the System to Customer pursuant to this Agreement.

6.3 Billing and Payment.

Billing and payment for the Solar Services sold and purchased under this Agreement and any other amounts due and payable hereunder shall be as follows:

6.3.1 Payments. Subject to adjustment in accordance with the following sentences of this Section 6.3.1, Customer shall pay to Provider for each Monthly Period during the Term within thirty (30) days after receipt of any invoice ("Invoice") a payment for the Energy delivered by the System and any In Lieu of Electricity Payment during each such Monthly Period equal to the sum of (1) product of (a) Monthly Production for the System for the relevant month multiplied by (b) the then applicable kWh Rate plus (2) product of (a) Deemed Delivered Energy for the relevant month multiplied by (b) the then applicable In Lieu of Electricity Payment, which payment shall be made by check to:

Solar Star IRWD Baker, LLC
Attn: Commercial Asset Management Group
c/o SunPower Corporation, Systems
1414 Harbour Way South, Suite 1901
Richmond, CA 94804

Payment may also be made by wire transfer of immediately available funds upon receipt of specific instructions by Provider. Upon receipt of written direction and instructions from Provider and Provider's lender, all payments to be made by the Customer to the Provider under this Agreement shall be made directly to the Provider's lender or its agent designated in a writing addressed to Customer from time to time.

6.3.2 Invoice Errors. Within thirty (30) days after receipt of any invoice, Customer may provide written notice to Provider of any alleged error therein (including any error resulting from Meter adjustments pursuant to Section 4.3.3). Customer shall pay all undisputed amounts, including the undisputed portion of any invoice, in accordance with the instructions set forth for payment under Section 6.3.1. If Provider notifies Customer in writing within thirty (30) days of receipt of such notice that Provider disagrees with the allegation of error in the invoice, the Parties shall meet, by telephone conference call or otherwise, within ten (10) days of Customer's response for the purpose of attempting to resolve the dispute. If the Parties are unable to resolve the dispute within thirty (30) days after such initial meeting, such dispute shall be submitted to arbitration administered by the American Arbitration Association in accordance with its then-existing Commercial Arbitration Rules. The arbitration shall take place in Alameda County, California before a single arbitrator selected in accordance with the Commercial Arbitration Rules. The decision of the arbitrator in the matter shall be final and binding upon the Parties and judgment on the award rendered by the arbitrator may be entered in any court having jurisdiction. The Parties agree that the arbitrator shall have the power to award damages, injunctive relief and reasonable attorneys' fees and expenses to either Party in such arbitration; provided that this arbitration provision does not prevent either Party from seeking interim injunctive relief from a court in order to preserve the status quo.

6.3.3 Late Payments. All payments hereunder shall be made without setoff or deduction. Any payment not made within the time limits specified in Section 6.3.1 shall bear interest from the date on which such payment was required to have been made through and including the date on which such payment is actually received by the Provider. Such interest shall accrue at a monthly rate equal to the lesser of the then prevailing prime rate of interest as published in The Wall Street Journal or the maximum interest rate permitted by Applicable Law.

7. General Covenants.

7.1 Provider's Covenants.

As a material inducement to Customer's execution and delivery of this Agreement, Provider covenants and agrees to the following:

7.1.1 Permits and Approvals. Subject to Section 3.2, Section 3.3, and Section 7.2, while providing Solar Services, Provider shall obtain and maintain all approvals, consents, licenses and permits from relevant Governmental Authorities, utility personnel, and (to the extent known to Provider) the Site's owners, if Customer is not the owner of the Site, and other agreements and consents required to be obtained and maintained by Provider and to enable Provider to perform such work. Provider shall deliver copies of all permits and approvals obtained pursuant to this Section to Customer.

7.1.2 Health and Safety. Provider shall take all reasonably necessary safety precautions in providing the Solar Services and shall comply in all material respects with all Applicable Laws pertaining to the safety of persons and real and personal property.

7.1.3 Removal of Liens. Provider shall not directly or indirectly cause, create, incur, assume or suffer to exist any mortgage, pledge, lien (including mechanics', laborers' or materialmen's liens), charge, security interest, encumbrance or claim of any nature ("Liens") on or with respect to the Site or any interest therein; provided that this Section 7.1.3 shall not limit Liens on the System. If Provider breaches its obligations under this Section, it shall immediately notify Customer in writing, shall promptly cause such Lien to be discharged and released of record without cost to Customer, and shall defend and indemnify Customer against all costs and expenses (including reasonable attorneys' fees and court costs at trial and on appeal) incurred in discharging and releasing such Lien.

7.1.4 Provider Records. Provider shall keep complete and accurate records of its operations hereunder and shall maintain such data as may be necessary to determine with reasonable accuracy any item relevant to this Agreement. Customer shall have the right to examine all such records insofar as may be necessary for the purpose of ascertaining the reasonableness and accuracy of any statements of costs relating to transactions hereunder.

7.2 Customer's Covenants.

As a material inducement to Provider's execution of this Agreement, Customer covenants and agrees as follows:

7.2.1 Health and Safety. Customer shall at all times maintain the areas of the Site consistent with all Applicable Laws pertaining to the health and safety of persons and property.

7.2.2 Security. Customer shall provide and take reasonable measures for security of the System, including commercially reasonable monitoring of the Site's alarms, if any.

7.2.3 Notice of Damage. Customer shall promptly notify Provider of any matters of which it becomes aware pertaining to any damage to or loss of the use of the System or that could reasonably be expected to adversely affect the System.

7.2.4 Liens. Customer shall not directly or indirectly cause, create, incur, assume or suffer to exist any Liens on or with respect to the System or any interest therein. Customer also shall pay promptly before a fine or penalty may attach to the System any taxes, charges or fees of whatever type of any relevant Governmental Authority for which Customer is responsible under Section 6.2. If Customer breaches its obligations under this Section, it shall immediately notify Provider in writing, and shall promptly cause such Lien on or with respect to the System (including if such arises in favor of any third party claiming through Customer, such as a lender, mortgagee or encumbrancer of real property) to be removed, discharged and released of record without cost to Provider, and shall defend, indemnify and hold Provider harmless against all costs and expenses (including reasonable attorneys' fees and court costs at trial and on appeal) incurred in removing, discharging and releasing such Lien.

7.2.5 Consents and Approvals. Customer shall obtain and maintain, and secure and deliver to Provider copies of, all consents, approvals, permits, licenses, and authorizations (or evidence that the project—including the System, the Lease, and the work and Solar Services described in this Agreement—is exempt from the regulatory jurisdiction of local agencies (including zoning, building, and land-use requirements) or that all required local agency approvals and permits have been obtained) relating to the performance of Customer's obligations and the rights granted by Customer hereunder, and that are required by the terms, conditions or provisions of any restriction or any agreement or instrument or statute to which Customer is a party or by which Customer is bound, including completing applications for interconnection with Customer's local electric utility. Customer shall use best efforts to assist Provider in fulfilling Provider's responsibilities under Section 7.1.1. In addition, as a condition precedent to the effectiveness of this Agreement, Customer covenants that it has obtained all discretionary and other approvals required in connection with the project from its board and all applicable Government Authorities and that such board or Governmental Authority reviewed and certified a CEQA impact assessment before providing such approval; or, if no other discretionary approvals were required, such board or Governmental Authority approved this Agreement before it was executed.

7.2.6 Maintenance of Interconnection. Customer shall ensure that all of the facilities to which Energy is delivered hereunder remain interconnected to the electrical grid during the entire Term, except as permitted under Section 9. Customershall make a reasonable effort to ensure that anyone acting through, on behalf of, or with the consent of Customer,

including the operator of the Customer ESS, will not interrupt, impair or terminate such interconnection or cause same.

7.2.7 Solar Access. Customer shall ensure that the System remains free of overshadowing or other blocked access to sunlight during the Term, and it is acknowledged and agreed by the Parties that the foregoing is a material obligation of the Customer for the purposes of this Agreement. Customer will use best efforts to secure a solar easement for the Site to prevent other buildings, structures or flora from overshadowing or otherwise blocking access of the sunlight to the System. Provider shall provide assistance to Customer in seeking a solar easement; however, Customer shall bear all costs and expenses related to obtaining any such easement.

7.2.8 Customer Records. Customer shall keep complete and accurate records of its operations hereunder and shall maintain such data as may be necessary to determine with reasonable accuracy any item relevant to this Agreement. Provider shall have the right to examine all such records insofar as may be necessary for the purpose of ascertaining the reasonableness and accuracy of any statements of costs relating to transactions hereunder.

8. Insurance Requirements.

8.1 Provider's Insurance.

Provider shall maintain, at its sole expense, commercial general liability insurance, including products and completed operations and personal injury insurance, and contractual liability provisions with a minimum amount of one million dollars (\$1,000,000) per occurrence and in the aggregate. Where exposure exists, provide a business automobile liability insurance with a combined single limit of one million dollars (\$1,000,000) for property damage and bodily injury covering all motor vehicles owned, hired, rented or used by Provider. Customer will be included as an additional insured. The minimum coverage amount of \$1,000,000 per occurrence and in the aggregate may be satisfied by a combination of a general liability policy, business automobile liability, and an excess/umbrella liability policy. Provider, if it has employees, shall also maintain at all times during the term of this Agreement workers' compensation insurance coverage in accordance with the applicable requirements of federal and state law. Within thirty (30) days after execution of this Agreement, Provider shall deliver to Customer certificates of insurance naming the customer as an "Additional Insured" on all policies for general and automobile liability insurance coverage. ACORD 25 form "Certificate Holder" box should read: Irvine Ranch Water District, Attn: Purchasing Department, 15600 Sand Canyon Avenue, Irvine, CA 92692, evidencing such coverage, which shall specify that Customer shall be given at least thirty (30) days' prior written notice by the applicable insurer in the event of, cancellation or termination of coverage, except ten (10) days for non-payment of premium. Such insurance shall be primary coverage without right of contribution from any insurance of Customer.

Provider shall provide and maintain an “all-risk” property insurance policy for the System during the Term of this Agreement (construction and operation). The operational “all-risk” insurance policy will include business interruption coverage for an indemnity period no less than twelve (12) months. This insurance is subject to terms and conditions that are consistent with current industry practice.

8.2 Reserved

8.3 Waiver of Claims.

Provider shall not be liable for any damage to the Site, or any equipment or personal property located thereon that results from perils that would be insured against in a so called “all-risk property damage” insurance policy, unless such damage is caused by Provider’s gross negligence or willful misconduct.

9. Force Majeure Events.

If either Party is prevented from or delayed in performing any of its obligations under this Agreement by reason of a Force Majeure Event, such Party shall notify the other Party in writing as soon as practicable after the onset of such Force Majeure Event and shall be excused from the performance of its obligations under this Agreement to the extent that such Force Majeure Event has interfered with such performance. The Party whose performance under this Agreement is prevented or delayed as the result of a Force Majeure Event shall use reasonable efforts to remedy its inability to perform. If a Party’s failure to perform its obligations under this Agreement is due to a Force Majeure Event, then such failure shall not be deemed a Provider Default or a Customer Default, as the case may be. Notwithstanding anything in this Section 9 to the contrary, no payment obligation of Customer under this Agreement may be excused or delayed as the result of a Force Majeure Event except to the extent that the Force Majeure Event causes (a) a breakdown of Customer’s payment processing systems or (b) an interruption of the Energy generated by the System but only to the extent such interruption excuses payment. In case a Force Majeure Event continues for at least one (1) year with respect to the System, then either Party may terminate this Agreement by written notice to the other in which case neither Party shall be deemed in default hereunder and neither Party shall have any further liability to the other Party in connection herewith.

10. Term; Customer Options; Termination.

10.1 Term.

The term of this Agreement shall commence on the Effective Date and shall expire on the date (the “Expiration Date”) that is twenty five (25) years after the Commercial Operation Date (the “Term”), unless and until terminated earlier

pursuant to Sections 3.1, 3.1.1, 3.3, 9, 10.2.3, 10.6 or 12 (the date of any such termination, the "Termination Date").

10.2 Customer Options Upon Cessation of Business Operations at Site.

If, prior to the end of the Term, Customer ceases to conduct business operations at the Site, vacates the Site, or is prevented from allowing operation of the System on the Site:

10.2.1 Substitute Site. Customer shall have the right to relocate the System within the same Utility district, subject to requisite governing agency approvals, so long as such relocation does not impair or reduce the value of Provider's participation in the LCR Program, the value of the Capacity Product, or any Environmental Financial Incentives that may be available to the Provider, or otherwise have an adverse tax or economic effect or otherwise have an adverse tax or economic effect on Provider; provided, however, that if such relocation does have any of the aforementioned effects, Provider shall disclose to Customer in writing the value of the detriment caused by the aforementioned effects (the "Substitute Detriment") and Customer shall have the right to elect to pay to Provider an amount equal to the Substitute Detriment and relocate the System as set forth in this Section 10.2.1. If such alternate site is available and is acceptable to Provider, the definition of Site set forth herein shall thereafter be deemed amended to delete the prior Site and add the new site, but otherwise this Agreement shall remain in full force in accordance with its terms and shall not be deemed otherwise amended. Customer shall pay the reasonable costs arising in connection with the relocation(s) of the System, including removal costs, installation costs, any applicable interconnection fees, costs related to obtaining a site license or lease at the substitute site, other costs of deployment at the substitute site, and in Lieu of Electricity Payments due to such relocation(s) to Provider in the form of a revised kWh Rate or a lump sum payment..

10.2.2 "Move and Pay" Option. So long as such event does not impair or reduce any Environmental Attributes or Environmental Financial Incentives, or Provider's participation in the LCR Program, Customer may elect to pay or guarantee the payment of the remaining monthly amounts due under this Agreement to Provider, and cause the System to be kept in operation at the Site, in each case through the remainder of the Term.

10.2.3 Termination and Payment of Termination Value. If, beginning in the sixth year following the applicable Commercial Operation Date, a substitute site cannot be located in accordance with Section 10.2.1 with respect to the System and Customer elects not to avail itself of the provisions of Section 10.2.2 with respect to the System, then Customer shall so notify Provider, Provider shall remove the System (at Customer's sole cost and expense) and Customer shall pay to Provider the then-applicable Termination Value specified in Schedule D as liquidated damages, whereupon this Agreement shall terminate. The Parties agree that actual damages to Provider if this Agreement is terminated as contemplated in this Section 10.2 would be difficult to ascertain, and the applicable Termination Value is a reasonable approximation of the damages suffered by Provider as a result of early termination of this Agreement.

10.3 Customer Options Upon Expiration of Term.

10.3.1 Extension of Term. Upon prior written notice to Provider at least one-hundred eighty (180) days prior to the Expiration Date, Customer shall have the option to renew the term of this Agreement with respect to the System for one (1) additional five (5)-year period at the Renewal Rate.

10.3.2 Purchase of System. If Customer has not elected to renew the term of this Agreement in accordance with Section 10.3.1, Customer shall have the option to purchase the System by paying Provider the Fair Market Value thereof no later than one-hundred and eighty (180) days prior to the relevant Expiration Date. The "Fair Market Value" of the System shall be the value determined by the mutual agreement of Customer and Provider within ten (10) days after receipt by Provider of Customer's notice of its election to purchase the System. If Customer and Provider cannot mutually agree to a Fair Market Value, then the Parties shall jointly select a nationally recognized independent appraiser with whom the parties have discussed methods and assumptions, with experience and expertise in the solar photovoltaic industry to value such equipment. Such appraiser shall act reasonably and in good faith to determine the Fair Market Value and shall set forth such determination in a written opinion delivered to the Parties. 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. Notwithstanding the foregoing, nothing in this Section 10.3.2 is intended to force Customer to buy, or Provider to sell the System in the event terms cannot be agreed to. To the extent transferable, the remaining period, if any, on all warranties for the System will be transferred from Provider to Customer at Customer's sole expense. If the Parties are unable to agree on the selection of an appraiser, such appraiser shall be jointly selected by the appraiser firm proposed by the Customer and the appraiser firm proposed by the Provider. Upon receipt by Provider of payment of the Fair Market Value, title to the System as well as available Environmental Attributes and Environmental Financial Incentives shall transfer to Customer as-is, where-is. In the event the Customer exercises its option pursuant to this Section to purchase the System, Customer and Provider will execute all documents necessary to continue the sale of the Capacity Product to Customer and other terms and conditions necessary to retain eligibility of the System in the LCR Program for the remainder of the years remaining in the Term of this Agreement.

10.3.3 Return of System. If at the end of a Term, or an Extension of Term pursuant to Section 10.3.1, Customer does not exercise any of the options described in Sections 10.3.1 and 10.3.2, Provider shall remove all of its tangible property comprising the System from the Site by a mutually convenient date but in no case later than one hundred eighty (180) days after the Expiration Date with respect to the System. Such cost to remove the System shall be borne by the Provider. The portion of the Site on which the System was installed shall be returned to its original condition, except for System support structures, electric/wiring components and ordinary wear and tear, and Provider shall leave the portion of the Site on which the System was installed in neat and clean order.

10.4 Customer Purchase Option Prior to Expiration Date.

On the 8th and 16th anniversary of the Commercial Operation Date, provided that no Customer Default shall have occurred and be continuing beyond any applicable period of cure, Customer may elect to purchase the System. If Customer elects to so purchase the System, the purchase price shall be the higher of the then Fair Market Value of the System (calculated in accordance with the definition of "Fair Market Value" set forth in Section 10.3.2 at Customer's sole cost and expense), or the then current Termination Value specified in Column B of Schedule D. Not less than one-hundred-and-eighty (180) days prior to the exercise of the purchase option for the System, Customer shall provide written notice to Provider of Customer's exercise thereof. Upon the exercise of the foregoing purchase option plus receipt of the Value as determined in Section 10.4 above and all other amounts then owing by Customer to Provider, the Parties will execute all documents necessary to cause title to the System to pass to Customer as-is, where-is; provided, however, that Provider shall remove any encumbrances placed on the System by Provider at Customer's expense.

10.5 Payment of Termination Value on Termination Date.

In the event that the Termination Date has occurred for reasons other than pursuant to Sections 9, 3.1.2., 10.6 or 12.1.1, Customer shall be required to pay to Provider the then- applicable Termination Value specified in the first column of Schedule D as liquidated damages. The Parties agree that actual damages to Provider in the event this Agreement terminates prior to the expiration of the Term for causes attributable to Customer would be difficult to ascertain, and the applicable Termination Value is a reasonable approximation of the damages suffered by Provider as a result of early termination of this Agreement.

10.6 Provider Termination.

Provider shall have the right, in Provider's sole and absolute discretion, to terminate this Agreement upon written notice if any of the following occurs:

10.6.1 at any time until construction of the System commences;

10.6.2 if the occurrence of an unstayed order of a court or administrative agency having the effect of subjecting the sales of Energy to federal or state regulation of prices and/or service;

10.6.3 the elimination or alteration of one or more Environmental Financial Incentives or other change in law that results in a material adverse economic impact on Provider; or

10.6.4 if the annual direct beam solar resource availability at the Site is less than or equal to 90% of historical averages as measured by long-term weather data (minimum of

five (5) years) collected at the Site and/or other reliable calibrated and appropriate weather station representative of the Site.

In the event of a Provider termination under this Section 10.6, Provider shall remove all of its tangible property comprising the System from the Site by a mutually convenient date but in no case later than one hundred eighty (180) days after the Expiration Date. Such cost to remove the System shall be borne by the Provider. The portion of the Site on which the System was installed shall be returned to its original condition, except for System support structures, electric/wiring components, and ordinary wear and tear, and Provider shall leave the portion of the Site on which the System was installed in neat and clean order.

11. Dispute Resolution and Defaults.

11.1 Dispute Resolution. The following procedures will apply to any disputes under this Agreement other than Invoice Errors covered in Section 6.3.2 or Failure to Pay in Section 11.2.1. The Parties must undertake this Dispute Resolution process before a Default under this Agreement may be declared by either Party.

11.1.1 The first level of dispute resolution is mandatory informal discussions between representatives of Provider and Customer. These discussions must take place before the next level of dispute resolution is invoked and shall occur within seven (7) days of notice of a dispute.

11.1.2 The second level of dispute resolution is mandatory informal discussions at the General Manager level. These discussions must take place before the next level of dispute resolution is invoked and shall be completed within thirty (30) days of notice of a dispute. Informal discussion shall consist of one or more meetings with the General Manager or equivalent from each Party and respective Counsel meeting in good faith to resolve any dispute.

11.2 Customer Default.

The occurrence of any of the following events shall constitute a "Customer Default":

11.2.1 Failure to Pay. Unless due to a Force Majeure Event excused by Section 9, the failure of Customer to pay during the Term any amounts owing to Provider on or before the date on which such amounts are due and payable under the terms of this Agreement and Customer's failure to cure such failure within fifteen (15) days after Customer receives written notice of each such failure from Provider;

11.2.2 Failure to Perform Other Obligations. Unless due to a Force Majeure Event excused by Section 9, the failure of Customer to perform or cause to be performed any other material obligation required to be performed by Customer under this Agreement, or the failure of any representation, covenant, or warranty set forth herein to be true and correct as and when made; provided, however, that if such failure by its nature can be cured, then Customer shall have a period of thirty (30) business days after receipt of written notice from Provider of such failure to Customer to cure the same and a Customer Default shall not be deemed to exist during such period; provided,

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further, that if Customer commences to cure such failure during such period and is diligently and in good faith attempting to effect such cure, said period shall be extended for one hundred twenty (120) additional days; provided, finally, that in any event if such failure shall continue for at least five (5) days after notice to Customer and shall result in lost revenue to Provider, Provider shall be entitled to reasonably estimate the amount of revenue that would have been obtained and shall invoice Customer therefor;

11.2.3 Bankruptcy, Etc. (a) Customer admits in writing its inability to pay its debts generally as they become due; (b) Customer files a petition or answer 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, district or territory thereof; (c) Customer makes an assignment for the benefit of creditors; (d) Customer consents to the appointment of a receiver of the whole or any substantial part of its assets; (e) Customer has a petition in bankruptcy filed against it, and such petition is not dismissed within ninety (90) days after the filing thereof; (f) a court of competent jurisdiction enters an order, judgment, or decree appointing a receiver of the whole or any substantial part of Customer's assets, and such order, judgment or decree is not vacated or set aside or stayed within ninety (90) days from the date of entry thereof; or (g) 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 Customer's assets and such custody or control is not terminated or stayed within ninety (90) days from the date of assumption of such custody or control; or

11.2.4 Lease Default. A material default by Customer under the Lease occurs, or, if the Customer is not the fee owner of the real property covered by the Lease, if the Customer ceases to have the right to occupy the applicable Site and to permit Provider to own and operate the applicable System thereon.

11.3 Provider Default.

The occurrence of the following events shall constitute a "Provider Default":

11.3.1 Failure to Perform Obligations. Unless due to a Force Majeure Event excused by Section 9, the failure of Provider to perform or cause to be performed any obligation required to be performed by Provider under this Agreement or the failure of any representation and warranty set forth herein to be true and correct as and when made; provided, however, that if such failure by its nature can be cured, then Provider shall have a period of thirty (30) business days after receipt of written notice from Customer of such failure to Provider to cure the same and a Provider Default shall not be deemed to exist during such period; provided, further, that if Provider commences to cure such failure during such period and is diligently and in good faith attempting to effect such cure, said period shall be extended for one-hundred twenty (120) additional days;

11.3.2 Bankruptcy, Etc. (a) Provider admits in writing its inability to pay its debts generally as they become due; (b) Provider files a petition or answer 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, district or territory thereof; (c) Provider makes

an assignment for the benefit of creditors; (d) Provider consents to the appointment of a receiver of the whole or any substantial part of its assets; (e) Provider has a petition in bankruptcy filed against it, and such petition is not dismissed within ninety (90) days after the filing thereof; (f) a court of competent jurisdiction enters an order, judgment, or decree appointing a receiver of the whole or any substantial part of Provider's assets, and such order, judgment or decree is not vacated or set aside or stayed within ninety (90) days from the date of entry thereof; or (g) 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 Provider's assets and such custody or control is not terminated or stayed within ninety (90) days from the date of assumption of such custody or control; or

11.3.3 Lease Default. A material default by Provider under the Lease occurs.

12. Remedies Following Default

12.1 Customer's Remedies Upon Occurrence of a Provider Default.

12.1.1 Termination. If a Provider Default as described in Section 11.3 above has occurred and is continuing, and if Provider fails to correct or cure the conditions causing such Provider Default within ten (10) days after Provider shall have received Customer's written notice of Customer's intent to terminate this Agreement as a result of such Provider Default, then this Agreement shall terminate and be of no further force or effect as of the last day of such ten (10) day period.

12.1.2 Other Rights and Remedies. If any Provider Default described under Section 11.3 has occurred and Customer has terminated this Agreement as a result thereof in accordance with the terms of Section 12.1.1 above, then, subject to Section 12.3, Provider's sole liability to Customer in respect of such Provider Default shall be the payment of an amount not to exceed the then-present value (discounted at the prevailing prime rate of interest as published in *The Wall Street Journal* on the day preceding the date of determination) of the cash flows equal to the product of (i) the positive difference, if any, of the price per kWh for commercially available, utility-provided energy in the applicable market(s) (which shall not include related charges such as delivery, service, distribution, or taxes) minus the kWh Rate of Energy hereunder (as such kWh Rate would have been escalated over time pursuant to the terms hereof) hereof, multiplied by (ii) the number of days remaining in the term of the Agreement times the expected daily number of kWh of Energy to be delivered under this Agreement, calculated by dividing the Estimated Year 1 Production set forth in Schedule B, adjusted for as-built System, by 365. Except as provided in Sections 10.2.3 and 12.1.1, Customer shall have no right to terminate this Agreement and shall have no other remedies.

12.2 Provider's Remedies Upon Customer Default.

In addition to any other remedies available under this Agreement or at law, if a Customer Default as described in Section 11.2 has occurred and is continuing, and if Customer fails to correct or cure the conditions causing such Customer Default

within ten (10) days after the date on which Provider gives Customer written notice of Provider's intent to terminate this Agreement as a result of such Customer Default, then this Agreement shall terminate and be of no further force or effect as of the last day of such ten (10) day period and Provider shall have the right to (a) cause Customer to pay (and Customer shall have the obligation to pay to Provider) the applicable Termination Value set forth in Column A of Schedule D and (b) enter onto the Site and remove the System in accordance with the last sentence of Section 10.2.3.

12.3 No Consequential Damages.

Nothing in this Agreement is intended to cause either Party to be, and neither Party shall be, liable to the other Party for any lost business, lost profits or revenues from others or other special or consequential damages, all claims for which are hereby irrevocably waived by Customer and Provider. Notwithstanding the foregoing, none of the payments for Energy or any other amount specified as payable by Customer to Provider under the terms of this Agreement upon the termination of this Agreement shall be deemed consequential damages. Provider's liability hereunder shall be in all respects limited to amounts paid to it hereunder during the most recent twenty-fourth (24)-month period.

12.4 Effect of Termination of Agreement.

Upon the Termination Date or the Expiration Date, as applicable, any amounts then owing by a Party to the other Party shall become immediately due and payable and the then future obligations of Customer and Provider under this Agreement shall be terminated (other than the indemnity obligations set forth in Section 13). Such termination shall not relieve either Party from obligations accrued prior to the effective date of termination or expiration.

13. Indemnification.

13.1 Indemnification by Provider.

Without limiting the provisions of Section 8, Provider shall fully indemnify, save harmless and defend Customer from and against any and all costs, claims, and expenses incurred by Customer in connection with or arising from any claim by a third party for physical damage to or physical destruction of property, or death of or bodily injury to any Person, but only to the extent caused by (a) the gross negligence or willful misconduct of Provider or its agents or employees or others under Provider's control at the Site or (b) a Provider Default hereunder or a default by Provider under the Lease; provided, however, that nothing in this Section 13.1 is intended to modify the limitation of Provider's liability set forth in Sections 12.1.2 and 12.3 above.

13.2 Indemnification by Customer.

Without limiting the provisions of Section 8, Customer shall fully indemnify, save harmless and defend Provider or its assignees and successors from and against any and all costs, claims, and expenses incurred by Provider in connection with or arising from any claim by a third party for physical damage to or physical destruction of property, or death of or bodily injury to any Person, but only to the extent caused by (a) the gross negligence or willful misconduct of Customer or its agents or employees or others under Customer's control at the Site or (b) a Customer Default hereunder or a default by Customer under the Lease; provided, however, that nothing in this Section 13.2 is intended to modify the limitation of Customer's liability set forth in Section 12.3 above.

13.3 Notice of Claims.

Any Party seeking indemnification hereunder (the "Indemnified Party") shall deliver to the other Party (the "Indemnifying Party") a notice describing the facts underlying its indemnification claim and the amount of such claim (each such notice a "Claim Notice"). Such Claim Notice shall be delivered promptly to the Indemnifying Party after the Indemnified Party receives notice that an action at law or a suit in equity has commenced; provided, however, that failure to deliver the Claim Notice as aforesaid shall not relieve the Indemnifying Party of its obligations under this Section 13, except to the extent that such Indemnifying Party has been prejudiced by such failure.

13.4 Defense of Action.

If requested by an Indemnified Party, the Indemnifying Party shall assume on behalf of the Indemnified Party, and conduct with due diligence and in good faith, the defense of such Indemnified Party with counsel reasonably satisfactory to the Indemnified Party; provided, however, that if the Indemnifying Party is a defendant in any such action and the Indemnified Party believes that there may be legal defenses available to it that are inconsistent with those available to the Indemnifying Party, the Indemnified Party shall have the right to select separate counsel to participate in its defense of such action at the Indemnifying Party's expense. If any claim, action, proceeding or investigation arises as to which the indemnity provided for in this Section 13 applies, and the Indemnifying Party fails to assume the defense of such claim, action, proceeding or investigation after having been requested to do so by the Indemnified Party, then the Indemnified Party may, at the Indemnifying Party's expense, contest or, with the prior written consent of the Indemnifying Party, which consent shall not be unreasonably withheld, settle such claim, action, proceeding or investigation. All costs and expenses incurred by the Indemnified Party in connection with any such contest or settlement shall be paid upon demand by the Indemnifying Party.

13.5 Survival of Provisions.

The provisions of this Section 13 shall survive the expiration or termination of this Agreement and/or the Lease, as applicable.

14. Miscellaneous Provisions.

14.1 Notices.

All notices, communications and waivers under this Agreement shall be in writing and shall be (a) delivered in person or (b) mailed, postage prepaid, either by registered or certified mail, return receipt requested or (c) sent by reputable overnight express courier, addressed in each case to the addresses set forth below, or to any other address either of the parties to this Agreement shall designate in a written notice to the other Party:

If to Provider:

Solar Star IRWD Baker, LLC
c/o SunPower Corporation
1414 Harbour Way South, Suite 1901
Richmond, CA 94804
Attention: Julie Williamson, Project Administration
Phone: 510-540-0550
Fax: 510-540-0552

If to Customer:

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618
Attention: Kevin Burton
Phone: (949) 453-5594
Fax: (888) 645-3804

All notices, communications and waivers to Customer's lenders or other financiers under this Agreement shall be to the name and address specified in a notice from Customer to Provider. All notices sent pursuant to the terms of this Section 14.1 shall be deemed received (i) if personally delivered, then on the date of delivery, (ii) if sent by reputable overnight, express courier, then on the next business day immediately following the day sent, or (iii) if sent by registered or certified mail, then on the earlier of the third (3rd) business day following the day sent or when actually received.

14.2 Authority.

14.2.1 Provider Representations. Provider hereby represents and warrants that:

- (a) It is a Delaware limited liability company duly organized, validly existing and in good standing under the laws of the state of its formation and has all requisite limited liability company power and authority to enter into this Agreement, to perform its obligations hereunder and to consummate the transactions contemplated hereby;
- (b) The execution and delivery of this Agreement and the performance of its obligations hereunder have been duly authorized by all necessary limited liability company action;
- (c) This Agreement is a legal, valid and binding obligation of Provider enforceable against Provider in accordance with its terms, subject to the qualification, however, that the enforcement of the rights and remedies herein is subject to (i) bankruptcy and other similar laws of general application affecting rights and remedies of creditors and (ii) the application of general principles of equity (regardless of whether considered in a proceeding in equity or at law);
- (d) To the best knowledge of Provider, as of the date of execution hereof, no governmental approval (other than any governmental approvals that have been previously obtained or disclosed in writing to Customer) is required in connection with the due authorization, execution and delivery of this Agreement by Provider or the performance by Provider of its obligations hereunder which Provider has reason to believe that it will be unable to obtain in due course on or before the date required for Provider to perform such obligations; and
- (e) Neither the execution and delivery of this Agreement by Provider nor compliance by Provider with any of the terms and provisions hereof (i) conflicts with, breaches or contravenes the provisions of the articles of formation or operating agreement of Provider or any contractual obligation of Provider or (ii) results in a condition or event that constitutes (or that, upon notice or lapse of time or both, would constitute) an event of default under any material contractual obligation of Provider.

14.2.2 Customer Representations. Customer hereby represents and warrants that:

- (a) It is an independent special district formed under State of California Water District Law (California Water Code, Division 13) and has all requisite power and authority to enter into this Agreement, to perform its obligations hereunder and to consummate the transactions contemplated hereby;
- (b) The execution and delivery of this Agreement and the performance of its obligations hereunder have been duly authorized by all necessary action;
- (c) This Agreement is a legal, valid and binding obligation of Customer enforceable against Customer in accordance with its terms, subject to the qualification, however, that the enforcement of the rights and remedies herein is subject to (i) bankruptcy and other similar laws of general application affecting rights and remedies of creditors and (ii) the application of general principles of equity (regardless of whether considered in a proceeding in equity or at law);
- (d) No Governmental Approval (other than any Governmental Approvals which have been previously obtained or disclosed in writing to Provider) is required in connection with the due authorization, execution and delivery of this Agreement by Customer or the performance by Customer of its obligations hereunder which Customer has reason to believe that it will be unable to obtain in due course;
- (e) Neither the execution and delivery of this Agreement by Customer nor compliance by Customer with any of the terms and provisions of this Agreement (i) conflicts with, breaches or contravenes the provisions of the [articles of incorporation/articles of formation/*charter documents, etc.*] or [bylaws/*operating agreement/partnership agreement, etc.*] of Customer, or any contractual obligation of Customer, or (ii) results in a condition or event that constitutes (or that, upon notice or lapse of time or both, would constitute) an event of default under any contractual obligation of Customer;
- (f) Except for the Customer ESS, which has been disclosed to the Provider, Customer has not entered into any contracts or agreements with any other person regarding the provision of

the services at the Site contemplated to be provided by Provider under this Agreement; and

- (g) None of the electricity to be generated by the Provider will be used to generate energy for the purpose of heating a swimming pool.

14.3 Assignment.

Customer shall not be permitted to assign all or any part of this Agreement without the prior written consent of the Provider and Provider's Financing Party, which shall not be unreasonably withheld. Any assignment by the Customer not permitted under this Section 14.3 shall be void ab initio. Provider shall be permitted to assign this Agreement to a Financing Party upon written notice thereof to Customer. Provider may, without any consent of Customer, sell, transfer, assign or pledge (or grant security interests in) its rights, title and interest in this Agreement, and/or any monies due under this Agreement, in connection with any financing for the ownership, acquisition, construction, operation or use of the System.

14.4 Successors and Assigns.

The rights, powers and remedies of each Party shall inure to the benefit of such party and its successors and permitted assigns.

14.5 Entire Agreement.

This Agreement (including all exhibits and schedules attached hereto) and the Lease represent the entire agreement between the parties to this Agreement with respect to the subject matter hereof and thereof and supersede all prior and contemporaneous oral and prior written agreements. In the event of any conflict between the provisions of this Agreement and the provisions of the Lease, the provisions of this Agreement shall govern and control.

14.6 Amendments to Agreement.

This Agreement shall not be amended, modified or supplemented without the written agreement of Provider and Customer at the time of such amendment, modification or supplement.

14.7 Waivers; Approvals.

No waiver of any provision of this Agreement shall be effective unless set forth in writing signed by the Party making such waiver, and any such waiver shall be effective only to the extent it is set forth in such writing. Failure by a Party to insist upon full and prompt performance of any provision of this Agreement, or to take action in the event of any breach of any such provisions or upon the occurrence of any Provider Default or Customer Default, as applicable, shall not constitute a waiver of any rights of such Party, and, subject to the notice requirements of this

Agreement, such Party may at any time after such failure exercise all rights and remedies available under this Agreement with respect to such Provider Default or Customer Default. Receipt by a Party of any instrument or document shall not constitute or be deemed to be an approval of such instrument or document. Any approvals required under this Agreement must be in writing, signed by the Party whose approval is being sought.

14.8 Partial Invalidity.

In the event that any provision of this Agreement is deemed to be invalid by reason of the operation of Applicable Law, Provider and Customer shall negotiate an equitable adjustment in the provisions of the same in order to effect, to the maximum extent permitted by law, the purpose of this Agreement (and in the event that Provider and Customer cannot agree then such provisions shall be severed from this Agreement) and the validity and enforceability of the remaining provisions, or portions or applications thereof, shall not be affected by such adjustment and shall remain in full force and effect.

14.9 Execution in Counterparts.

This Agreement may be executed in counterparts, and all said counterparts when taken together shall constitute one and the same Agreement.

14.10 Governing Law; Jurisdiction; Forum.

This Agreement shall be governed by and construed in accordance with the internal laws of the State of California. Customer irrevocably agrees that any action, suit or proceeding by or among Provider and Customer may be brought in whichever of the Superior Courts of the State of California, Alameda County, or the Federal Court for the Northern District of California, has subject matter jurisdiction over the dispute and waives any objection that Customer may now or hereafter have regarding the choice of forum whether on personal jurisdiction, venue, forum non conveniens or on any other ground. Customer irrevocably consents to the service of process outside of the territorial jurisdiction of such courts by mailing copies thereof by registered or certified mail, postage prepaid, to Customer's address set forth herein with the same effect as if Customer were a resident of the State of California and had been lawfully served in such state. Nothing in this Agreement shall affect the right to service of process in any other manner permitted by law. Customer further agrees that final judgment against it in any action or proceeding shall be conclusive and may be enforced in any other jurisdiction within or outside the State of California by suit on the judgment, a certified or exemplified copy of which shall be conclusive evidence of the fact and the amount of such judgment.

To the extent permitted by applicable law, Customer hereby waives any defense of sovereign immunity that Customer might otherwise have in connection with

any action taken by Provider to enforce its rights against Customer under this Agreement.

14.11 Attorneys' Fees.

If any action shall be instituted between Customer and Provider in connection with this Agreement, the Party prevailing in such action shall be entitled to recover from the other Party all of its reasonable costs and expenses incurred in connection with such action by arbitration or other legal proceeding, including reasonable attorneys' fees.

14.12 No Third Party Rights.

This Agreement is only for the benefit of the parties to this Agreement, their successors and permitted assigns (including any lender or lessor of Provider) and Persons expressly benefited by the indemnity provisions of this Agreement. No other Person (including, without limitation, tenants of the Site) shall be entitled to rely on any matter set forth in, or shall have any rights on account of the performance or non-performance by any Party of its obligations under, this Agreement.

14.13 Treatment of Additional Amounts.

The Parties hereto acknowledge and agree that any amounts payable by one Party to the other as a result of the payor's (including In Lieu of Electricity Payments) default shall constitute liquidated damages and not penalties. The Parties further acknowledge that in each case (a) the amount of loss or damages likely to be incurred is incapable or is difficult to precisely estimate, (b) the amounts specified hereunder bear a reasonable proportion and are not plainly or grossly disproportionate to the probable loss likely to be incurred by Customer or Provider as the case may be and (c) the Parties are sophisticated business parties and have been represented by sophisticated and able legal and financial counsel and negotiated this Agreement at arm's length.

14.14 No Agency.

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.

14.15 No Public Utility.

Nothing contained in this Agreement shall be construed as an intent by Provider to dedicate its property to public use or subject itself to regulation as a "public utility" (as defined in the California Public Utilities Code or any other Applicable Law).

14.16 No Recourse to Affiliates.

This Agreement is solely and exclusively between the Parties, and any obligations created herein on the part of either Party shall be the obligations solely of such Party. No Party shall have recourse to any parent, subsidiary, partner, member, affiliated company, lender, director, officer or employee of the other Party for performance or non-performance of any obligation hereunder, unless such obligations were assumed in writing by the Person against whom recourse is sought.

14.17 Cooperation with Financing.

Customer acknowledges that Provider may be financing the Solar Services and the System and Customer agrees that it shall reasonably cooperate with Provider and its financing parties in connection with such financing, including (a) the furnishing of such information, (b) the giving of such certificates or acknowledgments (which may be in the form of the attached Exhibit B), and (c) providing such opinions of counsel and other matters as Provider and its financing parties may reasonably request; provided, that the foregoing undertaking shall not obligate Customer to materially change any rights or benefits, or materially increase any burdens, liabilities or obligations of Customer, under this Agreement (except for providing notices and additional cure periods to the financing parties with respect to Events of Defaults with respect to Provider as a financing party may reasonably request).

14.18 Setoff.

Except as otherwise set forth herein, each Party reserves to itself all rights, setoffs, counterclaims and other remedies and/or defenses to which it is or may be entitled, arising from or out of this Agreement or the Lease.

14.19 Service Contract.

The Parties intend this Agreement to be a "service contract" within the meaning of Section 7701(e)(3) of the Internal Revenue Code of 1986.

15. Confidential Information.

Each Party (the "Receiving Party") shall not use for any purpose other than performing its obligations under this Agreement or divulge, disclose, produce, publish, or permit access to, without the prior written consent of the other Party (the "Disclosing Party"), any confidential information of the Disclosing Party. Confidential information includes, without limitation, this Agreement and exhibits hereto, all information or materials prepared in connection with this Agreement, designs, drawings, specifications, techniques, models, data, documentation, source code, object code, diagrams, flow charts, research, development, processes, procedures, know-how, manufacturing, development or marketing techniques and materials, development or marketing timetables, strategies and development plans, customer, supplier or personnel names and other information related to customers, suppliers or personnel, pricing policies and financial information, and other

information of a similar nature, whether or not reduced to writing or other tangible form, and any other trade secrets. Confidential information does not include (a) information known to the Receiving Party prior to obtaining the same from the Disclosing Party; (b) information in the public domain at the time of disclosure by the Receiving Party; or (c) information obtained by the Receiving Party from a third party who did not receive same, directly or indirectly, from the Disclosing Party. The Receiving Party shall use the higher of the standard of care that the Receiving Party uses to preserve its own confidential information or a reasonable standard of care to prevent unauthorized use or disclosure of such confidential information. Notwithstanding anything herein to the contrary, the Receiving Party has the right to disclose Confidential Information without the prior written consent of the Disclosing Party: (i) as required by any court or other Governmental Authority, or by any stock exchange on which the shares of any Party are listed, (ii) as otherwise required by law, (iii) as advisable or required in connection with any government or regulatory filings, including without limitation, filings with any regulating authorities covering the relevant financial markets, (iv) to its attorneys, accountants, financial advisors or other agents, in each case bound by confidentiality obligations, (v) to banks, investors and other financing sources and their advisors, in each case bound by confidentiality obligations; or (vi) in connection with an actual or prospective merger or acquisition or similar transaction where the party receiving the Confidential Information is bound by confidentiality obligations. If a Receiving Party believes that it will be compelled by a court or other Governmental Authority to disclose confidential information of the Disclosing Party, it shall give the Disclosing Party prompt written notice, and in all cases not less than five (5) business days notice in advance of disclosure, so that the Disclosing Party may determine whether to take steps to oppose such disclosure.

Subject to the foregoing, the Parties shall jointly agree upon the necessity and content of any press release in connection with the matters contemplated by this Agreement. Any other publication, news release or other public announcement by a Party relating to this Agreement or to the performance hereunder shall first be reviewed and consented to in writing by the other Party, such consent not to be unreasonably withheld.

16. Estoppel.

Either Party hereto, without charge, at any time and from time to time, within five (5) business days after receipt of a written request by the other party hereto, shall deliver a written instrument, duly executed, certifying to such requesting party, or any other person, firm or corporation specified by such requesting party:

- a) That this Agreement is unmodified and in full force and effect, or if there has been any modification, that the same is in full force and effect as so modified, and identifying any such modification;
- b) Whether or not to the knowledge of any such party there are then existing any offsets or defenses in favor of such party against enforcement of any of the terms, covenants and conditions of this Agreement and, if so, specifying the same and also whether or not to the knowledge of such party the other party has observed and

performed all of the terms, covenants and conditions on its part to be observed and performed, and if not, specifying the same; and

- c) Such other information as may be reasonably requested by a Party hereto.

Any written instrument given hereunder may be relied upon by the recipient of such instrument, except to the extent the recipient has actual knowledge of facts contained in the certificate.

[THE REMAINDER OF THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties hereto have duly executed and delivered this Agreement as of the date set forth above.

PROVIDER:

SOLAR STAR IRWD BAKER, LLC

By: SunPower AssetCo, LLC
Its member

By: _____
Name: _____
Title: _____

CUSTOMER:

IRVINE RANCH WATER DISTRICT

By: _____
Name: _____
Title: _____

EXHIBIT A

STANDARD SYSTEM DESIGN PACKAGE

The following are the standard assumptions made by the Provider regarding the existing condition at the Site, including but not limited to the ground conditions, electrical system including panels, inverter installation location, and security fencing for the following system.

System Size: 1,109.2 kWp

System Type: Ballasted ground mount fixed tilt system

System Components: Modules, mechanical attachment assemblies, DC wiring, DC combiner boxes, DC-AC inverters, data acquisition system, and interconnection related equipment on the Customer side of the meter, including panel circuit breakers, utility lockable disconnect switches, NGO (or shadow) metering(s), conduit, and wiring.

System Description: Photovoltaic modules installed on top of two buried reservoirs in array layout per System Description

Tie-In Location: A 12 kV interconnection at PME-10 along with the associated electrical conduit routing.

System assumes the following conditions and assumptions

Qualifications, Conditions and Assumptions

This Standard System Design Package is based upon Provider's visual observations of the site; and review of all documents available at time of contract execution; and includes the following assumptions.

This Standard System Design Package identifies Provider's assumptions and understanding of the project requirements. Upon contract execution, Provider will perform the necessary due diligence in order to determine and discover the existing site conditions pertinent to the design and to ensure alignment with the Customer's expectations.

This Standard System Design Package is based on steel pricing as of the date on this scope and excludes any future tariffs on steel..

1.0 Labor

1.1 Overtime and special shift requirements

Overtime and special shift requirements are not included, based on schedule.

1.2 Prevailing Wages

Project is assumed to be Prevailing Wage per industrial relations requirements of project location. Union labor is not included.

1.3 Diversity Requirements

Requirements and/or related due diligence and good faith efforts for small, small local, diversified or minority contractors are not included..

2.0 Indirect Construction Costs

2.1 Taxes and fees

Taxes or fees, other than local building permit fees and sales tax, are not included. Sales tax is included at a rate of 7.75%.

2.2 Bonds

Payment and performance bonds are included.

2.4 Permits and Regulatory Fees

An allowance for building, fire and electrical permits only is included for \$12,970.

All other permits/approvals, including CEQA, are excluded.

Provider includes durations of 7 weeks for procuring permit and regulatory approvals.

3.0 System Design & Scope

3.1 Solar Electrical Equipment and Conductors

The PV module arrays, equipment pads, and point of interconnection will be constructed to the design and specifications as shown in Schedule B - Description of System.

Conductors will be copper according to Electrical Engineer of Record's determination. AC feeder length from Panel Board to equipment pad location and from equipment pad location to tie in is identified in Schedule B - Description of System. AC feeder lengths from inverter equipment pad location to assumed point of interconnection, and length assumptions with equipment amperage ratings are shown on single line drawing. All electrical conduits will be encased in concrete except those located inside the boundaries of the array.

DC array wiring may be exposed on the underside of PV modules or neatly secured to PV modules and/or racking system. DC source circuits are USE-2 weather rated for exterior exposure.

DC array bonding is achieved by use of Provider proprietary grounding clip and/or rivet attachment.

Design includes rigid conduit for underground transitions and in areas subject to vehicle traffic; EMT conduit with rain-tight compression fittings above inverters for any aboveground low voltage or AC circuits; and PVC for all underground conduit.

Transformers are 480V:12kV, non-Dry-type by manufacturer of Provider's choosing. Secondary containment is not included in this scope.

All electrical raceways, pull boxes and fittings will be constructed per IRWD specifications.

A ballast racking system will be provided maintain the integrity of the existing reservoirs.

3.2 Utility Interconnection

Coordination of shutdown may be required with customer and local utility. Temporary power generators are excluded. Interconnection is scheduled for minimum 4 hours and is assumed to be performed on off hours with prior written approval from Customer. Additional shutdowns may be required in order to assess physical condition of the Customer's switchgear.

The utility will have 24/7 access to existing electric utility meters and the utility lockable disconnect locations for all electrical interconnections related to this project.

3.3 Utility Requirements

Standard System Design Package assumes all utility-owned electrical equipment serving the sites electrical distribution system has adequate capacity to handle the photovoltaic system output. No utility required electrical equipment upgrade or replacement is included in this scope, including design and coordination thereof.

3.4 Facility Equipment

It is assumed that the system will interconnect at 12kV at PME-10. The interconnection includes AC runs to the PME-10 vicinity with a breaker or disconnect switch and relay with enclosures and mounting. Also included are the added interconnection facilities, both SCE costs and site work, for the conduit and conductor from the breaker or disconnect switch to the PME-10 switch directly, a third party medium voltage (MV) switchgear, or an electrical vault with acceptable capacity. MV switchgear and additional protections are not included.

Scope excludes Circuit Breaker Coordination Study for this project.

Scope excludes Short-Circuit Coordination Study for this project. Provider will provide overcurrent settings that will be coordinated with Customer overcurrent settings.

If harmonic data of the site is not available, Provider shall assume that the Harmonic data are within the acceptable limits of the Institute for Electrical and Electronics Engineers (IEEE) Standard 519.

3.5 Shading

The design is based on existing visual conditions on site. Removal of trees or other obstructions to install the solar arrays and system components is not included in the scope. Trees and/or other obstructions identified for removal or trimming by the Customer must be removed or trimmed prior to substantial completion or performance expectations/guarantees will require adjustment.

3.6 Painting

Metal materials are either factory-finished or non-corrosive and will not need painting for weather protection or aesthetic reasons.

3.7 Fencing

A 6-0' galvanized, 9 gauge, 2" mesh fencing and chain link fence-with gate around perimeter electrical equipment pad locations is included. Special provisions for privacy slats, special hardware, lock sets, small fabric, etc. are not included. 4" bollards are included only in areas subject to vehicle impact.

3.8 Access

Scope assumes project will be constructed in a single phase.

Provider will be guaranteed site access to perform all work. All work to be performed during regular business hours between 7:00 am and 5:00 pm. Extra time or personnel constraints due to site

security beyond daily signing in by workers on a sign in sheet—i.e. badging, background checks, tool inventory checks, etc.—is not included.

Provider will have access to a staging area for delivery trucks and a crane required to lift materials, as applicable, during normal business hours.

Existing roads will be capable of handling all required construction equipment such as drilling rigs, concrete trucks, delivery trucks, cranes, and all other equipment necessary to complete the work. Provider will be responsible for any excessive damage to existing roads resulting from construction operations and activities.

3.9 Use of Facilities

On-site water and power connections will be available for construction with no restrictions and at no charge to Provider. Provider will be responsible for delivery of water and power from the connection point to the construction location. If a Customer initiated power shut down has duration over 4 hours and effects normal construction operations, Provider can rent and install a temporary generator and submit associated costs to Customer for reimbursement. Water quality shall be sufficient for use in dust control, as necessary, and be suitable for Provider's standard concrete mix design.

3.10 Special handling of site materials

Testing for removal and disposal of any existing hazardous waste materials, contaminated soils, or any other unforeseen site conditions that require special handling are not included.

3.11 Site utilities and hazards

Changes resulting from utilities, right of ways, easements, and/or hazards—underground or above ground—or any undocumented building upgrades are not included.

Documented utilities and building upgrades are considered as part of this scope if as-builts are provided to Provider prior to contract execution in order to confirm locations of these possible hazards. Customers shall supply Provider with a current Title Report with plotted easements, encumbrances, and right-of-ways at all project site locations.

3.12 Site Preparation

Scope assumes Provider will prepare the site. Site Preparation work shall include:

- Placing a woven ground cover and 4-inch rock base on the area that the array will be installed. Provider has excluded hydro-seeding.

3.13 Site Access Roads

Scope assumes that the current roads are adequate for fire department requirements.

3.14 Soils and Structural Foundations

Provider will conduct a professional structural engineering analysis and report to determine if the buried reservoirs can accommodate the addition of a solar facility, gravel ground cover and associated

wind load. In addition, the Provider will perform a licensed structural analysis and report to determine the ancillary equipment's weight and location does not transfer an unacceptable load to the reservoir walls.

Scope assumes that if ground water or dewatering, sub grade rocks, or other unforeseen underground structures are encountered and there is a need to slurry and re-drill or dewater site, then additional costs will be the responsibility of the client.

3.15 Soil Conditions

Customer has provided a geotechnical report (GMU Geotechnical, Inc. May 11, 2011) of the project site to the Provider. Provider will review the geotechnical report and determine if additional investigations are required to determine the existing site soil has the following characteristics:

- IBC or UBC Table 1804A.2, Class 3 or equivalent Non-hazardous, sandy gravel and/or gravel
- Allowable foundation pressure greater than or equal to 2000 psf Lateral Bearing strength below grade equal to 200 (Lbs./Sq. Ft./Ft. of depth)
- Lateral sliding coefficient of friction greater than or equal to 0.35. No sub-grade rocks or rock formations
- Adequate drainage
- No seismic-related hazards (e.g. faults, liquefaction, seismically-induced settlement, lateral spreading) Limited expansiveness
- Low to moderate corrosiveness (PH is less than 5.5, electrical resistivity is more than 1000 OHM-cm, chloride is less than 500 ppm, sulfate is less than 2000 ppm)
- Depth to start of passive pressure is 0.5 feet.

3.16 Drainage

Special drainage requirements and/or drainage design and interconnection to customer's existing storm drain system or any other storm drain discharge system is excluded from this scope.

3.17 Wind

Site max wind speed has been estimated by Provider to be no more than 110 mph based on City of Irvine Ordinance Number 292 amendment to Title 8 of the Municipal Code and based on published wind speeds from Applied Technology Council.

3.18 Weather conditions

Provider assumes standard weather patterns and site conditions for planning the project schedule.

4.0 Commissioning, Monitoring, Operations & Maintenance

4.1 Commissioning

Scope assumes commissioning requirements for this project is only for the Photovoltaic portion of the project only. Scope does not include other building system commissioning cost not related to our

work (i.e. HVAC, Plumbing, Fire Alarm, etc.).

4.2 Monitoring

Provider will connect to the existing Baker WTP SCADA system and provide run and fail input signals to monitor the status of the PV Generating Facility and accept one digital output signal to shut down the PV system if required. No other vendor information will be transmitted directly to IRWD. The inverter controllers will communicate with the SCADA system through Modbus/TCP/IP. The WTP SCADA system will act as the Modbus master, and the solar system controller will act as the Modbus slave. Provider includes an allowance of \$50,000 for all monitoring and SCADA scope.

4.3 Operations and Maintenance

Refer to section 4.0 Operation and Maintenance of System in the main agreement.

4.4 Other

Provider will ensure the solar system will discontinue operation if SCE power goes down and the Baker Water Treatment Plant's emergency generators are operating.

EXHIBIT B

FORM OF FINANCING PARTY ACKNOWLEDGMENT

[Note: The below form contemplates a sale-leaseback financing of the System]

CONSENT AND AGREEMENT ([CONSENTING PARTY])

This CONSENT AND AGREEMENT (this "Consent"), dated as of [____], 20[____], is made by and among [____] (the "Consenting Party"), Solar Star [____], LLC, a Delaware limited liability company (the "Project Company"), and [____], as Collateral Agent (together with its successors in such capacity, the "Collateral Agent") under the Participation Agreement (as defined below).

RECITALS

WHEREAS, in order to consummate the sale and leaseback (the "Transaction") of an approximately [____]-MW solar photovoltaic generating facility located in [County], [State] (the "Project"), the Project Company has entered into that certain Participation Agreement, dated as of [____], 20[____] (as amended, amended and restated, modified or supplemented from time to time, the "Participation Agreement"), by and among [____] (the "Lessee"), the Project Company and certain subsidiaries of the Lessee that become parties thereto by joinder from time to time, as the SPE Subsidiaries (collectively, the "SPE Subsidiaries"), [____], as Lessor (the "Lessor"), [____], as Trustee, [____], as Pledgor, and [____], as Owner Participant, pursuant to which the Project Company and the Lessor agreed to sell and lease various projects, including the Project described in this Consent, on the terms described therein;

WHEREAS, the Consenting Party and the Project Company have entered into those certain agreements set forth on Schedule I hereto (as amended, restated, modified or otherwise supplemented from time to time in accordance with the terms hereof, the "Assigned Agreements");

WHEREAS, the Lessee, the SPE Subsidiaries and the Lessor have entered into that certain Master Lease Agreement, dated as of [____], 20[____] (as amended, amended and restated, modified or supplemented from time to time, the "Master Lease Agreement"), setting forth certain terms and conditions for a master lease program for certain projects, including the Project described in this Consent, identified more specifically in schedules between SPE Subsidiaries and the Lessor;

WHEREAS, pursuant to the Participation Agreement, the Project Company and the Lessor will enter into, as of the date of this Consent, that certain Bill of Sale, dated as of the date hereof (as amended, amended and restated, supplemented or otherwise modified from time to time, the "Bill of Sale"), pursuant to which the Project Company will sell the Project to the Lessor on the terms described therein;

WHEREAS, pursuant to the Master Lease Agreement, the Project Company and the Lessor will enter into, as of the date of this Consent, that certain Lease Schedule dated as of the date hereof

(as amended, amended and restated, supplemented or otherwise modified from time to time, the "Lease"), pursuant to which, and pursuant to the terms of the Master Lease Agreement, the Project Company will lease from the Lessor, operate, use and maintain the Project on the terms described therein;

WHEREAS, the Project Company and the Collateral Agent will enter into that certain Security Agreement (as amended, amended and restated, modified or supplemented from time to time, the "Security Agreement" and, together with the Participation Agreement, the Bill of Sale, the Master Lease Agreement and the Lease, the "Sale Leaseback Documents"), pursuant to which the Project Company will collaterally assign and grant to the Collateral Agent for the benefit of the Lessor a first-priority security interest in all of the Project Company's right, title and interest in, to and under the Assigned Agreements as collateral security for satisfaction of all obligations of the Project Company under the Sale Leaseback Documents; and

WHEREAS, it is a requirement under the Participation Agreement that the Project Company, the Collateral Agent and the Consenting Party execute and deliver this Consent.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound, the parties hereto hereby agree as follows:

1. CONSENT TO ASSIGNMENT, ETC.

a. Consent to Assignment. The Consenting Party (i) consents to Transaction and to the pledge and assignment to the Collateral Agent for the benefit of the Lessor of all of the Project Company's right, title and interest in, to and under the Assigned Agreements pursuant to the Security Agreement, (ii) consents to the direct assignment of the Assigned Agreements to the Lessor, or any Substitute Owner in accordance with Section 1(b) below, (x) upon the scheduled expiration of the Lease if Lessee elects to return or cause the Project Company to return the Project to the Lessor at such time, and (y) upon the early termination of the Lease if the Lessor elects to repossess the Project at such time and (iii) acknowledges the right, but not the obligation, of the Collateral Agent or the Collateral Agent's designee or assignee, in the exercise of the Collateral Agent's rights and remedies under the Sale Leaseback Documents, upon its assumption of the Assigned Agreements pursuant to Section 1(b), to make all demands, give all notices, take all actions and exercise all rights of the Project Company in accordance with the Assigned Agreements to the same extent as the Project Company thereunder, and agrees that in such event the Consenting Party shall continue to perform its obligations under the Assigned Agreements; provided, that in the event, with respect to any Assigned Agreement, there exists a conflict or ambiguity between any notice given or action taken by the Collateral Agent, and any notice given or action taken by the Project Company, such conflict or ambiguity shall be resolved in favor of the notice given or action taken by the Collateral Agent.

b. Substitute Owner. Notwithstanding anything to the contrary in the Assigned Agreements and without any additional consent of the Consenting Party, the Consenting Party agrees that, if (i) the Collateral Agent notifies the Consenting Party that an event of default under any Sale Leaseback Document has occurred and is continuing and that the Collateral Agent has exercised its rights (A) to have itself or its designee or assignee substituted for the Project Company

under any of the Assigned Agreements, (B) to acquire or have its designee or assignee acquire the Project Company or (C) to sell, assign, transfer or otherwise dispose of any Assigned Agreement to a third party or (ii) the Collateral Agent or the Project Company notifies the Consenting Party that the Project Company will return the Project to the Lessor or its designee at the end of the Lease term, then the Collateral Agent, the Collateral Agent's designee (including the Lessor), or such third party (each, a "Substitute Owner") shall be substituted for the Project Company under such Assigned Agreement and, in such event, the Consenting Party shall cure any outstanding uncured defaults by the Project Company under the Assigned Agreements and shall continue to perform its obligations under such Assigned Agreement in favor of the Substitute Owner subject to the terms and conditions hereof and of the Assigned Agreements.

c. Right to Cure. (i) Notwithstanding anything to the contrary contained in any of the Assigned Agreements, the Consenting Party shall not exercise any right it may have under any Assigned Agreement, at law or in equity, to cancel, suspend or terminate any Assigned Agreement or any of its obligations under any Assigned Agreement, as the result of any default or other action or omission of the Project Company in the performance of any of its obligations under any Assigned Agreement, or upon the occurrence or non-occurrence of any event or condition under any Assigned Agreement that would immediately or with the passage of any applicable grace period or the giving of notice, or both, enable the Consenting Party to terminate or suspend its obligations or exercise any other right or remedy under such Assigned Agreement or under applicable law (hereinafter an "Assigned Agreement Default"), until the Consenting Party first gives written notice of such Assigned Agreement Default to the Collateral Agent and affords the Collateral Agent or the Collateral Agent's designee or assignee a period of at least sixty (60) days (or, if such default is a payment default, thirty (30) days) to cure such default, commencing from the later to occur of (A) the Collateral Agent's receipt of such notice and (B) the expiration of any notice periods or cure periods provided for in such Assigned Agreement; provided, however, that (x) the time periods specified in this Section 1(c) for curing an Assigned Agreement Default shall be extended for the time taken to complete foreclosure proceedings, and (y) if any such party is prohibited from curing any such Assigned Agreement Default by any process, stay or injunction issued by any governmental authority or pursuant to any bankruptcy or insolvency proceeding involving the Project Company or the Lessee, then the time periods specified in this Section 1(c) for curing an Assigned Agreement Default shall be extended for the period of such prohibition.

1.1 (ii) No cancellation, suspension or termination of any Assigned Agreement by the Consenting Party shall be binding upon the Collateral Agent or the Lessor without the notice and extended cure period specified in this Section 1(c). Any dispute that may arise under any Assigned Agreement notwithstanding, the Consenting Party shall continue performance under such Assigned Agreement and resolve any dispute without discontinuing such performance until the lapse of the notice and extended cure period specified in this Section 1(c).

d. No Termination, Assignment or Material Amendments. The Consenting Party shall not enter into any consensual cancellation or termination of any Assigned Agreement (except with respect to termination in the event of a default by the Project Company, subject to the limitations and extended cure periods provided for in Section 1(c)), or assign, novate or otherwise transfer any of its right, title or interest thereunder or consent to any such assignment or transfer by the Project Company without, in each such case, the written consent of the Collateral Agent; provided that such consent of the Collateral Agent shall not be needed if prior written consent of the

Collateral Agent with respect to such cancellation, termination, assignment or transfer has been obtained in accordance with the Sale Leaseback Documents. The Consenting Party shall not enter into or agree to any material amendment, material supplement, assignment or other material modification to, or benefit from any material waiver under, any Assigned Agreement without the prior written consent of the Collateral Agent; provided, that such consent of the Collateral Agent shall not be needed if prior written consent of the Collateral Agent with respect to such amendment, assignment, supplement, modification or waiver has been obtained in accordance with the Sale Leaseback Documents.

e. Replacement Agreement. In the event that any Assigned Agreement is rejected or otherwise terminated as a result of any bankruptcy or insolvency proceeding affecting the Project Company, the Consenting Party shall, at the option of the Collateral Agent, enter into a new agreement with the Collateral Agent or any Substitute Owner (or its transferee or other nominee that owns or leases the Project) for a term equal to the remainder of the term of such Assigned Agreement and otherwise having terms substantially the same as the terms of such Assigned Agreement. The Collateral Agent shall have the right to assign its interest in any replacement agreement to a Substitute Owner.

f. No Liability. The Consenting Party acknowledges and agrees that none of the Collateral Agent, Lessor or the Collateral Agent's designee shall have any liability or obligation under any Assigned Agreement as a result of this Consent, the Sale Leaseback Documents, the Security Agreement or otherwise, nor shall the Collateral Agent, Lessor or the Collateral Agent's designee be obligated or required to (i) perform any of Project Company's obligations under any Assigned Agreement, except, in the case of the Collateral Agent or the Collateral Agent's designee, during any period in which the Collateral Agent or the Collateral Agent's designee is a Substitute Owner pursuant to Section 1(b), in which case (A) the obligations of such Substitute Owner shall be no more than those of the Project Company under such Assigned Agreement, (B) such Substitute Owner shall have no personal liability to the Consenting Party for the performance of such obligations and (C) the sole recourse of the Consenting Party for the performance of such obligations shall be to such Substitute Owner's interest in the Project, or (ii) take any action to collect or enforce any claim for payment assigned under the Security Agreement.

g. Delivery of Notices. The Consenting Party shall deliver to Collateral Agent, concurrently with the delivery thereof to the Project Company, a copy of each notice, request or demand given by the Consenting Party pursuant to any Assigned Agreement and copies of any and all modifications, amendments, extensions, alterations and revisions to any Assigned Agreement.

h. Additional Deliverables. The Consenting Party agrees to deliver to the Collateral Agent and Lessor in connection with the execution and delivery of this Consent, a legal opinion substantially in the form attached hereto as Exhibit B.

2. PAYMENTS UNDER [AND CLARIFICATION OF] THE ASSIGNED AGREEMENTS

a. Payments. The Consenting Party shall pay all amounts payable by it under the Assigned Agreements, if any, in lawful money of the United States of America, in immediately available funds, directly into the account specified on Exhibit A attached hereto, or to such other

person or account as may be specified from time to time by the Collateral Agent to the Consenting Party in writing.

b. No Offset, Etc. All payments required to be made by the Consenting Party under the Assigned Agreements shall be made without any offset, recoupment, abatement, withholding, reduction or defense whatsoever.

c. [Clarification of Assigned Agreement]. Notwithstanding anything to the contrary in the Assigned Agreement, the Consenting Party, the Project Company and the Collateral Agent agree that:]

3. REPRESENTATIONS AND WARRANTIES OF THE CONSENTING PARTY

In order to induce the Lessor to enter into the Bill of Sale and Lease and to induce the Collateral Agent to enter into the Security Agreement, the Consenting Party makes the following representations and warranties as of the date hereof, which shall survive the execution and delivery of this Consent and the Assigned Agreements and the consummation of the transactions contemplated hereby and thereby:

a. Organization; Power and Authority. The Consenting Party is a [corporation/partnership/limited liability company], duly organized, validly existing and in good standing under the laws of the State of [____], and is duly qualified, authorized to do business and in good standing in every jurisdiction in which it owns or leases real property or in which the nature of its business requires it to be so qualified, and has all requisite power and authority to enter into and to perform its obligations under this Consent and the Assigned Agreements, and to carry out the terms hereof and thereof and the transactions contemplated hereby and thereby.

b. Authorization. The execution, delivery and performance by the Consenting Party of this Consent and the Assigned Agreements have been duly authorized by all necessary [corporate/partnership/limited liability company] action on the part of the Consenting Party and do not require any approval or consent of (i) any holder (or any trustee for any holder) of any indebtedness or other obligation of the Consenting Party or (ii) any other person or entity, except approvals or consents which have previously been obtained.

c. Execution and Delivery: Binding Agreements. Each of this Consent and each Assigned Agreement is in full force and effect, has been duly executed and delivered on behalf of the Consenting Party and constitutes the legal, valid and binding obligation of the Consenting Party, enforceable against the Consenting Party in accordance with its terms except as the enforceability hereof or thereof may be limited by (i) bankruptcy, insolvency, reorganization, or other similar laws affecting the enforcement of creditors' rights generally and (ii) general equitable principles (whether considered in a proceeding in equity or at law).

d. Litigation. There is no action, suit, proceeding or to the Consenting Party's knowledge, investigation pending or, to the best of the Consenting Party's knowledge, threatened against the Consenting Party before or by any court, administrative agency, arbitrator or governmental authority, body or agency which, if adversely determined, individually or in the aggregate, (i) could adversely affect the performance by the Consenting Party of its obligations under this Consent or any Assigned Agreement, or that could modify or otherwise adversely affect

the governmental approvals required to be obtained by the Consenting Party in connection with the execution, delivery and performance of any Assigned Agreement or (ii) questions the validity, binding effect or enforceability of this Consent or any Assigned Agreement, any action taken or to be taken pursuant hereto or thereto or any of the transactions contemplated hereby or thereby. No litigation or legal proceedings are currently pending before any court or arbitration panel between the Consenting Party and the Project Company and there are currently no disputes between the Consenting Party and the Project Company.

e. Compliance with Other Instruments, Etc. The Consenting Party is not in violation of its organizational documents, and the execution, delivery and performance by the Consenting Party of this Consent and the Assigned Agreements and the consummation of the transactions contemplated thereby will not result in any violation of, breach of or default under any term of its organizational documents, or of any material contract or agreement to which it is a party or by which it or its property is bound, or of any license, permit, franchise, judgment, writ, injunction, decree, order, charter, law, ordinance, rule or regulation applicable to it.

f. No Default or Amendment. Neither the Consenting Party nor, to the best of the Consenting Party's knowledge, any other party to any Assigned Agreement is in default of any of its obligations thereunder and no party has claimed force majeure as an excuse for performance or experienced circumstances that could form the basis for a claim of force majeure. The Consenting Party has no existing claims for damages, indemnity payments or otherwise, or existing counterclaims against the Project Company or offsets or defenses to payments currently due, if any, by the Consenting Party to the Project Company. The Consenting Party and, to the best of the Consenting Party's knowledge, each other party to each Assigned Agreement have complied with all conditions precedent to the respective obligations of such party to perform under such Assigned Agreement. To the best of the Consenting Party's knowledge, no event or condition exists that would either immediately or with the passage of any applicable grace period or giving of notice, or both, enable either the Consenting Party or the Project Company to terminate or suspend its obligations (or the performance of such obligations) under any Assigned Agreement. None of the Assigned Agreements has been amended, modified or supplemented in any manner except as expressly reflected in Schedule I hereto.

g. No Previous Assignments. Except in connection with that certain [Consent to Collateral Assignment], the Consenting Party has no notice of, and has not consented to, any previous assignment of all or any part of its right, title or interest in, to or under any Assigned Agreement.

h. Representations and Warranties. All representations, warranties and other statements made by the Consenting Party in each Assigned Agreement were true and correct as of the date when made and are true and correct as of the date of this Consent.

i. Bankruptcy. There are no actions pending against the Consenting Party under the bankruptcy or any similar laws of the United States or any state.

j. Payments. All amounts due and payable under the Assigned Agreements have been paid in full through the date hereof.

k. [Indemnity or Warranty Claims. Neither the Project Company nor the Consenting Party has made any indemnity or warranty claim or claims for liquidated damages under any Assigned Agreement.]¹

l. [Purchase Option. The Consenting Party has not taken any official action requiring or authorizing the exercise of any purchase option available to it under the Assigned Agreements, has not decided whether or not it will exercise any such purchase option, and is under no legal or economic compulsion to exercise any such purchase option; provided, however, nothing herein shall prohibit the Host from exercising any purchase option under the Assigned Agreements when it becomes exercisable in accordance with its term and such exercise shall not be deemed to be a breach of this representation and warranty.]

m. *[Other representations and warranties]*

4. MISCELLANEOUS

a. Applicable Law; Submission to Jurisdiction. a. i. THIS CONSENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK, UNITED STATES OF AMERICA, WITHOUT REFERENCE TO CONFLICTS OF LAWS (OTHER THAN SECTIONS 5-1401 AND 5-1402 OF THE NEW YORK GENERAL OBLIGATIONS LAW).

ii. Any legal action or proceeding with respect to this Consent and any action for enforcement of any judgment in respect thereof may be brought in the courts of the State of New York or of the United States of America for New York, and, by execution and delivery of this Consent, each of the Consenting Party, the Project Company and the Collateral Agent hereby accepts for itself and in respect of its property, generally and unconditionally, the non-exclusive jurisdiction of the aforesaid courts and appellate courts from any appeal thereof.

iii. Each of the Consenting Party and the Project Company irrevocably consents to the service of process out of any of the aforementioned courts in any such action or proceeding by the mailing of copies thereof by registered or certified mail, postage prepaid, to the Consenting Party or the Project Company, as the case may be, at its notice address provided pursuant to Section 4(c) hereof.

iv. Each of the Consenting Party, the Project Company and the Collateral Agent hereby irrevocably waives any objection which it may now or hereafter have to the laying of venue of any of the aforesaid actions or proceedings arising out of or in connection with this Consent brought in the courts referred to above and hereby further irrevocably waives and agrees not to plead or claim in any such court that any such action or proceeding brought in any such court has been brought in an inconvenient forum.

v. Nothing herein shall affect the right of the Collateral Agent or its designees to serve process in any other manner permitted by law or to commence legal proceedings or otherwise proceed against the Consenting Party or the Project Company in any other jurisdiction.

b. Waiver of Trial by Jury. EACH PARTY HERETO HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS CONSENT.

c. Notices. All notices and other communications hereunder shall be in writing, shall be deemed given upon receipt thereof by the party or parties to whom such notice is addressed, shall be sent by first class mail, by personal delivery, by a nationally-recognized courier service, by facsimile or by email (attached as a portable document file (.pdf) only), and shall be directed as follows:

If to the Consenting Party: []
[]
[]
Attention: []
Telephone: []
Facsimile: []
Email: []

If to the Project Company: []
77 Rio Robles
San Jose, California 95134
Attention: General Counsel
Facsimile Number: (510) 540-0552

If to the Collateral Agent: []
[]
[]
[]
Attention: []
Facsimile: []

The above parties may, by notice given hereunder, designate any further or different addresses to which subsequent notices or other communications shall be sent.

d. Amendment, Waiver. Neither this Consent nor any of the terms hereof may be terminated, amended, supplemented, waived or modified except by an instrument in writing signed by the Consenting Party, the Collateral Agent, and, unless an event of default under any Sale Leaseback Document has occurred and is continuing, the Project Company.

e. No Waiver; Remedies Cumulative. The waiver of any right, breach or default under this Consent by any party must be made specifically and in writing. No failure or delay on the part

of the Collateral Agent in exercising any right, power or privilege hereunder and no course of dealing between the Consenting Party and the Collateral Agent shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or privilege hereunder preclude any other exercise, or the further exercise, of any other right, power or privilege hereunder. No notice to or demand upon any party shall entitle such party to any further, subsequent or other notice or demand in similar or any other circumstances. The rights and remedies herein expressly provided are cumulative and not exclusive of any rights or remedies that the Collateral Agent would otherwise have.

f. Counterparts. This Consent may be executed in any number of counterparts and by the different parties hereto on separate counterparts, each of which when so executed and delivered shall be an original, but all of which shall together constitute one and the same instrument. Delivery of an executed counterpart of a signature page of this Consent by facsimile or portable document format (.pdf) shall be effective as delivery of a manually executed counterpart of this Consent.

g. Headings Descriptive. The headings of the several sections and subsections of this Consent are inserted for convenience only and shall not in any way affect the meaning or construction of any provision of this Consent.

h. Severability. In case any provision in or obligation under this Consent shall be invalid, illegal or unenforceable in any jurisdiction, the validity, legality and enforceability of the remaining provisions or obligations, or of such provision or obligation in any other jurisdiction, shall not in any way be affected or impaired thereby.

i. Successors and Assigns. This Consent shall be binding upon the parties hereto and their permitted successors and assigns and shall inure to the benefit of the parties, their designees and their respective permitted successors and assigns; provided, however, that, the Collateral Agent shall have an unlimited right to assign all or any portion of its rights in this Consent without the consent of the Consenting Party; provided further, that neither the Project Company (or its respective successors or assigns) nor the Consenting Party (or its successors or assigns) shall assign any of its interest in this Consent except in connection with an assignment of its interests in the Assigned Agreements and then only to the same person(s) to which its interest in the Assigned Agreements is so assigned.

j. Survival. All agreements, statements, representations and warranties made by the Consenting Party herein shall be considered to have been relied upon by the Collateral Agent and the Lessor and shall survive the execution and delivery of this Consent.

k. Conflicts. In the event of a conflict between any provision of this Consent and the provisions of the Assigned Agreement, the provisions of this Consent shall prevail.

l. Further Assurances. The parties hereto hereby agree to execute and deliver all such instruments and take all such action as may be necessary to effectuate fully the purposes of this Consent.

m. Termination. Each party's obligations hereunder are absolute and unconditional, and no party has the right to terminate this Consent or, except in connection with (i) a termination or expiration of the Assigned Agreements (in compliance with this Consent) or (ii) an assignment

of the Assigned Agreements (in compliance with Section 4(i) above), to be released, relieved or discharged from any obligation or liability hereunder until all obligations under the Sale Leaseback Documents have been indefeasibly satisfied in full, notice of which shall be provided by the Collateral Agent when such obligations have been satisfied, or otherwise when the Collateral Agent provides written notice to the Consenting Party of its desire to terminate this Consent.

(Signature Pages Follow)

IN WITNESS WHEREOF, the parties hereto have caused this Consent to be executed by their respective officers as of the date first above written.

[_____] ,
as Consenting Party

By: _____
Name:
Title:

[_____] ,
as Project Company

By: _____
Name:
Title:

[_____] ,
as Collateral Agent

By: _____
Name:
Title:

ASSIGNED AGREEMENTS

Not Applicable

PAYMENT INSTRUCTION

[To be provided]

Bank: [_____]

ABA Routing Number: [_____]

Account Number: [_____]

Account Name: [_____]

FORM OF LEGAL OPINION

[], 20[]

[],
in its capacity as Collateral Agent

[]
Attention: []
Telephone: []
Fax: []
E-mail: []

[],
in its capacity as Lessor

[]
Attention: []
Telephone: []
Fax: []
E-mail: []

[],
in its capacity as Owner Participant

[]
Attention: []
Telephone: []
Fax: []
E-mail: []

Re: [Project Description]

Ladies and Gentlemen:

This opinion is furnished to you at the request of [Project Company], a [Delaware] limited liability company (the "Project Company") in connection with (i) that certain Participation Agreement, dated as of [], 20[] (as further amended, amended and restated, modified or supplemented from time to time, the "Participation Agreement"), by and among [], as Lessee, the Project Company and certain subsidiaries of the Lessee that become parties thereto by joinder from time to time, collectively as SPE Subsidiaries, [], as Lessor, [], as Trustee, [], as Pledgor, and [], as Owner Participant and (ii) that certain Security Agreement (as amended, amended and restated, modified or supplemented from time to time, the "Security Agreement") between the Project Company and [], as Collateral Agent (together with its successors in such capacity, the "Collateral Agent").

The undersigned has acted as [title] to [name of Consenting Party], a [State] [type of entity] (the "Consenting Party"). In that capacity, the undersigned has reviewed (a) those certain [insert description of Project Documents] (the "Agreements") and (b) [insert description of Consent] (the

“Consent”, and together with the Agreements, the “Documents”). All capitalized terms used herein and not otherwise defined herein shall have the meaning given in the Consent.

1. Formation.

The Consenting Party is a [*corporation/partnership/limited liability company*], duly organized, validly existing and in good standing under the laws of the State of [*State*] and is duly qualified, authorized to do business and is in good standing under the laws of the State of [*State*] and every other jurisdiction in which it owns or leases real property or in which the nature of its business requires it to be so qualified.

2. Requisite Power.

The Consenting Party has (and had, if previously entered into) the organizational power and authority to enter into each of the Documents, and has the organizational power and authority to perform its obligations thereunder and conduct its business as proposed to be conducted in connection therewith.

3. Due Authorization.

The execution, delivery and performance by the Consenting Party of each of the Documents have been duly authorized by all necessary organizational action on the part of the Consenting Party.

4. Due Execution and Delivery.

Each of the Documents has been duly executed and delivered by the Consenting Party.

5. Enforceability.

Each of the Documents constitutes a legally valid and binding obligation of the Consenting Party, enforceable against the Consenting Party in accordance with its terms, except to the extent that enforceability may be limited by applicable bankruptcy, insolvency, moratorium, reorganization or other similar laws affecting the enforcement of creditors’ rights or by the effect of general equitable principles (regardless of whether such enforceability is considered in a proceeding in equity or at law).

6. No Conflicts.

The execution and delivery by the Consenting Party of each Document and the performance by the Consenting Party of its obligations under each of the Documents do not (and did not, if previously entered into) (a) violate any federal or state statute, rule or regulation applicable to the Consenting Party, (b) conflict with, result in a breach of or violate any of the terms, conditions or provisions of the Consenting Party’s formation, constituent or governing documents, (c) result in the breach of or a default under any of the material agreements (including any material indenture, mortgage or loan agreement) to which the Consenting Party is a party or by which it or any of its properties or assets is bound, (d) result in, or require, the creation of or imposition of any lien upon or with respect to any of the material properties or assets now owned or hereafter acquired by the Consenting Party, or (e) conflict with, result in a breach of or violate any terms, conditions or provisions of, any orders, writs, injunctions, decrees or arbitral awards that are binding upon the Consenting Party or its material properties or assets.

7. No Consents.

The execution and delivery by the Consenting Party of each Document and the performance by the Consenting Party of its obligations under the Documents do not (and did not, if previously entered into) require any consents, approvals, authorizations, registrations, declarations or filings by the Consenting Party under any federal or state statute, rule or regulation applicable to the Consenting Party or its properties or assets, except those consents, approvals,

authorizations, registrations, declarations and filings which have been made or obtained prior to the date hereof (and the date otherwise required, if previously entered into) and are in full force and effect.

[The foregoing opinions may be subject to such qualifications, exceptions and limitations as shall be reasonably customary and as are acceptable to the addressees.]

Each of the addressees hereto and their respective assignees and successors shall be permitted to rely upon this opinion.

Very truly yours,
[SIGNATURE BLOCK]

EXHIBIT C

PV SYSTEM PERFORMANCE GUARANTEE

This PV System Performance Guarantee (“Guarantee”) forms a part of the Agreement.

ARTICLE I. DEFINED TERMS

Section 1.01 Defined Terms.

As used in this Guarantee, the following terms shall have the meanings set forth below. All other capitalized terms have the meaning ascribed in the Agreement.

Actual Generation means, for each Guarantee Year during the Term and with respect to each System, the System’s alternating current or “AC” electricity production in kilowatt-hours (“kWh”) as measured under Section 3.02.

Avoided Energy Price per kWh means the amount that the Customer will be paid for each Kilowatt-hour as set out in Exhibit C - Appendix B.

Customer Responsibilities shall have the meaning set forth in Section 4.01.

Data Acquisition System or DAS means Provider’s system that displays historical meteorological and production data over an Internet connection and consists of hardware located on-site and software housed on Provider’s DAS server. The DAS measures and logs, at a minimum, the following parameters on a 15-minute average basis at the Sites: actual AC electricity production of the System (in kWh) and solar irradiance (in W/m²)

Expected Energy means, for each System in a specified Guarantee Year, the kilowatt hours for that System set forth on Appendix A to Exhibit C – Expected Energy.

Excused Performance Event, for the purposes of this Guarantee, means:

- Force Majeure Event;
- Impingements on solar access by structures or activities on neighboring sites or by facilities that are beyond the control of either Party;
- Externally caused outages, including:
 - Warranty Exclusions: hours during any period when the System or any portion thereof is off-line due to an event that would constitute an exclusion under any applicable manufacturer’s, system, workmanship or other applicable warranty.
 - Network Disturbance Hours: hours during any period when a fluctuation in the utility network parameters (e.g., a frequency or voltage variation) result in the disconnection of the inverters or the System from the utility network and prevented energy from being evacuated from the System.
 - Network Outage Hours: hours during any period when a failure in the distribution network or in the connection infrastructure prevented energy from being evacuated from the System.
 - Third-Party Equipment Servicing Hours: equipment or System outage hours during any period that result from service issues related to non-Provider equipment or delays in procuring non-Provider replacement parts.

- **Customer-Caused Hours:** hours during any period when the equipment or the System is off-line due to Customer-required outages or Customer-caused delays in Site access.
- **Major Maintenance Hours:** hours during any period when the equipment or the System is off-line due to Customer-required major maintenance work.

Guaranteed Level means the value of Guaranteed Energy for a Guarantee Year for each specified System indicated in Appendix A.

Guarantee Year means each successive 12-month period during the Term commencing on the Commercial Operation Date.

Kilowatt-hour or kWh means electrical energy expressed in kilowatt-hours and recorded from the kWh interval records of the Revenue Meter.

PVSim means the software program utilized by Provider to predict the amount of energy that a System will produce in an average year which currently has the following characteristics: (1) based on PVFORM, the photovoltaic simulation software produced by Sandia National Laboratories and the US Department of Energy, (2) all photovoltaic characteristics are modeled, (3) all ancillary array losses are taken into account and (4) PVSim simulations use either measured data or typical meteorological year files from Meteonorm and NREL.

Revenue Meter means the principal meter of a given System from which energy output is read and documented.

SEMMY or Simulated Energy in a Measured Meteorological Year, means, with respect to any Guarantee Year, Year 1 AC Energy output of the System simulated by PVSim using measured average hourly irradiance, wind speed, and air temperature as recorded by the Data Acquisition System, holding all other inputs equal to those used in calculating SETMY.

SETMY or Simulated Energy for a Typical Meteorological Year, means the Year 1 AC Energy output of the System simulated by PVSim using average hourly irradiance, wind speed, and air temperature data contained within the Weather File.

Site means the real estate where a System and any support structure are located including any building and building roof that touch or support the System.

System means each photovoltaic system located at a Site as more particularly identified in the Agreement.

True-up Period means each successive five (5)-year period during the Term commencing on the first day of the Term.

Weather Adjustment means the method for reconciling expected kWh during a typical weather year with the actual meteorological conditions measured on-site, as described in Section 3.01.

Weather File means the typical meteorological year data set specified for the System as SolarAnywhereTGY2016_(10km)_33.65_-117.65.

ARTICLE II. PERFORMANCE GUARANTEE PRICE.

Section 2.01 Price

The Parties agree that the consideration set forth in the Agreement includes adequate consideration for the terms, conditions and provisions of this Guarantee.

ARTICLE III. PERFORMANCE GUARANTEE

Provider guarantees to Customer that the Actual Generation of each System during any Guarantee Year, subject to the limitations, terms and conditions stated in this Guarantee and the Agreement, shall be not less than Guaranteed Level.

Section 3.01 Guaranteed Output Calculations.

Provider shall calculate the Annual Deficit for each System for each Guarantee Year during the Term:

(a)

Annual Deficit

$$= (\text{Expected Energy} \times \text{Guaranteed Level}) \times \text{Weather Adjustment} \\ - \text{Actual Generation}$$

Where “Weather Adjustment” means the following ratio:

$$\frac{\text{Simulated Energy in a Measured Meteorological Year (SEMMY)}}{\text{Simulated Energy for a Typical Meteorological Year (SETMY)}}$$

For each Guarantee Year, within 30 days after the end of such Guarantee Year, Provider shall calculate the Annual Deficit for each System. The Customer shall have the right to access all data and information supporting Provider’s calculation of the Annual Deficit.

Guarantee Payment/Reimbursement.

(b) At the end of each True-up Period:

- (i) if the $\sum$ Annual Deficits > 0 , then Provider shall pay to Customer an amount equal to the cumulative product of (i) the Annual Deficits and (ii) the Avoided Energy Price per kWh (a “Guarantee Payment”);
- (ii) Provider shall, by invoice, promptly notify Customer of any Guarantee Payment due. A Guarantee Payment shall be payable within thirty (30) days of the date of such invoice.

(c) For purposes of calculating a Guarantee Payment, the Annual Deficit for any System shall not exceed twenty percent (20%) of the Expected Energy for that System for that Guarantee Year.

Section 3.02 Actual Generation Measurement.

The process for measuring Actual Generation for each System for each Guarantee Year shall be:

- (a) **Initial Output Data Collection.** During the Term, Provider will collect energy output data using its Data Acquisition System. For each Guarantee Year, Provider will sum the daily kWh output for each System provided by the DAS to calculate the Actual Generation for each System for such Guarantee Year.
- (b) **Contingency for Equipment Failure.** In the event of hardware, communication, or other failure affecting the DAS, Provider will make commercially-reasonable efforts to resolve the failure in a timely manner. In the event that data is lost, Actual Generation for each affected System shall be adjusted to compensate for such lost data:
 - (i) In lieu of lost meteorological data, Provider will utilize such data obtained from a nearby meteorological station that Provider monitors and selects for such purpose.

- (ii) In lieu of lost electricity data, Provider will utilize the cumulative data from System meter readings to calculate the electricity generated by each affected System during the missing interval. In the event that data from any System meter is inaccurate or missing, Provider will simulate electricity production during the missing interval utilizing measured meteorological data and PVSIM. The simulated electricity production during the missing interval will be added to the Actual Generation for each affected System for the subject Guarantee Year.

ARTICLE IV. CUSTOMER RESPONSIBILITIES

Section 4.01 Customer's Failure to Uphold Responsibilities.

Provider's obligations under this Guarantee shall be suspended for the duration of Customer's actual failure to satisfy Customer's obligations under the Agreement. Provider shall promptly notify Customer of any such failures ("Out of Compliance Letter"). Upon Customer's cure of all substantiated failures described in an Out of Compliance Letter, Provider will notify Customer ("In Compliance Letter") that Customer is complying with Customer's Responsibilities. For any period between the issuance of an Out of Compliance Letter and of an In Compliance Letter (a "Noncompliance Period"), to the extent that Customer's non-compliance actually impacts the Actual Generation of any System, any Actual Generation from such affected Systems in such month(s) shall be disregarded in the calculation of Annual Deficits for such Systems under Section 3.01, and the Expected Energy for any affected System in any Guarantee Year in which there is a Noncompliance Period shall be reduced by a proportionate amount.

ARTICLE V. EXPECTED ENERGY ADJUSTMENT

Section 5.01 Adjustment of Expected Energy.

If, and to the extent, any of the following events results in a change in the production of electricity by any System, Expected Energy for that System shall be adjusted correlatively for the period of such change:

- (a) Subject to Provider's obligations under any warranty it provides in connection with the Systems (including any Provider obligation, with respect to any System, in connection with any requirements under the California Solar Initiative program), a material portion of the components of any System fails, and the manufacturer of such component(s) refuses, or otherwise fails to honor its corresponding warranty;
- (b) Customer fails to perform any of its obligations under the Agreement – such as obligations related to maintaining each System's interconnection to the local utility grid or limiting outages (as defined in the Agreement) – and such failure reduces the amount of electricity that any System can generate or deliver.
- (c) There is any failure of any System to perform caused by legislative, administrative or executive action, regulation, order or requisition of any federal, state or local government, local utility or public utilities commission;
- (d) There is an Excused Performance Event; or
- (e) Adjustment to the Expected Energy, or a reduction in the amount of Energy that Provider is obligated to deliver, is permitted or required under the Agreement.

Section 5.02 Notification of Changes to Expected Energy.

If Provider determines that any changes to Expected Energy for any System are required based on an event or events described in Section 5.01 (above), then Provider shall notify the Customer, in writing, of the basis for its determination, and Provider shall either provide revised definitions of Expected Energy in appendixes that, upon mutual agreement of the Parties, which shall not be unreasonably denied or delayed, shall replace the current Appendixes to this Guarantee, or specify a date by which it shall do so.

Appendix A to Exhibit C – Expected Energy

Guarantee Year	Expected Energy (kWh)	Guaranteed Energy (kWh)
1	1,946,344	1,849,027
2	1,941,478	1,844,404
3	1,936,624	1,839,793
4	1,931,783	1,835,194
5	1,926,953	1,830,606
6	1,922,136	1,826,029
7	1,917,331	1,821,464
8	1,912,537	1,816,911
9	1,907,756	1,812,368
10	1,902,987	1,807,837
11	1,898,229	1,803,318
12	1,893,484	1,798,809
13	1,888,750	1,794,312
14	1,884,028	1,789,827
15	1,879,318	1,785,352
16	1,874,620	1,780,889
17	1,869,933	1,776,436
18	1,865,258	1,771,995
19	1,860,595	1,767,565
20	1,855,944	1,763,146
21	1,851,304	1,758,739
22	1,846,676	1,754,342
23	1,842,059	1,749,956
24	1,837,454	1,745,581
25	1,832,860	1,741,217

Appendix B to Exhibit C – Avoided Energy Price

Guarantee Year	Avoided Energy Price per kWh
1	\$ 0.0180
2	\$ 0.0185
3	\$ 0.0191
4	\$ 0.0197
5	\$ 0.0203
6	\$ 0.0209
7	\$ 0.0215
8	\$ 0.0221
9	\$ 0.0228
10	\$ 0.0235
11	\$ 0.0242
12	\$ 0.0249
13	\$ 0.0257
14	\$ 0.0264
15	\$ 0.0272
16	\$ 0.0280
17	\$ 0.0289
18	\$ 0.0298
19	\$ 0.0306
20	\$ 0.0316
21	\$ 0.0325
22	\$ 0.0335
23	\$ 0.0345
24	\$ 0.0355
25	\$ 0.0366

EXHIBIT D

SITE LEASE AGREEMENT

THIS SITE LEASE AGREEMENT (“**Agreement**”), dated as of _____, 201_ (“**Effective Date**”), is by and between Irvine Ranch Water District, an independent special district formed under State of California Water District Law (California Water Code, Division 13) (“**Lessee**”), and Solar Star IRWD Baker, LLC, a [a limited liability company formed under the laws of the State of Delaware] (“**Lessor**”).

Recitals

A. Lessee and Lessor have entered into that certain Power Purchase Agreement, dated as of the Effective Date (the “**PPA**”), pursuant to which Lessee has agreed to engineer, construct and install the Systems and provide Lessor with the Solar Services. Capitalized terms used herein but not defined herein (including in the recitals hereto) shall have the meanings given in the PPA;

B. In order to construct and install the Systems and provide the Solar Services, Lessee requires access to certain real property owned or leased by Lessor as identified in Appendix A to Exhibit D – Legal Description of Site (“**Site**”)

C. In connection with the foregoing, Lessee desires that Lessor lease, and Lessor desires to lease to Lessee, the Premises (defined below); and

D. The Lessee may finance the Systems and, in connection therewith, grant a first priority security interest therein in favor of the Lenders (defined below).

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants and agreements herein contained, and intending to be legally bound hereby, Lessee and Lessor hereby agree as follows:

1. Lease. Lessor hereby leases (the “**Lease**”) to Lessee, in accordance with the terms and conditions hereinafter set forth, the real property listed in Appendix B to Exhibit D – Legal Description of Premises where the Systems will be installed (individually and collectively, the “**Premises**”). Upon the completion of the installation of the Systems, Lessee shall provide Lessor with “as-built” drawings setting forth in detail the location of all components of each System. Subject to Section 5, Lessor hereby also grants to Lessee, for a period co-terminous with the Lease, a right of way to access the Premises across or through the Site and any surrounding or nearby premises owned or leased by Lessor, passage through which is necessary or convenient to gain access to the Systems or the Premises.

2. Benefits. Lessee shall pay Lessor one U.S. dollar (\$1.00) on the Commercial Operation Date as and for rent of the Premises.

3. Condition of Premises and System Construction.

(a) Lessor and Lessee acknowledge and agree that the terms and conditions of Exhibit D to the PPA shall govern with respect to the condition of the Site and Premises hereunder.

(b) Lessor hereby consents to the construction of each System, including, without limitation, solar panels, mounting substrates or supports, wiring and connections, power inverters, service equipment, metering equipment and utility interconnections, on the Premises.

(c) Lessor acknowledges that the installation of all or a portion of the Systems may require physically mounting and adhering of the Systems [to the roofs of the building(s) below the Premises / to the ground and consents to such mounting and adhering, as applicable. Lessee may request written acknowledgement from Lessor pertaining to the final structural analysis related to the System in Lessee's sole discretion.

4. System Installation, Operation, Ownership and Removal.

(a) Lessee shall have the right from time to time during the term hereof and in accordance with the PPA:

- (i) to construct, install, operate and monitor the Systems in and on the Premises;
- (ii) to maintain, clean, repair, replace and dispose of part or all of any System;
- (iii) to add or remove any System or any part thereof consistent with the PPA;
- (iv) to access the Premises with guests or consultants for advertising and other promotional purposes, including without limitation the taking of photographs and filming of images, which access shall occur during normal business hours and at such other times as are acceptable to the Lessor in its reasonable business judgment; and
- (v) to perform (or cause to be performed) all tasks necessary or appropriate, as reasonably determined by Lessee, to carry out the activities set forth in subparagraphs (i) through (iv) of this Section 4(a).

(b) Lessor acknowledges and agrees that Lessee or its affiliate is the exclusive owner and operator of each System and that all equipment comprising the Systems shall remain the personal property of Lessee and shall not become fixtures, notwithstanding the manner in which the Systems are or may be affixed to any real property of Lessor. Lessor shall have no right, title or interest in any System or any component thereof, notwithstanding that any such System may be physically mounted or adhered to the Premises.

(c) Lessor represents and warrants that Lessor (i) has been duly authorized to enter into this Agreement by all necessary action, (ii) will not be in default under any agreement to which it is a party (including any lease in respect of any Site as to which Lessor is the tenant)

(e) With respect to each Site as to which Lessor's interest in such Site is a fee simple interest, Lessor shall not sell, lease, assign, mortgage, pledge or otherwise alienate or encumber any such Site unless Lessor shall have given Lessee at least thirty (30) days' prior written notice thereof, which notice shall identify the transferee, the Site or Sites to be so transferred and the proposed date of transfer. Lessor agrees that this Agreement and the rights in the Premises granted in Section 1 of this Agreement shall run with the Sites and survive any transfer of any Site while the PPA and this Agreement are in effect. In furtherance of the foregoing, Lessor agrees that it shall cause any purchaser, lessee, assignee, mortgagee, pledgee or party to whom a lien has been granted to execute and deliver to Lessee a document pursuant to which such party acknowledges and consents to the Lessee's rights in the Sites as set forth herein.

(f) Lessee shall keep the Premises and the Sites free from any mechanic's liens and shall pay when due all invoices arising out of any work performed or materials furnished to or at the Premises. If

any claim of mechanic's lien is recorded against title to the Premises and the Sites, Lessee shall bond against or discharge same within thirty (30) days after Lessee's receipt of written notice that such lien has been recorded.

5. Access to Premises. Lessor shall provide Lessee with access to the Premises in accordance with Exhibit D to the PPA and as reasonably necessary to allow Lessee to perform the Installation Work and maintain the Systems as contemplated in the PPA, including, without limitation, ingress and egress to and from the Premises for Lessee and its employees, contractors and sub-contractors and access to electrical panels and conduits to interconnect the Systems with the electrical wiring of the Sites. Lessor shall use commercially reasonable efforts to designate sufficient space, adjacent to the Premises, for the temporary storage and staging of tools, materials and equipment (collectively, "**Equipment**") by Lessee and for the parking of Lessee's construction crew vehicles, temporary construction trailers and facilities reasonably necessary during the Installation Work, removal work and access for rigging and material handling. Lessor shall designate a reasonable area adjacent to the Premises for construction laydown by Lessee. Lessor and its authorized representatives shall at all times have access to and the right to observe the Installation Work, subject to compliance with Lessee's safety rules, but shall not interfere with the Installation Work or handle any Equipment or the System without prior written authorization from Lessee. In addition, Lessor shall grant Lessee access to the Site as reasonably necessary to allow Lessee to perform the O&M Work, including, without limitation, ingress and egress to and from the Premises for Lessee and its employees, contractors and subcontractors and local electric utility personnel. Lessee shall perform the O&M Work in a manner that minimizes inconvenience to and interference with Lessor and Lessor's invitees' and customers' use of the Site to the extent commercially practicable.

6. Representations and Warranties, Covenants of Lessor. Lessor represents and warrants to Lessee that there are no circumstances known to Lessor or commitments to third parties (including, without limitation, mortgages, liens, or activities that may adversely affect any System's direct or indirect exposure to sunlight) that may damage, impair or otherwise adversely affect Lessee's rights under this Agreement or any System and/or its function. Lessor represents and warrants that Lessor has lawful title to the Sites and the Premises and full right to enter into this Agreement and that Lessee shall have quiet and peaceful possession of the Premises throughout the term of this Agreement. Lessor will not initiate or conduct activities that it knows or reasonably should know may damage, impair or otherwise adversely affect any System or its function (including activities that may adversely affect any System's direct or indirect exposure to sunlight). Lessor will not conduct maintenance to the Sites or the Premises that is reasonably likely to damage, impair or otherwise adversely affect any System or its function.

7. Term. The term ("**Term**") of this Agreement shall commence on the Effective Date and terminate on the date that is one hundred eighty (180) days after the expiration or earlier termination of the PPA. In addition, Lessee may terminate this Agreement effective immediately upon provision of written notice to Lessor if (a) within one hundred eighty (180) days of the Effective Date, Lessee determines that a System cannot be installed and operated according to Lessee's investment criteria; or (b) at any time during the Term, Lessee determines that the System or operation thereof is impaired at any Site due to lack of direct or indirect exposure to sunlight as a result of the acts or omissions of Lessor or Lessor's agents, employees or contractors.

8. Insurance. Each of Lessee and Lessor shall obtain and maintain the insurance coverages required under the PPA.

9. Taxes. Each of Lessee and Lessor shall pay taxes, fees, excises, assessments, bonds, levies, or similar charges as required under the PPA.

10. Liability and Indemnity.

(a) General Indemnification.

(i) By Lessee. Lessee shall indemnify, defend and hold harmless Lessor, its affiliates, officers, agents and employees (the "**Lessor Indemnitees**") from and against any claim, demand, lawsuit, or action of any kind (collectively, "**Losses**") for injury to or death of persons, including, but not limited to, employees of Lessee or Lessor, and damage or destruction of property, including, but not limited to, property of Lessee, any utility company or Lessor, or other loss or damage incurred by Lessor, arising out of (A) negligent acts or omissions or willful misconduct of Lessee, its agents, officers, directors, employees or contractors on or at the Premises or the Sites in connection with this Agreement; or (B) the material breach by Lessee of any of its obligations under this Agreement. The obligation to indemnify shall extend to and encompass all costs incurred by Lessor and any Lessor Indemnitee in defending such Losses, including, but not limited to, attorney, witness and expert witness fees, and any other litigation related expenses. Lessee's obligations pursuant to this Section 10(a)(i) shall not extend to Losses for liability to the extent attributable to the negligence, fraud or willful misconduct of Lessor, the Lessor Indemnites, or their respective contractors, successors or assigns, or to the acts of third parties. Lessee shall pay any cost that may be incurred by Lessor or the Lessor Indemnites in enforcing this indemnity, including reasonable attorney fees.

(ii) By Lessor. Lessor shall indemnify, defend and hold harmless Lessee, its affiliates, officers, agents and employees (the "**Lessee Indemnites**") from and against any Losses for injury to or death of persons, including, but not limited to, employees of Lessee or Lessor, and damage or destruction of property, including, but not limited to, property of either Lessee or Lessor, or other loss or damage incurred by Lessee, arising out of: (A) negligent acts or omissions or willful misconduct of Lessor, its agents, officers, directors, employees, representatives, or contractors; (B) the material breach by Lessor of any of its obligations under this Agreement; or (C) the inaccuracy of any representation or warranty of Lessor contained in this Agreement. The obligation to indemnify shall extend to and encompass all costs incurred by Lessee and any Lessee Indemnitee in defending such Losses, including, but not limited to, attorney, witness and expert witness fees, and any other litigation related expenses. Lessor's obligations pursuant to this Section 10(a)(ii) shall not extend to Losses for liability to the extent attributable to the negligence, fraud or willful misconduct of Lessee, the Lessee Indemnites, or their respective contractors, successors or assigns, or the acts of third-parties. Lessor shall pay any cost that may be incurred by Lessee or the Lessee Indemnites in enforcing this indemnity, including reasonable attorney fees.

(b) Environmental Indemnification.

(i) By Lessor. Lessor shall indemnify, defend and hold harmless Lessee and the Lessee Indemnites from and against any and all Losses suffered or incurred by any such party by reason of or resulting from (A) any Release on the Sites or the Premises caused by Lessor or the Lessor Indemnites or any Release on other property in the vicinity of the Sites or the Premises caused by Lessor or the Lessor Indemnites to the extent any such Release impacts the Sites or the Premises; or (B) any environmental claim from any third party with regard to any violation or alleged violation of any Environmental Laws by Lessor or the Lessor Indemnites or any actual, threatened or alleged Release affecting the Sites or the Premises by Lessor or the Lessor Indemnites. For the purposes hereof, (1) "**Release**" means any releasing, spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, disposing, or dumping into the environment in violation of any Environmental Laws; and (2) "**Environmental Laws**" shall mean all federal, state, and local laws, statutes, ordinances, and regulations now or hereafter in effect, and in each case as amended, and any judicial or administrative interpretation thereof relating to the regulation and protection of human health, safety, the environment and natural resources (including, without limitation, ambient air, surface water, groundwater, wetlands, land, surface or subsurface strata, wildlife, aquatic species

and vegetation), including without limitation, laws and regulations relating to emissions, discharges, releases or threatened releases of hazardous materials or otherwise relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transport or handling of hazardous materials.

(ii) By Lessee. Lessee shall indemnify, defend and hold harmless Lessor and the Lessor Indemnitees from and against any and all Losses suffered or incurred by any such party by reason of or resulting from (A) any Release on the Sites or Premises caused by Lessee or the Lessee Indemnitees; or (B) any environmental claim from any third party with regard to any violation or alleged violation of any Environmental Laws by Lessee or the Lessee Indemnitees or any actual, threatened or alleged Release affecting the Sites or the Premises by Lessee or the Lessee Indemnitees.

(c) No Consequential Damages. Notwithstanding any provision in this Agreement to the contrary, neither Lessee nor Lessor shall be liable to the other for incidental, consequential, special, punitive or indirect damages, including without limitation, loss of use, loss of profits, cost of capital or increased operating costs, arising out of this Agreement whether by reason of contract, indemnity, strict liability, negligence, intentional conduct, breach of warranty or from breach of this Agreement. The foregoing provision shall not prohibit Lessee or Lessor from seeking and obtaining general contract damages for a breach of this Agreement.

(d) Survival. The indemnities contained in this Section 10 shall survive the expiration or earlier termination of this Agreement.

11. Assignment.

(a) Except as permitted in the PPA, neither party shall have the right to assign any of its rights, duties or obligations under this Agreement without the prior written consent of the other party, which consent may not be unreasonably withheld or delayed; provided, however, that Lessee may in its sole discretion and without the consent of Lessor assign any of its rights, duties or obligations under this Agreement to (i) one or more of its affiliates, (ii) one or more third parties in connection with a sale-and-leaseback or other financing transaction, or (v) a successor entity in a merger or acquisition transaction (any of the foregoing being a “**Permitted Transfer**”). Lessee shall provide notice to Lessor of the occurrence of any such Permitted Transfer.

(b) With respect to a Permitted Transfer pursuant to clause (ii) in Section 11(a), Lessor acknowledges and agrees that, upon receipt of written direction from a financing-transaction assignee of Lessee (collectively, “**Lender**”), and notwithstanding any instructions to the contrary from Lessee, Lessor will recognize Lender, or any third party to whom Lender has reassigned the rights of Lessee under this Agreement, as the proper and lawful Lessee of the Premises and as the proper and lawful successor to Lessee with respect to access to the Premises across or through the Sites and fully entitled to receive the rights and benefits of Lessee hereunder so long as Lender (or its assignee) performs the obligations of Lessee hereunder. Lessor shall be protected and shall incur no liability in acting or proceeding in good faith upon any such foregoing written notice and direction by Lender which Lessor shall in good faith believe (i) to be genuine and (ii) a copy of which to have been delivered to Lessee. Lessor shall be under no duty to make any investigation or inquiry as to any statements contained or matters referred to in any such foregoing notice and direction, but may accept and rely upon them as conclusive evidence of the truth and accuracy of such statements.

12. Provisions Benefiting Lender.

(a) Lessor agrees to provide written notice to Lender, provided that Lessor shall have previously received written notice of Lender’s designated address, of any act or event of default of Lessee under the Agreement of which Lessor has knowledge that would entitle Lessor to cancel, terminate, annul, or modify the

Agreement or dispossess or evict Lessee from the Premises or otherwise proceed with enforcement remedies against Lessee, and Lender shall have the same amount of time as Lessee, but at least ten (10) days with respect to any monetary default and at least thirty (30) days with respect to any non-monetary default, to cure any default by Lessee under the Agreement; provided that in no event shall Lender be obligated to cure any such default.

(b) Subject to the terms and conditions hereof, Lessor hereby subordinates any lien it may have in and to the Systems and other property that is or may from time to time hereafter be located at the Premises in connection with the construction, installation, operation, maintenance and/or repair of the Systems, and to which Lessee has granted or will grant a security interest to Lender (all such property and the records relating thereto shall be hereafter called the “**Collateral**”) to the lien of Lender; provided, however, that this subordination shall not prevent Lessor from exercising any right or remedy against Lessee to which Lessor may be entitled under the terms of the Agreement or as may be provided by applicable law; nor shall it prevent Lessor from realizing upon any lien it may have on any property of Lessee, including the Collateral, so long as Lessor recognizes Lender’s prior right to the Collateral described above. Lessor recognizes and acknowledges that any claim or claims (“**Claims**”) that Lender has or may have against such Collateral by virtue of any lien or security interest, are superior to any lien, security interest, or claim of any nature that Lessor now has or may hereafter have to such Collateral by statute, agreement or otherwise. The subordination provided for herein shall be effective until the discharge of the Claims. Lessor further agrees to notify any purchaser of the Premises, and any subsequent mortgagee or other encumbrance holder, of the existence of the foregoing waiver of Lessor’s lien, which shall be binding upon the executors, administrators, successors and transferees of Lessor, and shall inure to the benefit of the successors and assigns of Lender. Lessor agrees to execute such documents as may be required by Lender to evidence the foregoing subordination and to obtain similar executed documents from any third party who now has or obtains in the future an interest in the Sites or the Premises, including any lenders to Lessor.

(c) Lessor consents to Lender’s security interest in the Collateral and waives all right of levy for rent and all claims and demands of every kind against the Collateral, such waiver to continue so long as any sum remains owing from Lessee to the Lender. Lessor agrees that the Collateral shall not be subject to distraint or execution by, or to any claim of, Lessor.

(d) Lessor hereby irrevocably agrees and consents to refrain from taking any action to bar, restrain or otherwise prevent Lender from the Premises and the Sites for the purpose of inspecting the Collateral, and agrees that Lender may access the Premises through the Sites to inspect the Collateral.

13. Amendments. This Agreement may be amended only in writing signed by Lessee and Lessor or their respective successors in interest.

2. 14. 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 AIR COURIER SERVICE, OR PERSONALLY DELIVERED TO A REPRESENTATIVE OF THE RECEIVING PARTY, OR SENT BY FACSIMILE (PROVIDED AN IDENTICAL NOTICE IS ALSO SENT SIMULTANEOUSLY BY MAIL, OVERNIGHT COURIER, OR PERSONAL DELIVERY AS OTHERWISE PROVIDED IN THIS SECTION 14). ALL SUCH COMMUNICATIONS SHALL BE MAILED, SENT OR DELIVERED, ADDRESSED TO THE PARTY FOR WHOM IT IS INTENDED, AT ITS ADDRESS SET FORTH BELOW, UNLESS A CHANGE OF ADDRESS NOTICE HAS BEEN

**DELIVERED BY A PARTY TO THE OTHER PARTY IN ACCORDANCE
WITH THIS SECTION 14:**

If to Lessor:

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92648
Attention Kevin Burton, P.E.

Phone: (949) 453-5594
Facsimile: (888) 645-3804

If to Lessee:

[], LLC
c/o SunPower Corporation, Systems
1414 Harbour Way South, Suite 1901
Richmond, CA 94804
Attention: Julie Williamson, Project Administration
Phone: 510-540-0550
Fax: 510-540-0552

15. **Waiver.** The waiver by either party of any breach of any term, condition, or provision herein contained shall not be deemed to be a waiver of such term, condition, or provision, or any subsequent breach of the same, or any other term, condition, or provision contained herein.

16. **Remedies Cumulative.** No remedy herein conferred upon or reserved to Lessee or Lessor shall exclude any other remedy herein or by law provided, but each shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law or in equity or by statute.

17. **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.

18. **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).

19. **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.

20. **Counterparts.** This Agreement may be executed in counterparts, which shall together constitute one and the same agreement. Facsimile or "pdf" signatures shall have the same effect as original signatures and each party consents to the admission in evidence of a facsimile or photocopy of this Agreement in any court or arbitration proceedings between the parties.

21. **Entire Agreement.** This Agreement and the PPA represent the full and complete agreements between the parties hereto with respect to the subject matter contained herein and therein and supersede all prior written or oral agreements between said parties with respect to said subject matter. In the event of any

conflict between the provisions of this Agreement and the provisions of the PPA, the provisions of the PPA shall govern and control.

22. Further Assurances. Upon the receipt of a written request from the other party, each party shall execute such additional documents, instruments and assurances and take such additional actions as are reasonably necessary to carry out the terms and intent hereof. Neither party shall unreasonably withhold, condition or delay its compliance with any reasonable request made pursuant to this section. Lessor consents to and hereby appoints Lessee as its attorney in fact for the purpose of recording a memorandum of this Agreement in the land registry or title records of the county where the Premises is located or other applicable government office. From time to time, within seven (7) days of a written request by Lessee (or its lenders), Lessor shall provide an estoppel certificate with respect to Lessee's compliance with the terms of this Agreement and attesting to Lessor's knowledge of any known issues of noncompliance by Lessee.

23. Estoppel. Either party hereto, without charge, at any time and from time to time, within five (5) business days after receipt of a written request by the other party, shall deliver a written instrument, duly executed, certifying to the requesting party, or any other person, firm or corporation specified by the requesting party:

(a) that this Agreement is unmodified and in full force and effect, or if there has been any modification, that the same is in full force and effect as so modified, and identifying any such modification;

(b) whether or not to the knowledge of such party there are then existing any offsets or defenses in favor of such party against enforcement of any of the terms, covenants and conditions of this Agreement and, if so, specifying the same and also whether or not to the knowledge of such party the other party has observed and performed all of the terms, covenants and conditions on its part to be observed and performed, and if not, specifying the same;

(c) the dates to which amounts due have been paid; and

(d) such other information as may be reasonably requested by the requesting party. Any written certificate given hereunder may be relied upon by the recipient thereof, except to the extent the recipient has actual knowledge of facts contained therein.

APPENDIX A TO EXHIBIT D

Legal Description of Site

That certain parcel of land situated in the City of Lake Forest, County of Orange, State of California, being Parcel 2 of Amending Parcel Map No. 89-218, filed in Book 274, Pages 27 through 29 of Parcel Maps in the Office of the County Recorder of said County (APPENDIX A PLAT)

EXCEPTING THEREFROM the following parcels of land:

- 1) That portion of said land as described in the deed to Municipal Water District of Orange County recorded January 23, 1996 as Instrument No. 19960033544 of said Official Records;
- 2) That portion of said land as described in the Irrevocable Offer of Dedication recorded May 3, 2011 as Instrument No. 2011000222167 and accepted by the City of Lake Forest per the Certificate of Acceptance of Irrevocable Offer of Dedication in Fee Simple of Real Estate Recorded May 9, 2012 as Instrument No. 2012000265051, both of said Official Records;
- 3) That portion of said land as described in the Grant Deed to Lennar Homes of California, Inc. recorded September 1, 2017 as Instrument No. 2017000374689 of said Official Records;
- 4) That portion of said land as described in the Grant Deed to the City of Lake Forest recorded March 6, 2018 as Instrument No. 2018000079566 of said Official Records.

APPENDIX A PLAT



APPENDIX B TO EXHIBIT D

Legal Description of Premises

**LEASE AREA
BAKER WATER TREATMENT PLANT**

LEGAL DESCRIPTION

Those certain parcels of land situated in the Lake Forest, County of Orange, State of California being that portion of Parcel 2 of Amending Parcel Map No. 89-218 as shown on a map thereof filed in Book 274, Pages 27 through 29 of Parcel Maps in the Office of the County Recorder of said County described as follows:

PARCEL A:

Being a closed circle with a radius of 160.00 feet, the radius point of said circle being described as follows:

COMMENCING at northeasterly terminus of that certain course on the general southeasterly line of said parcel shown on said map as having a bearing and distance of "N 33°28'43" E 480.56"; thence along said general southeasterly line South 33°28'43" West 79.82 feet; thence leaving said southeasterly line North 56°31'17" West 334.46 feet to a point hereinafter referred to as Point "A", said point being also the radius point of the herein described circle.

CONTAINING: 1.846 acres, more or less.

PARCEL B:

Being a closed circle with a radius of 160.00 feet, the radius point of said circle being described as follows:

COMMENCING at the hereinbefore described Point "A"; thence South 30°13'47" West 342.12 feet to a point hereinafter referred to as Point "B", said point being also the radius point of the herein described circle.

CONTAINING: 1.846 acres, more or less.

SUBJECT TO: Covenants, conditions, reservations, restrictions, rights-of-way, and easements of record, if any.

APPENDIX "B" PLAT attached hereto and by this reference made a part hereof.

Prepared by me or under my direction:

Dated: August 16, 2018

Steven L. Malloy, R.C.E. 31926
License expires December 31, 2018



Appendix B-1g1.doc

APPENDIX B TO EXHIBIT D

APPENDIX B PLAT

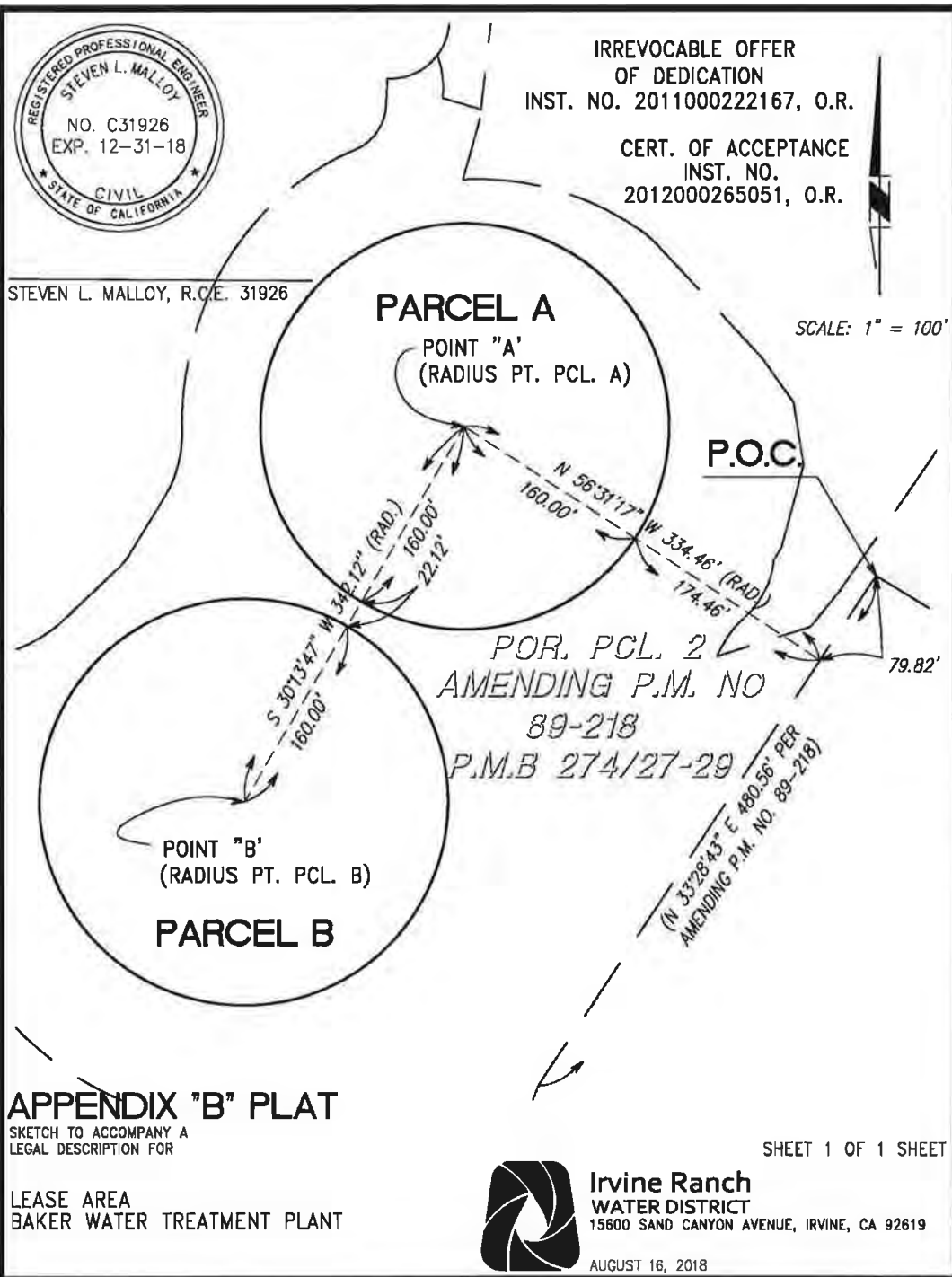


STEVEN L. MALLOY, R.C.E. 31926

IRREVOCABLE OFFER
OF DEDICATION
INST. NO. 2011000222167, O.R.

CERT. OF ACCEPTANCE
INST. NO.
2012000265051, O.R.

SCALE: 1" = 100'



Schedule A

DESCRIPTION OF SITE

Site Name: Baker Water Treatment Plant

Site Address: 21082 Wisteria , Lake Forest, CA 92630

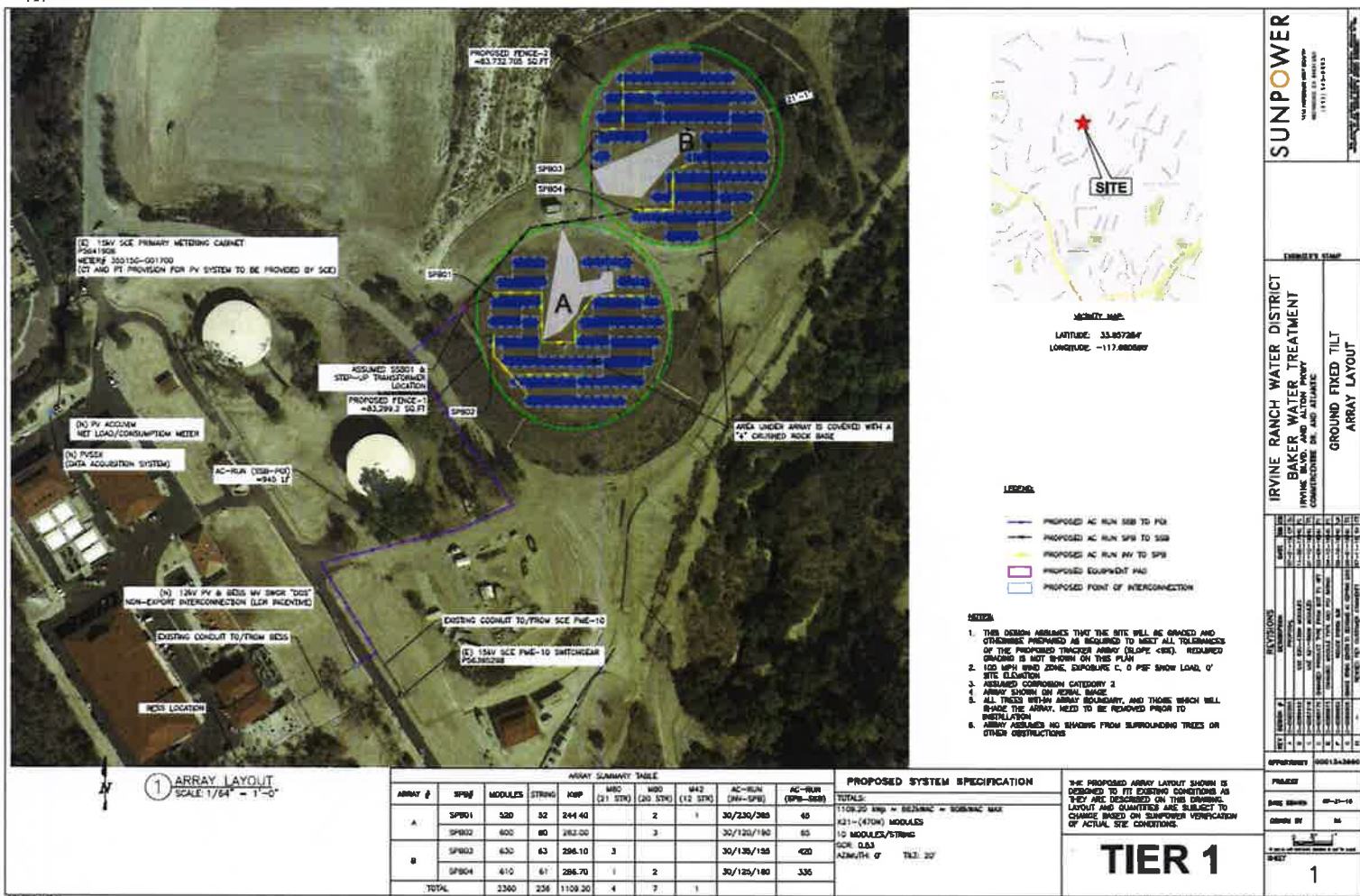
Description of Building and Surrounding Area: The Baker Water Treatment Plant is a 28.1 million gallon per day (mgd) drinking water treatment plant at the site of the former Baker Filtration Plant in the City of Lake Forest. The surrounding area is primarily residential.

Description of Electrical Facility: 12kV PME 10 switch as indicated in System Description

Summary of Twelve Months of Utility Bills: 17,663,572 kWh

Satellite Picture of Property:







Schedule C

PRICING

The following pricing is based on the Standard System Design Package described in Exhibit A.

kWh Rate (\$/kWh)	Term (Years)	Annual Rate Escalator (% / Year)
\$0..075	25	0%

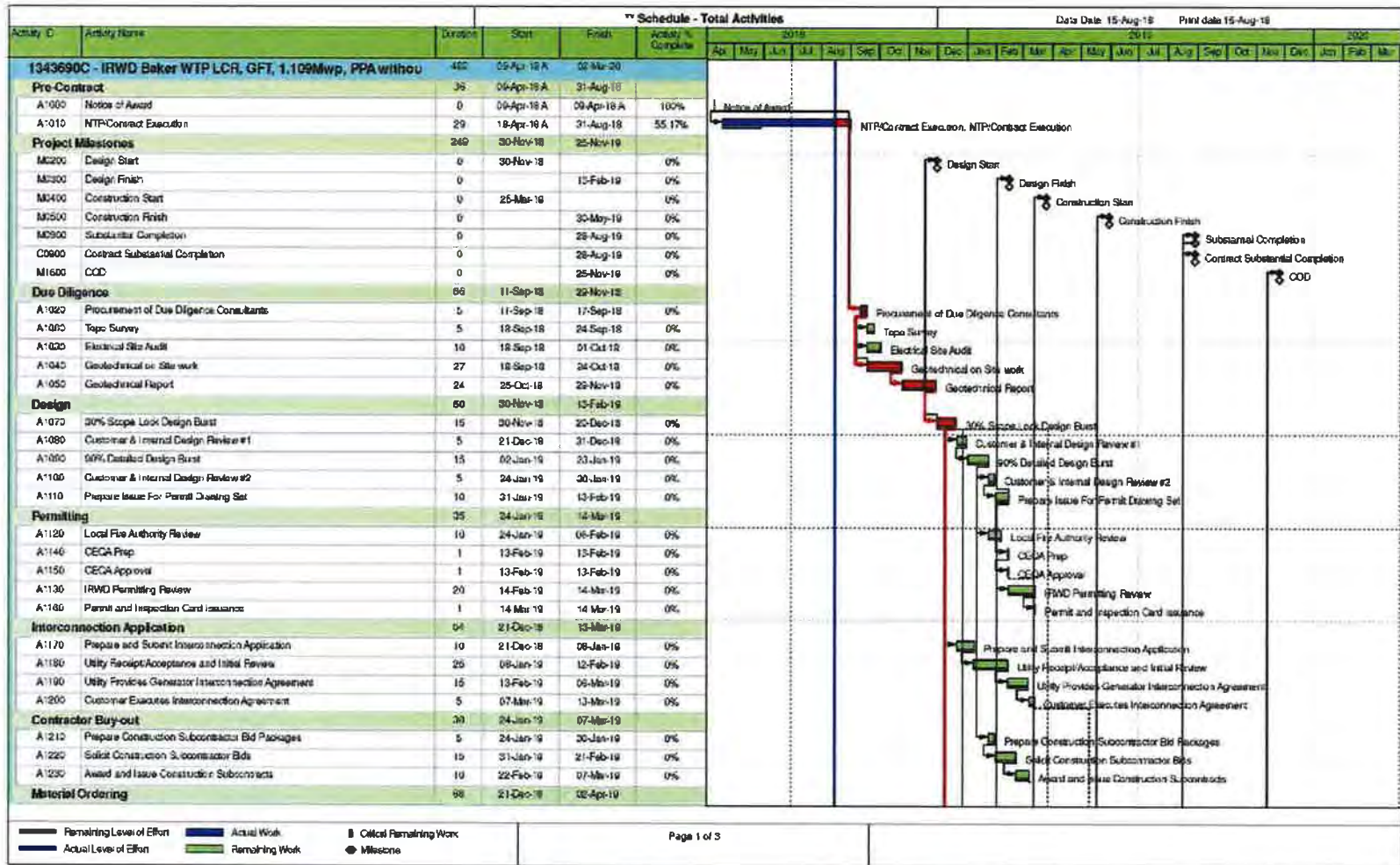
Schedule D

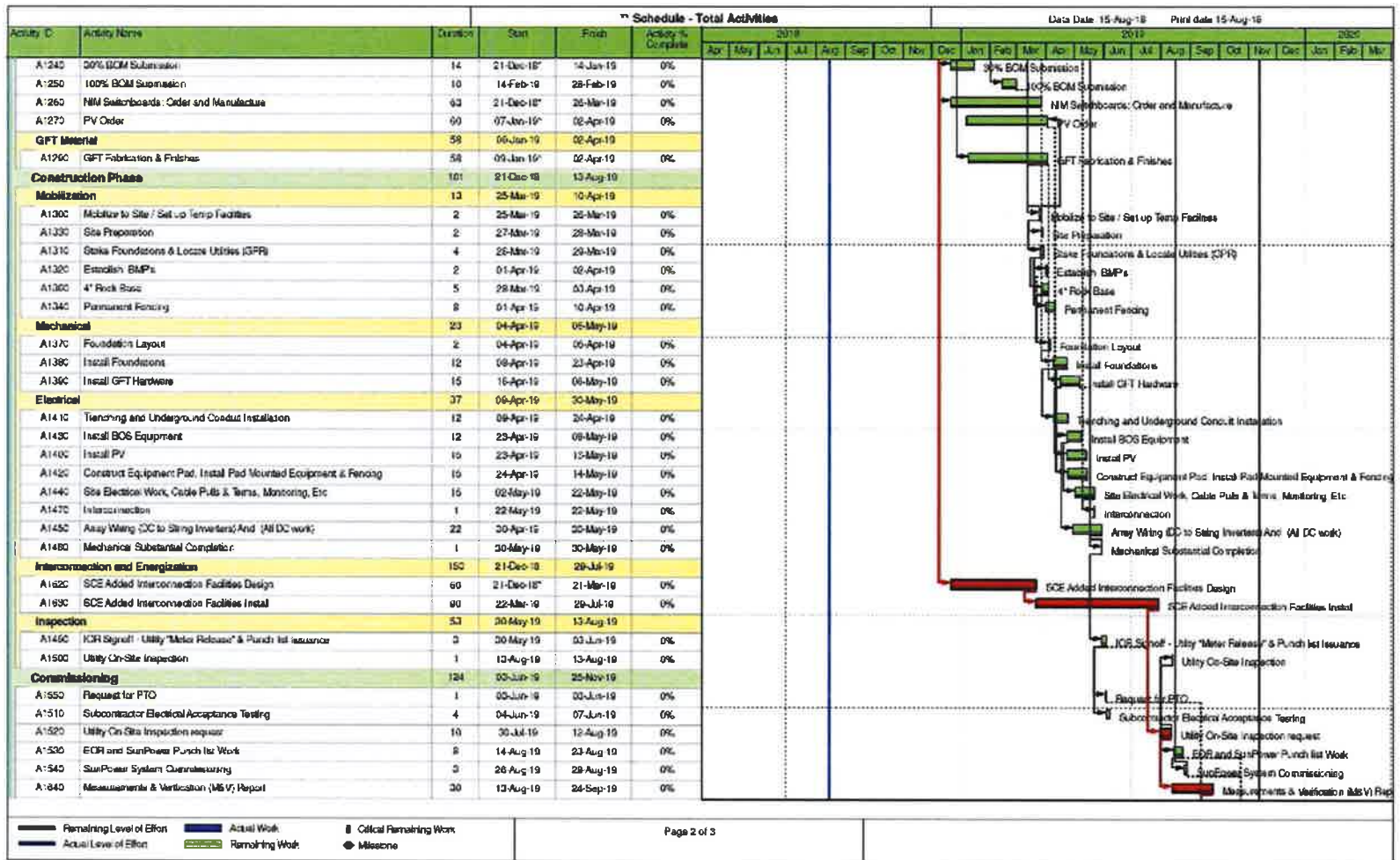
TERMINATION VALUES

The following Termination Values are based on the Standard System Design Package.

Applicable Date: Commercial Operation Date plus	Termination Value
0 Year	\$3,855,000
1 Year	\$3,399,000
2 Years	\$3,011,000
3 Years	\$2,618,000
4 Years	\$2,222,000
5 Years	\$1,822,000
6 Years	\$1,748,000
7 Years	\$1,675,000
8 Years	\$1,582,000
9 Years	\$1,498,000
10 Years	\$1,414,000
11 Years	\$1,310,000
12 Years	\$1,213,000
13 Years	\$1,118,000
14 Years	\$999,000
15 Years	\$890,000
16 Years	\$829,000
17 Years	\$801,000
18 Years	\$776,000
19 Years	\$753,000
20 Years	\$713,000
21 Years	\$698,000
22 Years	\$675,000
23 Years	\$582,000
24 Years	\$488,000

EXHIBIT E
SCHEDULE OF PROVIDER'S WORK





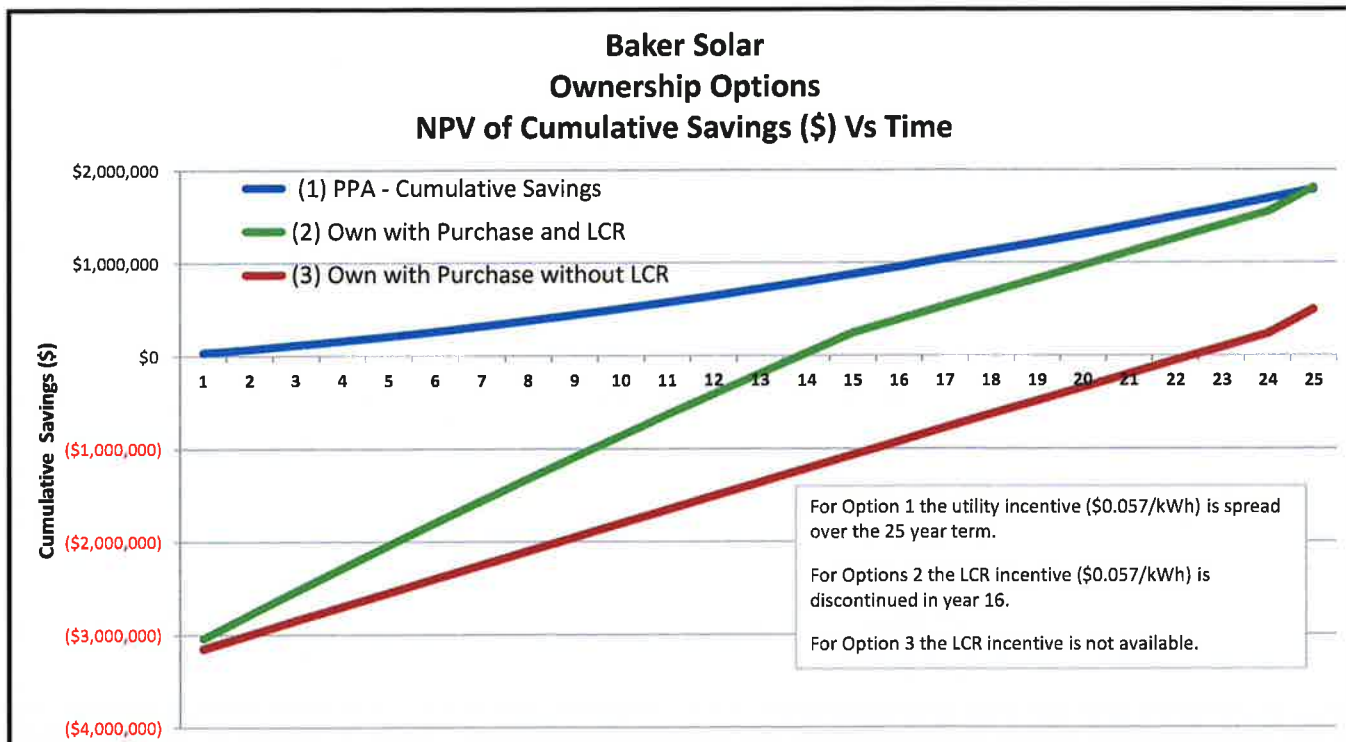
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EXHIBIT "C"

Results of Economic Analysis

Baker Solar - Ownership Options (August 13, 2018)			
TECHNICAL ASSUMPTIONS		FINANCIAL ASSUMPTIONS	
Capital Cost	\$3,301,348	Customer Cost of Debt	2.50%
System Size (kWp)	1,109	Customer Rate of Return	3.00%
Year 1 Energy Production (kWh)	1,946,344		
Annual PV Degradation	0.25%		
PRICING ASSUMPTIONS		UTILITY ECONOMICS	
Year 1 PPA Rate (\$/kWh)	\$0.075	Avoided Utility Cost (\$/kWh)	\$0.093
Term (yrs)	25	Annual Utility Inflator (%)	3.0%
PPA Term 1	25	Utility Incentive Rate (\$/kWh)	\$0.057
PPA Term 1 escalator	0.00%	Duration of Utility Incentive (yrs)	15

Baker Solar - Ownership Options (August 3, 2018)			
Option	1	2	3
Item	PPA	Own and Purchase with LCR	Own and Purchase without LCR
Economic Comparison			
Capital Cost to IRWD	\$0	(\$3,301,348)	(\$3,301,348)
Year 1 Revenue and Costs			
- Energy Savings	\$181,010	\$181,010	\$181,010
- PPA payment	(\$145,976)	\$0	\$0
- LCR Benefit	Included	\$111,720	\$0
- O&M	Included	(\$18,484)	(\$18,484)
- Guarantee	Included	(\$6,787)	(\$6,787)
- Opportunity Cost (1)	\$0	(\$99,040)	(\$99,040)
Net Present Value (3.0% for 25 years) (2)	\$1,787,639	\$1,806,416	\$493,993
NPV of Cumulative Interest Earned by not Funding the Capital (at 3%)	\$2,403,894	\$0	\$0
(1) Opportunity cost for options 2 and 3 is equal to 3.0% on \$3.3M investment for first year only.			
(2) Includes residual value of \$0.25 million in year 25 for options 2 & 3.			



August 20, 2018

Prepared by: E. Pham / D. McElroy

Submitted by: J. Zepeda

Approved by: Paul A. Cook



ENGINEERING AND OPERATIONS COMMITTEE

IRWD 2018 SEWER SYSTEM MANAGEMENT PLAN

SUMMARY:

The State Water Resources Control Board is the permitting agency for sewage collection systems in California. The State Board requires that the owner of a sewage collection system develop, implement, and update a Sewer System Management Plan (SSMP). As part of the SSMP implementation, the State Board also requires that the governing body of the agency that owns the sewer system certify the SSMP. Staff has completed the District's SSMP update and recommends that the Board approve and certify the IRWD 2018 SSMP.

BACKGROUND:

IRWD operates one of the largest sewer systems in Orange County, with over 102,000 sewer connections serving 390,000 customers. The District maintains 1,100 miles of gravity sewer mains and 12 miles of sewer force mains throughout its service area. Regular cleaning, inspection, and maintenance of all components of the sewer system preserve its excellent operating condition. In 2015, IRWD's sewer system received the Sewage Collection System of the Year Award from the California Water Environment Association.

Under the State Board's General Waste Discharge Requirements (WDRs) for sewage collection systems, owners of the systems must develop, implement, and maintain an SSMP to facilitate the appropriate funding and management of sewer systems. An SSMP must include provisions to properly and efficiently manage, operate, and maintain the sewer system, while taking into consideration risk management and cost-benefit analyses. Additionally, an SSMP must contain a Spill Response Plan that establishes standard procedures for immediate response to a sewer system overflow (SSO) in a manner designed to minimize health and water quality impacts, along with potential nuisance conditions.

The IRWD 2018 SSMP Update:

The WDRs require that the SSMP be updated every five years and must include any significant program changes. Certification by the governing board of the District is required in accordance with Section D. Provision 14 of the WDRs when updates to the SSMP are made. Once the IRWD Board has certified the SSMP, staff will complete the certification process by entering the required data into the California Integrated Water Quality System SSO database, post a certified copy of the SSMP on IRWD's website, and mail a certified copy of the SSMP to the State Board.

The District's SSMP was most recently updated by staff and certified by the Board on June 24, 2013. This update included recommendations from the SSMP Program Audit Report dated June 22, 2012.

Revisions to the IRWD 2018 SSMP were completed in June 2018 and included recommendations from the SSMP Program Audit Report dated May 2, 2016. The following SSMP elements were updated:

1. Organization and Roles of IRWD Staff;
2. Legal Authority;
3. Operations and Maintenance Program Design and Performance Provisions;
4. Overflow Emergency Response Plan;
5. Fats, Oils and Grease (FOG) Control Program;
6. System Evaluation and Capacity Assurance Plan;
7. Monitoring, Measurement and Program Modifications Plan;
8. Periodic Internal SSMP Audits;
9. SSMP Communication Program;
10. System Evaluation and Capacity Assurance Plan;
11. Monitoring, Measurement, and Program Modifications;
12. SSMP Program Audits; and
13. Communication Program.

SSMP Implementation Training:

Collection Systems Department staff is trained annually on all aspects of the SSMP. The Collection Systems Manager facilitates and documents all training, which focuses on response, roles and responsibilities in the department. Standby personnel and first responder training is also provided to District staff who participate in the standby program.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

That the Board approve and certify the IRWD 2018 Sewer System Management Plan.

LIST OF EXHIBITS:

Exhibit "A" – 2018 Sewer System Management Plan



Irvine Ranch
WATER DISTRICT

Irvine Ranch Water District Sewer System Management Plan

June 2018

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Chapter 1 Introduction

This Sewer System Management Plan (SSMP) has been prepared in compliance with the State Water Resources Control Board (SWRCB) Order 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDR). The SSMP also complies with Monitoring and Reporting Program (MRP) Order No. WQ 2013-0058-EXEC, along with all future revisions to the monitoring and reporting program, included by reference to the WDR. The WDR prohibits sanitary sewer overflows (SSOs) and requires reporting of SSOs using the statewide electronic reporting system. The WDR and MRP Order No. WQ 2013-0058-EXEC are included in **Appendix A**.

1.1 Organization of SSMP

The structure of this document follows the section numbering and nomenclature specified in the WDR. The SSMP includes thirteen sections, as follows:

1. Introduction
2. Prohibitions and Provisions
3. Goal
4. Organization
5. Legal Authority
6. Operation and Maintenance Program
7. Design and Performance Provisions
8. Overflow Emergency Response Plan
9. Fats, Oils and Grease (FOG) Control Program
10. System Evaluation and Capacity Assurance Plan
11. Monitoring, Measurement, and Program Modifications
12. SSMP Program Audits
13. Communication Program

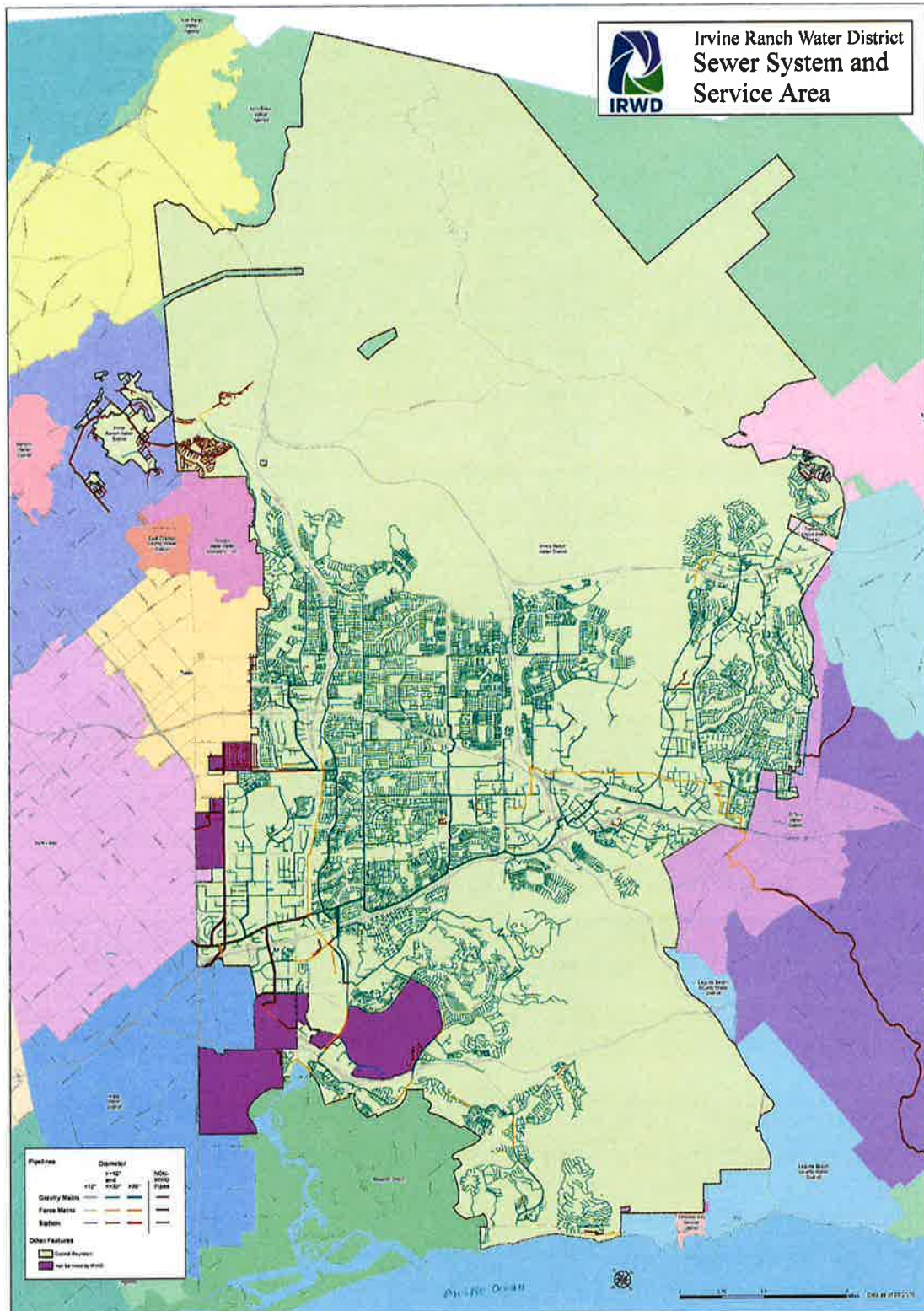
1.2 System Overview

Irvine Ranch Water District (IRWD) is a California Special District formed in 1961 and incorporated under the California water code. IRWD owns a sanitary sewer system with approximately 102,000 sewer connections serving 390,000 customers and operates and maintains 1,100 miles of sanitary sewer mains and 12 miles of force mains spanning 181 square miles (84,000 acres) of service area in Orange County. The wastewater collection system serves the City of Irvine, Lake Forest, parts of Tustin, Newport Beach, Foothill Ranch, Costa Mesa, and unincorporated areas of Orange County. There is a small amount of wastewater generated in the City of Newport Beach and Irvine that is collected by trunk sewers owned, operated, and maintained by the IRWD, then discharged into sewers owned and maintained by the Orange County Sanitation District (OCSD).

IRWD's sewer mains range in size from 4 to 60 inches in diameter as shown in **Figure 1-1**. The sewer main material is nearly exclusively vitrified clay pipe (VCP) and polyvinyl chloride (PVC), with other miscellaneous materials. Drainage patterns in the wastewater collection system are influenced by the

physical geography of the service area and result in five separate wastewater collection systems within the IRWD service area which are covered by the Sewer System Management Plan.

Figure 1-1: IRWD Sewer System and Service Area



1.3 Definitions, Acronyms, and Abbreviations

Best Management Practices (BMP) - Refers to the procedures employed in commercial kitchens to minimize the quantity of grease that is discharged to the sanitary sewer system. Examples include scraping food scraps into the garbage can and dry wiping dishes and utensils prior to washing.

California Integrated Water Quality System (CIWQS) - Refers to the State Water Resources Control Board online electronic reporting system that is used to report SSOs, certify completion of the SSMP, and provide information on the sanitary sewer system.

Capital Improvement Program (CIP) - Refers to the document that identifies planned capital improvements to the District's wastewater collection system.

Closed Circuit Television (CCTV) - Refers to the process and equipment that is used to internally inspect the condition of gravity sewers.

Collection System – See Wastewater Collection System

Computerized Maintenance Management System (CMMS) - Refers to software utilized to manage maintenance and condition assessment data including the production of work orders and the recording of work completed.

District - Refers to the Irvine Ranch Water District.

Enhanced Maintenance Area - A gravity sewer identified as requiring frequent preventive maintenance to reduce the likelihood of SSOs.

Fats, Oils, and Grease (FOG) - Refers to fats, oils, and grease typically associated with food preparation and cooking activities that can cause blockages in the sanitary sewer system.

Fiscal Year (FY). IRWD's fiscal year starts July 1 and ends the following year on June 30.

Food Service Establishment (FSE) - Refers to commercial or industrial facilities where food is handled/prepared/served that discharge to the wastewater collection system.

Full-time Equivalent (FTE) - Refers to the equivalent of 2,080 paid labor hours per year by a regular, temporary, or contract employee.

Geographical Information System (GIS) - Refers to the District's system that it uses to capture, store, analyze, and manage geospatial data associated with the District's wastewater collection system assets.

Grease Removal Equipment (GRD) - Refers to grease traps or grease interceptors that are installed to remove FOG from the wastewater flow at food service establishments.

Infiltration/Inflow (I/I) - Refers to water that enters the wastewater collection system from stormwater and groundwater that increases the quantity of flow. Infiltration enters through defects in the wastewater collection system after flowing through the soil. Inflow enters the sanitary sewer without flowing through the soil.

Lateral Connection – The point of connection of the customer's upper lateral with the lower lateral of the District.

Lower Lateral – The District's facility between its collection system and the lateral connection, which is normally the exterior boundary of the easement or the street or access road right-of-way.

Legally Responsible Official (LRO) - Refers to the individual who has the authority to certify reports and other actions that are submitted through the Online SSO Reporting System.

Manhole (MH) - Refers to an engineered structure that is intended to provide access to a sanitary sewer for maintenance and inspection.

Monitoring and Reporting Program (MRP) - Refers to the State Water Resources Control Board Monitoring and Reporting Program No. 2006-0003-DWQ, including all future revisions.

National Pollution Discharge Elimination System (NPDES)

OCSD – Orange County Sanitation District

Online SSO Reporting System - Refers to the California Integrated Water Quality System (CIWQS).

Operations and Maintenance (O&M)

Overflow Emergency Response Plan (OERP)

Preventive Maintenance (PM) - Refers to maintenance activities intended to prevent failures of the wastewater collection system facilities (e.g. cleaning, CCTV, inspection).

Private Lateral Sewage Discharges (PLSD) - Sewage discharges that are caused by blockages or other problems within the privately-owned portion of a sewer service lateral.

Sanitary Sewer Overflow (SSO) - Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. SSOs include:

- (i) Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
- (ii) Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States; and
- (iii) Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

Sewer System - See Wastewater Collection System.

Sewer System Management Plan (SSMP)

State Water Resources Control Board (SWRCB) - State Water Resources Control Board and staff responsible for protecting the State's water resources.

Supervisory Control and Data Acquisition (SCADA) - Refers to an electronic system that is used to monitor lift station performance and to initiate alarms when monitored parameters exceed pre-set limits.

Upper Lateral – The pipeline from the lateral connection to the building or improvements of the applicant, owner, or customer.

Vitrified Clay Pipe (VCP)

Waste Discharge Requirements (WDR) - Refers to the State Water Resources Control Board Order No. 2006-0003, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, dated May 2, 2006, including all future revisions.

Wastewater Collection System - Refers to the portion of the sanitary sewer facilities owned and operated by the Irvine Ranch Water District.

Chapter 2 Prohibitions and Provisions

This chapter describes the sewage discharge prohibitions and provisions as stated in the WDR.

2.1 Prohibitions

To meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, IRWD is required to comply with the following prohibitions:

- Any SSO that results in a discharge of untreated or partially treated wastewater to waters of the United States is prohibited, and
- Any SSO that results in a discharge of untreated or partially treated wastewater that creates a nuisance as defined in California Water Code Section 13050(m) is prohibited.

2.2 Provisions

As stated in the Order, IRWD agrees to meet the following provisions:

1. IRWD must comply with all conditions in the Order. Any noncompliance with the Order constitutes a violation of the California Water Code and is grounds for enforcement action.
2. Nothing in the general WDR shall be:
 - (i) Interpreted or applied in a manner inconsistent with the Federal Clean Water Act, or supersede a more specific or more stringent state or federal requirement in an existing permit, regulation, or administrative/judicial order or Consent Decree;
 - (ii) Interpreted or applied to authorize a SSO that is illegal under either the Clean Water Act, an applicable Basin Plan prohibition or water quality standard, or the California Water Code;
 - (iii) Interpreted or applied to prohibit a Regional Water Board from issuing an individual National Pollutant Discharge Elimination System permit or WDR, superseding this general WDR, for a sanitary sewer system, authorized under the Clean Water Act or California Water Code; or
 - (iv) Interpreted or applied to supersede any more specific or more stringent WDR or enforcement order issued by a Regional Water Board.
3. IRWD shall take all feasible steps to eliminate SSOs. In the event that an SSO does occur, IRWD shall take all feasible steps to contain and mitigate the impacts of an SSO.
4. In the event of an SSO, IRWD shall take all feasible steps to prevent untreated or partially treated wastewater from discharging from storm drains into flood control channels or waters of the United States by blocking the storm drainage system and by removing the wastewater from the storm drains.
5. IRWD shall report SSOs in accordance with Section G of the general WDR.
6. IRWD understands that in any enforcement action, the State and/or Regional Water Boards will consider the appropriate factors under the duly adopted State Water Board Enforcement Policy,

and, consistent with this policy, must consider IRWD's efforts to contain, control, and mitigate SSOs when considering the California Water Code 13327 factors. In assessing these factors, the State and/or Regional Water Boards will also consider additional factors listed in Provision 6 of the WDR.

7. When an SSO occurs, IRWD shall take all feasible steps and necessary remedial actions to 1) control or limit the volume of untreated or partially treated wastewater discharged, 2) terminate the discharge, and 3) recover as much of the wastewater discharged as possible for proper disposal, including any wash down water.

IRWD shall implement all remedial actions to the extent they may be applicable to the discharge and not inconsistent with an emergency response plan, including the following:

- (i) Interception and rerouting of untreated or partially treated wastewater flows around the wastewater line failure.
 - (ii) Vacuum truck recovery of sanitary sewer overflows and washdown water.
 - (iii) Cleanup of SSO-related debris at the overflow site.
 - (iv) System modifications to prevent another SSO at the same location.
 - (v) Adequate sampling to determine the nature and impact of the release.
 - (vi) Adequate public notification to protect the public from exposure to the SSO.
8. IRWD shall properly manage, operate, and maintain all parts of the sanitary sewer it owns and operates, and shall ensure that the system operators (including employees, contractors, or other agents) are adequately trained and possess adequate knowledge, skills, and abilities.
9. IRWD shall allocate adequate resources for the operation, maintenance, and repair of its sanitary sewer system, by establishing a proper rate structure, accounting mechanisms, and auditing procedures to ensure an adequate measure of revenues and expenditures. These procedures must be in compliance with applicable laws and regulations and comply with generally accepted accounting practices.
10. IRWD shall provide adequate capacity to convey base flows and peak flows, including flows related to wet weather events. Capacity shall meet or exceed the design criteria as defined in IRWD's System Evaluation and Capacity Assurance Plan for all parts of the sanitary sewer system owned or operated by the IRWD.
11. IRWD shall develop and implement a written SSMP and make it available to the State and/or Regional Water Board upon request. A copy of this document must be publically available at the Enrollee's office and/or available on the internet. This SSMP must be approved by the Enrollee's governing board at a public meeting.
12. In accordance with the California Business and Professions Code sections 6735, 7835, and 7835.1, all engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. Specific elements of the SSMP that require professional evaluation and judgments shall be prepared by or under the direction of appropriately qualified professionals, and shall bear the professional(s)' signature and stamp.

13. The elements of the SSMP include:

- (i) Goal
- (ii) Organization
- (iii) Legal Authority
- (iv) Operations and Maintenance Program
- (v) Design and Performance Provisions
- (vi) Overflow Emergency Response Plan
- (vii) FOG Control Program
- (viii) System Evaluation and Capacity Assurance Plan
- (ix) Monitoring, Measurement, and Program Modifications
- (x) SSMP Program Audits
- (xi) Communication Program

14. The SSMP must be updated every five (5) years, and must include any significant program changes. Re-certification by the governing board of IRWD is required when significant updates to the SSMP are made. To complete the re-certification process, IRWD shall enter the data in the Online SSO Database and mail the form to the State Water Board, as described in Section D.14 of the Order.

IRWD has met all the mandatory elements of the SSMP as specified in the SSMP Development and Completion Schedule in **Table 2-1**.

Table 2-1: SSMP Development and Completion Schedule

SSMP Task	Milestone Due/Completion Date
SSMP Development Plan and Schedule	February 2018
Goal and Organization Structure	February 2018
Overflow Emergency Response Plan	February 2018
Legal Authority	February 2018
Operation and Maintenance Program	February 2018
Fats, Oils, and Grease Control Program	February 2018
Design and Performance Provisions	February 2018
System Evaluation and Capacity Assurance Plan	February 2018
Final SSMP, addressing all SSMP requirements	April 2018
SSMP Update	June 2018
Present to Engineering & Operations Committee	August 2018
Board Approved & Certified SSMP	August 2018

Chapter 3 Goal

This chapter describes the goal of this SSMP document.

3.1 Purpose

The purpose of the Order is to prevent SSOs. IRWD has prepared and implemented this SSMP to support this purpose. IRWD will monitor the effectiveness of this SSMP and the SSMP implementation to determine if deficiencies exist in the SSMP or SSMP implementation and will take appropriate steps to correct them.

3.2 Goal

The goal of the SSMP is to provide a plan and schedule to properly manage, operate, and maintain all parts of the IRWD sanitary sewer system to prevent SSOs and mitigate any SSOs that do occur.

A copy of the Order and the certified SSMP is available to personnel operating and maintaining the IRWD sanitary sewer system. Pursuant to California Water Code Section 13267(b), IRWD will also comply with the SSO Monitoring and Reporting Program No. 2006-0003-DWQ” as amended by Order No. WQ 2013-0058-EXEC, and all future revisions, included by reference in the Order. A copy of the WDR and MRP Order No. WQ 2013-0058-EXEC amending the original MRP is included in **Appendix A** of this SSMP.

3.3 Objectives for Operation and Maintenance of the Sewer System

The District aims to operate and maintain the sewer collection system in a safe, efficient, reliable and cost effective manner to prevent spills and interruptions in an environmentally safe manner with the highest customer satisfaction. IRWD has set the following objectives for operation and maintenance of the wastewater collection system:

- (a) Maintain the collection system in an efficient and reliable manner to prevent problems for IRWD customers.
- (b) Maintain the collection system to prevent any sewer system overflows (SSO) from occurring.
- (c) Clean the entire collection system consisting of 21-inch diameter pipelines and under on a 24-month cycle.
- (d) Improve collection system reliability by identifying and mitigating areas with an accumulation Fats, Oils and Grease (FOG).
- (e) Maintain sewer collection system reliability by identifying and mitigating areas with excessive root growth.
- (f) Monitor and inspect all lift stations within the collection system to ensure efficient and reliable operation.
- (g) Monitor H₂S levels throughout the collection system to identify sources for mitigation, and to ensure efficient and effective H₂S control.
- (h) Monitor sewer flows throughout the collection system to ensure sufficient capacity.
- (i) Conduct CCTV inspections of at least 10 percent of all existing pipelines on an annual basis.
- (j) Identify sewer collection system deficiencies using CCTV inspection equipment and schedule infrastructure repairs as needed.

- (k) Provide our Engineering Department with timely and accurate CCTV inspections of all existing and newly constructed sewer pipelines.
- (l) Identify areas within the collection system requiring the application of vector control chemicals.
- (m) Provide our employees with training necessary to fulfill the goals of IRWD succession planning program.
- (n) Provide our employees a safe work environment and recognition for their contributions.

Chapter 4 Organization

This section identifies the Authorized Representative to meet the SWRCB requirements for completing and certifying spill reports and the implementation and development of the SSMP. This section also includes IRWD's staff responsible for managing and maintaining the wastewater collection system and the responders to SSO events.

4.1 Regulatory Requirements

The WDR requirements for the Organization section of the SSMP are listed below:

- (a) *The name of the responsible or Authorized Representative.*
- (b) *The names and telephone numbers for management, administrative and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation; and*
- (c) *The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).*

4.2 Authorized Representative

IRWD's Authorized Representative/Legally Responsible Official (LRO) is the Executive Director of Operations, or his/her designee. In this capacity, he/she is responsible for overseeing the SSMP, as well as certifying the SSOs to the State via the CIWQS electronic reporting system.

The Authorized Representative has delegated the field reporting to IRWD's Collection Systems Manager and/or Collection Systems Supervisor as sewer overflow response staff. As the first responders, they are responsible for documenting the conditions associated with the spill and reporting to Regulatory Compliance staff. Regulatory Compliance staff is responsible for the on-line reporting in CIWQS. The Executive Director of Operations, or his/her designee, is responsible for certifying the submitted reports in the electronic reporting system. The Standby personnel staff and Regulatory Compliance are also responsible for verbal notification to the various regulatory agencies including State and Regional Boards, California Emergency Management Agency, and Orange County Health Department.

4.3 Responsibility for SSMP Development, Implementation, and Maintenance

The Executive Director of Operations, or his/her designee, is responsible for the overall development, implementation, and maintenance of the SSMP. The Executive Director of Operations in turn utilizes Collection Systems and other District staff to carry out the various tasks under the SSMP. IRWD's Collection Systems personnel are responsible for the operation and maintenance of the wastewater collection system, with assistance from Electrical Services and Mechanical Services, as shown in **Figure 4-1**. **Table 4-1** lists the positions responsible for the SSMP. **Table 4-2** provides a narrative explanation of the roles of various positions with the District's organization with implementing elements of the SSMP. The names and telephone numbers for management, administrative, and maintenance positions listed in **Table 4-1** is included in **Appendix B**.

Figure 4-1: Organization and Roles of IRWD Staff Responsible for Development and Implementation of the SSMP

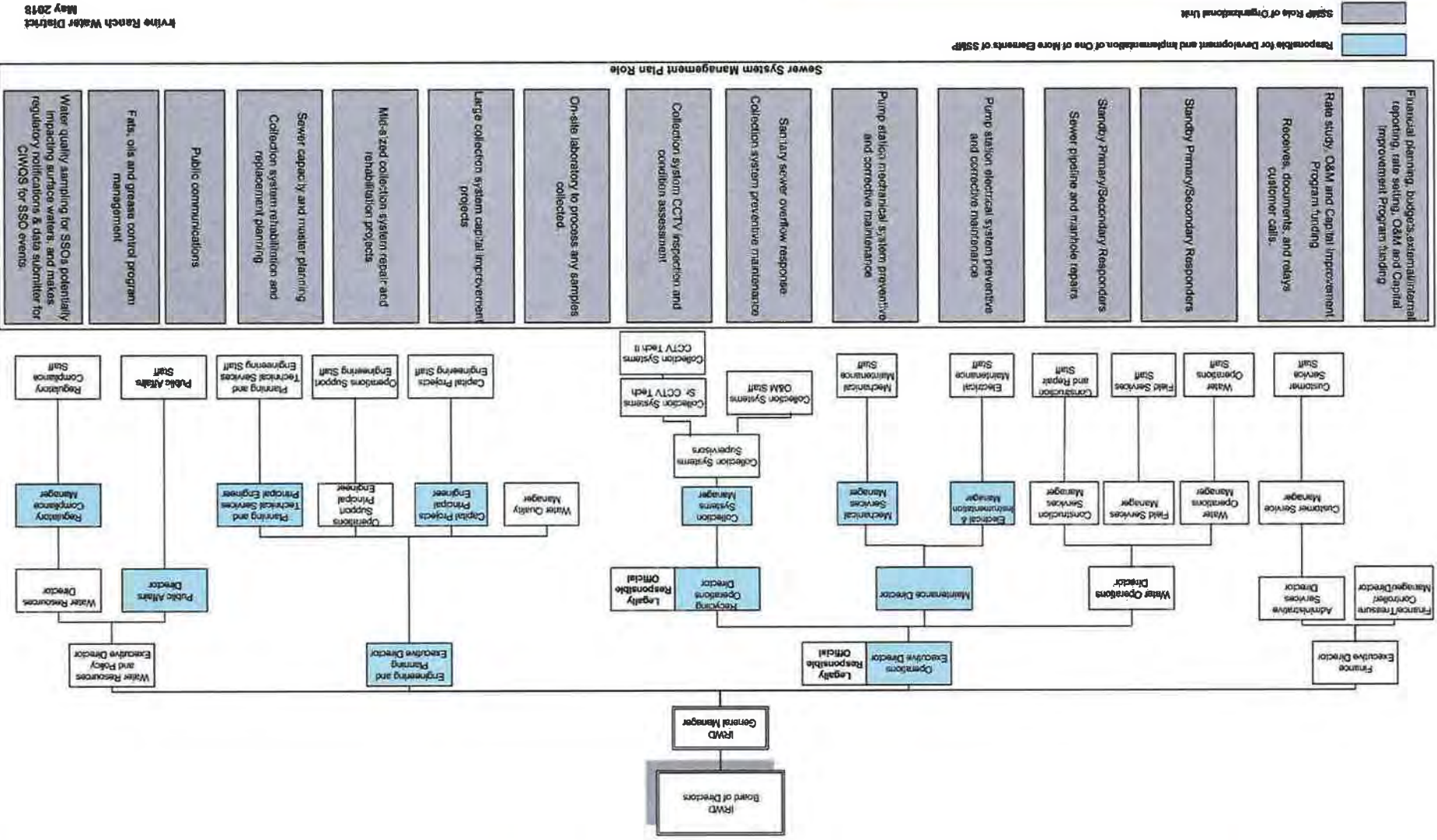


Table 4-1: Positions Responsible for SSMP Development and Implementation

WDR Reference	SSMP Element/Measure	Responsible Position
D.13	Overall SSMP Development and Implementation	Executive Director of Operations
D.13(i)	Goal	Director of Recycling Operations
D.13(ii)	Organization	Director of Recycling Operations
D.13(iii)	Legal Authority	Director of Recycling Operations
D.13(iv)(a)	Operations and Maintenance Program – Mapping	Planning and Technical Services, Principal Engineer
D.13(iv)(b)	Operations and Maintenance Program – Sewer Pipeline and Manhole Preventive and Routine Maintenance	Collection Systems Manager
D.13(iv)(b)	Operations and Maintenance Program – Lift Station Mechanical and Electrical Preventive and Routine Maintenance	Director of Maintenance
D.13(iv)(c)	Operations and Maintenance Program – System Inspection	Collection Systems Manager
D.13(iv)(c)	Operations and Maintenance Program – Condition Assessment; Rehabilitation and Replacement Program	Executive of Director Engineering and Planning
D.13(iv)(c)	Operations and Maintenance Program – Capital Program Funding	Executive of Director Engineering and Planning
D.13(iv)(d)	Operations and Maintenance Program – Training	Collection Systems Manager
D.13(iv)(e)	Operations and Maintenance – Critical and Replacement Part inventory	Mechanical Services Manager
D.13(v)	Design and Performance Provisions	Planning and Technical Services, Principal Engineer
D.13(vi)	Overflow Emergency Response Plan	Collection Systems Manager
D.13(vii)	Fats, Oils, and Grease Control Program	Regulatory Compliance Manager
D.13(viii)	System Evaluation and Capacity Assurance Plan	Planning and Technical Services, Principal Engineer
D.13(ix)	Monitoring, Measurement, and Program Modifications	Director of Recycling Operations
D.13(x)	SSMP Program Audits	Director of Recycling Operations
D.13(xi)	Communication Program – Public education	Director of Public Affairs
D.13(xi)	Communication Program – Satellite agencies	Executive Director of Operations

Table 4-2: Narrative Explanation of SSMP Roles of Various Positions

Position	Narrative Explanation
Administrative Services, Director	Responsible for overseeing customer service activities.
Controller	Responsible for financial planning, budgets, external/internal reporting, rate setting, O&M and Capital Improvement Program funding.
Board of Directors	Responsible for hiring the General Manager and for assessing the overall direction and strategy of the District.
Capital Projects, Engineering Staff	Responsible for performing or managing design and construction services to implement capital projects.
Capital Projects, Principal Engineer	Manages Capital Projects engineering staff responsible for performing or managing design and construction services to implement capital projects.
Collection Systems CCTV Technician	Responsible for performing CCTV inspection of sewer pipelines.
Collection Systems Manager	Responsible for collection system operations, maintenance, and performance. Oversees emergency response, sewer cleaning, and sewer inspection activities.
Collection Systems O&M Staff	Responsible for performing collection system emergency response and sewer cleaning activities.
Collection Systems Sr. CCTV Tech	Responsible for District's CCTV inspection program and performing CCTV inspection of sewer pipelines.
Collection Systems Supervisors	Responsible for overseeing collection system emergency response and sewer cleaning activities.
Construction Services Manager	Responsible for managing staff that support sewer overflow emergency response activities. Responsible for overseeing sewer repair activities.
Construction Services Staff	Performs primary and secondary responder duties. Supports sewer overflow emergency response when needed. Responsible for performing sewer repair activities.
Customer Service Manager	Manages customer service staff responsible for receiving, documenting, and communicating customer calls to emergency response and O&M staff.
Customer Service Staff	Responsible for receiving, documenting, and communicating customer calls to emergency response and O&M staff.
Electrical and Instrumentation Manager	Responsible for preventive and corrective maintenance of electrical equipment at sewer pump stations.
Electrical and Instrumentation Staff	Performs preventive and corrective maintenance of electrical equipment at sewer pump stations.
Engineering and Planning, Executive Director	Responsible for overseeing capital project planning and implementation.
Finance and Administration, Executive Director	Manages staff responsible for receiving, documenting, and relaying customer calls within the District organization. Manages staff responsible for working with operations and engineering to determine financial requirements of organization; responsible for ensuring revenue stream and funding is in place to meet financial obligations for operations, maintenance, and capital improvements.
IRWD General Manager	Responsible for overseeing day-to-day operation of the District.
Director of Maintenance	Responsible for managing staff performing electrical and mechanical preventive and corrective maintenance at sewer pump stations.
Mechanical Services Manager	Responsible for preventive and corrective maintenance of mechanical equipment at sewer pump stations.

Position	Narrative Explanation
Mechanical Services Staff	Performs preventive and corrective maintenance of mechanical equipment at sewer pump stations.
Operations Support, Engineering Staff	Responsible for managing design and construction of sewer rehabilitation projects.
Operations Support, Principal Engineer	Responsible for overseeing design and construction of sewer rehabilitation projects.
Operations, Executive Director	Serves as the legally responsible official for the District. Responsible for the overall development and implementation of the SSMP. Manages organizational units responsible for sewer overflow emergency response; collection system preventive maintenance, inspection and repair;
Planning and Technical Services, Engineering Staff	Performs system evaluation and capacity assurance planning. Performs sewer rehabilitation and replacement planning. Performs updates to collection system GIS databases.
Planning and Technical Services, Principal Engineer	Oversees system evaluation and capacity assurance planning activities. Oversees sewer rehabilitation and replacement planning.
Public Affairs Staff	Responsible for public communications, maintaining the District website, and implementing social media strategies.
Public Affairs, Director	Responsible for overseeing staff that are responsible for public communications, maintaining the District website, and implementing social media strategies.
Regulatory Compliance Manager	Responsible for managing the District's Fats, Oils, and Grease Control Program. Responsible for overseeing staff who conduct sewer overflow notification and reporting, performing water quality sampling and testing when a sewer overflow impacts surface waters. Also responsible for managing the District's Fats, Oils, and Grease Control Program.
Regulatory Compliance Staff	Performs water quality sampling and testing when a sewer overflow impacts surface waters.
Water Operations, Director	Responsible for managing staff that perform sewer repairs.
Recycling Operations, Director	Legally responsible official for the District. Responsible for the overall development and implementation of the SSMP.
Field Services Manager	Responsible for overseeing collection system repairs activities performed by District repair crews. Manages staff that perform Primary and Secondary Responder duties during standby.
Field Services Staff	Performs primary and secondary responder duties. Supports sewer overflow emergency response when needed.
Water Resources and Policy, Executive Director	Responsible for overseeing staff that are responsible for public communications, maintaining the District website, and implementing social media strategies. Also responsible for Regulatory Compliance Department staff.

4.4 SSO Reporting Chain of Communication

The SSO reporting chain of communication is illustrated in **Figure 8-1** and **Figure 8-2**. Chapter 8 – Overflow Emergency Response Plan details the procedures and responsibilities during an SSO event, and the process is briefly summarized below.

Once a detection of an SSO is reported, either by the public or IRWD personnel, Collection Systems personnel will be dispatched to the scene by Customer Service Representatives during normal operating hours. If notification occurs after hours, the Standby personnel are notified by IRWD's afterhours answering service.

No later than the next business day, a completed internal SSO Report Form should be forwarded to Regulatory Compliance staff. Any debriefings of the respondents to the SSO will occur at the Senior Management level. The internal SSO Reporting form is utilized to document the SSO event, communicate SSO event to all appropriate IRWD staff internally, enter all required information into the CIWQS on-line database, and to certify the SSO by the LRO.

Chapter 5 Legal Authority

This section of the SSMP discusses the IRWD's legal authority to comply with the SSMP requirements, as provided in its Rules and Regulations and agreements with other agencies.

5.1 Regulatory Requirements

The requirements for the Legal Authority element of the SSMP are summarized below:

IRWD must demonstrate, through collection system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:

- (a) *Prevent illicit discharges into its wastewater collection system (examples may include infiltration and inflow (I/I), storm water, chemical dumping, unauthorized debris and cut roots, etc.);*
- (b) *Require that sewers and connections be properly designed and constructed;*
- (c) *Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;*
- (d) *Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and*
- (e) *Enforce any violation of its sewer ordinances.*

5.2 Legal Authorities

The District complies with the legal authority requirements of the WDR. The District's legal authorities are contained in the following documents:

- Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service
- Regulations for the Discharge of Wastewater to Sewerage Facilities of the Irvine Ranch Water District that are in the South Orange County Wastewater Authority Service Area, Ordinance 2015-1
- Procedural Guidelines and General Design Requirements
- IRWD Standard Drawings and IRWD Standard Specifications for the sewer system
- Standard Specifications for Public Works Construction (Greenbook)

The primary source of IRWD's legal authorities is Section 7 of the District's Rules and Regulations, which is dedicated to "Use of District Sewerage Facilities". The following sections provide a narrative of the District's legal authorities for each of the requirements of the WDR. **Table 5-1** provides a summary of the District's legal authorities.

5.2.1 Prevention of Illicit Discharges

Measures prohibiting illicit discharges are included in Sections 7.3.1 to 7.3.12. The specific purpose of the Section is to prevent the discharge of any pollutant or any combination of pollutants into the sewers that would obstruct or damage the collection system, interfere with treatment, or threaten harm to human health or the environment. A full copy of the latest version of IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service is available on the District's website (<http://www.irwd.com/doing-business/engineering-planning/engineering-docs.html>).

Section 7.11 of the District's Rules and Regulations also limit the discharge of fats, oils, and grease. Legal authorities regarding control of fats, oils, and grease are discussed in detail in Section 9.3 of the SSMP and summarized in **Table 9-1**.

5.2.2 Proper Design and Construction of Sewers and Connections

The District's legal authorities pertaining to the design, construction, and inspection of sewer pipelines and connections are included in IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service, IRWD's Standard Drawings and Standard General Technical Specifications. IRWD also utilizes the Standard Specifications for Public Works Construction, popularly known as the "Greenbook".

Section 4.4.2 of the District's Rules and Regulations require the lower lateral and lower lateral connection be designed in accordance with the District's Procedures Guide and Construction Manual. The District also has the authority to determine and specify the size, location, and manner of installing the lower lateral.

5.2.3 Lateral Maintenance Access

Per Section 4.15.1 to 4.15.4 of the District's Rules and Regulations, property owners are responsible for clearing and cleaning the upper and lower laterals to their connection point with the main sewer. IRWD is only responsible for repairs to the lower lateral to the sewer main. See Section 2 for the definitions for upper lateral and lower laterals. The District's Construction Manual Standard Detail Drawing S-3 requires a cleanout on the lateral at the property line or edge of easement providing the District with access to the lower lateral. The latest version of the District's Standard Detail Drawings for the sewer system are available on the District's website (<http://www.irwd.com/doing-business/engineering-planning/engineering-docs.html>).

5.2.4 Enforcement Measures

Sections 14.1 to 14.3 of IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service describe measures available to IRWD staff for enforcement of sewer provisions. Any person, firm, corporation, association, or agency found to be violating any provision of the District's Rules and Regulations; or the terms and conditions of the applicant's, owner's, or customer's service agreement, permit; or any and all applicable Federal, State, or local statutes, regulations, ordinances; or other requirement; shall be served by the District with written notice stating the nature of the violation and providing a reasonable time limit for the satisfactory correction. The offender shall, within the period of time stated in such notice, permanently cease all violations. This provision is in addition to and not by way of derogation of any other remedies or procedures available to the District by law, regulation, or pursuant to any of the provisions of these Rules and Regulations including, but not limited to, Section 7.

Failure to permanently cease all violations within the time stated shall result in revocation of the permit by the District and termination of water, sewer, recycled water and/or natural treatment system service as provided in Sections 14.2 and 14.3. Violations regarding any one service may result, at the sole discretion of the Board or Manager, in termination of any combination of or all water, sewer, recycled water and natural treatment system service.

5.3 Agreements with Other Agencies

The SSMP requirements for legal authority are fulfilled by IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service. However, IRWD does have additional legal agreements with other agencies, which are described in this section for reference.

5.3.1 Orange County Sanitation District Agreement

A portion of IRWD service boundaries is currently included inside the boundaries of Orange County Sanitation District (OCSD), which has the direct responsibility for the transport and treatment of wastewater discharged to IRWD sewer system pursuant to that agency's Wastewater Ordinance. In

addition, IRWD coordinates with OCSD to permit and implement the industrial waste requirements of the Clean Water Act and the State Water Resources Control Board. OCSD, in conjunction with IRWD, jointly permit all major industrial dischargers and categorical industries pursuant to its State approved pretreatment program requirements.

5.3.2 South Orange County Wastewater Authority Agreement

A portion of IRWD service boundary is included in the boundaries of the South Orange County Wastewater Authority (SOCWA), which has the responsibility to implement a pretreatment program associated with the facilities that discharge into SOCWA's Aliso Creek Ocean Outfall (ACOO) pursuant to that agency's Wastewater Ordinance. IRWD's Los Alisos Water Recycling Plant (LAWRP) discharges secondary treated effluent into the ACOO. Thus, IRWD coordinates with SOCWA to permit and implement the industrial waste requirements of the Clean Water Act and the State Water Resources Control Board. SOCWA, in conjunction with IRWD, jointly permit all major industrial dischargers and categorical industries pursuant to its State approved pretreatment program requirements.

5.3.3 Satellite Systems

IRWD accepts a small quantity of wastewater into its sewer system from the University of California, Irvine (UCI) which is located within IRWD's service boundaries. IRWD has a Sewer Service Agreement with UCI regarding acceptance of their discharges and requiring UCI to amend the agreement if additional capacity is required. IRWD has verified that UCI has developed a site specific SSMP for their sewer system. IRWD sewer system has adequate capacity to convey the minor flows it accepts from UCI.

Table 5-1: Summary of IRWD Legal Authorities

Requirement	Reference in Rules and Regulations	Reference in Procedural Guidelines* or Standard Details
ILLCIT DISCHARGES		
Prevent illicit discharges into the wastewater collection system	Sec. 7.3.1	
Limit the discharge of fats, oils, and grease and other debris that may cause blockages	Sec. 7.11	
Control infiltration and inflow (I/I) from private service laterals	Sec. 7.3.2	
PROPER DESIGN AND CONSTRUCTION		
Require that sewers and connection be properly designed and constructed	Sec. 4.4.2 Sec. 5.1; Sec. 5.2	Procedural Guidelines, Sec. 4
Require proper installation, testing, and inspection of new and rehabilitated sewers		Procedural Guidelines, Sec. 2.5
ACCESS TO LATERALS		
Clearly define District responsibility and policies	Sec. 4.15	
Ensure access for maintenance, inspection, or repairs for portions of the service lateral owned or maintained by the District		Standard Detail Drawing S-3
FOG SOURCE CONTROL		
Requirements to install grease removal devices (such as traps or interceptors)	Sec. 7.11.4	
Design standards for the grease removal devices	Sec. 7.11.6.8	
Maintenance requirements, BMP requirements, record keeping and reporting requirements for grease removal devices	Sec. 7.11.6.8 Sec. 7.11.6.11 Sec. 7.11.7	
Authority to inspect grease producing facilities	Sec. 7.11.7.4	
ENFORCEMENT		
Enforce any violations of its sewer ordinances	Sec. 7.11.8 Sec. 14	

*Refers to Procedural Guidelines and General Design Requirements Manual, Development Services Group, August 2011. The latest version of the Procedural Guidelines and General Design Requirements Manual is on the District's website (<http://www.irwd.com/doing-business/engineering-planning/engineering-docs.html>).

Chapter 6 Operations and Maintenance Program

This section of the SSMP presents the District's wastewater collection system operations and maintenance (O&M) program.

6.1 Regulatory Requirements

The WDR requirements for the Operations and Maintenance Program are:

- (a) Maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities;*
- (b) Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at enhanced maintenance areas. The Preventative Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders;*
- (c) Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan;*
- (d) Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained; and*
- (e) Provide equipment and replacement part inventories, including identification of critical replacement parts.*

6.2 Collection System Mapping

Irvine Ranch Water District uses Geographic Information System (GIS) technology to create, maintain, and manage maps and data sets associated with its wastewater collection system facilities. The sewer system GIS mapping is maintained by the Engineering and Planning Department. Pipe inventory data includes ownership, installation year, diameter, length, material, slope, status, record drawing reference, and other information. Manhole inventory data includes ownership, installation year, shaft diameter, depth, invert elevation, rim elevation, record drawing reference, and other information. The GIS information is available to all appropriate District field staff in the form of hard copy Atlas maps.

The District last printed Atlas maps in entirety in 2010 however the electronic version of the atlas books are updated on a regular basis. The District has implemented mobile computers to collection system field crews, which will include the ability to access system mapping and as-built plans electronically. Currently, all Collection Systems field crews have access to up-to-date sewer system mapping in electronic format on shared workstations in District offices. Field crews routinely locate and print up-to-date Atlas map pages as needed. In addition, both CCTV crews have access to sewer system mapping in electronic format in the field using the computer on District-owned CCTV trucks.

The District has also scanned all sewer system record drawings into electronic format and has made these drawings available to District staff through Mapplet and MapLibrary software, which is available on all workstations. Typically, the Collection System Supervisor or the Collection System Manager will perform the detailed investigations requiring access to sewer system record drawings.

6.2.1 Updates to Existing GIS Mapping

The District has a formal process to correct sewer system mapping. All Collection System Maintenance Division field crews are trained to note mapping issues on Field Mapplet. The Collection System Supervisors review Field Mapplet software and transmit all significant update requests to the CCTV crew for investigation. Upon investigation and verification, the CCTV crew will note changes to the sewer system GIS using Field Mapplet software and will transmit this data to the District's GIS staff electronically. The GIS staff will perform changes to the Atlas maps on a weekly basis. Changes are generally performed in order of submission (i.e., first in - first out) unless a specific request has been made to expedite a change. The updated GIS is posted to the server and available for review immediately after changes are completed.

6.2.2 New Improvement Plan Drawings

The District requires that record drawings be prepared and submitted for the installation of new sewer facilities and for the rehabilitation or replacement of existing facilities. The record drawings are submitted in both hard copy and electronic formats. The new record drawings are scanned and linked to the GIS and available through Mapplet Library. New or altered facilities are digitized and the associated inventory data are added to the GIS database and hard copy maps weekly.

6.3 Preventive Maintenance

The elements of the District's wastewater collection system Operation and Maintenance Program include proactive, preventive, and corrective maintenance of sewers and lift stations. The District utilizes combination jetter/vacuum units to clean and remove material from the sewer system. Each truck is equipped with an array of nozzles and other tools to support effective cleaning of the sewer system under a variety of situations. A rotating nozzle is primarily utilized for cleaning smaller diameter sewer pipes. The District contracts with the nozzle manufacturer to perform nozzle maintenance as needed. This section describes the District's O&M programs. **Figure 6-1** provides a map of the District's sewer system by decade constructed.

6.3.1 Proactive Sewer Cleaning

The District proactively cleans every gravity sewer pipe segment in the wastewater collection system at least once every 2 years on a systematic cleaning cycle. The 2-year systematic cleaning cycle used for proactive sewer cleaning consists of cleaning groups of pipes, organized into "tracks," which are scheduled in a sequence to clean all pipes less than or equal to 21 inches in diameter starting from the farthest reaches and ending at the treatment plant. **Figure 6-2** shows the sequence of system-wide cleaning performed on a 2-year schedule.

The District cleans all pipes larger than 21-inches in diameter every five years separately from the cleaning performed in the tracks. As staffing permits, Collection Systems crews report to duty at 3 a.m. to perform cleaning of sewer pipes located on arterials as well as larger diameter lines.

6.3.2 Preventive Maintenance Sewer Cleaning

Preventive maintenance sewer cleaning is utilized for sewer reaches with a known history of one or more maintenance issues such as root intrusion, grease accumulation, or debris deposition. Based on the severity of the maintenance issue identified, the Collection Systems Supervisor for that area will assign a monthly or quarterly, or semi-annual sewer enhanced maintenance area cleaning frequency. As additional

information is gathered, either through subsequent cleaning crew findings or CCTV inspection data, the sewer cleaning frequency for individual sites are adjusted to increase or decrease preventive maintenance based on the maintenance needs of individual pipe segments.

The cleaning frequencies for all sewer reaches are all documented in the District's Field Mapplet database and is linked to GIS. **Figure 6-3** provides a map of the District's current sewer quarterly enhanced maintenance area cleaning program.

6.3.3 Lift Station Operation and Maintenance

The District currently owns, operates, and maintains 12 sewage lift stations. Each of the lift stations are equipped with SCADA and monitored daily by the Collection System Supervisors. The Collection System Supervisors can monitor lift station SCADA data from the office or remotely on laptop computers. The District addresses SCADA alarms on a daily basis. A collection system maintenance crew visits each lift station at least once weekly to perform operational inspections. The Lift Station Weekly Inspection Form is included in **Appendix D**. The collection system crew documents weekly operational inspections using a Lift Station Inspection Sheet. Collection System Supervisors coordinate maintenance of electrical and mechanical equipment with the District's Electrical (Dept. 820) and Mechanical (Dept. 840) Services Department.

The District has installed quick-connect connections and isolation valves at critical lift stations to easily bypass the station in the event of lift station mechanical or electrical failure. The District owns replacement pumps for all lift stations.

6.3.4 Maintenance Scheduling

Sewer maintenance activities are scheduled based on maintenance frequency. Collection Systems Supervisors maintain a list of pipelines on the semi-monthly and quarterly cleaning schedule and assign the list for cleaning as the due date approaches. Pipes on the proactive cleaning are cleaned throughout the year and are used to balance the cleaning workload schedule with priority given to preventive maintenance of sewer reaches with known maintenance issues.

6.3.5 System Monitoring

The District has equipped 18 manholes with sensor technology at strategic locations in the sewer system in pipelines with potential capacity constraints and manholes with potential for vandalism or illegal dumping. The sensors trigger alarms in the case of surcharging beyond a preset levels or in the case of intrusion.

The District has also installed redundant level controls at each lift station. In addition to redundant level controls, the District has installed Mission Control Units, which are secondary communication systems in the event of loss of SCADA communication, loss of power, and/or high wet well. In the case of a high wet well, floats are in place to trigger all pumps to turn on. In the event of loss of SCADA communication or power, an alarm is sent to the Collection System Manager, Collection System Supervisors, and Collection System Primary and Secondary Responders.

6.3.6 Maintenance Documentation

The District uses Mapplet-CMMS technology, to document sewer cleaning preventive maintenance activities, including cleaning and inspection activities related to Customer Service Request response and sewer blockage removal. Collection Systems crews document sewer overflow events using the Spill Response Field Report which is included in **Appendix E** and referenced in the Overflow Emergency Response Plan. Completion of sewer cleaning activities are documented and tracked in the District's Collection System Field Mapplet database. Collection Systems Supervisors are responsible for entering and reviewing data into the Mapplet-CMMS program collected by their crews.

An important aspect of the District's sewer cleaning program is to record cleaning results on the computerized reports for each manhole-to-manhole pipe. Those results then provide the basis for the Collection Systems Supervisors to modify the frequency or method of cleaning for that pipe segment to reflect current field conditions. The District is currently recording the severity of cleaning results using the comment field on the Field Mapplet program. The District plans on incorporating code-based values to document the type and severity of sewer cleaning findings, into the District's Maximo asset management information system. **Figure 6-4** charts the process the District utilizes to review cleaning data and modify preventive maintenance frequencies.

In addition to documenting preventive maintenance activities, the District replaced the Customer Service Request System with the Oracle Customer Care and Billing system (Oracle CC&B) in FY 2015. Customer Service documents the customer complaints using the Oracle CC&B system. Customer Service sends a Customer Service Request as both a text and e-mail notification to Collection System Manager and Collection System Supervisors. Customer Service also follows up with a phone call to the Collection System Manager or Collection System Supervisors. During after-hours, when Customer Service is not on duty, all calls are forwarded to the District's answering service. The answering service contacts the Primary Responder using a text, e-mail notification, and a phone call. The answering service does not enter calls into the Customer Service Request system. During after-hours, the Primary Responder or Collection System First Responder will enter the service call into the Customer Service Request system. The responding Collection System Supervisor will document findings and close-out the Customer Service Request in the Customer Service Request system.

6.3.7 Maintenance Program Analysis

At least once per year, the Collection Systems Manager and Supervisors output a list of pipes from the Field Mapplet program, identifying all locations with maintenance issues and forwards this list to Engineering Services. Engineering Services uses the information to develop future capital projects as needed.

Figure 6-1: IRWD Sewer Pipeline Installation By Decade

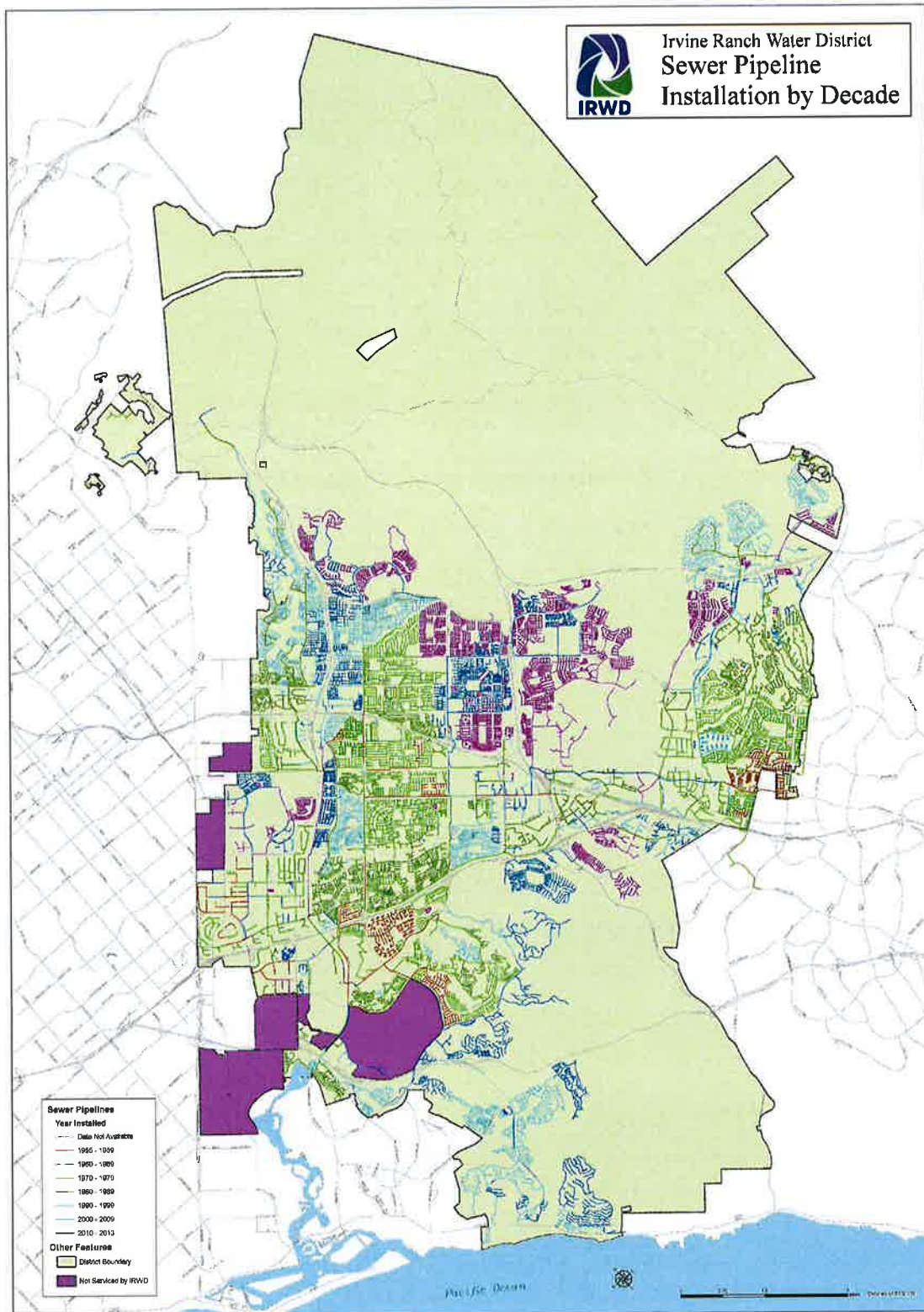


Figure 6-2: IRWD System-Wide Sewer Cleaning Plan

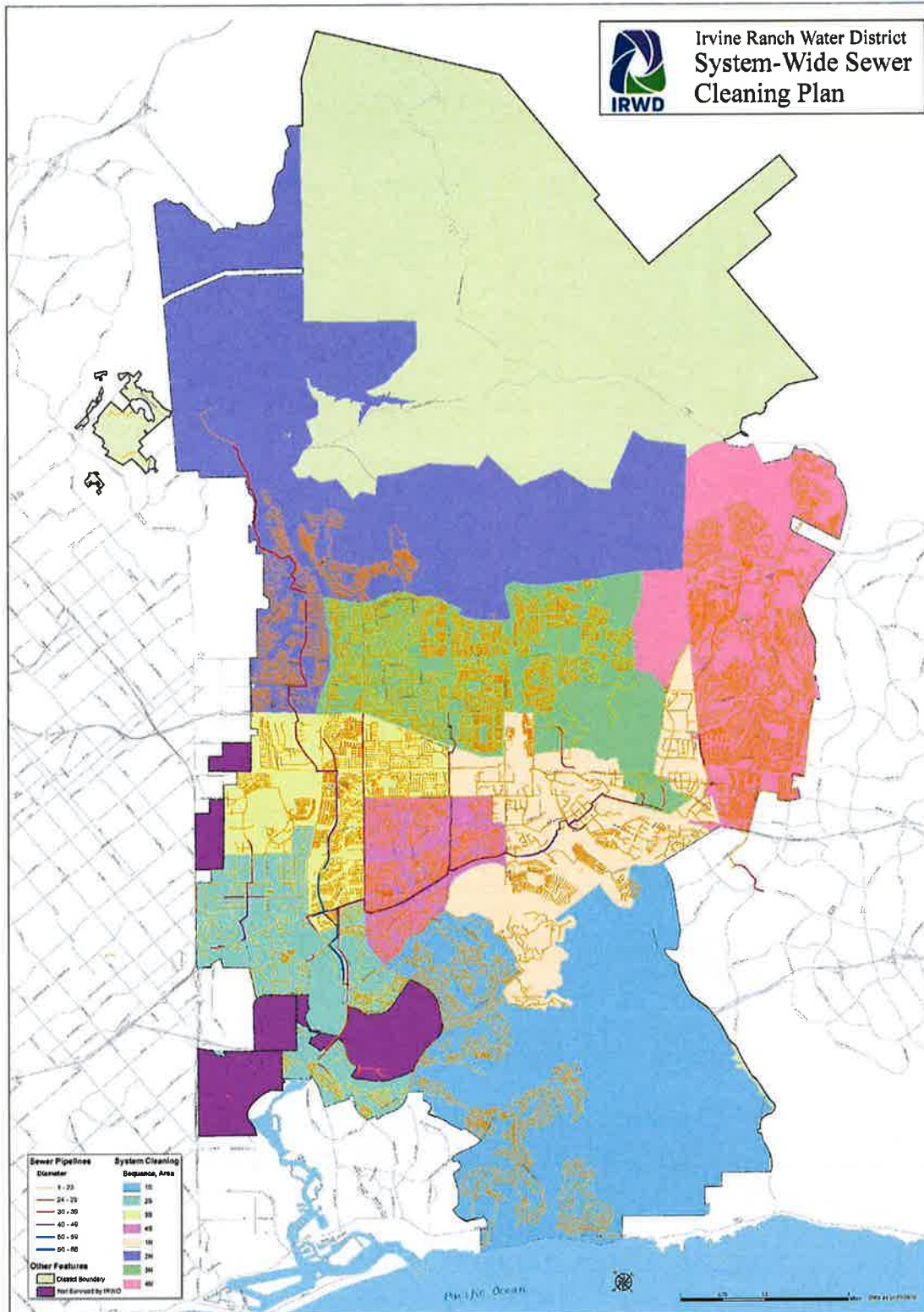


Figure 6-3: IRWD Sewer Quarterly Enhanced Maintenance Area Cleaning

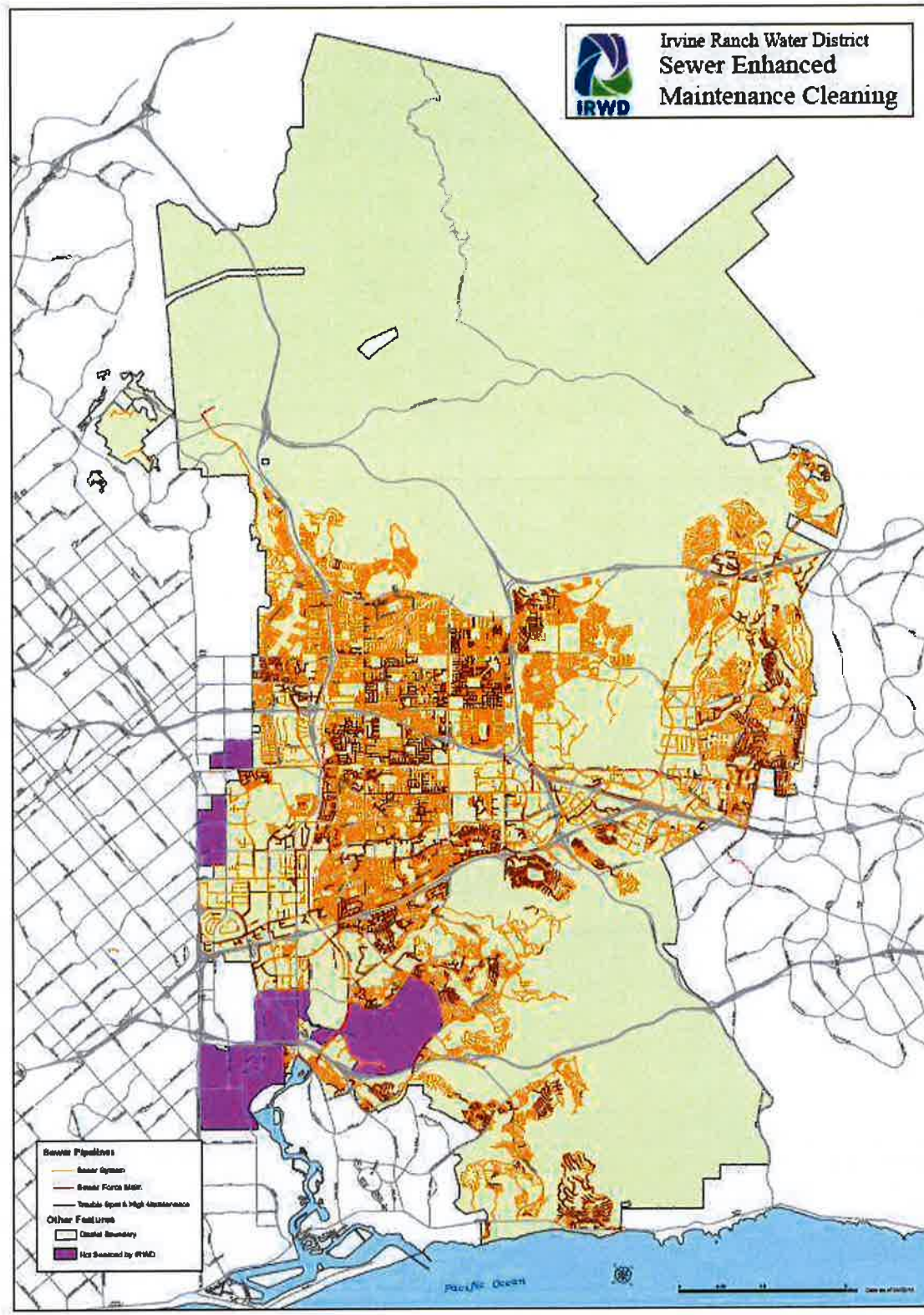
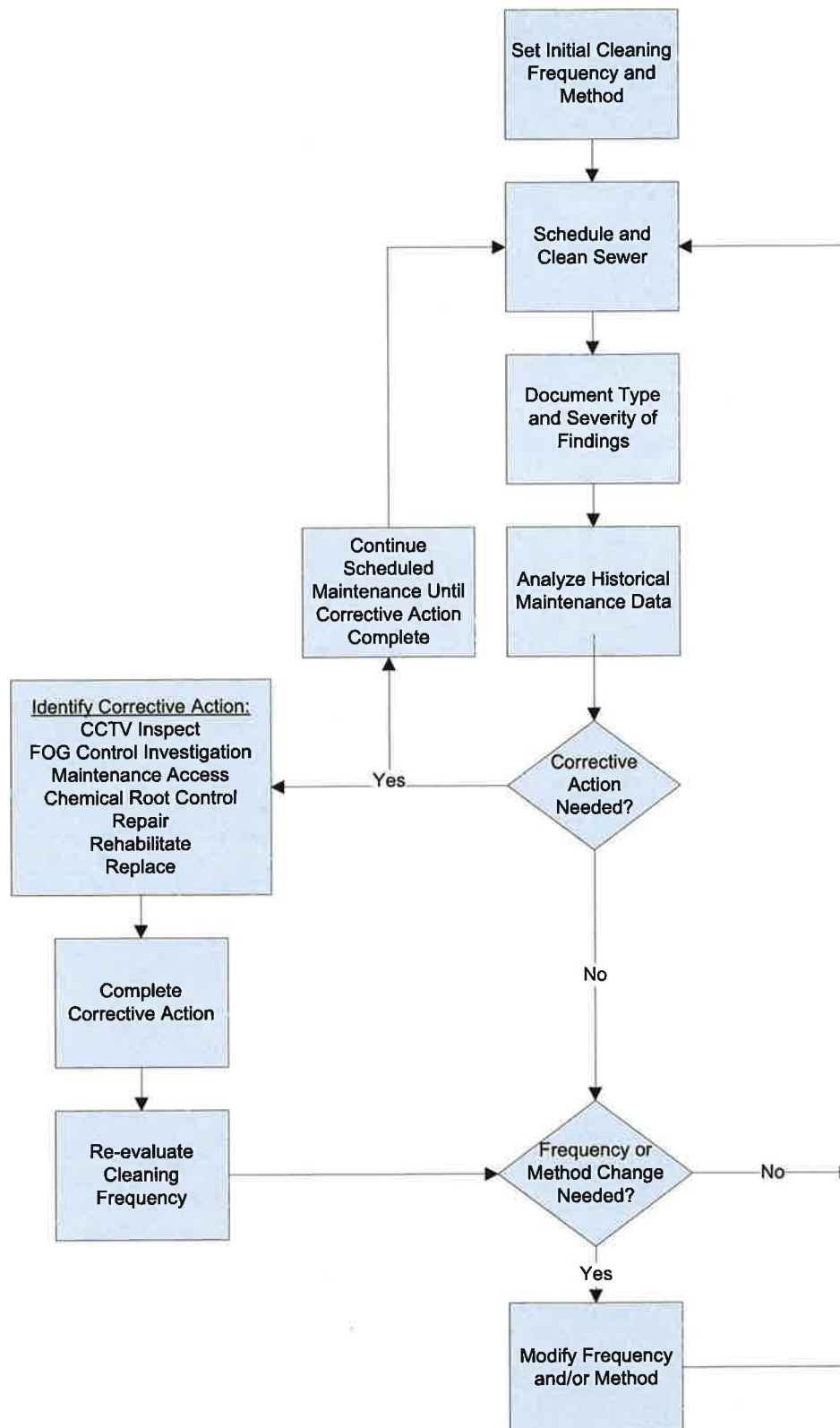


Figure 6-4: Sewer Cleaning Scheduling Flowchart



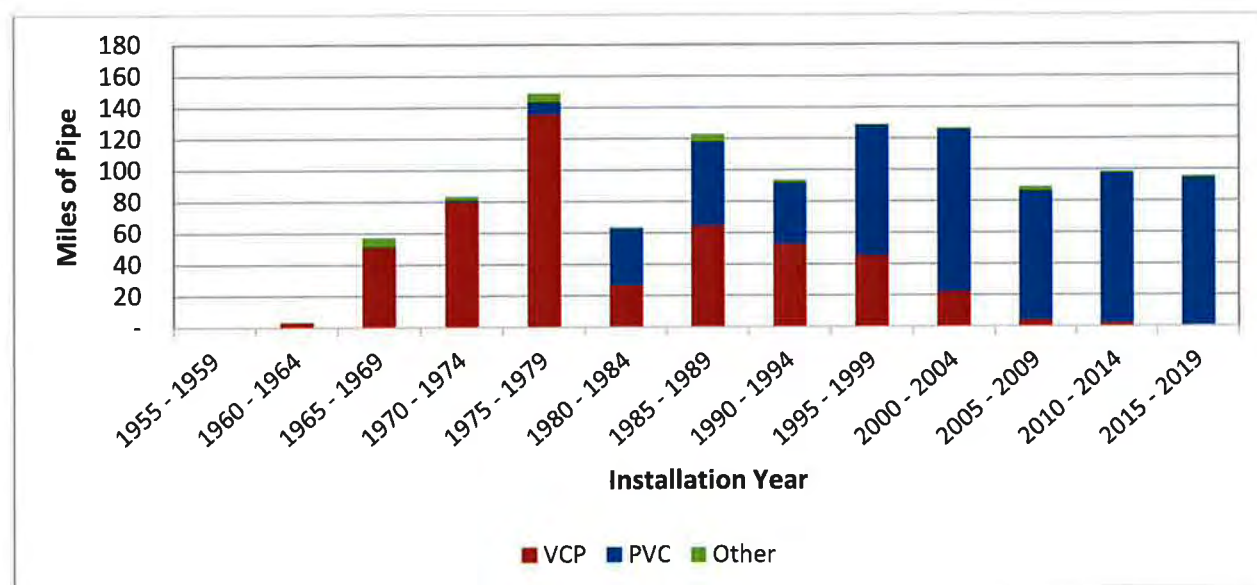
6.4 Rehabilitation and Replacement Plan

The District's sewer system rehabilitation and replacement planning process consists of systematic inspection and condition assessment of all pipe reaches 30 years and older over a 10 year period and identification of condition-related repair, rehabilitation, and replacement projects as determined by condition assessment. The District's process is to evaluate sewer system structural deficiencies identified through sewer inspection and condition assessment to determine if a repair, rehabilitation, or replacement project is required along with an appropriate timeframe for addressing the structural issues identified.

6.4.1 Sewer System Materials and Age

The sewer system was largely constructed beginning in the 1960s with approximately 50 percent of the system constructed prior to 1994 as shown in **Figure 6-5**. The oldest 65 miles (5.9 percent) of the sewer system built during the 1960s are currently between 48 to 56 years old.

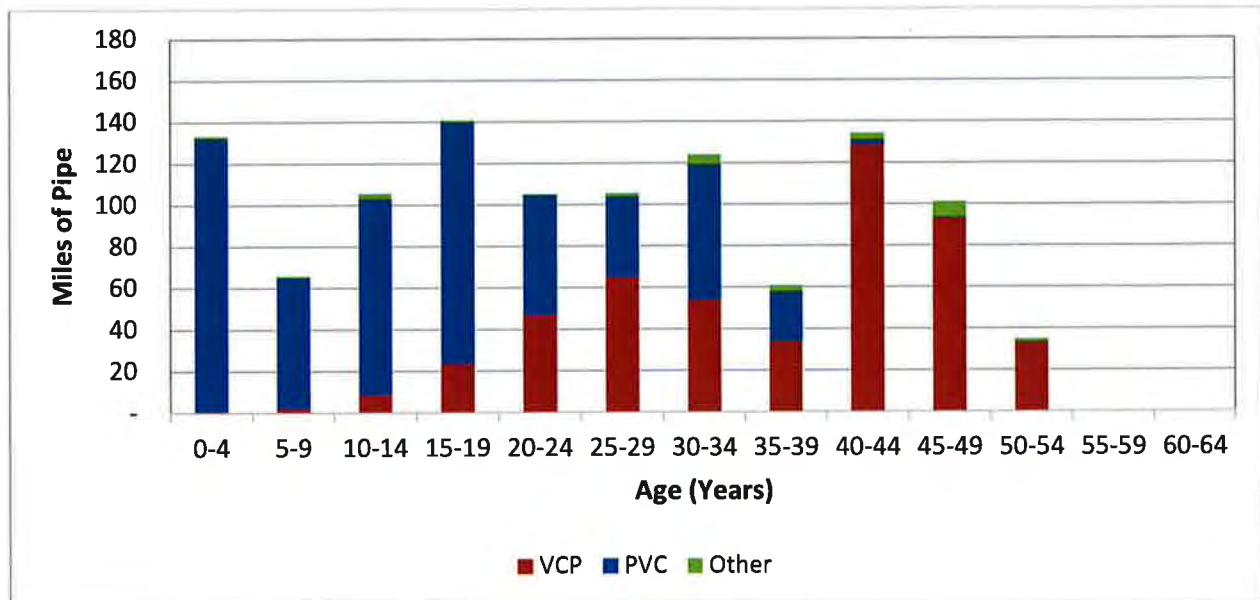
Figure 6-5: Pipe Material by Year of Installation



*Data is based on current sewer mileage report

Figure 6-6 shows the amount of pipe by material and sewer pipeline age. Currently, approximately 456 miles of sewers are 30 years or older. Over the next 10 years, an additional 211 miles of sewers will reach 30 years in age for a total of 667 miles, or 59.9 percent of the system. In the early phases of construction of the system, the predominant material of construction was vitrified clay pipe (VCP). Beginning in the mid-1970s, the District began installing polyvinyl chloride (PVC) pipe, which has now become the predominant material utilized for new construction.

Figure 6-6: Pipe Material by Sewer System Age



*Data is based on current sewer mileage report

Of the 492 miles of VCP sewer pipes in the District's sewer system, only 514 feet were installed prior to 1960. For all intensive purposes, all VCP pipe installed in the District's sewer system was installed after 1960 with approximately 99 percent installed after 1965. This is an important point since clay pipe experienced significant technological advancements in both standards and methods of manufacture. These advancements included:

Table 6-1: Advancements in Manufacture of Vitrified Clay Pipe Prior to Construction of IRWD Sewer System

Timeframe	Advancement
1950s – Present	Pipe extrusion, drying, and firing (vitrification) were greatly improved after World War II. The pipe is more dense with reduced voids and higher strengths.
1958 – Present	Factory applied elastomeric joints introduced for bell and spigot pipes. Joints change to compression joints for VCP pipe and fittings. ASTM C 425 created for joints for bell and spigot pipes. 1958-1967: Factory applied joint for 4-inch through 12-inch bell pipe composed of Polyvinyl Chloride. 1962-1967: Factory applied joint for 15-inch through 42-inch bell pipe composed of Polyester with an embedded gasket in the bell. 1966-Present: Factory applied joint for 4-inch through 42-inch bell pipe composed of Polyurethane.

These advancements in manufacture, combined with advancements in construction techniques, most notably the introduction of standard specifications for installing pipeline connections, significantly improved the quality of construction of the District's sewer system when compared to sewer systems with

older installations of clay pipe. It is reasonable to assume a mean expected useful life of 100 years for the vitrified clay pipe sewer mains installed in the District's system. In the mid-1970s, the District began transitioning to the installation of PVC pipe for gravity sewer mains. Similar to VCP pipe, it is reasonable to assume a mean expected useful life of 100 years for PVC sewer mains.

6.4.2 Collection System Inspection and Condition Assessment

This section describes the inspection and condition assessment program for sewer manholes and pipelines.

6.4.2.1 Sewer Manhole Inspection and Condition Assessment

All collection system crews perform sewer manhole inspection and condition assessment daily in the course of performing sewer cleaning and CCTV inspection activities. Sewer cleaning and CCTV inspection crews rate manhole condition on a 1 to 3 scale, with a 1 being a higher priority and 3 being a lower priority and mark manholes recommended for rehabilitation. The Collection System Supervisors perform a secondary inspection to verify the need and priority of the recommended manhole rehabilitation. Based on the results of the secondary inspection, the District's GIS staff creates a manhole map book annually, which is included as an attachment in a Request for Bid to hire a contractor to perform manhole rehabilitation. The District has allocated approximately \$330,000 annually for capital improvements related to manhole rehabilitation.

6.4.2.2 Sewer Main Inspection and Condition Assessment

The District has three full-time in-house CCTV technicians certified to perform sewer inspection and condition assessment according to the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) standard. The District's three CCTV technicians each operate a CCTV truck and operate as a one-person crew. Two of the CCTV technicians are a Senior Collection Systems CCTV Technicians and are responsible for overseeing all CCTV inspection activities. The CCTV inspection trucks each have a Pearpoint pan and tilt CCTV camera and capture CCTV inspection data utilizing Pipelogix software. The Collection Systems CCTV technicians perform an initial condition assessment screening of sewer pipelines to identify repair, rehabilitation, or replacement recommendations, as well as maintenance issues requiring a one-time cleaning or periodic preventive maintenance, and forwards recommendations to the Collection System Manager and Collection Systems Supervisors. CCTV technicians document the specific pipe segment inspected and recommendations using Mapple- CMMS program, which the CCTV technician or Collection System Supervisor enters into the District's CCTV database. The associated backup CCTV inspection documentation is uploaded to District servers daily. The Collection Systems Supervisors review CCTV crew recommendations for repair, rehabilitation, or replacement and forward reviewed recommendations to the Collection Systems Manager.

The District plans to inspect all sewer mains within the next 10 years. The District's goal is to record a baseline condition assessment inspection of each pipe segment in the sewer system by Fall of 2018. The District prioritizes CCTV inspection by age and history of general maintenance issues within a given area. The Collection Systems Supervisors prioritize referrals for CCTV inspection into the CCTV inspection workload. Supervisors give the highest priority to inspection requests on pipes experiencing blockages or suspected of having severe maintenance or structural issues. **Figure 6-7** identifies the sewer pipes inspected since March 2013 and the remaining pipes requiring inspection by July 2018.

6.4.3 Sewer Rehabilitation and Replacement Plan

Since April 2013, the District has inspected approximately 443 miles of sewer pipes for condition assessment. **Table 6-2** summarizes the results of the inspection performed since 2013. Of the 443 miles of sewer pipes inspected, only 10 miles of pipes had one or more NASSCO PACP Structural Grade 4 or

Grade 5 defects requiring repair, rehabilitation, or replacement. This represents 2.3 percent of the sewer system having a structural condition requiring near-term action indicating the sewer system is in very good condition. The District performed these inspections in the older portions of the sewer system. The District expects even less structural issues in the newer portions of the sewer system remaining to be inspected. **Figure 6-8** shows the maximum structural grade for all pipelines inspected and highlights pipelines inspected from March 2013 to present day.

Table 6-2: Maximum Structural Defects Observed in Pipe Segments in Since 2013

Maximum Structural Defect Observed	Miles of Pipes	Percentage of Total Inspected, By Length
PACP Structural Grade 5	2.6	0.6%
PACP Structural Grade 4	7.4	1.7%
PACP Structural Grade 3	23.8	5.4%
PACP Structural Grade 2	46.3	10.4%
PACP Structural Grade 1	69.8	15.7%
No Structural Defects	293.6	66.2%
Total Inspected	443.6	100%

The District is addressing existing PACP Structural Grade 4 and Structural Grade 5 defects through a combination of localized repairs or sewer rehabilitation. Since the sewer system is in very good condition, the District has focused on a large portion of existing sewer repair and rehabilitation on addressing pipe segments with maintenance issues. **Figure 6-9** shows the location of sewer rehabilitation and repair performed between March 2013 and July 2018 to address significant structural and maintenance defects in the sewer system.

Figure 6-7: Sewer Pipelines Inspected between April 2013 to Present

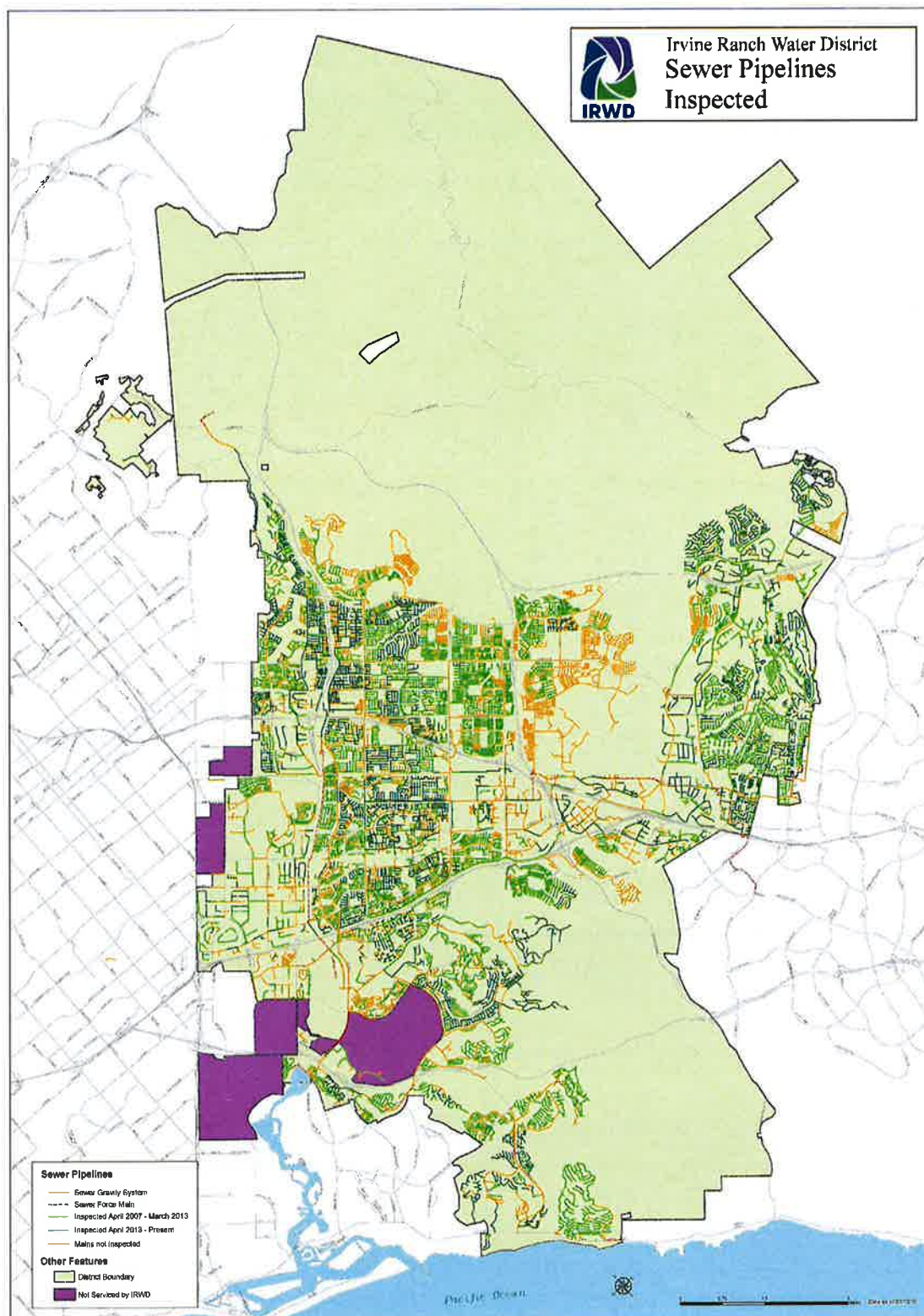


Figure 6-8: Maximum Structural Defect Grade for Pipes Inspected Between March 2013 and March 2018

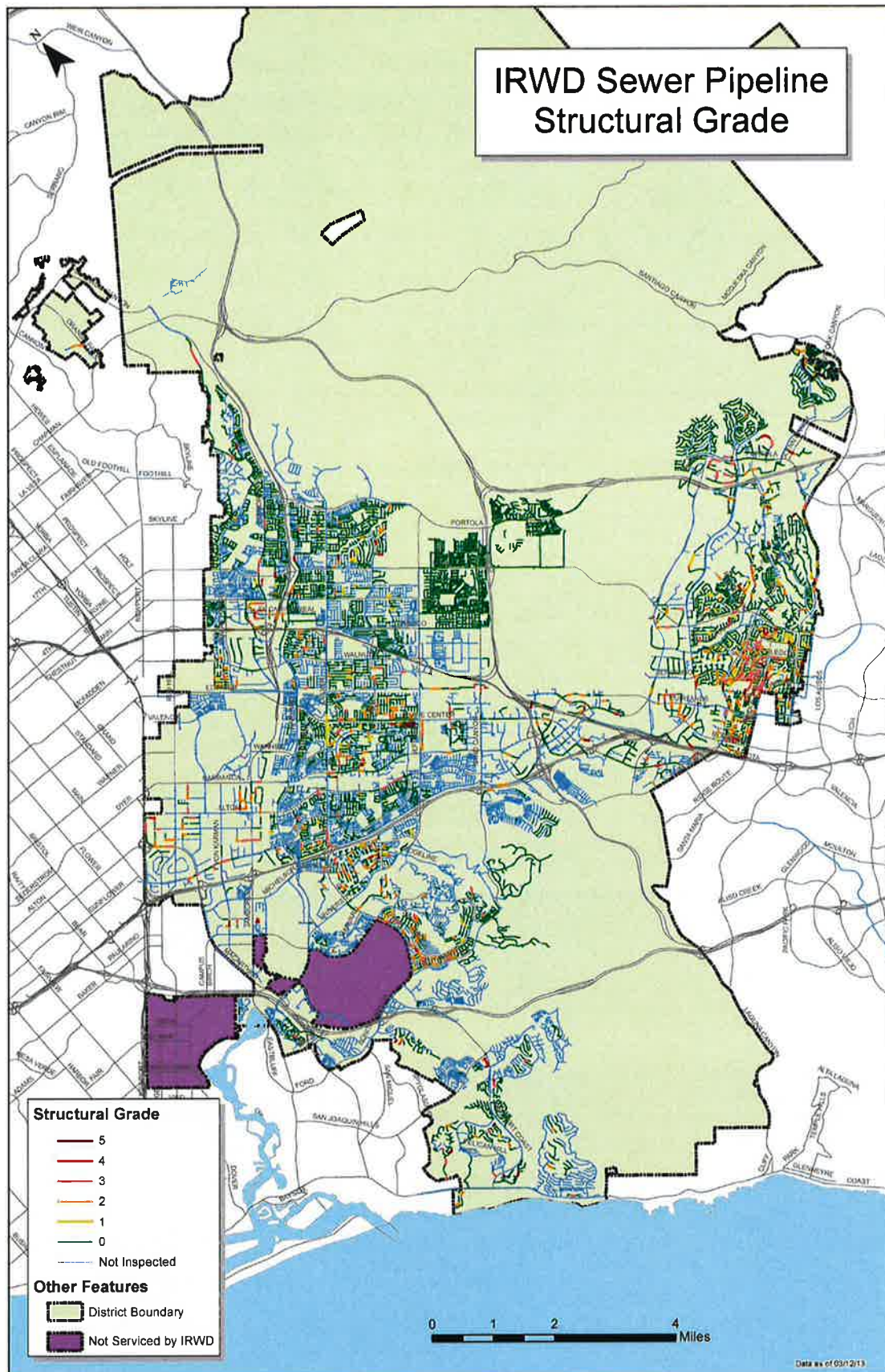
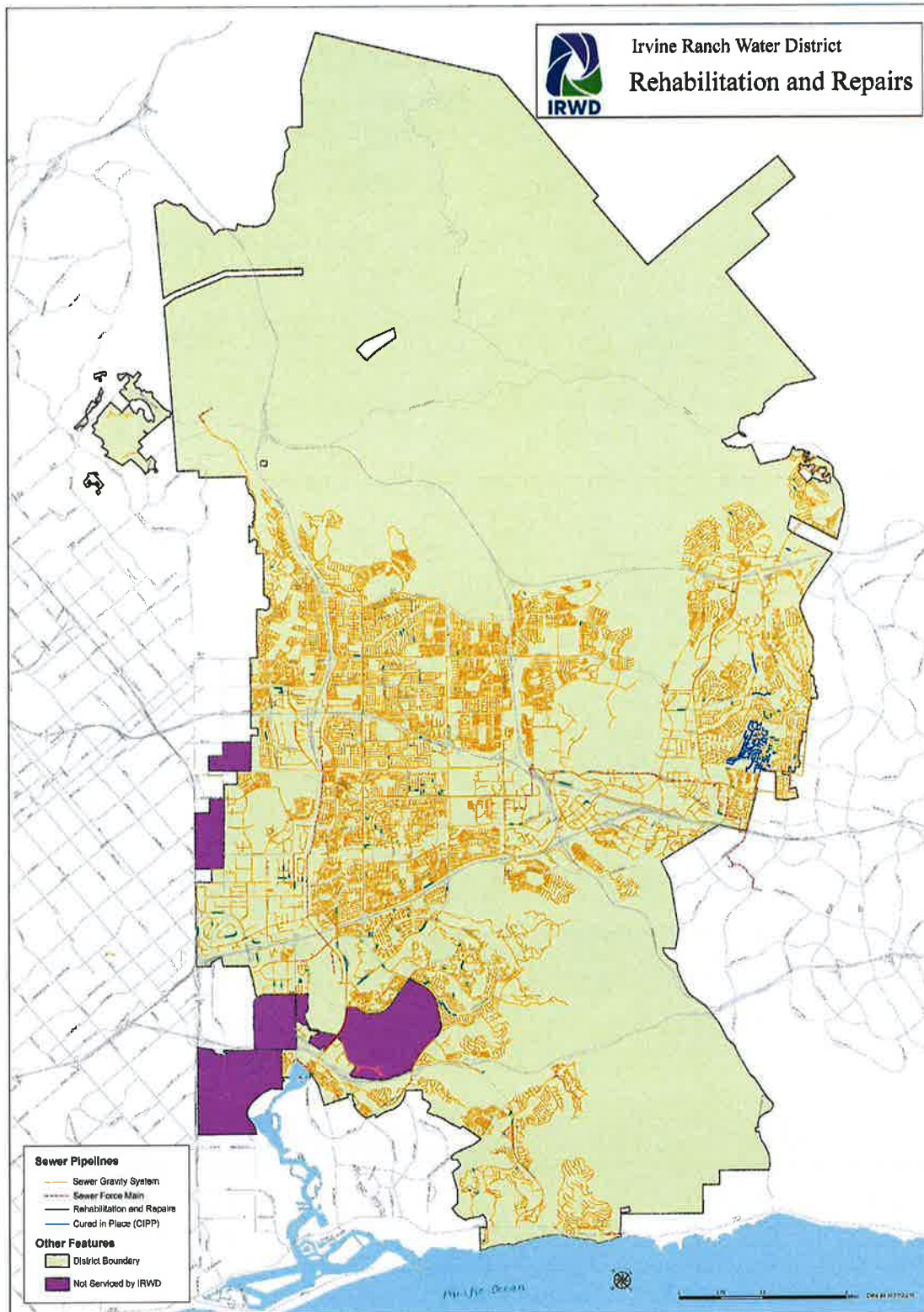


Figure 6-9: Sewer Pipeline Rehabilitation and Repair



6.4.4 Capital Improvement Program Funding

The District has funding available to accomplish the capital improvements required to address wastewater collection system capacity, structural, and maintenance issues. In addition to comprehensive system inspection, condition assessment, and capacity modeling, the District has also employed a Replacement Planning Model (RPM). In place since 1996, the RPM utilizes asset management principles to build a funding policy for establishing a funding mechanism for rehabilitation and replacement projects.

Collection system sewer pipelines and lift stations are included in the model. The model assumes a 75-year lifecycle for sewer pipelines, which is a conservative estimate since the majority of pipelines in the District's sewer system are comprised on newer generation materials likely to have a mean lifecycle of 100 years. The model assumes the costs for pipeline rehabilitation and replacement are incurred over a period of years before and after the estimated replacement date, since it is likely some pipelines will fail early and some will last longer.

The RPM also includes lift stations and have varying estimates for the lifecycle of lift station assets ranging from 20 years for pumps to 40 years for the lift station structures. The RPM incorporates assumptions for rehabilitation for lift station assets over the lifecycle of the individual assets prior to full-scale replacement of the asset. In 2010, the Planning and Technical Services Division updated the RPM to include additional pipelines and new facilities. The Planning and Technical Services Division is currently updating the RPM and anticipates costs to be available in FY 2018-19.

The Planning and Technical Services Division utilizes the RPM to generate a report of the projected costs for long-term asset replacement for all District assets, including wastewater collection system pipelines and lift stations. The Planning and Technical Services Division provides the projected costs from the RPM to Finance and Administration for incorporation into the District's rate model and rate structure.

Cost projections for sewer pipelines from the RPM incorporated in the District's rate structure are shown in **Table 6-3**. Cost projections for lift stations are lumped in with cost projections for all treatment plant assets for the treatment plant and are incorporated into the District's rate structure as well.

Table 6-3: FY14 – FY23 10-Year Pipeline Capital Improvement Program Funding

Fiscal Year	Sewer Pipeline Rehabilitation and Replacement (\$1,000s)
FY14	\$492
FY15	\$492
FY16	\$492
FY17	\$492
FY18	\$492
FY19	\$512
FY20	\$532
FY21	\$553
FY22	\$575
FY23	\$599
10-Year Total	\$5,231

6.5 Training Program

The District provides training on a regular basis to all employees performing operations and maintenance activities on the sewer system assets. The District also requires contractors working on the sewer system to be appropriately trained.

6.5.1 District Staff

The District uses a combination of on-the-job training, conferences, seminars, and other training opportunities to provide technical training for its wastewater collection system staff. Vendors provide training for new equipment. The District's budget includes approximately \$15,000 for CWEA membership for employees and technical training in the form of conferences, seminars, and other training classes. Examples of technical training and training materials the District's wastewater collection staff might take advantage of are listed in **Table 6-4** and **Table 6-5**.

Table 6-4: Training Resources (Conferences, Seminars, and Courses)

Sponsor	Event	Timeframe	References
Water Environment Federation	Collection System Specialty Conference	Periodically	www.wef.org
	WEFTEC	Periodically	www.weftec.com
California Water Environment Association	Santa Ana River Basin Section	Annually	www.cwea.org
	State Conference	Every other April	
	Southern Regional Safety Conference	May	
	Southern Sections Collection Systems Committee	Quarterly	
Southern California Alliance of Publicly Owned Treatment Works	Collection System Committee	Quarterly	www.scap1.org

Table 6-5: Training Resources (Materials)

Sponsor	Materials	Reference
California State University, Sacramento	Videos, manuals, home study courses	www.owp.csus.edu

In addition to technical training provided by outside resources, the District provides in-house technical training to collection system operations and maintenance staff. The focus of in-house training is hands-on training at a work site. Other potential sources of training include the Southern California Chapter of the American Public Works Association.

6.5.1.1 CWEA Certification

All Collection System Operations and Maintenance employees have earned California Water Environment Association Collection System Maintenance certification. Employees responsible for performing collection system maintenance activities enter into the organization as a Collection Systems Tech I and are required to obtain CWEA Collection System Maintenance Grade 1 certification within one year of employment. Collection System Technician II employees are required to have three years of field experience and CWEA Collection Systems Maintenance Grade 2 certification. The CCTV Technician classification is an entry-level position. Senior CCTV Technicians require CWEA Collection Systems Maintenance Grade 3 certification. The Collection System Supervisor position, requires to possess a

CWEA Collection System Maintenance Grade 3 certification with the ability to earn CWEA Collection System Maintenance Grade 4 certification. The Collection System Manager is required to have a CWEA Collection System Maintenance Grade 4 certification, a Bachelor degree in business, public administration, or related field, six years of management experience in the collection system field, and three years of experience as a supervisor.

6.5.1.2 Training Documentation

The District documents all training activities using a Training Sign-In Sheet with signatures of attendees along with training agenda and training handouts. These documents are managed and stored by the Safety Office.

6.5.2 Training Requirements for Contractors

The District requires contractors who work on District sewer projects to be qualified with wastewater collection system experience. The District has a Supplier Assessment Process requiring all contractors to become pre-qualified by the District's Purchasing Department. Contractors must apply for pre-qualification by submitting a Supplier Assessment Information Sheet. Each contractor must provide the District with three references to demonstrate they are qualified to perform the work and the District performs reference checks to verify contractor qualifications. In addition, during the process of selecting contractors for a specific project, the District requires each contractor to submit a list of three local comparable projects performed using the equipment and techniques specified. These references are checked during the selection process for a specific project.

Once contractors are selected for a specific project, the District requires contractors to provide safety plans, confined space plans, and wastewater bypass plans prior to work. These are reviewed by the Safety Department, Collection System Maintenance, and Engineering prior to commencing project. SSO response is part of their Safety Plan and Wastewater Bypass Plan. In the specification documents there is a notification list with contacts in the case of an emergency (including SSO). If any work involves or requires coordination with pump station operations, the District will provide pump station operations staff to support coordination with contractor activities.

6.6 Equipment and Replacement Parts Inventory

The District has assembled equipment and replacement parts inventory to quickly address a lift station or a sewer main failure.

6.6.1 Equipment and Replacement Parts Inventory for Sewer Mains

The District does not consider a sewer main as requiring critical spare parts. The District has stored PVC pipe in various sizes at the Michelson Water Reclamation Plant along with fittings and coupling required to perform a pipeline repair. The District also owns three trailer-mounted bypass pumps for bypassing sewer main failures, if required, along with 6,000 feet of 8-inch diameter flexible hose on two different spools and 2,000 feet of 6-inch diameter flexible hose on a separate spool. The three existing pumps include:

- One (1) 6-inch pump;
- One (1) 10-inch pump;
- One (1) 12-inch pump

6.6.2 Equipment and Replacement Parts Inventory for Lift Stations

The District has identified lift stations pumps and motors as critical spare parts. The District owns spare pumps and motors for all lift stations. In addition, the District owns spare level transducers enabling quick

replacement when needed. The District has designated backup pumps and backup power providing redundancy at each lift station.

Chapter 7 Design and Performance Provisions

This section of the SSMP documents IRWD's design and performance provisions.

7.1 Regulatory Requirements

The WDR requires IRWD to have the following design and performance provisions:

- (a) *IRWD must have design and construction standards and specifications for the installation of new sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sewer systems;*
- (b) *IRWD must also have procedures and standards for inspecting and testing the installation of new sewers, pump stations, and other appurtenances and for rehabilitation and repair projects.*

7.2 Design and Construction Standards

The District has developed design and construction standards for the installation of new sewer systems, pump station components, and other appurtenances. The latest versions of all of the District's design and construction standards, guidelines, specifications, and details are publicly available on the internet at <http://www.irwd.com/doing-business/engineering-planning/engineering-docs.html>.

The District's webpage includes the following documents:

- Procedural Guidelines and General Design Requirements
- Standard Drawings
- General Technical Specifications

In addition, anyone interested in automatically receiving updates to the District's documents, guidelines, and requirements can sign up for IRWD eNotify (<http://www.irwd.com/about-us/e-notifications.html>), which will send e-mail notifications when changes are made to any of the documents or when a change is posted to the IRWD website.

The District's Procedural Guidelines and General Design Requirements include:

- Development Plan and Permit Processing Procedures
 - District authority to access work site
 - Sewer system inspection standards and procedures for construction
- Design Criteria for Sewer Facilities
 - Pipe size, material, minimum and maximum slope, and flow design criteria;
 - Standard location and alignment, stationing, and minimum depth;
 - Manhole location, size, type, frame and covers, and lining;
 - Cleanout design criteria;
 - Force main design criteria;
 - Sewer lateral design criteria;
 - Sewer pump stations design criteria; and,

- Design criteria for easement and right-of-way for sewer.

The District's Sewer Standard Drawings includes the following eight standard details for the sewer system listed in **Table 7-1**.

Table 7-1: Sewer Standard Drawings

Drawing No.	Description
S-1	Manhole
S-2	Drop Manhole
S-3	Sewer Lateral
S-4	Cut-in Wye Connection
S-5	Terminal Cleanout
S-6	Sewer Trench
S-7	Steel Casing for Sewer Pipe
S-8	Concrete Slope Anchors

The District's General Technical Specifications, for use in all District construction contracts, includes a comprehensive set of specifications for sewer system pipelines and facility construction. The District contracts with a design engineer for the development of design drawings and specifications for sewer pipeline and pump station rehabilitation and replacement projects. In addition, IRWD has adopted and uses the Standard Specifications for Public Works Construction (Greenbook).

7.3 Inspection and Testing Standards

IRWD uses the inspection and testing requirements detailed in the District's Procedural Guidelines and General Design Requirements, General Technical Specifications, and the Standard Specifications for Public Works Construction (Greenbook).

The District's Procedural Guidelines and General Design Requirements requires sewer inspections at the following intervals:

- Trench excavation and bedding
- Placing of pipe, fittings, and structures
- Placing and compacting the pipe zone backfill
- Backfill of the trench to grade
- Raising of manhole and clean-outs and during system cleaning
- Pipeline CCTV inspection at completion of construction

Prior to pipelines CCTV inspection, pipelines must be balled and flushed, air-tested, and mandrelled. CCTV inspection is then performed to determine if any of the following defects exist:

- Off grade - 0.08 foot, or greater, deviation from grade.
- Joint separations exceeding 3/4-inch.

- Misaligned joints (none permitted on straight runs or on wrong side of pipe curves). Joint spaces exceeding $\frac{3}{4}$ -inch on designed curves.
- Chips in pipe ends more than $\frac{1}{4}$ " deep.
- Cracked or damaged pipe or evidence of presence of an external object bearing upon the pipe (rocks, roots, etc.).
- Dropped joints.
- Infiltration in excess of maximum permissible specified in the District Standard Specifications, Section 15043.
- Debris or other foreign object in the line.
- Other obvious deficiencies.

Any defects found must be corrected prior to final acceptance. Inspection and testing standards for sewer pipeline repair and rehabilitation projects are developed by the design engineer during the design phase of the project. Similar, inspection and testing requirements for pump station repair or rehabilitation projects are developed by the design engineer during the design phase of the project.

Chapter 8 Overflow Emergency Response Plan

The purpose of the Overflow Emergency Response Plan (OERP) is to support an orderly and effective response to Sanitary Sewer Overflows (SSOs). This plan provides guidelines for District personnel to follow in responding to, cleaning up, and reporting SSOs that may occur within the District's service area.

8.1 Regulatory Requirements

IRWD shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:

- (a) Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;*
- (b) A program to ensure appropriate response to all overflows;*
- (c) Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, regional water boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the Monitoring and Reporting Program. All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board Waste Discharge Requirements or National Pollutant Discharge Elimination System (NPDES) permit requirements. The SSMP should identify the officials who will receive immediate notification;*
- (d) Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained;*
- (e) Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities; and*
- (f) A program to ensure that all reasonable steps are taken to contain untreated wastewater and prevent discharge of untreated wastewater to waters of the United States and minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.*

8.2 Goals of the Overflow Emergency Response Plan

The District's goals with respect to responding to SSOs are:

- Work safely;
- Minimize public contact with the spilled wastewater;
- Respond quickly to minimize the volume of the SSO;
- Eliminate the cause of the SSO;
- Contain the spilled wastewater to the extent feasible;
- Prevent sewage system overflows or leaks from entering the storm drain system or receiving waters to the maximum extent practicable;
- Mitigate the impact of the SSO; and
- Meet the regulatory reporting requirements.

8.3 SSO Detection

The processes that are employed to notify the District of the occurrence of an SSO include: observation by the public, receipt of an alarm, or observation by District staff during the normal course of their work.

8.3.1 Public Observation and Emergency Communications

Public observation is the most common way that the District is notified of blockages and spills. Contact information for reporting sewer spills is located on monthly water bills and on the District's website at www.irwd.com/about-us/contact.

8.3.1.1 Normal Work Hours

The normal working hours for District office staff, including Customer Service staff responsible for answering emergency calls, is from 7:30 a.m. to 5:00 p.m. Monday through Thursday. The office is open every other Friday from 7:30 a.m. to 4:00 p.m. Customer service staff are available to answer calls every Friday from 7:30 a.m. to 4:00 p.m. The District's Collection System Maintenance field crews operate on a 4/10 schedule. Staff alternate schedules either working on Monday through Thursday from 6:00 a.m. to 4:30 p.m. or Tuesday through Friday from 6:00 a.m. to 4:30 p.m. When a report of a sewer spill or backup is received, the Customer Service representative receives the call, takes the information from the caller and communicates this information to the Collection System Manager or Supervisors who dispatch a field crew to the site. Emergency calls received by the City of Irvine or County of Orange are routed to the IRWD Customer Service main line.

8.3.1.2 After Hours

After hours emergency calls go to the District's after hours answering service. The District's after hours answering service staff are trained to gather basic information regarding a customer complaint and relay this information to the District Primary Responder. The District Primary Responder is trained to investigate any emergency issue and is responsible for either addressing the issue or contacting an appropriate standby response crews. The Field Services Manager is responsible for maintaining the Standby List for all departments containing the names, phone numbers, and responsibilities for standby employees and distributing an updated list weekly via e-mail.

The District's afterhours approach to sewer overflow response is to include employees with different skill sets on the Standby List enabling the District to respond quickly and effectively to a variety of emergencies involving sewer pipelines or sewer pump stations. The Standby List includes the following designations for standby employees:

Table 8-1: Standby List Positions and Roles

Standby Position	Roles
Primary Responder	Investigate service calls and either address issue or request support from specialized standby personnel as needed.
First Backup	Provide backup support to primary responder as requested.
Second Backup	Provide backup support to primary responder as requested.
Collection System (1 st)	Respond to sewer-related service calls when requested by Primary Responder.
Collection System (2 nd)	Respond to sewer-related service calls when requested by Primary Responder.
Electrical Services	Respond to service calls requiring expertise in electrical systems. This includes electrical systems for sewer pump station issues.
Water System Operator	Responds to service calls requiring water system operational expertise.
Regulatory Compliance	Responds to service calls involving water quality issues.
Standby Manager	A list is provided to standby staff for all IRWD managers. All managers are available to respond during off-hours.
LAWRP Plant Operator	Respond to after-hours issues related to, or requiring coordination with, LAWRP operations.
MWRP Treatment Plant Operator	Respond to after-hours issues related to, or requiring coordination with, MWRP operations.

Information from the emergency call is recorded on the Spill Response Field Report Form included in **Appendix E**.

8.3.1.3 Routing of Calls

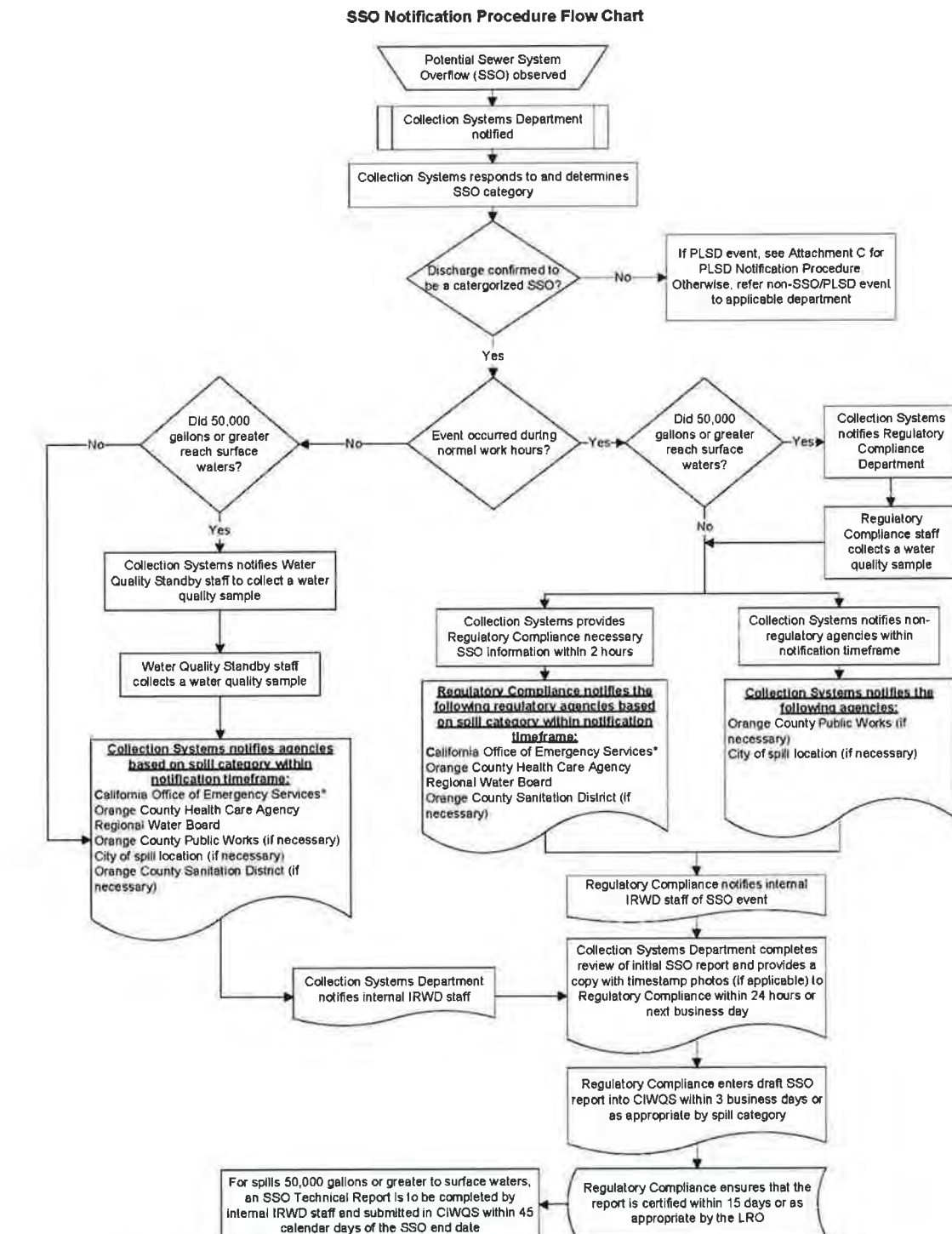
Any calls answered by the District's answering service are routed to the Primary Responder on the Standby List. District customer service staff are trained to send sewer overflow calls to the Collection System Maintenance Supervisor during normal business hours and to the Collection System First Responder after 4:30 p.m. on Monday through Friday.

8.4 SSO Response Procedures

Sewer service calls are high priority events that demand a prompt response to the location of the problem. Upon notification of a potential sewer overflow, a District Primary Responder shall be dispatched onsite within 30 minutes during normal working hours and during standby. During normal working hours, the District's Primary Responder will be a Department 570 Collection System maintenance crew. During after hours, the District's Primary Responder will be assigned personnel from Department 420, 425, or 430 who will investigate the service call to determine the appropriate response.

The response procedures for SSOs caused by District-owned sewers and private laterals within the District service area are depicted in **Figures 8-1** and **8-2**.

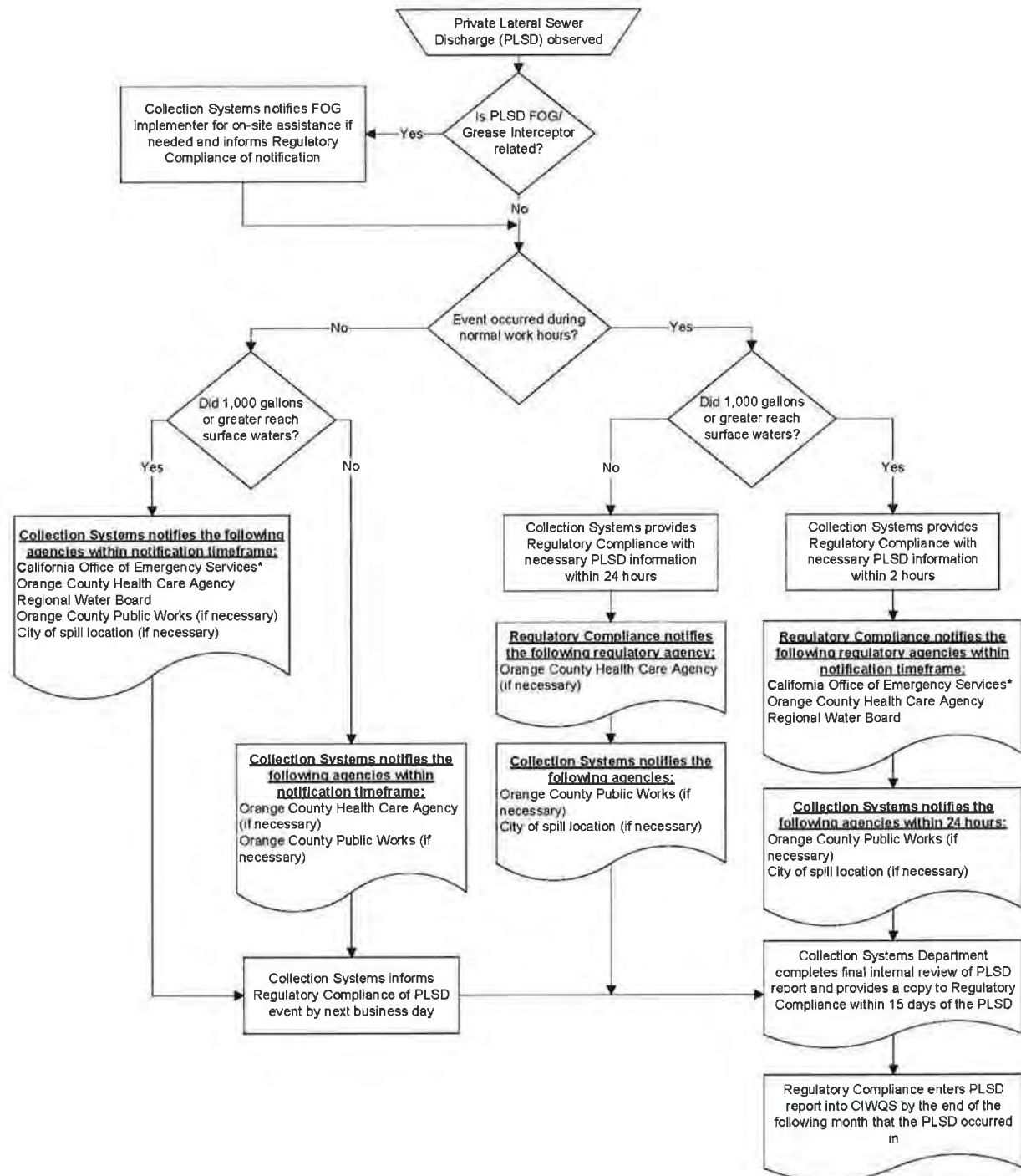
Figure 8-1: SSO Response Procedure Flow Chart



*Notify Cal OES of spills $\geq 1,000$ gallons that reach surface waters or spilled in a location where it probably will be discharged to surface waters

Figure 8-2: PLSD

PLSD Notification Procedure Flow Chart



*Notify Cal OES of spills $\geq 1,000$ gallons that reach surface waters or spilled in a location where it probably will be discharged to surface waters

8.4.1 Safety

The District's Primary Responder, as first responder, is responsible for following District safety procedures at all times.

8.4.1.1 Traffic Control

Traffic control requirements vary depending on the location and the risk to operating personnel and the public. CalTrans standards are the minimum for congested and/or high-speed streets and highways. The minimum traffic controls for low-speed/low-traffic-density streets should conform to the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), the California Department of Transportation MUTCD, and the Watch Book Manual standards. In the case where there are no local standards, the minimum traffic control should be:

- Warning signs (signs with the symbol for person working are preferred);
- Directional arrow signs on rear of the truck;
- Traffic cones clearly delineating traffic lanes and directions; and
- One or more flaggers utilized to control and direct traffic where visibility is limited or the possibility of collision exists.

8.4.2 Primary Responder Priorities

The Primary Responder's priorities, as the first person to respond to the call, are:

- To follow safe work practices;
- To respond promptly with appropriate equipment;
- To contain the spill wherever feasible;
- To restore the flow as soon as practicable;
- To minimize public access to and/or contact with the spilled sewage;
- To return the spilled sewage to the wastewater collection system; and
- To restore the area to its original condition (or as close as possible).

8.4.3 Initial Response

Clarify that the Primary Responder during standby will perform initial assessment either through phone call interview or initial site assessment. Once the Primary Responder determines it is a sewer-related event, they will transfer the call to Collection Systems Maintenance.

The Primary Responder is responsible for contacting the reporting party to clarify the situation and collect any additional information that may allow District personnel to respond in an efficient manner. If the Primary Responder determines the event is sewer-related, immediately contact the Collection Systems Maintenance standby staff. Whichever person arrives to the site first will:

- Field verify the address and nearest cross street to determine whether the spill or backup is located in the District's service area.
 - If the location of the spill is not in the District's service area or not caused by the District's sewer system, call the responsible agency, provide them with the service call information, and notify the caller that the responsible agency has been notified. The District's Emergency Directory contains contact information for surrounding agencies.
 - If the spill/backup is caused by another agency sewer system, the responding crew will standby until representatives of the responsible party arrive and are fully operational

unless an emergency on one of the District's sewers requires the team to respond to another location.

- Notify the Collection Systems Manager and Collection System Supervisor when an SSO is verified. The Collections System Manager will work with crew to determine if additional resources are needed and level of response.
- Respond with the appropriate spill response equipment that has spill containment tools, materials and any additional equipment that may be needed based on the details provided by the caller.
 - Note arrival time at spill site.
- If the spill/backup is caused by a private lateral, the responding crew should contain/mitigate the spilled sewage to prevent sewage from entering the public right of way without District staff going on private property.
- Set up traffic and pedestrian control as necessary for safety of the public and the response crew.
- Identify and assess the affected area and extent of spill. If possible, take photographs to document the extent of the spill.
 - If the spill appears to be too large for the response crew to handle or is in an area that may cause danger to human health (e.g. impacting a school, hospital, park, etc.), then document conditions upon arrival with photographs.
- Use best judgment to determine whether to proceed immediately with blockage removal versus containment. The guidance for this decision is:
 - Small spills – proceed with immediate containment measures near the appearance point followed by blockage removal.
 - Moderate or large spill where containment is anticipated to be simple – proceed with immediate containment measures near the appearance point followed by blockage removal.
 - Moderate or large spills where containment is anticipated to be difficult – proceed with clearing the blockage; however, call for additional assistance immediately to focus on implementing containment measures.

8.4.4 Restore Flow

Using the appropriate cleaning tools, set up downstream of the blockage and hydro clean upstream from a clear manhole. Attempt to remove the blockage from the system and observe the flows to ensure that the blockage does not recur downstream.

- If the blockage cannot be cleared within a reasonable time (15 minutes), or the sewer requires construction repairs to restore flow, then initiate additional containment measures and/or bypass pumping.
- If assistance is required, contact other employees, contractors, and equipment suppliers.

8.4.5 Initiate Spill Containment Measures

The responding crew should attempt to contain as much of the spilled sewage as possible using the following steps:

- Determine the immediate destination of the overflowing sewage.
- Implement immediate containment measures consisting of plugging storm drains using sandbags, plastic sheeting, and/or other dam construction material to contain the spill, whenever appropriate.

- Additional containment measures include containing/directing the spilled sewage using dike/dam, sandbags, or earthen berms in landscaped or undeveloped areas.
- Pump around the blockage/pipe failure to convey the wastewater to the nearest downstream manhole or facility.
- If the spill is caused by a sewer lateral, District staff may shut off the water supply to that property when the wastewater endangers the public health.

8.4.6 Water Quality Sampling and Testing

Water quality testing is performed to determine the extent and impact of an SSO when sewage enters a water body. Water quality sampling is required to be conducted within 48 hours after initial SSO notification for Category 1 SSOs in which 50,000 gallons or greater are spilled to surface waters. If required, the water quality sampling procedures are:

- The Collection Systems Manager, Collection System Supervisor, or Collection System First Responder will contact Regulatory Compliance personnel during normal hours, or the Water Quality standby personnel during after-hours, to collect samples. Regulatory Compliance personnel or the Water Quality standby will collect samples within 48 hours after the discovery of the SSO event.
- The District has a state-certified laboratory to analyze the samples to determine the nature and impact of the discharge. The basic analyses include ammonia, total coliform, fecal coliform, and *Enterococcus*.

8.4.7 Recovery and Clean Up

The recovery and clean up phase begins when the flow has been restored and the spilled sewage has been contained to the extent possible. The SSO recovery and clean up procedures include the steps below.

8.4.7.1 Estimate the Volume of Spilled Sewage

Use the methods outlined in **Appendix E**, or other methods as deemed necessary, to estimate the volume of the spilled sewage. If possible, utilize available information such as pump station run times and Supervisory Control and Data Acquisition (SCADA) data to support or validate volume estimates. Wherever possible, document the estimate using photos of the SSO site before and during the recovery operation.

8.4.7.2 Recovery of Spilled Sewage

Vacuum up spilled sewage using the hydro/combo unit or pump the spilled sewage and any water used to flush the area and discharge it back into the wastewater collection system.

8.4.7.3 Clean Up and Disinfection

Implement clean up and disinfection procedures to reduce the potential for human health issues and adverse environmental impacts that are associated with an SSO event. The procedures described are for dry weather conditions and should be modified as required for wet weather conditions. Where clean-up is beyond the resources or capabilities of District staff, the District may use a contractor to support clean-up operations.

8.4.7.3.1 Hard Surface Areas

Take reasonable steps to contain and vacuum up the wastewater and return it to the wastewater collection system. Collect all signs of sewage solids and sewage-related material either by hand or with the use of

rakes and brooms. Wash down the affected area with high pressure water using nozzles on provided on the hydro/combo unit and vacuum the wash water utilizing the hydro/combo unit. Allow area to dry. Repeat the process if additional cleaning is required.

8.4.7.3.2 *Landscaped and Unimproved Natural Vegetation*

Collect all signs of sewage solids and sewage-related material either by hand or with the use of rakes and brooms.

Wash down the affected area with clean water until the water runs clear. The flushing volume should be approximately three times the estimated volume of the spill.

Either contain or vacuum up the wash water so that none is released. Return the wastewater to the wastewater collection system to the extent possible.

Allow the area to dry. Repeat the process if additional cleaning is required.

8.4.7.3.3 *Natural and Man-Made Waterways*

Notify Orange County Public Works in the event an SSO impacts any waterways. Contain contaminated creeks where feasible. Remove all contaminated water by pumping to the collection system or vacuuming by means of vacuum truck and return all collected water to the sewer system. Introduce additional wash water as needed to flush contaminated areas towards the containment area.

8.4.7.4 *Wet Weather Modifications*

Omit flushing and sampling during heavy storm events with heavy runoff where flushing is not required and sampling would not provide meaningful results.

8.4.8 *Follow Up Activities*

If sewage has reached the storm drain system, the hydro/combo unit should be used to vacuum/pump out the catch basin. Flush the storm drain system with wash water and capture all residual wash water at a point of containment downstream.

In the event that an overflow occurs at night, inspect the location early on the following morning. The operator should look for any signs of sewage solids and sewage-related material that may warrant additional cleanup activities.

If the District sewer causes an overflow on a private property, restore flow and notify the Collection Systems Manager. The Collection Systems Manager will notify the Director of Recycling Operations and the Manager of Contracts Administration and Risk to determine if any immediate steps to rectify the issue are required. Provide the customer with the contact information for the Manager of Contracts Administration and Risk to make a claim, pending investigation.

8.5 *Traffic and Crowd Control*

Place barricades, cones, traffic arrow board, and caution tape as needed to keep vehicles and pedestrians away from contact with spilled sewage.

8.6 *Public Notification*

If an SSO affects a waterway or ocean requiring posting of signage, contact Orange County Public Works. Orange County Public Works will post and remove signage for waterways and beach closures as required and will not remove the signs until the effects of the spill have been mitigated.

Major spills may warrant broader public notice. The Collection Systems Manager and/or Director of Recycling Operations will contact the Director of Public Affairs or the Public Affairs Manager. Public Affairs will create and execute the outreach plan for media. If media crews show up at a job site the crews will ask media personnel to wait and will contact Public Affairs immediately. Do not respond to questions from the media or interview requests unless the Director of Public Affairs or the Public Affairs Manager provides direction and permission. The approval of the Public Affairs is required prior to contacting local media when significant areas may have been contaminated by sewage.

8.7 SSO Event Investigation

The objective of the SSO event investigation is to determine the cause of the SSO and to identify corrective action(s) needed that will reduce or eliminate potential for the SSO to recur.

The investigation includes reviewing all relevant data to determine appropriate corrective action(s) for the line segment. The investigation will be conducted by the Collection Systems Manager and/or Collection Systems Supervisor and reported to the Director of Recycling Operations or his/her designee.

The investigation should include:

- Reviewing and completing/correcting the Sanitary Sewer Overflow Report Form;
- Reviewing available photographs;
- Reviewing historical maintenance activities
- Conducting a CCTV inspection to determine the condition a portion of the line segment immediately following the SSO and reviewing the video and logs; and
- If FOG-related, reviewing the results of a FOG source control investigation
- Debrief with staff who responded to the spill.

The goal of the SSO event investigation is to determine the cause of the SSO event and to identify appropriate corrective actions. The District's standard practice is, at a minimum, to perform additional cleaning of the pipe containing the blockage that caused the SSO event along with the pipes immediately upstream and downstream.

8.8 SSO Categories

The California State Water Resources Control Board (SWRCB) has established guidelines for classifying and reporting SSOs. Reporting and documentation requirements vary based on the type of SSO.

Currently, there are three categories of SSOs as defined by the SWRCB¹:

- **Category 1** – Discharges of untreated or partially treated wastewater of any volume resulting from a sanitary sewer system failure or flow condition that:
 - Reach surface water and/or reach a drainage channel tributary to a surface water; or
 - Reach a Municipal Separate Storm System (MS4) and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain system discharges to a dedicated water or groundwater infiltration basin.

¹ State Water Resources Control Board Monitoring and Reporting Program No. 2006-0003-DWQ (as revised by Order No. WQ 20-0002.13-0058-.EXEC) Statewide General Waste Discharge Requirements for Sanitary Sewer Systems

- **Category 2** – Discharges of untreated or partially treated wastewater of 1,000 gallons or greater resulting from a sanitary sewer system failure or flow condition that do not reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.
- **Category 3** – All other discharges of untreated or partially treated wastewater resulting from a sanitary sewer system failure or flow condition.
- **Private Lateral Sewage Discharges** – Discharges of untreated or partially treated wastewater resulting from blockages or other problems within a privately owned sewer lateral connected to the sanitary sewer system or from private sewer assets.

8.9 SSO Documentation and Reporting

All SSOs should be thoroughly investigated and documented for use in managing the wastewater collection system and meeting established reporting requirements. The procedures for investigating and documenting SSOs are:

8.9.1 Internal SSO Reporting Procedures

The Collection Systems Primary Responder will fill out the Sanitary Sewer Overflow Field Report Form and turn it in to the Collection Systems Supervisor. Collection Systems management reviews and completes a draft of the report and will send a copy to Regulatory Compliance staff documenting all field activities. Regulatory Compliance staff is required to enter all required information into the State Water Resources Control Board (SWRCB) California Integrated Water Quality System (CIWQS) Online SSO Reporting System. The LRO certifies the SSO Report in CIWQS.

8.10 External SSO Reporting Procedures²

CIWQS is used for reporting SSO information to the SWRCB whenever possible. The procedures for external SSO notification and reporting, including contact information is contained within IRWD's Environmental Working Practice 6 (EWP-6) for Sanitary Sewer Overflow Notification and Reporting and is included in **Appendix C**. These procedures are consistent with the Monitoring and Reporting Requirements in the WDR.

² State Water Resources Control Board Monitoring and Reporting Program No. 2006-0003-DWQ (as revised by Order No. WQ 2013-0058-EXEC) Statewide General Waste Discharge Requirements for Sanitary Sewer Systems

8.10.1.1 No Spill Certification (Monthly)

If there are no SSOs during the calendar month, the Legally Responsible Official will submit and certify an electronic report that the District did not have any SSOs, **within 30 days after the end of each calendar month.**

8.10.2 Internal SSO Documentation

8.10.2.1 Category 1, 2, and 3 SSOs

Collection Systems management will complete the SSO Response Report form and provide a draft report to Regulatory Compliance. Collection Systems management will assemble all available documentation and review, complete, and submit an internal report of all available information to Regulatory Compliance staff via e-mail.

An electronic file for each individual SSO will be prepared. The electronic file should include the following information as available:

- Initial service call information;
- Spill Response Field Report;
- Volume estimate;
- Map showing the spill location;
- Photographs of spill location;
- CCTV inspection data, if applicable;
- Water quality sampling and test results, if applicable;
- SSO event investigation results; and
- Any other forms related to the SSO.

8.10.2.2 Private Lateral Sewage Discharges

Collection Systems management will complete the PLSD Response Report form and provide a draft report to Regulatory Compliance. Collection Systems management will assemble all available documentation and review, complete, and submit an internal report of all available information to Regulatory Compliance staff via e-mail.

A separate electronic file will be prepared for each individual PLSD. The file will include any relevant information from the above list.

8.10.3 External SSO Record Keeping Requirements³

The WDR requires that individual SSO records be maintained for a minimum of **five years** from the date of the SSO. This period may be extended when requested by a Regional Water Quality Control Board Executive Officer.

All records shall be made available for review upon State or Regional Water Board staff's request.

Records shall be retained for all SSOs, including but not limited to the following when applicable:

³ State Water Resources Control Board Monitoring and Reporting Program No. 2006-0003-DWQ (as revised by Order No. WQ 2013-0058-EXEC) Statewide General Waste Discharge Requirements for Sanitary Sewer Systems

- Any photos (if taken);
- SSO Response Report form;
- Steps that have been and will be taken to prevent the SSO from recurring and a schedule to implement those steps.

If water quality samples are required by the WDR, or if voluntary monitoring is conducted by the District, as a result of any SSO, records of monitoring information shall include:

- The date, exact place, and time of sampling or measurements;
- The individual(s) who performed the sampling or measurements;
- The date(s) analyses were performed;
- The individual(s) who performed the analyses;
- The analytical technique or method used; and
- The results of such analyses.

8.10.4 Post SSO Event Debriefing

As soon as possible after major SSO events, all of the participants, from the person who received the call to the last person to leave the site, should meet to review the procedures used and to discuss what worked and where improvements could be made in responding to and mitigating future SSO events.

8.11 Equipment

This section provides a list of specialized equipment that should be used to support this Sanitary Sewer Overflow Emergency Response Plan.

Camera -- A digital or disposable camera to record the conditions upon arrival, during clean up, and upon departure.

Closed Circuit Television (CCTV) Inspection Unit -- A CCTV Inspection Unit to determine the cause for all SSOs from gravity sewers. This equipment can be provided by a contractor.

Combination Sewer Cleaning Truck -- A combination high velocity sewer cleaning truck with vacuum tank to clear blockages in gravity sewers, vacuum spilled sewage, and wash down the impacted area following the SSO event.

Emergency Response Trailer -- A trailer to store and transport the equipment needed to effectively respond to sewer emergencies. The equipment and tools should include containment and clean up materials: sandbags, barricades, cones, caution tape, signs, rakes, drop-inlet mats, and plastic sheeting.

Portable Generators, Portable Pumps, Piping, and Hoses -- Portable equipment used to support this plan is available at the Operations Facility.

8.12 SSO Response Training

This section provides information on the training that is required to support this Overflow Emergency Response Plan.

8.12.1 Initial and Annual Refresher Training

All District personnel who may have a role in responding to, reporting, and/or mitigating a wastewater collection system overflow receive annual training on the contents of this OERP. All new employees receive training before they are placed in a position where they may have to respond.

8.12.2 SSO Training Record Keeping

The District maintains records for all OERP training provided in support of this plan. The records for all scheduled training courses and for each overflow emergency response training event include date, time, place, content, name of trainer(s), and names of attendees.

8.13 Contractors Working on District Sewer Facilities

All contractors working on District sewer facilities are required to develop an overflow response plan, which identifies who the contractor will contact at the District and any actions a contractor is required to perform in the event of an SSO.

Chapter 9 FOG Control Program

This section of the SSMP presents the District's Fats, Oils, and Grease (FOG) control program to reduce the amount of FOG discharged into the sanitary sewer system.

9.1 Regulatory Requirements

The Statewide General WDR for Wastewater Collection Agencies (Order No. 2006-003) requires the development of a FOG source control program to reduce the amount of FOG discharged to the sanitary sewer system. The requirement in the WDR is as follows:

FOG Control Program: *Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed, the Enrollee must provide justification for why it is not needed. If FOG is found to be a problem, the Enrollee must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. This plan shall include the following as appropriate:*

- (a) An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;*
- (b) A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;*
- (c) The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;*
- (d) Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;*
- (e) Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance;*
- (f) An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section; and*
- (g) Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.*

9.2 Nature and Extent of FOG Problem

The IRWD FOG Control Program is based on the findings of a FOG characterization study conducted in 2004, other studies with similar agencies, and the requirements of the WDR. The FOG characterization study was documented in the District's FOG Control Program Manual included in **Appendix F**. This program integrates various elements into the program to accomplish the goal of preventing SSOs. The key elements of the program include:

- A FOG Control ordinance;
- Sewer line maintenance activities associated with the FOG-related hot spots;
- An inspection process to minimize the discharge of FOG from Food Service Establishments (FSEs);

- An educational outreach program to minimize the discharge of FOG from multi-family housing and single-family homes; and,
- Orange County Sanitation District's (OCS D) Waste Discharge Pretreatment and Source Control Program for discharge of FOG from industry.

These elements are accomplished through a variety of program-related activities including:

- FSE inspections
- SSO follow-up and enforcement actions
- Plan review for grease control device requirements for new FSEs
- Residential outreach and education
- Mapping and program database utilization
- Follow-up to collection system staff observations

9.3 Legal Authority to Support FOG Source Control Program

The District's legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG is included in Section 7.11 of the District's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service. **Table 9-1** summarizes the legal authorities related to FOG source control and references the relevant section of the District's Rules and Regulations that establishes these authorities.

Table 9-1: Summary of IRWD's FOG Legal Authorities

FOG Legal Authority	Section of IRWD's Rules and Regulations
FOG Discharge Prohibition	7.11.3.1
Food Service Establishment Prohibitions	7.11.3.2
Requirement for FOG Wastewater Discharge Permit	7.11.3.3
Requirements for Implementation of FOG Best Management Practices	7.11.3.4
Requirement to Install, Operate, and Maintain Grease Removal Equipment	7.11.4
Grease Interceptor and Grease Trap Requirements	7.11.6.8 & 7.11.6.9
Authority to Require Monitoring, Reporting, Inspection, and Sampling for FOG Source Control Compliance	7.11.7
Record-Keeping Requirements	7.11.7.2
Authority to Perform Inspection and Sampling	7.11.7.4
Enforcement	7.6 & 7.11.8

9.3.1 FOG Discharge Prohibition

Section 7.11.3.1 of the District's Rules and Regulations prohibits a Food Service Establishment (FSE) from discharging FOG that may accumulate and/or cause or contribute to blockages in either IRWD's sewer system or sewer system lateral connecting the FSE to IRWD's sewer system.

9.3.2 Food Service Establishment Prohibitions

Section 7.11.3.2 of the District's Rules and Regulations applies the following prohibition to all FSEs:

1. Installation of food grinders is prohibited. This includes a requirement to remove existing food grinders.
2. Use of additives to emulsify FOG is prohibited.
3. Disposal of waste cooking oil into drainage pipes is prohibited.
4. Discharge of wastewater from dishwashers to any grease removal equipment is prohibited.
5. Discharge of wastewater with temperatures in excess of 140 degrees F to any grease removal equipment is prohibited.
6. Use of any biological additives for grease remediation or as a supplement to grease removal equipment maintenance is prohibited.
7. Discharge of wastes from toilets, urinals, and other fixtures containing fecal materials to sewer lines connected to grease removal equipment is prohibited.
8. Discharges of any waste including FOG and solid material removed from grease removal equipment to the sewer system is prohibited.
9. Diluting discharge as a substitute for treatment is prohibited.

9.3.3 Authority to Identify Measures to Prevent SSOs and Blockages Caused by FOG

The District has both incorporated measures to prevent SSOs and blockages caused by FOG into the District's Rules and Regulations and has the authority to identify additional measures as deemed necessary. The District's Rules and Regulations require the following measures to prevent SSOs and blockages caused by FOG:

1. Implementation of Best Management Practices to minimize discharge of FOG (Section 7.11.3.4)
2. Requirement to install a grease removal device (Section 7.11.4)
3. Requirement for grease removal equipment maintenance (Section 7.11.6.3)

9.3.4 Authority to Inspect FSEs and Enforce FOG Regulations

Section 7.11.7.4 of the District's Rules and Regulations provides the District with the authority to perform inspection and sampling at FSEs and Section 7.11.8 provides authority to enforce provisions of the Fats, Oils, and Grease Control program.

9.4 FOG Pretreatment Requirements

9.4.1 Requirements to Install Grease Removal Equipment

Pursuant to Section 7.11.4 of the District's Rules and Regulations, FSEs are required to install, operate and maintain approved type and adequately sized grease interceptors. The implementation of this FOG regulation includes:

1. All new construction of FSEs after December 30, 2004 are required to install grease interceptors prior to commencing discharges of wastewater to the sewer system as identified through the FSE FOG Plan Review Process.
2. Existing FSEs determined to be the cause or contributor of FOG related blockages or SSOs are required to install grease interceptors within 180 days of identification.
3. Existing FSEs undergoing remodeling or a change in operations or ownership are required to install grease interceptors as identified through the FSE FOG Plan Review Process.

The District's FOG regulation provides the District with the flexibility to grant a variance from grease interceptor requirements to allow alternative pretreatment technology if the installation of a grease interceptor is not practicable. The District also has the ability to grant a conditional waiver from installation of a grease interceptor if the FSE is determined to have negligible FOG discharge and insignificant impact to the sewer system.

9.4.2 Design Standards for Removal Devices

The District's FOG regulation requires grease removal equipment sizing and installation to conform to the current edition of the California Plumbing Code and also requires grease removal equipment to be constructed and located in accordance with the requirements and criteria set forth in the FOG Control Program. The District's Fats, Oils, and Grease (FOG) Control Program Manual, dated December 15, 2004, documents the current approach utilized by the FOG Control Program Manager to size grease interceptors.

The District's FOG Control Program Manager reviews and approves the sizing and installation of grease removal devices. The design and sizing is based on the current version of the California Plumbing Code Section 1014.3. The FOG Control Program Manager will also consider the potential for large grease interceptors to become septic and may compare the California Plumbing Code sizing against other sizing formulas and use best judgment based on other factors (e.g. FSE cooking equipment, menu, frequency of use of drainage fixture units) to determine the final size of the interceptor.

The FOG Control Program Manual also requires the floor of an interceptor to be shallow enough to allow for proper cleaning and an individual interceptor not to be larger than 3,000 gallons for most installations. FSEs with very large flows may be required to install multiple interceptors. Finally, an FSE calculation of 375 to 750 gallons is required to install a 750 gallon interceptor.

9.4.3 Maintenance Requirements for Grease Removal Equipment

The District's general FOG Wastewater Discharge Permit requires FSEs to perform grease removal equipment maintenance as frequently as is necessary to ensure FOG and/or solids in the device does not exceed 25 percent of the capacity of the equipment. Typically, the maintenance frequency required is quarterly, yet is no less frequent than once every six months. If FSE inspections identify non-compliance with the District's FOG regulation, the FOG Control Program Manager may require an FSE to perform more frequent maintenance.

9.4.4 Best Management Practice Requirements

The District's general FOG Wastewater Discharge Permit requires the implementation of the following Best Management Practices:

- Installation of drain screens
- Segregation and collection of waste cooking oils
- Disposal of food waste into trash or garbage, and not into sinks

- Employee training
- Kitchen signage

9.4.5 Recordkeeping and Reporting Requirements

The District's general FOG Wastewater Discharge Permit requires FSEs to conform with the following record keeping and notification requirements:

- Record Keeping requirements
 - Logbook of employee training
 - Records of spills and/or cleaning of the lateral or sewer system
 - Logbook of grease control equipment cleaning activities
 - Copies of grease control equipment records or waste hauling manifests
 - Records of sampling data and height monitoring of FOG and solid accumulation in the interceptor
- Notification requirements
 - Notification of a spill
 - Notification regarding planned changes

9.5 FOG Preventive Maintenance

The District employs preventive maintenance as a means to address areas prone to FOG accumulation in the system. The District has identified areas in the sewer system with FOG issues through a combination of maintenance crew knowledge, past grease-related SSOs and stoppages, CCTV inspection data, and the FOG characterization study performed in 2004. Staff maintains a database of all of the FSEs within the District. The District will continue to adjust the sewer cleaning frequency of pipes to address the FOG issue while optimizing the amount of sewer cleaning performed. The District employs the methods outlined in Chapter 4 – Operations and Maintenance Program to optimize its preventive maintenance activities.

The District also has an on-going CCTV inspection program that will continue search for sewer pipes with FOG issues. In addition, sewer cleaning crews record the type and severity of material found during cleaning activities and the District utilizes this information to identify new areas with FOG issues and to adjust sewer cleaning frequencies as described in Section 6.3.

9.6 FOG Source Control

The District performs several types of FSE inspections to ensure FSEs comply with FOG regulations and FOG Control Program requirements. **Table 9-2** lists the different types of inspection performed by the District.

Table 9-2: Types of FOG Source Control Inspection Performed by IRWD

Inspection Type	Description
Initial Inspections	These inspections are conducted to identify and classify each FSEs potential to generate FOG and its potential to discharge the FOG to the sanitary sewer system. If not adequately controlled, this FOG can lead to sewer blockages and, potentially, SSOs. The inspection identifies the type of food, equipment, and kitchen practices that contribute to FOG discharges and the equipment (e.g., grease interceptors, grease traps) that may reduce the discharge of FOG to the sewer. These initial inspections also provide the opportunity to educate the FSEs on the impact of their grease discharges, what they can do to minimize grease discharges, and how the District's FOG regulations could potential impact them.
Best Management Practices Inspection	These inspections are conducted to evaluate compliance with the facility's best management practices requirements.
Grease Removal Equipment Inspections	These inspections are conducted to evaluate compliance with the facility's grease removal equipment requirements.
Compliance Inspections	These inspections are conducted where it is determined by the FOG Control Program Manager that a follow-up inspection is required for a Non-Compliance issue that has been identified in previous BMP, GRE, or FOG source sewer pipe inspections.
Enforcement Inspections	These inspection are conducted when elevated enforcement of the Permit requirements are required or when the revocation of the FSEs grease interceptor installation Conditional Waiver, Waiver or Variance is required.

The District focuses inspections on FSEs in the vicinity and upstream of areas in the sewer system with known FOG issues and on FSEs identified as having a greater potential to generate FOG and discharge FOG to the sewer system. FSE inspections are conducted approximately once every two years and more frequently for FSEs with greater potential to discharge grease to the sewer system.

9.7 FOG Control Program Enforcement

The District has developed an enforcement response guideline to respond to Non-Compliance issues identified during the inspection process. The District bases the enforcement response on the severity of the non-compliance and the history of non-compliance at the FSE. The enforcement response follows a tiered approach consisting of three tiers: Notice of Non-Compliance, Notice of Violation, and Assessment of Penalties. **Table 9-3** lists the levels of enforcement response.

Table 9-3: Levels of FSE Enforcement Response

Tier	Enforcement Trigger
Tier 1 – Notice of Non-Compliance	A Tier 1 enforcement response is typically utilized for isolated deficiencies that are not serious non-compliance issues. No enforcement action is taken after correction of the deficiency. For example, a single BMP non-compliance finding would result in a Tier 1 enforcement response.
Tier 2 – Notice of Violation	A Tier 2 enforcement response is triggered due to the severity of non-compliance, an FSE that is non-responsive to previous requirements, or an FSE that remains in non-compliance beyond required timelines. This level of enforcement is triggered by multiple deficiencies identified in an inspection. An example of a serious non-compliance issue would be a deficiency in grease removal equipment maintenance or functionality. Another example is when a grease discharge from an FSE directly identified as the cause of a SSO or blockage event.
Tier 3 – Assessment of Penalties	Similar to Tier 2, a Tier 3 enforcement response is triggered due to the severity of non-compliance, an FSE that is non-responsive to previous requirements, or an FSE that remains in non-compliance beyond required timelines. A Tier 3 enforcement response is rare and is utilized by the District as a last resort to generate FSE compliance. This level consists of assessment of non-compliance fees; increased assessment of fees; revocation of FSE's Conditional Waiver requiring installation of a grease interceptor; and the potential loss of the FSE's right to discharge wastewater to the sewer system.

The District has an appeals process for FSEs to appeal the decisions of the FOG Control Program Manager or General Manager. A hearing is conducted and the FSE will be given the opportunity to present information supporting the FSE's position. A FSE affected by a Notice of Violation from an inspector or by the action or determination of the FOG Control Program Manager may file a request for a hearing with the General Manager. The General Manager will conduct a hearing with the FSE, review the facts, and make a determination concerning the appeal. An FSE affected by the action or determination of the General Manager may file a request for appeal hearing with the Board of Directors who will review the facts and make a determination.

9.8 FOG Program Staffing

FOG Control Program staffing consists of a combination of District staff and contractor staff. The District employs a part-time FOG Control Program Manager, along with two additional staff members in the Regulatory Compliance Department (Total of 0.75 FTEs). The FOG Control Program Manager and applicable staff are responsible for management of the following activities:

- FOG Control Program implementation, performance monitoring, and reporting
- FSE inspections
- FSE compliance follow-up
- FOG Control Program enforcement

- FOG Control Program education, outreach and customer support
- Grease removal device plan review and processing
- FOG Control Program variance and waiver evaluation and processing

The District utilizes a contractor to perform FSE inspections, issue Notice of Violation letters, and to perform compliance follow-up inspections. District staff perform FOG Control Program enforcement activities if the contractor determines compliance is not achieved at the time of the compliance follow-up inspection. The District also dedicates a portion of the District's sewer cleaning crews to FOG-related preventive maintenance activities.

9.9 FOG Disposal Facilities

Grease hauling companies serving the Irvine area as of March 2018 are shown in Table 9-4, and FOG disposal facilities serving the Irvine area as of March 2018 are shown in the following lists.

Table 9-4: Grease Hauling Companies Serving Orange County

Company	Phone Number
Ameriguard Maintenance Services	(800) 347-7876 x14
JR Grease Traps and Interceptor Service	(714) 739-4628
New Leaf Biofuel	(619) 236-8500
One More Time	(323) 268-2801
SMC Grease Specialist	(951) 788-6042
Superior Service Recycling	(714) 502-0240

FOG disposal facilities serving the Irvine area as of March 2018 are shown in **Table 9-5**. The primary grease drop off location is Orange County Sanitation District's Plant No. 1.

Table 9-5: Grease Rendering/Drop Off Points for Irvine Area

Company	Address	Phone Number	Type of Operation
Baker Commodities, Inc.	4020 Bandini Blvd Los Angeles, CA (Vernon, CA)	(323) 269-6177 or (800) 427-0696	Grease recycler. Drop off location and grease trap cleaning/hauling.
Darling International	10441 Stanford Ave Garden Grove, CA	(714) 556-7867	Drop off location and grease trap cleaning/hauling.
OCC Recycling	2701 Fairview Road Costa Mesa, CA	(714) 432-5131	Used cooking oil only
One More Time	4144 Bandini Blvd Los Angeles, CA (Vernon, CA)	(323) 268-2801	Used cooking oil only
Orange County Sanitation District, Plant No. 1	10844 Ellis Avenue, Fountain Valley, CA 92708	(714) 593-7428	Primary grease drop off point for grease haulers serving IRWD.
Southwest Processors	4120 Bandini Blvd Los Angeles, CA (Vernon, CA)	(800) 900-3366	Grease recycler. Drop off location and grease trap cleaning/hauling.

The District will update the list bi-annually based on the findings of the biennial SSMP Audit. The number and close proximity of the disposal sites is adequate to handle liquid wastes expected to be removed from current and future grease removal equipment within the District.

9.10 FOG Public Education Outreach

The District utilizes education as the primary method for controlling the discharge of FOG to the sewer system from multi-family housing and single-family homes. The District provides educational information concerning FOG in the District's Quarterly Newsletter at least once annually. In addition, the District mails FOG education brochures with utility bills on an annual basis to educate District customers.

The District conducts more frequent mailing of FOG brochures for areas identified as potential upstream sources of FOG in the sewer system. Additionally, the District provides FOG brochures and educational material to multi-family housing for posting in common areas.

9.11 Industrial Discharger FOG Control

The District utilizes the Orange County Sanitation District's (OCSD) source control program to regulate wastewater discharges from Industrial users into the District's sewer collection system. The District will coordinate with OCSD for regulation and enforcement of industrial dischargers for any FOG related discharges identified by the District.

Chapter 10 System Evaluation and Capacity Assurance Plan

10.1 Regulatory Requirements

The District shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:

- (a) **Evaluation:** *Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events;*
- (b) **Design Criteria:** *Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria; and*
- (c) **Capacity Enhancement Measures:** *The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The capital improvement plan shall include an implementation schedule and shall identify sources of funding.*
- (d) **Schedule:** *The District shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a) - (c) above. This schedule shall be reviewed and updated consistent with the SSMP review and update requirements in Section D. 14.*

10.2 Background

The District performs capacity assurance planning for both the trunk sewers as well as for sewer pipelines within smaller planning areas. The District performed capacity assurance planning for the trunk sewers in March 2017. The results were documented in the 2017 Sewer Collection System Master Plan included in **Appendix G**. The District also prepares water, sewer, and reclaimed water facility planning studies, also known as a Sub-Area Master Plans (SAMP), on areas after a developer has generated a specific plan of development with a planning area. An example of a SAMP is included in **Appendix G**. The District has not experienced any capacity-related sewer overflows.

10.3 Capacity Evaluation

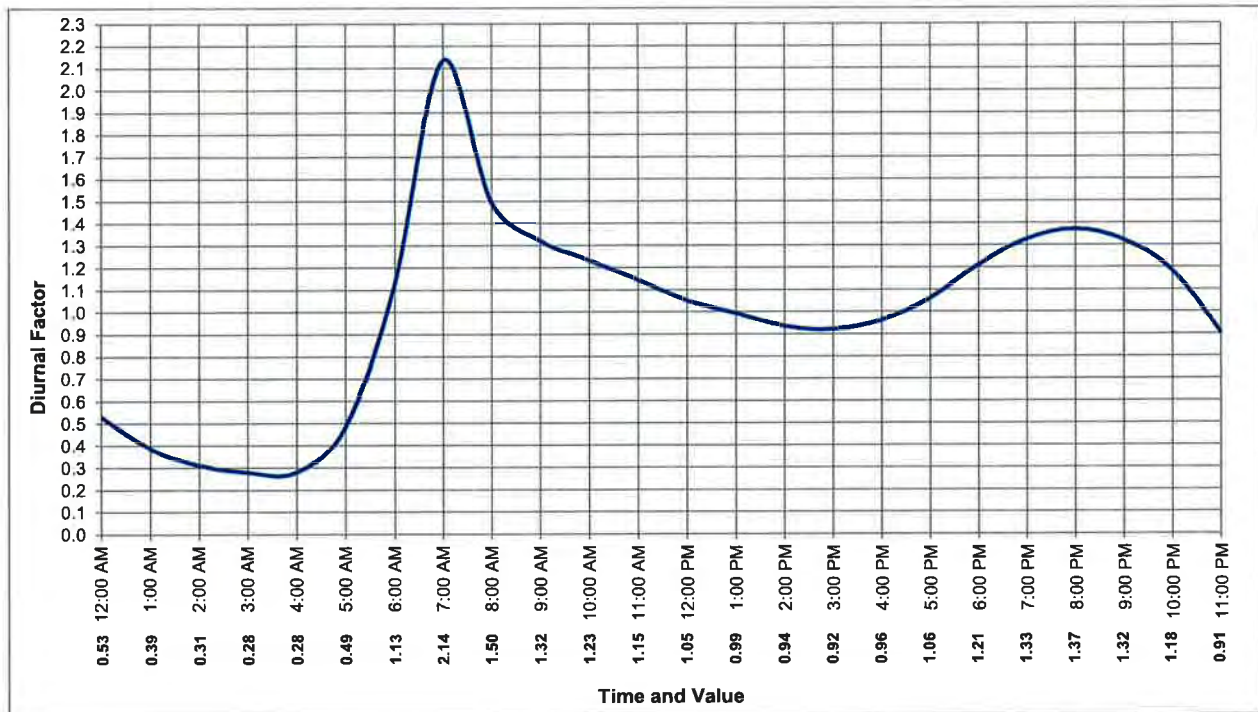
One of the primary objectives of the Sewer Collection System Master Plan, developed by the District and AKM Consulting Engineers in March 2017, was to determine the available capacity of the collection system and to identify any deficiencies resulting from those system capacities. To accomplish this objective, the District created a hydraulic model of the collection system. The hydraulic model is composed of both the physical characteristics of the system and the flows the District estimates will be conveyed by the system. Analyses were performed to determine the water demand and sewage flow generation factors for representative land uses throughout the District's service area. This analysis was documented in a Water Demand and Flow Generation Factor Study, which includes the procedures used to calculate water demands and sewage flow generation factors as well as the results of those analyses.

Hourly variations in wastewater flows are an important part of determining the hydraulic capacity of the sewer collection system. The District's Flow Measurement Program characterized the flow volumes per

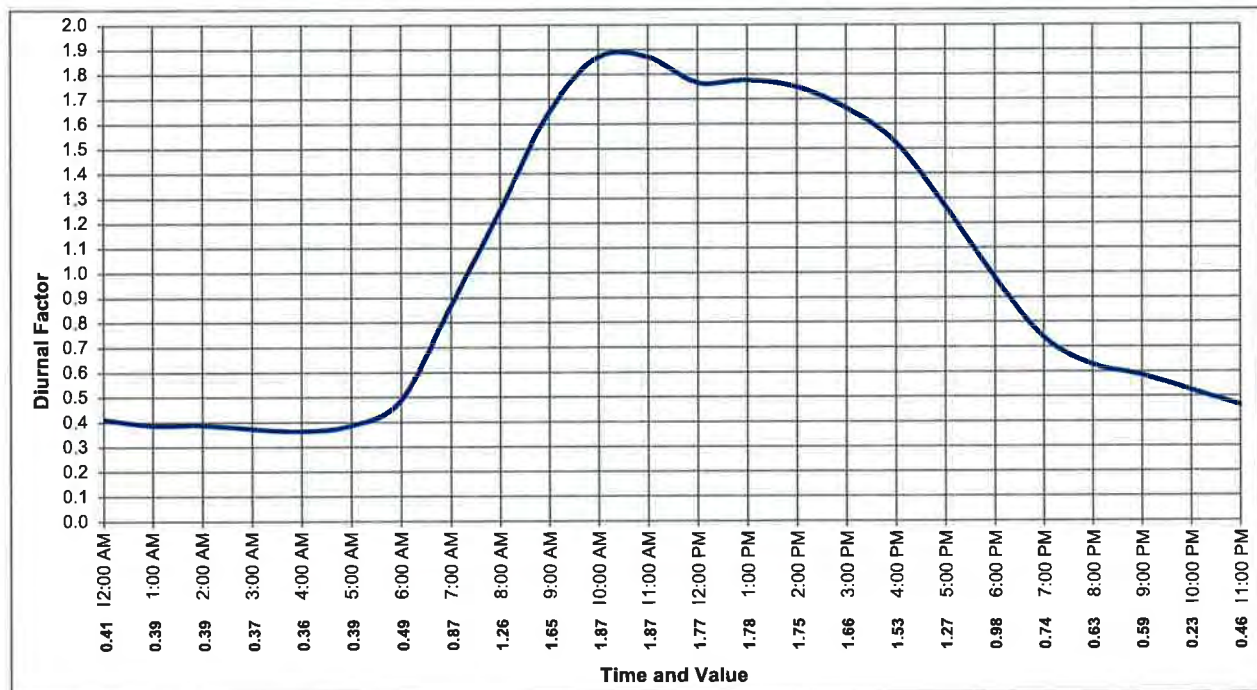
land use and this information was used to define the hourly flow variations for residential and non-residential land use types.

Under the first phase of the flow measurement program, a number of flow measurement devices (monitors) were installed throughout the collection system. These devices were positioned to measure flow from generally homogenous land use areas. Each device sampled the flow rate within the sewer system on a five-minute interval. For each measurement site, hourly average flow rates were used to define the diurnal pattern of the actual flow in the system. Hourly peak flow factors were calculated to allow comparison of the flow measurement results between drainage basins with different flow volumes. Hourly peak flow factors are calculated by dividing the average hourly flow rate by the average daily flow rate. **Figure 10-1** and **Figure 10-2** show the observed diurnal curves for residential and non-residential flows. These flow patterns are documented in Section 4 of the Sewer Collection System Master Plan.

Figure 10-1: Residential Diurnal Curve⁴



⁴ Figure 4-1, Sewer Collection System Master Plan, March 2017, AKM

Figure 10-2: Commercial Diurnal Curve⁵

In June 2012, the District's Sewer System Management Plan Program Audit included an audit finding indicating the District's current planning criteria of accounting for inflow/infiltration (I/I) using conservative depth over diameter (d/D) ratios may be inadequate for areas with high levels of I/I. In November 2012, the District performed a preliminary I/I study from data collected at selected lift stations between January 1, 2010 and March 31, 2012. The study concluded that normalized volumetric RDII responses from the evaluated tributary basins are considered moderate. Furthermore, RDII peak factors associated with the Canada, Coastal Ridge and Coyote lift stations suggest that peak flows leading to the wet wells of those stations were likely significant during the two large, system-stressing storms evaluated. Based on the results of this preliminary evaluation, the District plans on performing additional analysis during the next Sewer Master Plan project to determine if a change to the planning criteria for accounting for I/I is needed in areas with high levels of I/I.

10.4 Design and Performance Criteria

Section 4 of the Sewer Collection System Master Plan documents the District's design and performance criteria for gravity pipelines including the allowable sewer main slope, peaking factors, and minimum depth. Section 4 also includes performance criteria for force mains, sewer pump stations, and siphons.

10.4.1 Gravity Mains

The District requires design flows for residential sewer mains to be calculated based on the flow generation factors presented in Table 4-4 of the Sewer Collection System Master Plan according to the most appropriate land use category. The District encompasses a variety of land use types: residential and non-residential. The District requires Residential and Commercial/Industrial flow design criteria to be calculated by the design engineer based on projected generation rates for the specific commercial or industrial development. Peak dry weather design flows for sewer mains are to be designed to maintain a

⁵ Figure 4-2, Sewer Collection System Master Plan, March 2017, AKM

specific depth (d) to diameter (D) ratio, based on the selected diameter of the pipeline as shown in Table 10-1.

Table 10-1: d/D Performance Criteria for Gravity Sewer Pipes⁶

	Peak Dry Weather Flow d/D		
	Diameter < 15"	Diameter = 15"	Diameter > 15"
Priority 1	> 82%	> 82%	> 82%
Priority 2	75% - 82%	75% - 82%	75% - 82%
Priority 3	67% - 75%	67% - 75%	-
Priority 4	50% - 67%	-	-
Design Requirement	≤50%	≤67%	≤75%

Maintenance of specific d/D ratios under peak dry weather flow conditions provides sufficient pipeline capacity to accommodate wet weather flow, including infiltration, inflow and other storm related water, over and above the actual wastewater. This additional headspace also provides a margin of safety for variations in flow estimation. The overall intent is to provide a factor of safety within the pipeline for wet weather and other unexpected flows.

Design criteria establish a means of selecting a pipeline size and vertical slope that provides the required capacity and flushing velocity for projected flows and the available head space above the water surface for potential unexpected peak flows above normal projected conditions. Such instances of peak flows exceeding design conditions may occur during rain events where any number of potential avenues of water conveyance may allow rain water into the sewer collection system. Groundwater is another potential source of defect flow that may contribute to overall Inflow and Infiltration (I&I) that can occur during the life span of a pipeline segment. Excessive I&I within a collection system will increase the risk of sanitary sewer overflows.

The design criteria for gravity pipelines provides for an industry standard margin of safety from sanitary sewer overflows by dedicating the remaining head space (air space above the water level) for unexpected I&I situations. Once in operation for a long period of time, if a pipeline operates with a peak flow higher than the design criteria, it is not necessarily a trigger for upsizing the pipeline segment capacity. This is particularly relevant for areas that have already reached their ultimate build-out condition and do not expect any further increase in flows.

The District's Sewer Collection System Master Plan included gravity pipeline performance criteria to provide a means to prioritize existing pipeline segments experiencing flows above design standards. As shown in Table 10-1 above, a ranking system of one to four was created for different pipe size categories

⁶ Table 4-6, Sewer Collection System Master Plan, March 2017, AKM

and d/D ratio ranges to evaluate the performance of pipelines and focus on segments presenting the highest risk of flowing at full capacity.

Sewer mains are required to be designed and constructed to provide mean velocities as described in Section 4-2 of the District's Procedural Guidelines and General Design Requirements⁷ at the design depth defined in Table 10-1 above. Table 4-7 of the Sewer Collection System Master Plan documents the design criteria for allowable sewer main slope.

The adequacy of a sewer collection system is based upon its ability to convey the peak flows. District sewer mains are required to be designed and sized using peak flow conditions, determined by multiplying average flow conditions by a peaking factor. The capacity of the sewer collection system was validated by developing a calibrated hydraulic modeling and verifying with field observations. The methodology described below provides a representative understanding of the hydraulic modeling analysis supports the SSMP: The average base loads were established to match the flow monitoring and SCADA data at various lift stations, treatment plants, and 65 temporary sewer flow monitors. The average flows routing the tributary areas were loaded in the hydraulic model for over a 24-hour period. The instantaneous model flows are generated from the average flow conditions and the corresponding hourly diurnal patterns. Section 6-9 of 2016 Sewer Collection System Hydraulic Model Manual included the diurnal patterns for residential, commercial, and specific customers developed for the peak dry weather scenario simulations. Once the model was calibrated, the system was analyzed and verified for adequate capacity.

Additionally, developments containing more than 400 dwelling units are required to provide the District with a Sub-Area Master Plan (SAMP). The SAMP includes an analysis of the proposed sewer system using a computerized hydraulic model, a complete description of the facilities to be constructed, maps, and computations providing the design criteria meeting the requirements of the Sewer System Guidelines. The Sewer Collection System Master Plan incorporates the information provided by SAMPs where appropriate and available.

10.4.2 Force Mains

Section 4-10 of the IRWD Procedural Guidelines and General Design Requirements documents the design and performance criteria for force mains.

10.4.3 Sewer Pump Stations

Pump stations design and performance criteria included in the Sewer Collection System Master Plan conforms to Section 4-13 of the District's Procedural Guidelines and General Design Requirements.

10.4.4 Siphons

Section 4-8 of the Sewer Collection System Master Plan documents performance criteria utilized in evaluating the existing siphons. Final criteria for ultimate upgrades will be at the discretion of IRWD and addressed during the design phase of the project. Siphons are only used when specifically approved by the District Engineer, and after all other design options have been investigated.

10.5 Reliability and Redundancy

The District performed a system reliability and redundancy analysis documented in Section 7 of Sewer Collection System Master Plan. As part of the Sewer Collection System Master Plan update in 2016, a Criticality based Reliability and Redundancy analysis of the gravity system pipes, siphon, force mains, and

⁷ [https://www.irwd.com/images/pdf/doing-business/engineering/Procedural Guidelines and General Design Requirements - July 2016 Final.pdf](https://www.irwd.com/images/pdf/doing-business/engineering/Procedural_Guidelines_and_General_Design_Requirements_-_July_2016_Final.pdf)

lift stations was conducted. The analysis utilized the existing closed circuit television (CCTV) inspection data, the developed hydraulic model data, as well as other elements deemed of importance to the analysis.

InfoMaster, an ArcGIS based asset integrity management and capital planning software package, was utilized to conduct the analysis. It is a tool that assists in characterizing the likelihood and consequence of failure for individual pipes in the network. IRWD's CCTV inspection data and hydraulic analysis data were used by the InfoMaster software to assist in the analysis. InfoMaster relates the combination of both Likelihood of Failure and Consequence of Failure to risk. Risk takes into account the asset's physical condition, as well as the impact that its failure would have on system performance and stakeholders.

10.5.1 Gravity Pipe Risk Analysis

The resulting gravity system risk profile and recommended action items are included in Section 7-2 of Sewer Collection System Master Plan. A decision tree shown in Figure 7-4 of Sewer Collection System Master Plan is used to determine the action items related to each gravity pipe.

10.5.2 Siphon Risk Analysis

The siphon risk analysis was conducted along with the gravity main pipes. Because of the fact that siphons for the most part flow under pressure, and have a d/D greater than 0.75, all siphons are classified in the "Extreme Risk" or "High Risk" category. The list of siphons and their risk profile is shown in Table 7-2 of Sewer Collection System Master Plan.

10.5.3 Force Main Risk Analysis

In the Force Main Risk Analysis, the overall Likelihood of Failure and Consequence of Failure scores are calculated as a weighted average of all individual Likelihood of Failure and Consequence of Failure scores. Each of the Likelihood of Failure and Consequence of Failure elements are assigned different weighting factors depending on the goals and priorities of IRWD. The detail of risk analysis for force main is included in Section 7-5 of Sewer Collection System Master Plan.

10.5.4 Lift Station Risk Analysis

The weighted Scores for all Likelihood of Failure and Consequence of Failure Elements for Lift Station are shown in Table 7-5 of Sewer Collection System Master Plan. The Condition Grade is weighted heavily because it is based on actual observations made during the field visits of each lift station. Proximity to Major Waterways and Rate of Flow are weighted heavily because in the event of a spill, these lift stations would have the most impact on the community and the environment. Based on the Likelihood of Failure and Consequence of Failure scores and weightings, the resulting Lift Station Risk Profile is shown in Table 7-6 of Sewer Collection System Master Plan.

10.6 Capacity Enhancement, Reliability, and Redundancy Measures

Table 10-1 documents the priority of the pipe segments experiencing flows above the design standard d/D. Using the Performance Criteria, Plate 4 of Sewer Collection System Master Plan developed recommended action items from the risk analysis conducted on gravity pipes. IRWD conducts on-going maintenance and rehabilitation efforts for capacity enhancement, reliability, and redundancy measures. IRWD performs CCTV inspections on the sewer collection system and takes necessary steps to maintain and rehabilitate the gravity and force main sewer pipe. Since 2014, IRWD rehabilitated approximately 7,500 LF of 8-inch, 10-inch, 12-inch, and 15-inch sewer pipe with Cure-in-Place (CIP) Lining. In addition to CIP pipe lining, sewer pipe rehabilitation projects involve sewer line cleaning, additional CCTV inspections, mechanical root removal process, Calcium removal, and spot repairs.

Tables 7-2 and 7-4 of Sewer Collection System Master Plan provided the risk profile of Siphons and Lift Stations. In addition to the scored based risk assessment, IRWD performed condition assessment of the facilities to prioritize the rehabilitation projects. The IRWD goal is to rehabilitate one Siphon and one Lift Station annually to meet the capacity enhancement and improve reliability and redundancy measures.

IRWD's capital budget included several on-going capacity, reliability, and redundancy projects including:

- Michelson Force Main Rehabilitation Project – This project will install CIP Pipe Lining on approximately 3,400 LF of force main sewer pipe.
- Newport Coast Lift Station Rehabilitation Project – This project rehabilitates CIP Pipe Lining on approximately 3,000 LF of force main sewer pipe and installs a new portion of epoxy-lined Ductile Iron Pipe that connects the rehabilitated force main to the lift station drywell
- Sewer Siphon Rehabilitation – This project uses the results from the Criticality analysis and implements the identified rehabilitation.
- Sewer System Calcium Removal – As discussed earlier, the routine sewer line cleaning and inspections identify areas for calcium removal, this project implements this maintenance task.
- Sewer Line Repairs – This project is an on-going annual project put in place for, previously unidentified, sewer repairs.

Chapter 11 Monitoring, Measurement, and Program Modifications

This section of the SSMP presents the District's approach to Monitoring, Measurement, and Program Modifications.

11.1 Regulatory Requirements

The requirements for the Monitoring, Measurement, and Program Modifications element of the SSMP are that the District shall:

- (a) *Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities;*
- (b) *Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP;*
- (c) *Assess the success of the preventative maintenance program;*
- (d) *Update program elements, as appropriate, based on monitoring or performance evaluations; and*
- (e) *Identify and illustrate SSO trends, including: frequency, location, and volume.*

11.2 Performance Measures

The District utilizes data captured in the District's geographical information system (GIS), computerized maintenance management system (CMMS), and the State Water Resources Control Board's California Integrated Water Quality System (CIWQS) SSO database to monitor and measure the performance of the SSMP and SSMP implementation. The District monitors sewer overflow performance to accomplish the following:

- Establish and prioritize appropriate SSMP activities
- Monitor the implementation and effectiveness of the SSMP
- Assess the success of the preventative maintenance program
- Identify and illustrate SSO trends including frequency, volume, and location

The District's computerized maintenance management system contains information on the effectiveness of preventative maintenance activities and allows for historical review of pipeline work order history to adjust maintenance and repair priorities. The District also performs a failure cause analysis of all individual sewer overflow events and, based on this review, identifies corrective actions to SSMP program elements as appropriate.

11.3 Performance Monitoring and Program Changes

The District will evaluate the performance of its wastewater collection system at least annually using the performance measures identified in **Table 11-1**. The District will update the data and analysis of performance measures at the time of the evaluation. The District may use other performance measures in its evaluation.

Table 11-1: Performance Metrics for Monitoring and Measurement

Type	Performance Measure	Source
System Statistics	Total miles of gravity sewer	GIS
	Total miles of pressure sewer	GIS
	Total number of sewage pumping stations	GIS
Measures Based on SSO Number	Total number and percentage of SSOs by Category	CIWQS
	Number and percentage of dry weather versus wet weather SSOs	CIWQS
	Number of SSOs by cause:	CIWQS
	Number of SSOs per 100 miles of sewer per year	CIWQS
	Number of locations with more than one SSO in the past year	CIWQS
Measures Based on SSO Volume	Volume of SSOs per 100 miles per Year	CIWQS
	Number and percentage of SSOs by Size Class	CIWQS
	Total volume of SSOs	CIWQS
	Mean and median SSO volume	CIWQS
	Total SSO volume recovered and percentage of overall total SSO volume	CIWQS
	Net volume of SSOs (total minus recovered) and percentage of overall total SSO volume	CIWQS
	Total volume reaching storm drainage channel and not recovered or reaching surface waters and percentage of overall total SSO volume	CIWQS
SSO Response Time	Average response time during business hours	CIWQS
	Average response time outside of business hours	CIWQS
Maintenance Program	Number of blockages in the past year by cause	CMMS
	Planned cleaning (LF)	CMMS
	Planned cleaning versus goal (LF) – Gap analysis	CMMS
	Planned CCTV inspection (LF)	CMMS
	Planned CCTV inspection versus goal (LF) – Gap analysis	CMMS

11.4 SSMP Updates

The District will update its SSMP at least every five years and will complete the next update on or before August of 2023. The District will determine the need to update its SSMP prior to a 5-year update based on the results of the biennial audit and the performance of its sanitary sewer system.

District staff will seek approval from the District Board for any significant changes to the SSMP. The authority for approval of minor changes such as employee names, contact information, or minor procedural changes is delegated to the Director of Recycling Operations. Copies of the current SSMP document will be available to all interested parties on the District's website.

Chapter 12 SSMP Program Audits

This section of the SSMP presents the process the District will follow to audit its SSMP and related programs.

12.1 Regulatory Requirements

As part of the SSMP, IRWD shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the District's compliance with the SSMP requirements identified in this subsection (D.13 of the WDR), including identification of any deficiencies in the SSMP and steps to correct them.

12.2 SSMP Audits

The District will audit its SSMP every two years. Table 12-1 shows the schedule for future SSMP Program Audits. The SSMP Program Audit will determine whether the SSMP meets the current requirements of the WDR, whether the SSMP reflects the District's current practices, and whether the District is following the SSMP. The audit will be conducted by a team consisting of District staff. At the District's discretion, a consultant may be retained to perform all or part of the audit process in cooperation with District staff. The results of the audit will be included in the SSMP Audit Report.

Table 12-1: SSMP Program Audit Schedule

SSMP Program Audit Schedule
May 2, 2020

The SSMP Audit Report will focus on the effectiveness of the SSMP program, compliance with the WDR requirements, and identification of any deficiencies in the SSMP. The SSMP Audit Report will identify revisions that may be needed for a more effective program. Information collected as part of Chapter 11 – Monitoring, Measurement, and Program Modifications will be used in preparing the audit. The District will retain copies of the bi-annual Audit Reports for five years and will be available to the State Board upon request. A summary of the results from the District's 2016 SSMP Program Audit is included in **Appendix H**.

Chapter 13 Communication Program

This section of the SSMP is intended to outline the process involved in communicating with interested members of the public regarding the development, implementation, and performance of this plan.

13.1 Regulatory Requirements for the Communication Program

The Enrollee shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.

The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

13.2 Communication with Public

The District communicates on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system provides the public the opportunity to provide input to the District's SSMP and SSMP implementation. This communication occurs in the form of notices in the newsletter and on the District web site. Public comments are accepted at all monthly District Board meetings and the Districts will evaluate public input, when provided, and will address as appropriate.

The District's Board of Directors is presented a report of sewer spills volume and location as a part of the quarterly dashboard report of strategic measures during Board meetings. This information is available to the public in the monthly agenda and Board packets available on the internet. These quarterly sewer overflow performance reports are the primary means for the District to communicate the on-going performance of the SSMP and SSMP implementation to the public. District Board Meetings are open to the public with agendas posted on the District website prior to the meeting.

Table 13-1 lists the various strategies the District employs to communicate with the public on the development, implementation, and performance of the District's SSMP.

Table 13-1: Strategies for Communication with Public on SSMP Development, Implementation and Performance

Subject Matter	Strategy	Description	Frequency
SSMP Development	Website	SSMP presented to the Board for approval. The document is available for public review prior to the Board meeting. The public can provide input and comments to the Board at any Board meeting.	During and after development of SSMP update
SSMP Implementation	Website	District has a webpage dedicated to the collection system. The page includes a link to the District's SSMP and contact information for who to call with any questions regarding SSMP content, implementation, and performance.	Always available on District webpage
SSO Emergency Response	Website	IRWD website has Emergency and CodeRED button on homepage. Emergency and CodeRED webpage has contact information for who to call in case of an emergency.	Always available on District webpage
Fats, Oils, and Grease Best Practices	Website	IRWD website has a webpage providing the public with information relating to FOG control best practices.	Always available on District webpage
SSMP Performance	Board Meeting	Monthly report on sewer overflow performance included with Strategic Measures.	Monthly at Board Meetings
SSMP Performance	CIWQS Website	Sewer overflow performance information is available to the public on the State Water Resources Control Board (SWRCB) California Integrated Water Quality System (CIWQS). Go to https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportSSOServlet?reportAction=criteria&reportId=sso_main . Type in "Irvine Ranch" in the "Enter a sanitary sewer agency name" field. Click on "Generate Report" button.	Always available on internet

13.3 Communication with Tributary and/or Satellite Systems

The District's wastewater collection system serves the City of Irvine, Lake Forest, as well as parts of Tustin, Newport Beach, Foothill Ranch, Costa Mesa, and unincorporated areas of Orange County. These areas are within the District service area and are not considered tributary or satellite system.

IRWD does accept a small quantity of wastewater into its sewer system from the University of California, Irvine (UCI), which is located within IRWD's service boundaries. UCI has provided the District with a copy of the SSMP for the UCI sewer system. The District has communicated to UCI the commitment to provide mutual assistance in the event of a sewer overflow, if UCI requests support. The IRWD sewer system has adequate capacity to convey the minor flows it accepts from UCI. IRWD does not currently have a formal agreement with UCI regarding discharge of wastewater into the District's collection system.

There is a small amount of wastewater generated in the City of Newport Beach and Irvine that is collected by trunk sewers owned, operated, and maintained by the IRWD, then discharged into sewers owned and maintained by the Orange County Sanitation District (OCSD). The District communicates with the City of Newport Beach and OCSD through quarterly Orange County Waste Discharge Requirements Steering Committee and general meetings.