

AGENDA
IRVINE RANCH WATER DISTRICT
ENGINEERING AND OPERATIONS COMMITTEE
TUESDAY, NOVEMBER 21, 2017

CALL TO ORDER 7:00 a.m., IRWD's Operations Center, First Floor Committee Room,
3512 Michelson, Irvine Ranch Water District

ATTENDANCE Committee Chair: Douglas Reinhart _____
Committee Member – Steve LaMar _____

<u>ALSO PRESENT</u>	Paul Cook _____	Patrick Sheilds _____	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 _____	Bruce Newell _____	_____
	_____	_____	_____

COMMUNICATIONS

1. Notes: Burton
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. IRWD EMERGENCY OPERATIONS PLAN REVISION AND UPDATE – ZUNIGA/RONEY

Recommendation: Receive and file.

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

Recommendation: Receive and file.

INFORMATION - Continued

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

Recommendation: Receive and file.

8. POLYPHAGOUS SHOT HOLE BORER UPDATE – SWIFT/ZAPEDA/
SHEILDS

Recommendation: Receive and file.

9. MICHELSON WATER RECYCLING PLANT BIOSOLIDS AND
ENERGY RECOVERY FACILITIES CONSTRUCTION STATUS
QUARTERLY REPORT – MALLOY/BURTON

Recommendation: Receive and file.

ACTION

10. MICHELSON WATER RECYCLING PLANT BIOSOLIDS AND
ENERGY RECOVERY FACILITIES VARIANCES AND BUDGET
INCREASE – MALLOY/BURTON

Recommendation: That the Board authorize the General Manager to execute Variance No. 7 with Black & Veatch in the amount of \$3,190,018 for supplemental contract administration, construction phase, and start-up and commissioning services; authorize the General Manager to execute Variance No. 2 with Arcadis, Inc. in the amount of \$1,451,173 for supplemental construction inspection, construction management, and document control system services; authorize the General Manager to execute Variance No. 3 with HDR Engineering, Inc. in the amount of \$576,739.28 for supplemental construction inspection; authorize the General Manager to execute Variance No. 2 with EI&C Engineering, Inc. in the amount of \$958,720 for supplemental process control system construction management services, start-up testing, and development of process control system operation manuals and associated training presentations; and authorize a budget increase in the amount of \$11,500,000, from \$216,073,100 to \$227,573,100, to the FY 2017-18 Capital Budget for the Michelson Water Recycling Plant Biosolids and Energy Recovery Facilities, project 04286.

OTHER BUSINESS

11. A. Directors Comments

B. 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 Operation's 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.

November 21, 2017

Prepared by: Emilyn Zuniga

Submitted by: Jenny Roney

Approved by: Paul A. Cook



ENGINEERING AND OPERATIONS COMMITTEE

IRWD EMERGENCY OPERATIONS PLAN REVISION AND UPDATE

SUMMARY:

In February 2017, staff began the process to revise and update IRWD's Emergency Operations Plan (EOP). The purpose of the EOP, last updated in 2006, is to provide an understandable, actionable, and implementable reference plan for responding to emergencies of both natural and man-made hazards and risks. The update will apply current national, state, and local guidelines and standards including the National Incident Management System, Incident Command System and Standardized Emergency Management System to guide the revisions, updates and improvements. This will ensure that IRWD's EOP plan is aligned with the emergency plans of the cities, counties, water agencies surrounding the District's service area as well as the Water Emergency Response Organization of Orange County (WEROC) and the Orange County Sheriff's Department Operational Area. Staff and consultant Claris Strategy will review the updated EOP with the Committee.

BACKGROUND:

Beginning in April 2017, Phase I of the EOP Revision and Update project began with the District's consultant, Claris Strategy, and IRWD staff conducting information-gathering sessions with the District's management team and other key emergency response staff. During these meetings the project goals, scope, schedule and work plan were reviewed with all participants. The initial stage of the project also included site visits to evaluate the emergency response issues present at critical District facilities. The primary purpose of the first phase was to collect information from participants regarding the function of each department and the roles and responsibilities needed to be fulfilled during emergency operation events. This phase is now complete.

Phase II of the EOP Revision and Update project began in the first week of November 2017 and focuses on analyzing the information gathered from Phase I, and evaluating and defining how the District will operate during an emergency relative to staff, District processes, technology and facility operations. This is being accomplished through review with an EOP subcommittee comprised of the key emergency response staff members who will likely be called to action during an emergency. Once the concepts for the EOP revisions and updates are approved by the EOP subcommittee, the EOP will be drafted to include all of the information gathered in Phase I and Phase II.

The final EOP will reflect the District's mission, strategic objectives, and goals along with its current organizational structure. It will also describe the roles and responsibilities of the District's emergency responders both in the field and in the Emergency Operations Center including the Board of Directors, Executive Staff, Public Information, Administration and Planning. Also included in the EOP will be guidelines for activation of the emergency response plan, implementation of the crisis communication plan, emergency response processes for

specific sites and facilities, mutual aid activation, demobilization of emergency responders and post-event assessments.

Once the revised and updated EOP is complete in February 2018, it will be presented to senior management for final approval. Following approval, Phase III will begin in April 2018 consisting of an extensive training process for all District staff. This process will include review of the EOP and explanation of roles and responsibilities in the event of an emergency. Also included in Phase III will be practical Emergency Operations Center (EOC) activation and operation drills, and exercises to ensure that all staff fully understands their roles in the District's emergency response process. Following the initial Phase III training program, the District's Safety and Security office will maintain a schedule of ongoing training and periodic EOP plan review and updates to maintain a high level of emergency response readiness for IRWD, its customers, and the surrounding areas.

FISCAL IMPACTS:

The Safety and Security Department will continue to utilize funds from the approved budget for these services.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

None.

November 21, 2017

Prepared by: M. Cortez/E. Akiyoshi/

K. Lew/S. Malloy/R. Mori

Submitted by: K. Burton *KB*

Approved by: Paul A. Cook *PAC*

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 Planning	Start Design	Construction Award	Construction Final Acceptance
Michelson Force Main Rehabilitation			Winter 2018	
Re-establish SMH on Main Street, e/o MacArthur			Winter 2018	
Rockfield Flow Control Facility			Winter 2018	
Victor Access to SMH on Berm at MWRP			Winter 2018	
UCI Cooling Tower RW Conversion Offsite Pipeline Phase 2				Winter 2018
DRWF Surge Tanks				Spring 2018
Recycled Water Storage Filtration Study	Fall 2017			
MWRP FPS 2 Pipeline Manifold Replacement				Winter 2018
Michelson Campus Security, Phase 1 Fencing			Fall 2017	Winter 2018
2017 Sewer Line Repairs and Rehabilitation			Fall 2017	Winter 2018
SGU Sewer Connection			Winter 2018	
Derian Avenue and Lake Forest Sewer Upsizing		Fall 2017		
Vault Lid Replacement			Winter 2018	
Culver Drive 8-in RW Pipe Rehabilitation		Fall 2017	Spring 2018	
Laguna Canyon Road RW Pipeline Corrosion Repair			Winter 2018	
Turtle Ridge DW, RW Pipeline Rehabilitation			Winter 2018	
Seawatch RW Pipeline Replacement			Winter 2018	
University Drive Widening Appurtenance Relocations (RA w/ Irvine)			Winter 2018	
Santiago Dam Outlet Tower Replacement		Fall 2017		
Dam Failure Emergency Action Plans and Inundation Maps		Fall 2017		
MWRP Repairs: Act Sludge, Secondary Tanks, RAS/WAS			Fall 2017	
Wells 2, 17, & 52 Rehabilitation			Winter 2018	Spring 2018
IIC East Zone A-B BPS Upgrades			Spring 2018	
Zone 1 Reservoir No. 2			Spring 2018	
Eastwood Pump Station: Zone A-B BPS and Zone A-C BPS			Spring 2018	
ILP North Conversion - Pipelines				Fall 2018
A-B and A-C BPS Offsite Pipelines and ILP Bottom Drains			Spring 2018	
Northwood A-B PS Demolition and Rattlesnake PS Rebuild	Winter 2018			
ILP North Conversion - Reservoir				Winter 2019
Water Recycling Plant Master Plan Update	Winter 2018			
IDF Sodium Hypochlorite Storage and Feed System				Fall 2017
PDF Sodium Hypochlorite Storage and Feed System		Fall 2017		
Energy Storage Systems				Fall 2018
PA 51 Reach A Phase II Sewer Improvements		Fall 2017		
Santiago Canyon Area Distribution System Study		Winter 2018		
Syphon Reservoir Improvements		Spring 2018		
Newport Coast SLS and SFM Improvements				Fall 2018
MWRP Biosolids and Energy Recovery Facilities				Fall 2018
PA 1, Orchard Hills Neighborhood 1 RW (RA w/ICDC)				Winter 2018
PA 1, Orchard Hills Neighborhood 3 RW (RA w/ICDC)				Winter 2018
PA 1, Orchard Hills Neighborhood 3 DW and RW (RA w/ICDC)				Winter 2018
PA 1, Orchard Hills Neighborhood 3 "F" Street RW (RA w/ICDC)				Spring 2018
PA 6, Neighborhood 3, Phase 1 RW (RA w/ICDC)				Winter 2018
PA 6, Neighborhood 4B RW (RA w/ICDC)				Winter 2018
PA 6, Neighborhood 5A RW (RA w/ICDC)				Winter 2018
PA 6, Neighborhood 5B and C RW (RA w/ICDC)				Winter 2019
Technology Drive Extension Zone B RW (RA w/ICDC)				Winter 2018
Tustin Legacy, Moffett at Peters Canyon Channel DW, RW (RA w/Tustin)				Winter 2018
Tustin Legacy, Flight Drive RW (RA w/Tustin)				Spring 2018
Tustin Legacy, Moffett Dr and Legacy DW, RW (RA w/Tustin)				Fall 2018

IRWD UPCOMING PROJECTS STATUS REPORT

Project Name	Start Planning	Start Design	Construction Award	Construction Final Acceptance
PA 18 South, Hidden Canyon DW RW (RA w/Toll Brothers)				Winter 2018
PA 51, Marine Way DW, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Ridge Valley, Marine to Trabuco, DW, S (RA w/Heritage Fields)				Winter 2018
PA 51, C St from Trabuco Rd to LQ St, S (RA w/Heritage Fields)				Winter 2018
PA 51, LQ St from Ridge Valley to LY St, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, LN St from C St to LY St, DW, RW (RA w/Heritage Fields)				Winter 2018
PA 51, South C St and LY St, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, LY St from LQ St to Irvine Blvd, DW S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Alton Pkwy from Technology to Muirlands, DW S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Marine Way from Barranca Pkwy to Alton Pkwy, DW S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Cadence from Bosque to Z Street, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Alton Interceptor Sewer (RA w/Heritage Fields)				Winter 2018
PA 51, Marine Way from Alton to Barranca Sewer (RA w/Heritage Fields)				Winter 2018
PA 51, Sociable from Z St to B St, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Irvine Blvd from Lambert Rd to Z St, DW, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Benchmark and Prospective, DW, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, GP1 St DW, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, GP2 St, DW, S, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Benchmark DW, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Cultivate Sewer (RA w/Heritage Fields)				Winter 2018
PA 51, Benchmark and Modjeska DW, RW (RA w/Heritage Fields)				Winter 2018
PA 51, Magnet from Ridge Valley to Bosque RW (RA w/Heritage Fields)				Winter 2018
PA 51, Irvine Boulevard at Merit RW (RA w/Heritage Fields)				Winter 2018
PA 51, Episode from Frame to Pusan RW (RA w/Heritage Fields)				Winter 2018
PA 51, District 7, Z St and A St RW (RA w/Heritage Fields)				Winter 2018
PA 51, District 5, Irvine Blvd DW, RW Conn (RA w/Heritage Fields)				Winter 2018
PA 51, Cadence Sewer (RA w/Heritage Fields)				Summer 2018
PA 51, District 5, Chinon DW, S, RW (RA w/Heritage Fields)				Summer 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
Spectrum Center Drive 36" Sewer Relocation (RA w/ICDC)				Fall 2017
Serrano Summit Phase 2 Sewer				Winter 2019
Serrano Summit Phase 2 DW, RW				Winter 2019
Engineering OBIEE Upgrades	Fall 2017			
MWRP to Santa Ana River Feasibility Analysis	In-Process			
PA 51 District 1 West and Cultural Terrace SAMP Addendum	Fall 2017			
Phase I Regional Improvement District Split Update	Spring 2018			
Phase I Groundwater Workplan Update	Winter 2018			
Update Comprehensive Non-Potable Hydraulic Model	In-Process			
Potable Reuse Alternatives Analysis	In-Process			
Update to Replacement Planning Model, Phase 1	In-Process			
Lake Forest Zone C Study	In-Process			
			Category	Months
			Winter	Jan. Feb. & Mar.
			Spring	Apr. May & June
			Summer	Jul. Aug. & Sep.
			Fall	Oct. Nov. & Dec.

November 21, 2017

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	The draft final report was received at the end of September and technical comments were forwarded to WRRF project manager in the middle of October. Project may be extended if additional research request is approved.
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	Dec-17	Staff attended the expert workshop held November 10 - 11, 2015 at West Basin MWD. This project is currently idle.
3	Brine/Concentrate Recovery Technologies Assessment	Preliminary assessment of membrane brine/concentrate recovery technologies for potential application at IRWD membrane facilities.	Spangenberg	IRWD	Literature review, field inspections, meetings with vendors and public agencies, unit treatment cost gathering, and performance data.	Staff Time	May-16	Jan-18	Staff is revising technology recovery levels and cost estimates after receiving membrane consultants comments on draft report. Awaiting cost information on several technologies to check assumptions and cost estimates.
4	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	Nov-18	Project is going through contractual phase prior to kick off of project.

November 21, 2017

Prepared by: I. Swift / J. Zepeda

Submitted by: P. Sheilds

Approved by: Paul A. Cook 

ENGINEERING AND OPERATIONS COMMITTEE

POLYPHAGOUS SHOT HOLE BORER UPDATE

SUMMARY:

The Polyphagous Shot Hole Borer (PSHB) infestation in the San Joaquin Marsh has caused considerable damage, dieback, and mortality to a majority of tree species, and has the potential to completely reshape the physical structure, health, and ecosystem in the Marsh. Staff will present an analysis and assessment of the current damage, and propose mitigation measures to allow a smooth transition from the current tree species composition to one that would not likely be affected by PSHB.

BACKGROUND:

In 2010, infestations of healthy trees from an unknown bark beetle began to appear in the Descanso Gardens area of Los Angeles County. Today, the beetle has been identified as a new species known as the PSHB. The PSHB vectors a virulent (and unknown) fungus that causes weepy wounds in the main trunk and limbs of many species of trees, both native and ornamental. The fungus is quite harmful to trees, killing or causing dieback to over 80% of infected individuals. In April of last year, UC Irvine reported an infestation of over 800 trees (which are removed and chipped), while Mason County Park has several hundred infected trees. The Irvine area appears to be a major infestation point for PSHB in Orange County.

The PSHB has been identified at Rattlesnake Reservoir, Newport Coast Lift Station, several Natural Treatment System wetlands, and most seriously at the San Joaquin Marsh, where thousands of trees have been infested. To date, no treatment is known, but researchers at UC Riverside have begun investigations into this damaging pest using the Marsh as a primary study site. Last year, UCI hosted a symposium on PSHB, and District staff reported on the infestation within IRWD's service area and facilities.

To assess the impacts of PSHB in the San Joaquin Marsh, staff developed a model using satellite imagery from the U.S. Department of Agriculture and Geographical Information Systems software. The model incorporates imagery data to build a classification of major land cover types in the Marsh such as trees, shrubs and grasses, and bare ground. This allows for the quantification of these land cover types, which can then be monitored over time. The results of the analysis show the Marsh has lost 25.3% of its tree cover from 2010 to 2016, while gaining 60.1% shrub/grass cover and 64.2% bare ground over the same time period, which is illustrated in Exhibit "A". The results indicate that PSHB has caused significant tree mortality over the past several years, allowing shrubs and grasses to fill in the areas.

FISCAL IMPACTS:

Re-vegetation of the San Joaquin Marsh will require additional funding in the future.

ENVIRONMENTAL COMPLIANCE:

None.

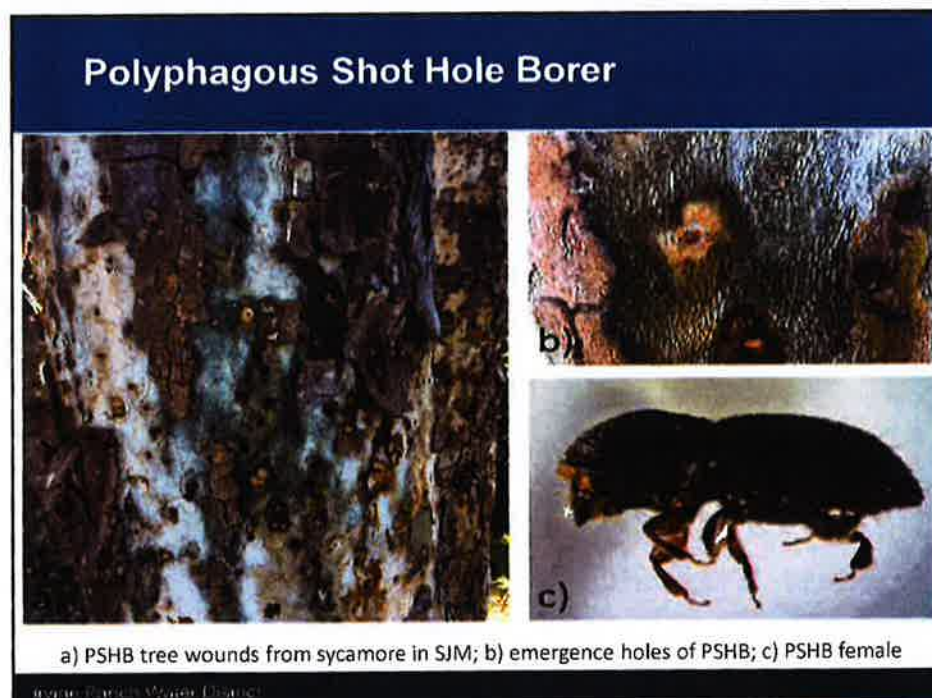
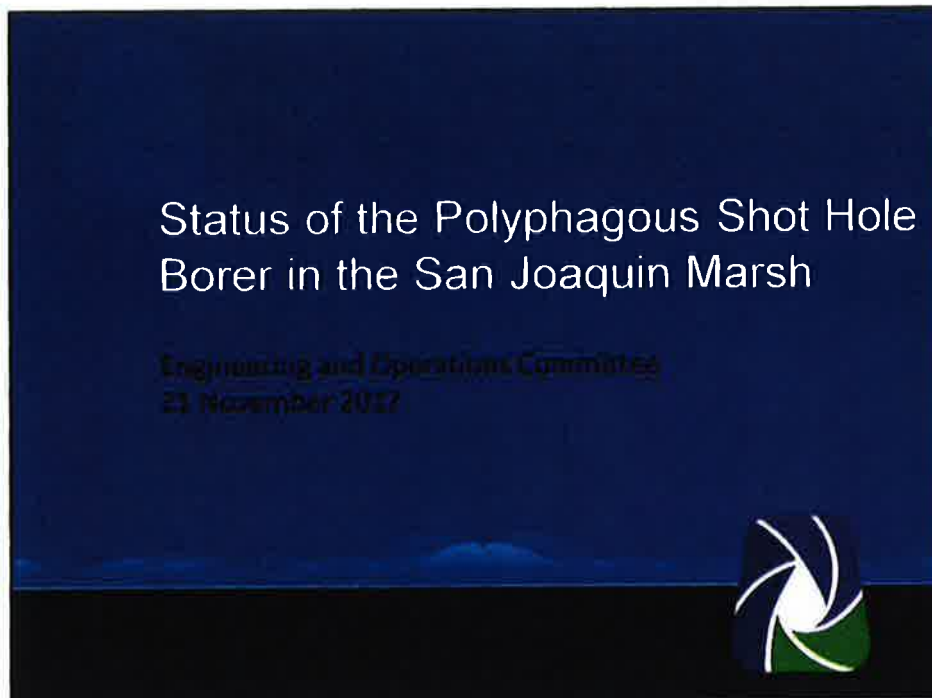
RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – PSHB Update Slides

EXHIBIT "A"



San Joaquin Marsh



NAIP Imagery

- The National Agriculture Imagery Program (NAIP) by the USDA
- ~1 meter/pixel imagery taken annually
- 4 bands of spectral resolution: Red, Green, Blue, and Near Infrared (NIR)

Visible Spectrum



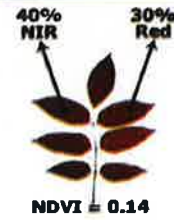
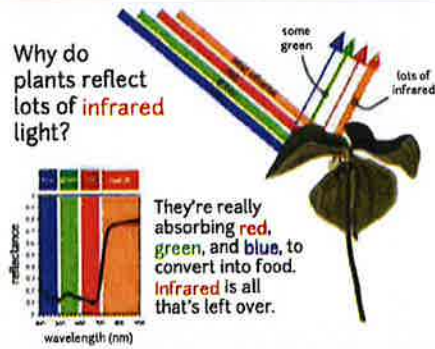
False Color Infrared



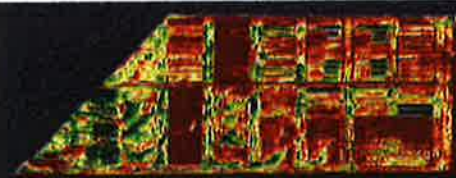
Irvine Ranch Water District

4

What is NDVI



$$\text{NDVI} = \frac{\text{NIR} - \text{Red}}{\text{NIR} + \text{Red}}$$



Irvine Ranch Water District

Results 2010



Irvine Ranch Water District

Results 2016

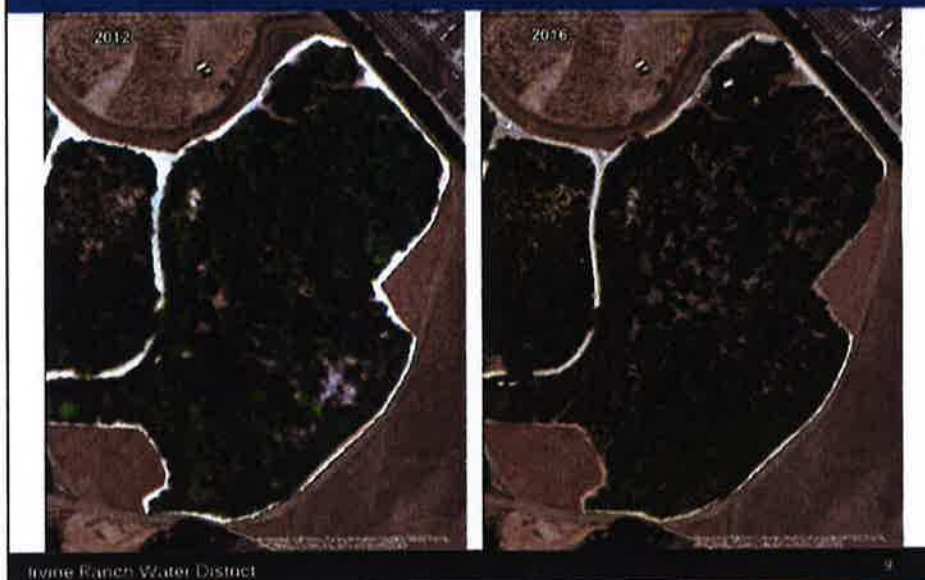


Land Cover Changes in the SJM

<u>Land Cover</u>	<u>2010</u> acres	<u>2016</u> acres	<u>2010 - 2016</u> % Change
Trees	90.5	67.5	-25.3%
Grass/Shrubs	36.1	57.8	60.1%
Dirt/Bare Ground	20.0	19.5	-2.7%
Deciduous Drought/ Dead Vegetation	3.6	5.9	64.2%

Irvine Ranch Water District

Visible Imagery Change 2012-2016



Next Steps: Mitigating Impacts of PSHB

- Using trees inoculated with endophytes (fungi and bacteria living within plant tissues) that are known to inhibit establishment of PSHB
- Use non-woody species (not yet known to be susceptible to PSHB)
- Outreach to Sea & Sage, public, and others

November 21, 2017

Prepared by: S. Malloy

Submitted by: K. Burton 

Approved by: Paul A. Cook 

ENGINEERING AND OPERATIONS COMMITTEE

MICHELSON WATER RECYCLING PLANT BIOSOLIDS AND ENERGY RECOVERY FACILITIES CONSTRUCTION STATUS QUARTERLY REPORT

SUMMARY:

This item is the August 2017 to October 2017 quarterly construction status report for the Michelson Water Recycling Plant (MWRP) Biosolids and Energy Recovery Facilities.

BACKGROUND:

Construction of the Biosolids project was awarded to Filanc/Balfour-Beatty Joint Venture (FBB) in March 2013 in the amount of \$163,465,940. The Biosolids project will provide biosolids digestion, dewatering, energy production, and on-site sludge drying. The project includes excavation for subsurface structures; installation of foundation piles; three egg-shaped methane digesters; a state-of-the-art odor control system; a biogas conditioning system and power generation using micro-turbines; a fats, oil and grease (FOG) receiving station; and new utility services. These facilities are being constructed on the land north of IRWD's existing Operations Center, maintenance shops, water quality laboratory, and warehouse.

General Project Information:

The project summary through October 31, 2017 and through Contract Change Order No. 65 is shown below.

Notice of Award	April 29, 2013
Contractual Project Completion Date	October 31, 2017
Estimated Project Completion Date	June 2019
Cumulative Time Extension through Change Order No. 65	368 Days
Percentage of Contractual Construction Time Elapsed	100%
Approximate Percentage of Total Contract Amount Invoiced	93%
Bid Amount	\$163,465,940
<u>Total Change Orders</u>	<u>\$ 17,335,535 (10.6%)</u>
Total Contract Amount	\$180,801,475

Construction Status:

Solids Handling Building: The Solids Handling Building structure has been completed. The majority of the roof has been installed. The decorative external veneer masonry has been completed and most of the green architectural veneer has been installed around the perimeter of the building. Internal piping systems for sludge processing, utility water, roof drainage, odor

control, and fire protection are being installed. Additionally, the HVAC system and electrical equipment are being installed at various locations of the building.

Major pieces of equipment installed in the Solids Handling Building include:

- Bulk polymer tanks;
- Sludge screens;
- Polymer aging tanks;
- Thickening centrifuges feed pumps;
- Thickening centrifuges;
- Digester feed pumps;
- Dewatering centrifuges;
- Centrate aeration blowers;
- Sludge dryer furnace and drum;
- 5-ton and 10-ton bridge cranes;
- Cake storage hopper;
- Odor control fans;
- Acid scrubber; and
- Centrifuge variable frequency drives.

West of the Solids Handling Building: Mechanical and electrical work has been completed on the stormwater pump station. Grating and guardrail have been installed for the four bulk polymer storage tanks.

North of the Solids Handling Building: The Centrate Treatment facility structure has been completed as well as interior piping, slide gates, and guardrail. Electrical wiring is being completed. The microturbines have been bolted in place on the microturbine slab and the heat recovery units are placed. Several large pieces of electrical equipment, including switchgear, transformers, secondary breakers, and the stand-by generator, have been installed. The enclosed gas burner (flare) has been installed.

East of the Solids Handling Building: The odor control system is completed including the liquid chemical storage facility, the three odor scrubber towers, and the odor scrubber piping system. FBB has installed the regenerative thermal oxidizer, chemical pumps, odor control fiberglass piping, and light poles. The digester sludge holding tank was painted green.

Egg-shaped Methane Digester Area: On the east side of the biosolids site, CB&I, the subcontractor for the egg-shaped digesters, completed the digester work in January 2016. PCI applied the foam insulation on the exterior of the methane digesters. The bridges to the top of the digesters have been installed. The contractor has begun installing the green architectural veneer on the outside of Methane Digesters Nos. 1 and 2.

Acid Phase Digester Area: FBB has completed the major concrete work, and Parada Painting has completed the interior coating of the acid phase digesters. FBB installed the mixers, handrail, and the inter-connecting bridges between the three acid phase digesters.

Digester Control Building: The building structure has been completed and electrical work is ongoing. Roofing installation has begun on the Digester Control Building. Masonry veneer has been installed on the outside of the building, and the masonry block for the elevator tower to the top of the egg-shaped digesters is completed. The heat exchangers, acid phase sludge transfer pumps, acid phase sludge recirculation pumps, the methane phase sludge recycle pumps and various piping systems have been installed in the basement. Heating water pumps have been installed and the two boilers are in place on the first floor. Air handling units were installed on the mezzanine level.

South of the Digester Control Building: The sludge holding tanks, mixers, interior protective coatings, and the interior and exterior piping in both tanks have been completed. Various pumps, valves, and piping have been installed in the basement of the Dewatering Feed Pump Station. FBB installed the steel cladding of the Dewatering Feed Pump Station stair tower. At the FOG receiving station all of the equipment, piping and electrical was installed. The FOG tanks have successfully completed the leakage tests.

FBB has been constructing the curb and gutter around the Biosolids site and is preparing sub-base for the new roads. Base and pavement will start this month.

Schedule Status:

Milestone No. 1 facilities (Waste Activated Sludge and Primary Sludge Pumping and Sludge Screening Facilities) were completed in October 2016. The new SCADA programmers are fully engaged and have begun bench testing programs for Milestone No. 2. The start-up of facilities associated with Milestone No. 2 are scheduled to begin in spring 2018.

FBB's construction manager has been submitting construction schedules in a timely manner since April 2017; however, the content appears to focus on items for which FBB holds IRWD responsible as justification for the overall completion schedule to slip from 20 days to 30 days with each monthly update. The construction management team has observed that work is accomplished at a very slow rate, inappropriately small equipment is being used that extends task durations, field crews do not have adequate materials on site to complete their work, and FBB is not efficiently coordinating work by its subcontractors and suppliers. FBB's most recent schedule for October 2017 indicates that the project completion date is May 2019, but this is based on very optimistic start-up and testing of the remaining milestones of the project in late 2018.

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit “A” – MWRP Biosolids and Energy Recovery Facilities Quarterly Report

EXHIBIT "A"

Michelson Water Recycling Plant Biosolids and Energy Recovery Facilities

Construction Status Quarterly Report – November 2017
(Activities from August 2017 through October 2017)

Engineering & Operations Committee
November 21, 2017



November 2017 Quarterly Report

Key Information / Dates

■ Contractor:	Filanc/Balfour-Beatty
■ Contract Amount:	\$163,465,940
■ Change Orders to Date (Thru CCO 65)	<u>\$ 17,335,535</u> (10.6%)
■ Revised Contract Amount to Date:	\$180,801,475
■ Contractual Calendar Days:	1,646
■ Additional Days thru Change Orders:	368
■ Notice of Award:	April 29, 2013
■ Time Elapsed thru October 2017:	100%
■ Contractual Completion Date:	October 31, 2017

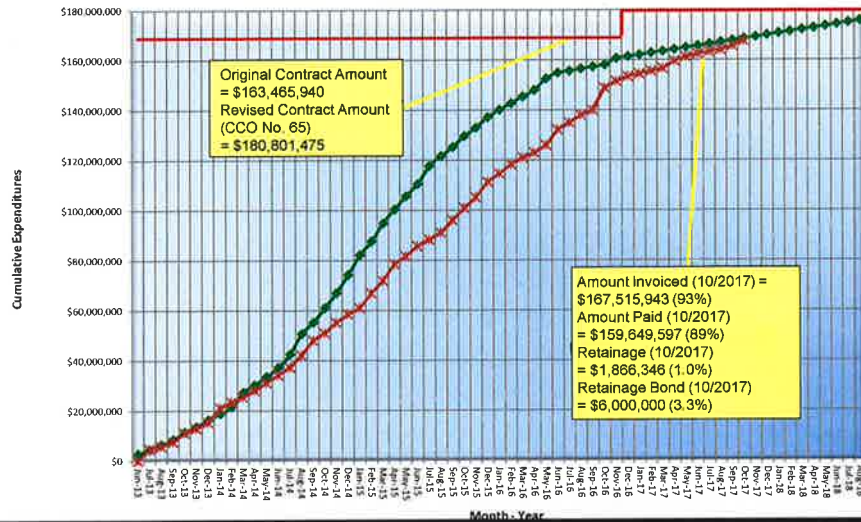
Irvine Ranch Water District



Irvine Ranch
WATER DISTRICT

November 2017 Quarterly Report

Financial - FBB Cumulative Expenditures



Irvine Ranch Water District

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November 2017 Quarterly Report

Financial – Consultant Construction Phase Services

Consultant	Scope	Purchase Order		Variance		Total Authorization	Total Invoice to Date	Percent of Total
		No.	Amount	Total No.	Amount			
Arcadis-US	Construction Inspection & Management	521366	\$ 2,931,368.00	1	\$ 1,345,755.00	\$ 4,277,123.00	(09/2017) \$ 3,783,584.26	88%
Black & Veatch	Engineer of Record	514248 600700	\$ 12,509,031.00	5	\$ 5,611,050.00	\$ 18,120,081.00	(09/2017) \$ 14,702,640.46	81%
Borchard Surveying	Surveying	514249	\$ 206,680.00	0	\$ -	\$ 206,680.00	(10/2017) \$ 187,455.00	91%
Dudek	Odor Control	514217	\$ 94,616.00	0	\$ -	\$ 94,616.00	(12/2014) \$ 8,791.36	9%
EL&C	SCADA Testing	518742 600246	\$ 1,239,007.00	1	\$ 734,600.00	\$ 1,973,607.00	(09/2017) \$ 1,567,550.94	79%
HDR	Construction Inspection	521288	\$ 2,834,476.00	2	\$ (393,997.50)	\$ 2,440,478.50	(08/2017) \$ 2,162,706.28	89%
Ninyo & Moore	Geotechnical-Concrete Testing	518585 600690	\$ 222,730.00	3	\$ 124,245.00	\$ 346,975.00	(08/2017) \$ 344,975.16	99%
NMG	Geotechnical-Piles and Material Testing	514251/526284 600247	\$ 650,273.00	5	\$ 206,019.20	\$ 856,292.20	(07/2017) \$ 828,196.20	97%
Element	Materials Testing	521515	\$ 10,000.00	0	\$ -	\$ 10,000.00	(04/2017) \$ 6,130.00	61%
TOTAL:			\$ 20,698,181.00	17	\$ 7,627,671.70	\$ 28,325,852.70	\$ 23,592,229.66	83%

Irvine Ranch Water District

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November 2017 Quarterly Report

MILESTONE	ACTIVITY	ORIGINAL	Revised per CCO #45 6/27/2016	Per Oct. 2017 Update
	Notice to Proceed	June 3, 2013		
1	WAS & Primary Sludge Processing	July 6, 2015	October 31, 2016	October 31, 2016
2	Sludge Thickening Facilities	August 20, 2015	February 10, 2017	June 6, 2018
3	FOG / Food Waste Receiving	September 19, 2015	April 17, 2017	June 25, 2018
	Construction Complete	New with CCO No. 45	April 28, 2017	May 23, 2018
4A	Anaerobic Digestion Equipment Installed	January 17, 2016	March 21, 2017	August 16, 2018
4B	Anaerobic Digestion Facilities Operational	January 17, 2016	August 1, 2017	October 20, 2018
5	Produce Class B Biosolids Cake	March 2, 2016	June 20, 2017	November 5, 2018
6	Microturbine Power Generation Online	June 30, 2016	August 28, 2017	January 8, 2019
7	Produce Class A Biosolids (Pellets)	August 29, 2016	September 29, 2017	February 21, 2019
Final Completion	Project Completion (including 35 weather-related allowance)	October 28, 2016	October 31, 2017	May 2, 2019

Irvine Ranch Water District

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November 2017 Quarterly Report

Entire Biosolids Site

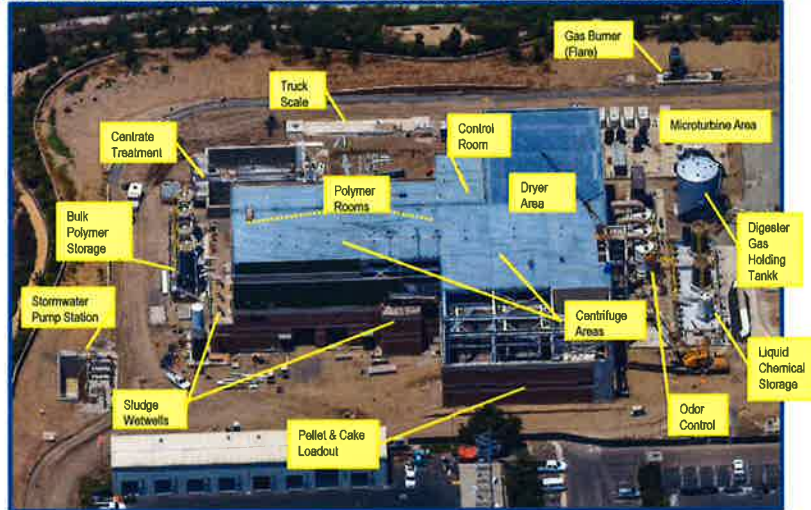


Irvine Ranch Water District

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November 2017 Quarterly Report

Aerial View of Western Half of Biosolids Site – Solids Handling Area



Irvine Ranch Water District

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November 2017 Quarterly Report

Architectural Veneer Installation – Solids Handling Building



Irvine Ranch Water District

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November 2017 Quarterly Report

Drum Dryer and Furnace – Solids Handling Building



Irvine Ranch Water District

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November 2017 Quarterly Report

Dryer Components – Solids Handling Building



Overhead Crane

Pellet Bucket
Elevator

Pellet Recycle
Bin

Off-gas
Scrubber

Pellet/Wet
Material Mixer

Irvine Ranch Water District

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November 2017 Quarterly Report

Dewatering Centrifuges – Solids Handling Building



Centrifuges

Local Control
Panels

Irvine Ranch Water District

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November 2017 Quarterly Report

Odor Control Fans – Solids Handling Building



Irvine Ranch Water District

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November 2017 Quarterly Report

Odor Control System and Chemicals



Irvine Ranch Water District

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November 2017 Quarterly Report

Truck Scale



Irvine Ranch Water District

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November 2017 Quarterly Report

Enclosed Gas Burner



Irvine Ranch Water District

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November 2017 Quarterly Report

Aerial View of Eastern Half of Biosolids Site – Digestion Area



Irvine Ranch Water District

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November 2017 Quarterly Report

Architectural Veneer - Methane Digester No. 1 and 2

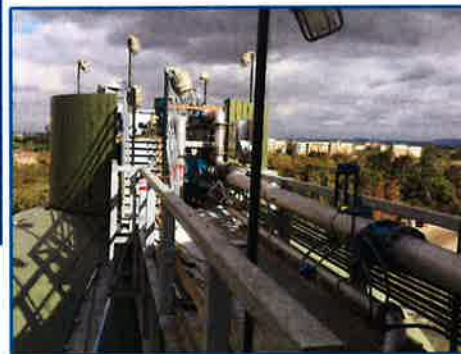


Irvine Ranch Water District

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November 2017 Quarterly Report

Methane Digester Bridges



Irvine Ranch Water District

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November 2017 Quarterly Report

Iron Sponge Vessels - Digester Gas Pre-Treatment



Irvine Ranch Water District

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November 2017 Quarterly Report

Top of Acid Digester and FOG Receiving Station



Irvine Ranch Water District

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November 2017 Quarterly Report

Boilers, Hot Water Pumps & Insulated Pipes – Digester Control Bldg.



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November 2017 Quarterly Report

Curb & Gutter, Sub-Base, & Road Base Placed. Ready for Paving.

Microturbines



Irvine Ranch Water District

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November 2017 Quarterly Report

Gas Line Installation along Riparian View

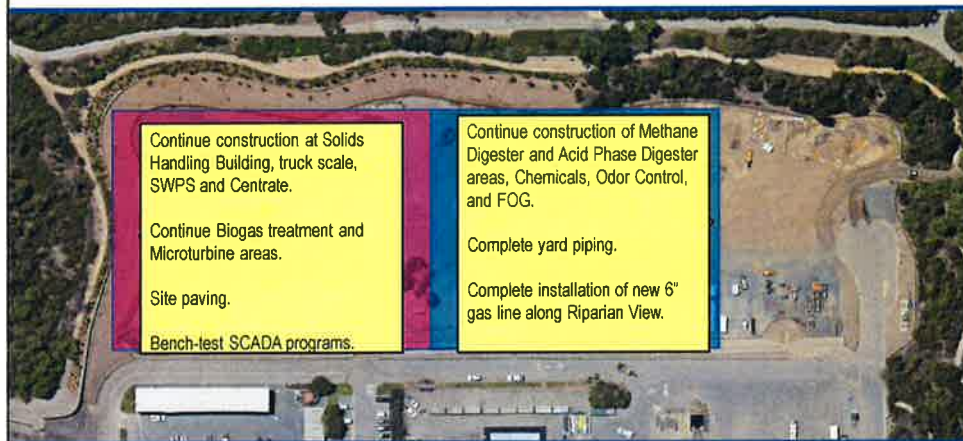


Irvine Ranch Water District

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November 2017 Quarterly Report

Planned Activities – November 2017 to January 2018



Irvine Ranch Water District

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November 21, 2017

Prepared by: S. Malloy

Submitted by: K. Burton *KLB*

Approved by: Paul A. Cook *P. Cook*

ENGINEERING AND OPERATIONS COMMITTEE

MICHELSON WATER RECYCLING PLANT BIOSOLIDS AND ENERGY RECOVERY FACILITIES VARIANCES AND BUDGET INCREASE

SUMMARY:

Filanc/Balfour-Beatty (FBB) is constructing the Michelson Water Recycling Plant (MWRP) Biosolids and Energy Recovery Facilities (Biosolids Project). According to FBB's October 2017 Schedule Update, the Biosolids Project will be extended to May 2019. The services of various consultants are needed to supplement the construction management team of the Biosolids project through this time extension. Staff recommends that the Board:

- Authorize the General Manager to execute Variance No. 7 with Black & Veatch in the amount of \$3,190,018 for supplemental contract administration, construction phase, and start-up and commissioning services;
- Authorize the General Manager to execute Variance No. 2 with Arcadis, Inc. in the amount of \$1,451,173 for supplemental construction inspection, construction management, and document control system services;
- Authorize the General Manager to execute Variance No. 3 with HDR Engineering, Inc. in the amount of \$576,739.28 for supplemental construction inspection;
- Authorize the General Manager to execute Variance No. 2 with EI&C Engineering, Inc. in the amount of \$958,720 for supplemental process control system construction management services, start-up testing, and development of operation manuals and associated training presentations; and
- Authorize a budget increase in the amount of \$11,500,000, from \$216,073,100 to \$227,573,100, to the FY 2017-18 Capital Budget for the MWRP Biosolids and Energy Recovery Facilities project.

BACKGROUND:

Construction of the Biosolids Project was awarded to FBB in March 2013 in the amount of \$163,513,307. The Biosolids Project will provide biosolids digestion, dewatering, energy production, and on-site sludge drying. The project includes excavation for subsurface structures; installation of 3,009 foundation piles; three egg-shaped digesters; a state-of-the-art odor control system; a biogas conditioning system and power generation using micro-turbines; a fats, oil and grease receiving station; and new utility services. These facilities are being constructed on the land north of IRWD's existing Operations Center, maintenance shops, water quality laboratory, and warehouse.

Variance No. 7 with Black & Veatch:

Black & Veatch (B&V) has provided contract administration, construction inspection, and construction management services since 2013. Variance No. 7 is summarized below:

- Additional Submittal Reviews – The number of submittals (2,776) through October 16, 2017 has significantly exceeded the estimated number of submittals (2,400), and the submittals (shop drawings) are anticipated to continue through approximately April 2018. A total of 3,076 submittals (including approximately 200 new and 100 record copy submittals) are now anticipated through April 2018. As of October 6, 2017, the actual expenditures were at approximately 102.5% of the budget allowance. The increase in the number of submittals is primarily due to the large number of re-submittals that have occurred. To date, 1,329 re-submittals have occurred compared with 1,447 initial submittals, which represents a very high re-submittal rate of 92% for FBB.
- Additional Request for Information (RFI) Reviews – The current number of RFIs (2,821) has exceeded the estimated number of RFIs (2,500), and additional RFIs are anticipated to continue through approximately November 2018. A total of 3,060 RFIs (approximately 240 new) are now anticipated through November 2018. As of October 6, 2017, the actual expenditures were at 105.4% of the budget allowance.
- Electronic Operations and Maintenance (O&M) Manual Development, Installation, and Training – Based on ongoing feedback from operations staff during electronic O&M manual (EOM) development to date, additional effort is needed for labeling, linking, and organization of startup documentation, Energy Control Procedures (ECPs), Job Safety Analysis (JSAs), Standard Operating Procedures (SOPs), electrical shutdown plans, drawings, air permitting reports, and adding vendor O&Ms to the EOM. This level of effort was not anticipated at the beginning of the project. Also, there has been a greater number of EOM reviews and meetings to demonstrate the EOM to the operations staff, to receive feedback, and to increase the comfort level of operations staff using the EOM. Multiple submittals and meetings were not originally envisioned, but due to the lengthened project schedule, these meetings have been helpful by providing sufficient time for comments and corrections in order to produce a better final project deliverable with more documentation included than originally scoped. In addition, a user's manual will be developed to provide directions on updating the manual as this is required due to the growth in complexity of the manual.
- Start-Up Testing Coordination – Monthly onsite start-up and commissioning meetings with the operations staff have provided valuable interaction between the B&V commissioning team and the IRWD operations staff, which staff will continue to hold. The informal planning sessions provide an opportunity to brainstorm and discuss upcoming startup and commissioning activities. In addition to the onsite meetings, considerable time has been spent, and will continue to be spent, answering questions posed by the operations staff on topics such as ammonia returned to the plant, digesters commissioning plan, centrate treatment commissioning plan, mass balance for recycling

solids to build up the solids concentration in the digester, dewatering/dryer commissioning plan, and other requests. Also, the startup material submitted by FBB has required multiple reviews for accuracy and correctness. This effort was beyond what was originally planned. Staff requested that B&V provide a resource for FBB in its development of the start-up plans.

- Record Drawings and Atlas Update – The Contract Documents require that FBB maintain a current set of redline drawings that reflect all revisions to the contract drawings using a “redline” drawing marking approach that results in an “as-built” drawing set that is ready for CAD revisions by B&V upon completion of the project. Since approximately November 2016, FBB has not provided redline drawings that are ready for CAD revisions; it is only noting locations on drawings that are being changed and referencing RFIs or construction change orders (CCOs) via hyperlinks to those documents. Therefore, B&V will require additional engineering time to process the information provided by FBB that will be used to prepare the record drawings for this project.

Variance No. 7, attached as Exhibit “A”, with B&V in the amount of \$3,190,018 is for supplemental contract administration, construction phase, and start-up and commissioning services.

Variance No. 2 with Arcadis, Inc.:

Arcadis has provided construction inspection, construction management, and document control system services since the start of the Biosolids project. Through Variance No. 2, Arcadis will continue to negotiate and prepare CCOs, provide as-needed construction management support, assist with resolving project cost and delay claims submitted by FBB, and assist with project close-out activities. These construction management services will be provided through June 30, 2019. Arcadis will also provide construction inspection services through June 30, 2018. Although the project schedule shows that physical construction is scheduled to be completed in May 2018, additional time will likely be needed for completion of punch list items. Arcadis will provide document control services until June 30, 2019, including assistance with the archiving of project documents. Variance No. 2, attached as Exhibit “B”, with Arcadis, Inc. in the amount of \$1,451,173 is for construction management, construction inspection services, and document control support.

Variance No. 3 with HDR Engineering, Inc.:

HDR Engineering has provided construction inspection since the start of the Biosolids project. With Variance No. 3, HDR will provide construction inspection services through April 30, 2019. It is assumed that close-out activities such as punch list items and record drawings will require HDR’s assistance. Variance No. 3, attached as Exhibit “C”, with HDR Engineering in the amount of \$576,739.28 is for construction inspection services.

Variance No. 2 with EI&C Engineering, Inc.:

EI&C Engineering has provided technical oversight of the process control system (PCS) development. EI&C will continue to provide technical oversight of the PCS development through June 2019. This includes witnessing various computer software tests at the manufacturer's panel fabrication facility, bench tests, and field tests. Additionally, EI&C will provide additional automation staff to supplement the start-up testing when it is anticipated that multiple start-up tests are scheduled simultaneously. EI&C will also provide technical writing support to prepare the operation manuals and associated training presentations related to the PCS. Variance No. 2, attached as Exhibit "D", with EI&C Engineering, Inc. in the amount of \$958,720 is for supplemental PCS construction management services, start-up testing, and development of PCS operation manuals and associated training presentations.

Budget Increase:

With the approval of CCO No. 65 in October 2017, an increase in the capital budget for the Biosolids Project is required. Additional budget is being requested to fund the future CCOs for which individual Change Requests (CRs) have been submitted by FBB. These CRs are being negotiated and are estimated to be worth approximately \$3,000,000. This does not include any CRs submitted by FBB for extended or expanded overhead.

IRWD costs also need to be funded by the budget increase for the extended project duration. This will cover costs for Construction Management staff, outside specialty legal and claims analysis staff to help resolve more complex construction items, Operations and Maintenance staff during start-up and training, and the MWRP Construction Trailer and supplies. These costs will be approximately \$1,500,000.

FISCAL IMPACTS:

The MWRP Biosolids and Energy Recovery Facilities, project 04286, is included in the FY 2017-18 Capital Budget. Staff requests a budget increase in the amount of \$11,500,000 for the above variances, future staff time, and future construction change orders as shown in the following tables.

<u>Item</u>	<u>Amount</u>
Construction Management Consultants	\$ 6,180,000
IRWD Staff	\$ 1,500,000
Legal	\$ 500,000
Future Contract Change Orders	\$ 3,000,000
Contingency (3% of this request)	\$ 320,000
Total	\$11,500,000

Project No.	Current Budget	Addition <Reduction>	Total Budget
04286	\$216,073,100	\$11,500,000	\$227,573,100

ENVIRONMENTAL COMPLIANCE:

The MWRP Biosolids and Energy Recovery Facilities is subject to the California Environmental Quality Act (CEQA) and in conformance with the California Code of Regulations Title 14, Chapter 3, Article 7, a Supplemental Environmental Impact Report, SCH # 2011031091, was certified by IRWD on October 22, 2012. The City of Irvine Planning Commission approved a conditional use permit for the IRWD Biosolids Project on December 6, 2012.

RECOMMENDATION:

That the Board authorize the General Manager to execute Variance No. 7 with Black & Veatch in the amount of \$3,190,018 for supplemental contract administration, construction phase, and start-up and commissioning services; authorize the General Manager to execute Variance No. 2 with Arcadis, Inc. in the amount of \$1,451,173 for supplemental construction inspection, construction management, and document control system services; authorize the General Manager to execute Variance No. 3 with HDR Engineering, Inc. in the amount of \$576,739.28 for supplemental construction inspection; authorize the General Manager to execute Variance No. 2 with EI&C Engineering, Inc. in the amount of \$958,720 for supplemental process control system construction management services, start-up testing, and development of process control system operation manuals and associated training presentations; and authorize a budget increase in the amount of \$11,500,000, from \$216,073,100 to \$227,573,100, to the FY 2017-18 Capital Budget for the Michelson Water Recycling Plant Biosolids and Energy Recovery Facilities, project 04286.

LIST OF EXHIBITS:

Exhibit "A" – Variance No. 6 with Black & Veatch
Exhibit "B" – Variance No. 2 with Arcadis, Inc.
Exhibit "C" – Variance No. 3 with HDR Engineering, Inc.
Exhibit "D" – Variance No. 2 with EI&C Engineering, Inc.

EXHIBIT "A"

IRVINE RANCH WATER DISTRICT

PROFESSIONAL SERVICES VARIANCE

Project Title: MWRP Biosolids & Energy Recovery Facilities – Construction Phase Services

Project No.: 04286 (21146)

Date: October 18, 2017

Purchase Order No.: 600700

Variance No.: 7

Originator: ☒ IRWD ☐ ENGINEER/CONSULTANT ☐ Other (Explain) _____

Description of Variance (*attach any back-up material*): At the request of IRWD provide additional services associated with (1) project management, (2) submittal reviews, (3) RFI reviews, (4) schedule reviews, (5) structural observations, (6) claims avoidance, (7) onsite design representative (8) electrical inspections, (9) I&C inspections, (10) electrical/automation field engineering, (11) civil/mechanical field engineering, (12) EOM development, (13) startup testing coordination, and (14) record drawings. See attached detailed scope of work description.

Engineering & Management Cost Impact:

Classification	Manhours	Billing Rate	Labor \$	Direct Costs	Subcon. \$	Total \$
See attached summary level of effort						
Total \$ =						3,190,018

Schedule Impact:

Task No.	Task Description	Original Schedule	Schedule Variance	New Schedule
All		December 31, 2017	16 months	April 30, 2019

Required Approval Determination:

Total Original Contract	\$ <u>12,509,031</u>	☐ Director: Cumulative total of Variances less than or equal to \$50,000.
Previous Variances \$	<u>5,826,550</u>	☐ Executive Director: Cumulative total of Variances less than or equal to \$75,000.
This Variance	\$ <u>3,190,018</u>	☐ General Manager: Cumulative total of Variances less than or equal to \$100,000.
Total Sum of Variances	\$ <u>9,016,568</u>	☒ Board: Cumulative total of Variances greater than \$100,000.
New Contract Amount	\$ <u>21,525,599</u>	
Percentage of Total Variances to Original Contract	<u>72.1%</u>	

ENGINEER/CONSULTANT: Black & Veatch Corp.
Company Name

IRVINE RANCH WATER DISTRICT

David R. Eubank
Project Engineer/Manager

October 18, 2017
Date

Department Director

Date

Jackie
Engineer's/Consultant's Management

October 18, 2017
Date

General Manager/Board

Date

IRVINE RANCH WATER DISTRICT

PROFESSIONAL SERVICES VARIANCE REGISTER

Project Title: MWRP Biosolids and Energy Recovery Facilities – Construction Phase Services

Project No.: 04286 (21146)

Project Manager: Steve Malloy

Variance No.	Description	Dates		Variance Amount
		Initiated	Approved	
1	Add a Field Electrical & Automation Engineer	02-05-14	03-25-14	\$664,600
2	Prepare an Odor Control Maintenance and Monitoring Program (OCMMP)	04-29-14	05-28-14	\$112,665
3	Add a Field Civil/Mechanical Engineer	10-06-14	11-10-14	\$899,000
4	Additional Startup Monitoring Activities	10-09-15	11-03-15	\$370,570
5	Additional Services for: (1) project management, (2) submittal reviews, (3) RFI reviews, (4) schedule reviews, (5) electrical inspections, (6) electrical/automation field engineering, (7) civil/mechanical field engineering, and (8) air quality permitting services.	04-07-16	09-27-16	\$3,564,215
6	Additional services for Standard Operating Procedures: (1) convert "existing" 60 SOPs from process summary type to individual equipment type, (2) expand the scope of the "existing" SOPs, and (3) prepare 70 new SOPs.	02-09-17	04-11-17	\$215,500

7	Additional Services for: (1) project management, (2) submittal reviews, (3) RFI reviews, (4) schedule reviews, (5) structural observations, (6) claims avoidance, (7) onsite design representative (8) electrical inspections, (9) I&C inspections, (10) electrical/automatio n field engineering, (11)civil/mechanical field engineering, (12) EOM development, (13) startup testing coordination, and (14) record drawings	10-18-17	pending	\$3,190,018

MEMORANDUM

Irvine Ranch Water District
MWRP Biosolids & Energy Recovery Facilities
Proposed Variance #6 – Additional SOP Work

179900
October 18, 2017

To: Steve Malloy – Principle Engineer

From: Dan Buhrmaster – Project Manager

Thank you for the opportunity to submit **Proposed Variance #7** to IRWD to accommodate the anticipated time extension for FBB (Contractor), extending our construction phase services completion schedule from December 31, 2017 to approximately April 30, 2019 (16 month time extension). The amount of this **Proposed Variance #7** is **\$3,190,018**. Attached are the following documents that make up our proposal to OCSD:

- IRWD Professional Services Variance Form – Proposed Variance #7.
- Scope of Services
- Budget Projection Spreadsheet
- Proposed Level of Effort and Engineering Fee Spreadsheet

We hope that the above information is satisfactory for you to review our proposal, approve the proposed engineering fee, and to submit for Board approval. As always, we are ready to discuss any of the items described above, or anything else that is of concern in support of moving your approval process forward.

Thank you once again for offering this opportunity to the Black & Veatch.

**IRVINE RANCH WATER DISTRICT
MWRP BIOSOLIDS & ENERGY RECOVERY FACILITIES
(BIOSOLIDS PROJECT)
CONSTRUCTION PHASE SERVICES
Project No. 21146 (4286)**

**VARIANCE #7
OCTOBER 18, 2017**

SCOPE OF WORK

BACKGROUND

The Irvine Ranch Water District (IRWD) owns and operates the Michelson Water Recycling Plant (MWRP). New biosolids and energy recovery facilities are currently under construction by Filanc-Balfour Beatty (FBB), the construction contractor. IRWD and FBB are negotiating a time extension to FBB that apparently will extend the contract completion date from December 2017 to April 2019 (16 month time extension). At the request of IRWD Black & Veatch will furnish additional project management; construction administration support; construction field support; electronic O&M manual; and training, commissioning, and start-up services to cover the additional time period granted to FBB and also cover out of scope work requested by IRWD.

BASIS FOR VARIANCE

The MWRP Biosolids & Energy Recovery Facilities Project (Biosolids Project) is currently under construction. The following events have occurred that resulted in this proposed variance for Black & Veatch:

- ***Contract Time Extension*** - FBB has been in negotiations with IRWD to obtain an extension in the construction schedule. It is anticipated that the project completion date will be extended from the current date of December 2017 to April 2019 (16 month time extension). This time extension directly affects the following scope of work tasks by extending the number of months that Black & Veatch services are required:
 - Task 1 - Project Management
 - Task 2.4 – Schedule Review
 - Task 2.5 – Structural Observations
 - Task 3.1 thru 3.8 – On-Site Design Team Representative
 - Task 3.9 – Electrical Inspection
 - Task 3.10 – Instrumentation and Control Inspections
 - Task 3.14 – Electrical/Automation Field Engineering
 - Task 3.15 – Civil/Mechanical Field Engineering
- ***Submittal Reviews (Scope Task 2.1 – B&V Phase 201)*** – The number of submittals (2,776) through October 16, 2017 has significantly exceeded the estimated number of submittals (2,400) and the shop drawing submittals are

anticipated to continue through approximately April 2018. A total of 3,076 submittals (including approximately 200 new and 100 record copy submittals) are now anticipated through April 2018. As of October 6, 2017, the actual expenditures were at approximately 102.5% of the budget allowance and a variance is necessary. Black & Veatch believes that the increase in the number of submittals is primarily due to the large number of re-submittals that have occurred. To date, 1,329 re-submittals have occurred compared with 1,447 initial submittals – this represents a very high re-submittal rate of 92% for FBB. B&V assumed a resubmittal rate of about 20% during the scope/fee development for this project and a re-submittal rate of about 20-40% is typical on projects.

- ***RFIs (Scope Task 2.2 – B&V Phase 202)*** – The current number of RFIs (2,821) has exceeded the estimated number of RFIs (2,500) and additional RFIs are anticipated to continue through approximately November 2018. A total of 3,060 RFIs (approximately 240 new) are now anticipated through November 2018. As of October 6, 2017, the actual expenditures were at 105.4% of budget allowance and a variance is necessary. Following are several reasons for the number of RFIs exceeding the estimated number.
 - IRWD has initiated a number of owner generated RFIs. This provides excellent documentation but is beyond what we normally experience on our projects.
 - There are a large number of programming/configuration RFIs required for this project due to the very detailed specifications and specific IRWD standards – much higher than a normal B&V project.
 - In some cases, RFIs were submitted by the contractor just to clarify what was in the contract documents or request additional design information and did not represent a design change.
 - The contractor has initiated changes to the work due to his lack of proper coordination of suppliers and subcontractors.
 - The contractor has initiated additional RFIs because he has proceeded at risk with fabrication of some electrical/I&C equipment without complete approved mechanical shop drawings, resulting in revisions.
- ***Claims Avoidance and Dispute Resolution (Scope Task 2.7 – B&V Phase 207 –*** The contractor (FBB) has made several claims for extra cost and delays on this project. B&V anticipates these contractor claims to continue and accelerate before this project is complete and we are recommending an increase in the budget for this task to accommodate responding to the anticipated increase in activity by FBB.
- ***Electronic O&M Manual (Scope Task 4.1 thru 4.2 – B&V Phase 401)*** - Based on ongoing feedback from IRWD operations staff during electronic O&M manual (EOM) development to date, additional effort is needed for labelling, linking, and organization of startup documentation, ECPs, JSAs, SOPs, electrical shutdown plan, drawings, air permitting reports, vendor O&Ms to the electronic O&M. This was not anticipated at the beginning of the project. Also, there have been a larger

number of EOM reviews and meetings to demonstrate the electronic O&M to the operations staff, to get comments from the operations staff, and have the operations staff be more comfortable with usage of the electronic O&M. Multiple submittals and meetings were not originally envisioned, but due to the lengthening project schedule these meetings have been helpful to IRWD and provide sufficient time for comments and correction to produce a better final project deliverable with more documentation included than originally scoped. In addition, a user's manual is to be developed to provide directions on updating the manual as this is required due to the growth in complexity of the manual.

- ***Start-Up Testing Coordination (Scope Task 5.3 – B&V Phase 503)*** – The contractor is showing their contract completion date extending to April 2019 in their most recent schedule update. Monthly onsite start-up and commissioning meetings with the operations staff has provided valuable interaction between the B&V commissioning team and the IRWD operations staff and B&V proposes to continue these monthly meetings. The planning sessions provide for informal meetings to brainstorm and discuss upcoming startup and commissioning activities. In addition to the onsite meetings, considerable time has been spent and will continue to be used to answer questions posed by the operations staff on topics such as ammonia in influent to the plant, digesters commissioning plan, centrate treatment commissioning plan, mass balance for recycling solids to build up the solids concentration in the digester, dewatering/dryer commissioning plan and other request from IRWD Operations. Also, the startup material submitted by the contractor has required multiple reviews for accuracy and correctness – above what was originally planned – and B&V has offered to be a resource for FBB in their development of the start-up plans.
- ***Record Drawings & Atlas Update (Scope Task 6.3 - B&V Phase 603)*** – The Contract Documents require that FBB (Contractor) maintain a current set of redline drawings that reflect all revisions to the contract drawings using a “redline” drawing marking approach that results in an “as-built” drawing set that is ready for CAD revisions by Black & Veatch upon completion of the project (see Section 01720 – Record Documents). Beginning approximately November 2016 FBB has refused to provide redline drawings that are ready for CAD revisions and are only noting locations on drawings that are being changed and referencing RFIs or CCOs via hyperlinks. Therefore, Black & Veatch will have additional engineering time to prepare the redline drawings that will be used in preparing the as-built drawings for this project and this represents out of scope work.

SCHEDULE AND LEVEL OF EFFORT

The level of effort has been estimated by projecting expenditures through the end of the new contract completion date of April 2019 (a 16 month time extension) for the tasks identified above – see Attachment A. The assumptions made for these projections are given in the attachment. The cumulative costs for each task on this project are shown for

the thirty-three (33) total project tasks. Nineteen (19) tasks are not affected by the time extension since the work effort is the same regardless of the timing of the work. Fourteen (14) tasks are affected by the time extension or IRWD requests for out of scope work. These tasks are listed above and shaded in pink color in the attachment.

The following B&V field staff and key team members will continue in their current role on this project through April 2019 unless otherwise approved by IRWD:

- Jim Clark – Project Director.
- Dan Buhrmaster – Project Manager.
- Mark Wilson – Engineering Manager.
- Neil Massart – Commissioning Manager.
- Jon Hay – Onsite Design Team Representative.
- Keene Matsuda – Electrical Field Inspector.
- Marc Zamora – I&C Inspector.
- Mark Lowe – Structural Field Engineer.
- Daniel Cearley – Civil/Mechanical Field Engineer (EI&C Sub-Consultant).
- Chris Carey - Civil/Mechanical Field Engineer.
- Shawn Rohr – Electrical/Automation Field Engineer.
- Sheila Moredó - Electrical/Automation Field Engineer.
- Thomas Cherian – Schedule Reviewer.

LEVEL OF EFFORT FOR VARIANCE #7 - OCTOBER 18, 2017	Project Director/VP	Project Manager 3	Engineer 7	Engineer 6	Engineer 4	Construction Manager 7	Construction Manager 5	O&M Specialist 6	O&M Specialist 4	Engineer 2	Clerical	Technician 3	Manhours	Sub- Consultants, Misc. Expenses, and Travel Costs	Variance #7 Fees
Hourly Rate	\$315	\$260	\$220	\$210	\$175	\$225	\$170	\$175	\$140	\$120	\$100	\$100			
Variance #7 Tasks															
Task 1 - Project Management	96	440									680		1,216	\$20,192	\$232,832
Task 2.1 - Submittal Reviews		120	240	480				120		720	40		1,720	\$18,315	\$314,515
Task 2.2 - RFI Reviews		80	150	300				80		480	32		1,122	\$11,651	\$203,251
Task 2.4 - Schedule Reviews							96						96	\$1,636	\$17,956
Task 2.5 - Structural Observations				360									360	\$4,953	\$80,553
Task 2.7 - Claims Avoidance and Dispute Resolution	80	240	240	120		240		64			40		1,024	\$15,200	\$250,000
Task 3.1 thru Task 3.8 - Onsite Design Team Representative				2,624									2,624	\$33,209	\$584,249
Task 3.9 - Electrical Inspection			840										840	\$12,151	\$196,951
Task 3.10 - I&C Inspections					540								540	\$8,644	\$103,144
Task 3.14 - Electrical/Automation Field Engineering				680						680			1,360	\$36,394	\$260,794
Task 3.15 - Civil/Mechanical Field Engineering										1,280			1,280	\$155,342	\$308,942
Task 4.1 thru Task 4.2 - Electronic O&M Manual Development, Installation, and Training									80	400			480	\$8,200	\$67,400
Task 5.3 - Startup Testing Coordination Services								1,200					1,200	\$59,431	\$269,431
Task 6.3 - Record Drawings & Atlas Update					1,000							1,000	2,000	\$25,000	\$300,000
Total - Variance #7	176	880	1,470	4,564	1,540	240	96	1,464	80	3,560	792	1,000	15,862	\$410,318	\$3,190,018

B&V Phase/Task Description	B&V Phase No.	Cumulative Costs Thru August 2017	Projected Future Costs through March 2018	Projected Cumulative Total Costs	Approved Budget	Approved Budget Cost - Projected Cumulative Total Cost	Projected Percent Complete Versus Budget	Regarding Remaining Assumptions Through (18 months)
Task 1 - Construction Phase Project Management								
Task 1.1 - Submittal Review	101	\$808,098.42	\$334,332.33	\$1,322,080.81	\$898,426.00		134.8%	Assume curve
Task 1.2 - Requests for Information (RFIs)	201	\$4,174,804.44	\$273,834.26	\$4,448,638.70	\$4,098,867.00		108.5%	Assume curve
Task 1.3 - Meetings/Technical Site Visits	202	\$1,495,086.63	\$126,901.18	\$1,621,987.81	\$1,428,596.00		113.5%	Assume curve
Task 1.4 - Schedule Review	203	\$555,547.54	\$152,832.46	\$708,380.00	\$658,400.00	\$50.00	100.0%	Assume no b/c
Task 1.5 - Structural Observations	304	\$411,738.08	\$144,015.92	\$555,754.00	\$555,754.00	\$0.00	100.0%	Assume no b/c
Task 1.6 - Proposed Contractor Change Orders	205	\$273,278.13	\$40,238.88	\$313,517.01	\$271,173.00	\$42,344.01	135.8%	Assume curve
Task 1.7 - Claims Avoidance and Dispute Resolution Assistance	206	\$178,508.75	\$294,801.25	\$473,310.00	\$473,310.00	\$0.00	100.0%	Assume no b/c
Task 1.8 - Final Walk-Through	207	\$40,425.00	\$108,795.00	\$209,220.00	\$50,220.00	\$159,000.00	298.7%	Assume signal
Task 1.9 - Final Walk-Through	208	\$0.00	\$112,560.00	\$112,560.00	\$112,560.00	\$0.00	100.0%	Assume no b/c
Task 2 - Construction Administration Support Services								
Task 2.1 thru 2.8 - On-Site Design Team Representative & Document Control	301	\$1,583,875.42	\$929,584.03	\$2,513,459.45	\$1,625,562.00	(\$887,897.45)	125.8%	Assume curve
Task 2.9 - Electrical Inspection	302	\$843,867.50	\$330,495.31	\$1,174,362.81	\$787,240.00	(\$387,122.81)	122.7%	Assume curve
Task 2.10 - Instrumentation and Control Inspections	303	\$532,788.43	\$520,074.60	\$1,052,863.03	\$866,200.00	(\$186,663.03)	119.2%	Assume curve
Task 2.11 - Edison Savings by "Design Grant" Application Support	304	\$18,801.25	\$20,198.75	\$38,999.99	\$40,000.00	\$10,000.01	100.0%	Assume no b/c
Task 2.12 - Control System Configuration & Programming Services (E&C)	305	\$349,640.00	\$20,360.00	\$369,999.99	\$360,000.00	\$9,999.99	100.0%	Assume no b/c
Task 2.13 - Mechanical Inspections	306	\$24,779.26	\$11,946.74	\$36,726.00	\$36,726.00	\$0.00	100.0%	Assume no b/c
Task 2.14 - Electrical/Automation Field Engineering (Variance #1)	307	\$428,348.80	\$421,825.79	\$850,174.59	\$850,174.59	(\$21,825.79)	126.9%	Assume curve
Task 2.15 - Civil/Mechanical Field Engineering (Variance #2)	308	\$750,704.30	\$462,020.00	\$1,212,724.30	\$899,000.00	(\$313,724.30)	134.9%	Assume two site engineer
Task 3 - Construction Field Support Services								
Task 3.1 thru 3.2 - Electronic O&M Manual Develop, Install, and Training	401	\$302,096.40	\$93,896.60	\$395,993.00	\$415,593.00	\$19,600.00	100.0%	Assume no b/c
Task 3.3 - Energy Control Procedures (ECPs)	402	\$162,252.51	\$40,903.49	\$203,156.00	\$203,156.00	\$0.00	100.0%	Assume no b/c
Task 3.4 - Job Safety Analysis (JSA) Documents	403	\$101,445.84	\$17,412.36	\$118,858.20	\$120,857.00	\$1,998.80	100.0%	Assume no b/c
Task 3.5 - Asset Management Data Collection	404	\$259,481.00	(\$11,681.00)	\$247,800.00	\$184,000.00	\$63,800.00	100.0%	Task complete
Task 3.6 - O&M Control Maintenance & Monitoring Program (Variance #2)	405	\$45,623.58	\$47,651.41	\$93,274.99	\$172,663.00	\$79,388.01	100.0%	Assume no b/c
Task 3.7 - Prepare Summary Standard Operating Procedure (SOP) Documents	406	\$53,289.30	\$270,353.30	\$323,642.60	\$223,653.00	\$100,000.00	100.0%	New task exp
Task 4 - Electronic O&M Manual								
Task 4.1 - Contractor/Vendor Training & Commissioning Meetings	501	\$0.00	\$81,454.00	\$81,454.00	\$81,454.00	\$0.00	100.0%	Assume no b/c
Task 4.2 - Pre-Startup Process Overview Training	502	\$98,498.18	\$171,648.84	\$270,146.00	\$270,146.00	\$0.00	100.0%	Assume no b/c
Task 4.3 - Start-Up Testing Coordination (Including Variance #4 - \$370,570)	503	\$513,412.70	\$429,020.00	\$942,432.70	\$698,156.00	(\$244,276.70)	134.1%	Additional cost
Task 4.4 - Factory Witness Testing	504	\$46,296.86	\$78,207.14	\$124,504.00	\$124,504.00	\$0.00	100.0%	Assume no b/c
Task 4.5 - 5.7 - Commissioning & Process Optimization Services	505	\$120,002.98	\$668,891.02	\$788,894.00	\$788,894.00	\$0.00	100.0%	Assume no b/c
Task 4.6 - Air Quality Permit Services	506	\$86,890.45	\$16,568.55	\$103,459.00	\$103,459.00	\$0.00	100.0%	Assume no b/c
Task 5 - Training, Commissioning, and Start-Up Services								
Task 5.1 - Post Start-Up Services	601	\$0.00	\$54,100.00	\$54,100.00	\$54,100.00	\$0.00	100.0%	Assume no b/c
Task 5.2 - Update Electronic O&M Manual	602	\$1,388.25	\$21,013.75	\$22,402.00	\$22,402.00	\$0.00	100.0%	Assume no b/c
Task 5.3 - Record Drawings & Atlas Update	603	\$15,644.38	\$455,147.62	\$470,792.00	\$170,792.00	(\$300,000.00)	275.7%	P&ID will not b
Task 5.4 - Project Closeout	604	\$0.00	\$43,712.00	\$43,712.00	\$43,712.00	\$0.00	100.0%	Assume no b/c
Task 6 - Post Construction Services								
		\$34,434,986.54	\$6,881,045.54	\$41,316,032.08	\$ 18,338,581.00	(\$22,977,451.08)	136.8%	

Variance #7 = \$ 2,892,432.08

EXHIBIT "B"**IRVINE RANCH WATER DISTRICT
PROFESSIONAL SERVICES VARIANCE**Project Title: MWRP Biosolids and Energy Recovery FacilitiesProject No.: 04286Date: October 19, 2017Purchase Order No.: 521366Variance No.: 02Originator: ☐ IRWD ☒ ENGINEER/CONSULTANT ☐ Other (Explain) _____Description of Variance (*attach any back-up material*):

Provide supplemental construction management services through June 30, 2019 and construction inspection services through June 30, 2018

Engineering & Management Cost Impact:

Classification	Manhours	Billing Rate	Labor \$	Direct Costs	Subcon. \$	Total \$
Sr. Construction Manager 2	3,720	\$225-236	\$863,165			\$863,165
Sr. Construction Inspector 5	1,585	\$162-249	\$343,302			\$343,302
Document Control System			\$112,781			\$112,781
Administration/ODCs						\$131,925
Total \$ =						\$1,451,173

Schedule Impact:

Task No.	Task Description	Original Schedule	Schedule Variance	New Schedule
	CM and Inspection Services	October 31, 2016	+15 months	June 30, 2018 (Inspection)
				June 30, 2019 (CM)

Required Approval Determination:

Total Original Contract	<u>\$ 2,931,368.00</u>	☐ Director: Cumulative total of Variances less than or equal to \$50,000.
Previous Variances	<u>\$ 1,345,755</u>	☐ Executive Director: Cumulative total of Variances less than or equal to \$75,000.
This Variance	<u>\$ 1,451,173</u>	☐ General Manager: Cumulative total of Variances less than or equal to \$100,000.
Total Sum of Variances	<u>\$ 2,796,928</u>	☒ Board: Cumulative total of Variances greater than \$100,000.
New Contract Amount	<u>\$ 5,728,296</u>	
Percentage of Total Variances to Original Contract	<u>95%</u>	

ENGINEER/CONSULTANT: Arcadis

IRVINE RANCH WATER DISTRICT

Company Name

Project Engineer/Manager

Date

Department Director

Date

Engineer's/Consultant's Management

Date

General Manager/Board

Date

IRVINE RANCH WATER DISTRICT

PROFESSIONAL SERVICES VARIANCE REGISTER

Project Title: MWRP Biosolids and Energy Recovery Facilities

Project No.: 04286 Project Manager: Ron Esmilla

Variance No.	Description	Dates		Variance Amount
		Initiated	Approved	
01	Supplemental CM & Inspection Services	8/29/2016	10/29/2016	\$1,345,755
02	Supplemental CM & Inspection Services	10/18/2017		\$1,451,173

Steve Malloy
Principal Engineer – MWRP Construction
Michelson Water Recycling Plant
3512 Michelson Drive
Irvine, CA 92612

Arcadis U.S., Inc.
320 Commerce
Suite 200
Irvine
California 92602
Tel 714 730 9052
Fax 714 730 9345
www.arcadis.com

Subject:
MWRP Biosolids and Heat Recovery Facilities PR 4286
Variance No. 2 – Service Extension to June 2018 (Inspection) and March 2019
(Construction Management)

Water - Construction

Date:
October 31, 2017

Dear Steve:

We are submitting Variance No. 2 to our scope of work to account for extended project duration and additional contract administration to satisfy prevailing wage requirements.

Contact:
Ron Esmilla

Phone:
949-231-8971

We have organized and listed the tasks below to follow the contract task numbering. This variance seeks to reconcile all remaining work items to arrive at a final project scope and budget based on the terms set forth in this letter.

Email:
Ron.Esmilla@arcadis.com

The requested fee for Variance 2 is \$1,451,173, and is summarized in the attached Variance No. 2 Fee Summary. These attachments supplement the summary and descriptions below. Inspection services will be provided by Tim Brown (Senior Construction Inspector). I will provide the construction management services.

Our ref:
01120038.0000

TASK 10000 – CONSTRUCTION MANAGEMENT SUPPORT SERVICES

I will provide construction management support services through June 30, 2019. I will negotiate and prepare change orders and provide as-needed construction management support, assist with resolving project claims and delays submitted by the Contractor, and assist in project close-out activities. My 2017 hourly rate is \$225; 2018 hourly rate is \$231; and 2019 hourly rate is \$236.

TASK 20000 – CONSTRUCTION INSPECTION SERVICES

Tim will provide construction inspection through June 30, 2018. Although the project schedule shows that physical construction is scheduled to be completed on May 23, 2018, we assumed that time is required for completion of punchlist items. We assumed full-time throughout this time period with an additional 20% of over time. His hourly wage will meet California Prevailing Wage requirements. For portion of 2017 remaining, Tim's hourly rate is \$162 for regular time and

Malloy
October 19, 2017

\$243 for over time at 1.5 times regular pay. For 2018, Tim's hourly rate will be \$166 for regular time and \$249 for over time at 1.5 times regular pay.

TASK 30000 – DOCUMENT CONTROL SYSTEM SUPPORT

Provide DCS support through June 30, 2019 including help with the archiving of vital project documents. This effort will also be for project close-out activities, coordinating with IRWD's information services and engineering library on capturing project documentation.

TASK 00000 – CONTRACT ADMINISTRATION/OTHER DIRECT COSTS

Per California SB 854, Arcadis must meet California Prevailing Wage requirements that include payroll tracking, reporting, certification, and payment to apprenticeship council. The variance amount for this task incorporates these costs. The ODCs also include the maintenance of computers and servers that store the document control system.

Sincerely,

Arcadis U.S., Inc.



Ron J. Esmilla, PE
Sr. Construction Manager

Copies:

Jon Westervelt, PE

Enclosures:

Attachments

- 1 Variance No. 2
- 2 Variance No. 2 Fee Summary

Irvine Ranch Water District
MWRP Biosolids and Heat Recovery Facilities
PR 04286
Variance No. 2 Fee Summary

Task	Description	Effort (Hrs)			Fee, Dollars			Fee, Dollars
		11/1/2017 to 12/31/2017	1/2018 thru 12/2018	01-2019 thru 06- 2019	11/1/2017 to 12/31/2017	1/2018 thru 12/2018	01-2019 thru 06-2019	Total
10000	Construction Management	360	2100	1260	\$ 81,000	\$ 484,313	\$ 297,852	\$ 863,165
20000	Inspection							
	Regular Time	360	1225	0	\$ 58,320	\$ 203,411	\$ -	\$ 261,731
	Overtime (25%) (1.5 X Regular)	72	257	0	\$ 17,496	\$ 64,075	\$ -	\$ 81,571
30000	DCS Support	20	240	152	\$ 21,500	\$ 55,350	\$ 35,931	\$ 112,781
	Subtotal				\$ 178,316	\$ 807,148	\$ 333,784	\$ 1,319,248
00000	Administration/ODCs (10%)				\$ 17,832	\$ 80,715	\$ 33,378	\$ 131,925
	Variance No. 2 Request				\$ 196,148	\$ 887,863	\$ 367,162	\$ 1,451,173

EXHIBIT "C"**IRVINE RANCH WATER DISTRICT
PROFESSIONAL SERVICES VARIANCE**Project Title: Michelson Water Recycling Plant, Biosolids Construction Management ServicesProject No.: 4286Date: November 8, 2017Purchase Order No.: 521288Variance No.: 3Originator: ☒ IRWD ☐ ENGINEER/CONSULTANT ☐ Other (Explain) _____Description of Variance (*attach any back-up material*):Additional construction support services to meet the new project completion date of April 30, 2019. See attached proposal for detailed breakdown.**Engineering & Management Cost Impact:**

Classification	Manhours	Billing Rate	Labor \$	Direct Costs	Subcon. \$	Total \$
Additional Support through 4/30/2019	4,784	Varies				\$576,739.28
Total \$ =						\$576,739.28

Schedule Impact:

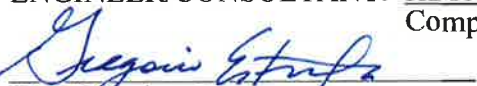
Task No.	Task Description	Original Schedule	Schedule Variance	New Schedule
1	Additional Support	Feb 28, 2017	26 months	Apr 30, 2019

Required Approval Determination:

Total Original Contract	\$ <u>1,867,153.78</u>	☐ General Manager: Single Variance less than or equal to \$30,000. ☐ Committee: Single Variance greater than \$30,000, and less than or equal to \$60,000. ☐ Board: Single Variance greater than \$60,000. ☒ Board: Cumulative total of Variances greater than \$60,000, or 30% of the original contract, whichever is higher.
Previous Variances \$	<u>(393,997.50)</u>	
This Variance	\$ <u>576,739.28</u>	
Total Sum of Variances	\$ <u>182,741.78</u>	
New Contract Amount	\$ <u>2,049,895.56</u>	
Percentage of Total Variances to Original Contract	<u>9.8%</u>	

ENGINEER/CONSULTANT: HDR Engineering Inc.
Company Name

IRVINE RANCH WATER DISTRICT


IRWD Project Manager11/8/17
Date_____
Department Director Date
Engineer's/Consultant's Management11/8/17
Date_____
General Manager/Comm./Board Date

IRVINE RANCH WATER DISTRICT

PROFESSIONAL SERVICES VARIANCE REGISTER

[illegible]



November 8, 2017

Mr. Steve Malloy, P.E.
Principal Engineer
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

Subject: MWRP Biosolids Construction Management Services - Variance No. 3

Dear Mr. Malloy,

HDR Engineering, Inc. (HDR) is requesting a variance to our scope of work to account for extended project duration.

Per your request, we are preparing this additional scope of services as Variance No. 3 to the Michelson Water Recycling Plant (MWRP) Biosolids Construction Management (CM) Services contract. We have organized and listed the tasks below to follow the contract task numbering. This variance seeks to reconcile all remaining work items to arrive at a final project scope and budget based on a project completion date of April 30, 2019.

The requested fee for Variance No. 3 is \$576,739.28, and is summarized in the attached **Cost-to-Complete Estimate and Variance No. 3 Fee Summary**. These attachments supplement the summary and descriptions below. The estimates are based on the project completion date noted above. Inspection services will be provided by John Walker (Senior Inspector) at the rates described below.

TASK 1 – PROJECT MANAGEMENT

Project Management is a continuous activity during the project and provides project oversight, workload projections, staff management, budget, scope and schedule tracking, and on-going coordination to address project management issues.

The extended schedule is projected to have an impact on project management activities, including additional project controls and contract administration. In addition, California Prevailing Wage requirements include payroll tracking, reporting, and certification. The variance amount for Project Management incorporates these costs and estimates the fee based on a project completion of April 30, 2019.

TASK 6 – INSPECTION SERVICES - 2017

The estimated cost to complete for this task includes full-time inspection (40 hours per week) and 25% overtime inspection at 1.5x overtime for September to December 2017. The billable rate for John Walker for the remaining portion of 2017 is established at \$157 per straight time hour and

Mr. Steve Malloy, P.E.
November 8, 2017

\$209 per 1.5 overtime hour. We have assumed that double overtime will not be required; however a rate of \$262 per 2.0 overtime hour is established should it be required.

TASK 7 –ON-CALL SERVICES

This task was established as part of Variance No. 2 to cover as-needed and as-requested engineering support services for on-call consultation related to construction, start-up, operations, process, or other support work. We have expended the majority of the original budget and are requesting an additional \$9,300 to cover as-needed services through the end of the project.

TASK 8 – INSPECTION SERVICES - 2018

The estimated cost for this task includes full-time inspection (40 hours per week) and 25% overtime inspection at 1.5x overtime for January to December 2018. The billable rate for John Walker for 2018 is established at \$161 per straight time hour and \$215 per 1.5 overtime hour. We have assumed that double overtime will not be required; however a rate of \$268 per 2.0 overtime hour is established should it be required.

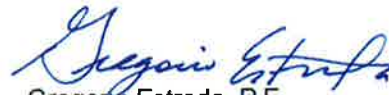
TASK 9 – INSPECTION SERVICES - 2019

The estimated cost for this task includes full-time inspection (40 hours per week) and 25% overtime inspection at 1.5x overtime for January to April 2019. The billable rate for John Walker for 2019 is established at \$165 per straight time hour and \$220 per 1.5 overtime hour. We have assumed that double overtime will not be required; however a rate of \$275 per 2.0 overtime hour is established should it be required.

We appreciate the opportunity to continue provided inspection services for this important project. Please do not hesitate to contact either of the undersigned if you wish to discuss the proposed scope of services further.

Sincerely,
HDR Engineering, Inc.


Aaron M. Meilleur, P.E.
Vice President


Gregorio Estrada, P.E.
Project Manager

Enclosures: Professional Services Variance Form
Cost-to-Complete Estimate
Variance No.3 Fee Summary

Irvine Ranch Water District
Michelson Water Recycling Plant | Biosolids Construction Management Services
Variance No. 3 Fee Summary



Original Authorization	\$2,834,476.00 a
Transfer to PO#515759 (9/3/2013)	\$400,000.00 b
Transfer to PO#515759 (10/14/2014)	\$350,000.00 c
Billed Through July 2014	\$217,322.22 d
Amount Authorized Under PO#521288	\$1,867,153.78 e = a - b - c - d
Scope Reduction (10/17/2014)	\$890,000.00 f
Variance No. 2 (9/27/2016)	\$496,002.50 g
Available Authorization Under PO#521288	\$1,473,156.28 h = e - f + g
Total Cost-to-Date (through August 2017)	\$1,243,795.56 i
Remaining Authorization	\$229,360.72 j = h - i
Estimated Cost to Complete (Aug 2016 - Dec 2017)	\$806,100.00 k (see attached Cost-to-Complete Estimate)
Variance No. 2 Amount	\$576,739.28 l = k - j
Total Authorization with Variance No. 3	\$2,049,895.56 m = h + l

Tasks	Current Budget	Cost to Date August 2017	Remaining Budget	Cost to Complete	Variance No. 3	New Budget
Task 1 - Project Management	\$73,902.33	\$67,646.01	\$6,256.32	\$38,800.00	\$32,543.68	\$106,446.01
Task 2 - Inspection and Engineering Services - 2013	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Task 3 - Inspection and Engineering Services - 2014	\$294,242.03	\$294,242.03	\$0.00	\$0.00	\$0.00	\$294,242.03
Task 4 - Inspection Services - 2015	\$299,610.92	\$299,610.92	\$0.00	\$0.00	\$0.00	\$299,610.92
Task 5 - Inspection Services - 2016	\$350,201.00	\$330,588.35	\$19,612.65	\$0.00	-\$19,612.65	\$330,588.35
Task 6 - Inspection Services - 2017	\$425,200.00	\$224,308.25	\$200,891.75	\$146,500.00	-\$54,391.75	\$370,808.25
Task 7 - On-Call Services	\$30,000.00	\$27,400.00	\$2,600.00	\$11,900.00	\$9,300.00	\$39,300.00
Task 8 - Inspection Services - 2018	\$0.00	\$0.00	\$0.00	\$452,700.00	\$452,700.00	\$452,700.00
Task 9 - Inspection Services - 2019	\$0.00	\$0.00	\$0.00	\$156,200.00	\$156,200.00	\$156,200.00
Total	\$1,473,156.28	\$1,243,795.56	\$229,360.72	\$806,100.00	\$576,739.28	\$2,049,895.56
	(h)	(i)	(j)	(k)	(l)	(m)

Irvine Ranch Water District
 Michelson Water Recycling Plant | Biosolids Construction Management Services
 Variance No. 3 | Cost-to-Complete Estimate



TASKS		LEVEL OF EFFORT, HOURS																FEE, DOLLARS				
No.	Description	Principal	Project Manager 2017	Project Manager 2018	Project Manager 2019	Sr Insp. ST 2017	Sr Insp. 1.5 OT 2017	Sr Insp. 2.0 OT 2017	Sr Insp. ST 2018	Sr Insp. 1.5 OT 2018	Sr Insp. 2.0 OT 2018	Sr Insp. ST 2019	Sr Insp. 1.5 OT 2019	Sr Insp. 2.0 OT 2019	Senior Engineer	Project Engineer	Staff Engineer					
	Client Billing R:					\$157	\$209		\$181	\$215	\$298	\$165	\$220	\$275	\$220	\$165	\$120	\$160	\$160			
1	Project Management																					
1.1	Project Management 2017, Oct-Dec																					
1.2	Project Management 2018, Jan-Dec																					
1.3	Project Management 2019, Jan-Apr																					
	Subtotal, Task 1 Project Management	3																			\$8,800	
2	Inspection Services 2017 (Sept - Dec)																					
2.1	Inspection Services - Straight Time																					
2.2	Inspection Services - 1.5 Overtime																					
2.3	Inspection Services - 2.0 Overtime																					
	Subtotal, Task 2 Inspection Services 2017 (Sept - Dec)	5	5	5	5	404	171	0	0	0	0	0	0	0	0	0	0	0	870	145,635	870	145,635
3	Inspection Services 2018 (Jan - Dec)																					
3.1	Inspection Services - Straight Time																					
3.2	Inspection Services - 1.5 Overtime																					
3.3	Inspection Services - 2.0 Overtime																					
	Subtotal, Task 3 Inspection Services 2018 (Jan - Dec)	5	5	5	5	0	0	0	2,696	524	0	0	0	0	0	0	0	0	2,620		489,736	
4	Inspection Services 2019 (Jan - Apr)																					
4.1	Inspection Services - Straight Time																					
4.2	Inspection Services - 1.5 Overtime																					
4.3	Inspection Services - 2.0 Overtime																					
	Subtotal, Task 4 Inspection Services 2019 (Jan - Apr)	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7	On-Call Services																					
7.1	On-Call Services																					
	Subtotal, Task 7 On-Call Services	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	70	11,905	0	61,660
	TOTAL, hours	3	20	54	18	696	174	0	2,696	524	0	696	174	0	20	16	24					
	TOTAL, dollars																					

EXHIBIT "D"
IRVINE RANCH WATER DISTRICT
PROFESSIONAL SERVICES VARIANCE

Project Title: MWRP Biosolids & Energy Recovery Facilities

Project No.: 4286

Date: September 15, 2017

Purchase Order No.: 600246 (formerly 518742)

Variance No.: 2

Originator: ☐ IRWD ☒ ENGINEER/CONSULTANT ☐ Other (Explain) _____

Description of Variance (*attach any back-up material*):

Extend contractor for Construction Management Services due to project schedule extension. For detailed explanation of
Scope of Work see attached.

Engineering & Management Cost Impact:

Classification	Hours	Billing Rate	Labor \$	Direct Costs	Subcon. \$	Total \$
Process Control Startup Engineer	3080	166				\$ 345,280
Process Control Startup Engineer	1080	170				\$ 183,600
Associate Automation Engineer	3080	135				\$ 280,800
Associate Automation Engineer	1080	138				\$ 149,040
Total \$ =						\$ 958,720

Schedule Impact:

Task No.	Task Description	Original Schedule	Schedule Variance	New Schedule
1	Construction Management Support	May 2014 – December 2017	January 2018 - July 2019	May 2014 – July 2019

Required Approval Determination:

Total Original Contract	\$ <u>1,239,007</u>	☐ Director: Cumulative total of Variances less than or equal to \$50,000.
Previous Variances \$	<u>734,600</u>	
This Variance \$	<u>958,720</u>	☐ Executive Director: Cumulative total of Variances less than or equal to \$75,000.
Total Sum of Variances	\$ <u>1,693,320</u>	
New Contract Amount	\$ <u>2,932,327</u>	☐ General Manager: Cumulative total of Variances less than or equal to \$100,000.
Percentage of Total Variances to Original Contract %	<u>137</u>	☒ Board: Cumulative total of Variances greater than \$100,000.

ENGINEER/CONSULTANT: EI&C Engineering Inc.

IRVINE RANCH WATER DISTRICT

Company Name

[Signature]
Project Engineer/Manager

Date

Department Director

Date

[Signature]
Engineer's/Consultant's Management

Date

General Manager/Board

Date

IRVINE RANCH WATER DISTRICT

PROFESSIONAL SERVICES VARIANCE REGISTER

Project Title: MWRP Biosolids & Energy Recovery Facilities

Project No.: 4286 Project Manager: Steve Malloy

Variance No.	Description	Dates		Variance Amount
		Initiated	Approved	
1	Expansion of Construction Management Support	8/16/2016		\$734,600
2	Expansion of Construction Management Support	9/08/2017		\$958,720

September 15, 2017

Irvine Ranch Water District
Steve L. Malloy, PE
Principal Engineer, MWRP Construction
15600 Sand Canyon Avenue
Irvine, CA 92618-3101

Re: Proposal for Variance 2 for Purchase Order No. 600246 (formerly 518742)
for the MWRP Biosolids and Energy Recovery Facilities Project

Dear Steve,

Enclosed is a proposal for a variance to extend the role of El&C Engineering Inc. for construction management services for the Michelson Water Recycling Plant (MWRP) Biosolids and Energy Recovery Facilities Project to April 12, 2019.

Task 1 is to extend the role of the team for Process Control System (PCS) Construction Management Services that is already working on the project for an additional 79 weeks to mid July 2019.

Task	Role	Year	Hours	Rate	Fee
1	Process Control Startup Engineer	2018	2080	\$166	\$345,280
		2019	1080	\$170	\$183,600
	Associate Automation Engineer	2018	2080	\$135	\$280,800
		2019	1080	\$138	\$149,040
Total					\$958,720

Enclosed is the scope of work, the schedule and fee breakdown, and resumes for your consideration. If you have any questions or need additional information please call me at 714-334-8912 or email me at lthomas@eiceinc.com.

Sincerely,

Laura Thomas

Laura Thomas, PE
CEO, Principal Engineer

Enclosure

Section 1

Scope of Work

Scope of Work

The schedule for the Biosolids and Energy Recovery Facilities Project (Biosolids Project) has been extended to the end of March 2019. EI&C Engineering Inc. is actively working on the project to provide startup support services for the Process Control System (PCS). EI&C Engineering Inc. will support the testing of the PCS software. The activities include (1) review the contractor's start-up plans; (2) provide oversight of Process Control System field testing; (3) support for the Process Control System training; (4) review as-built documentation; and 5) developing deficiency lists and punch lists specific to process control.

- **Task 1: Extension of existing support staff to July 12, 2019.** This variance extends the services already in place for the Biosolids PCS Startup Engineer (Laura Thomas, PE), the Associate Automation Engineer (Pavan Mutyala, EIT).

Task 1a: Process Control Start-up Engineer

The role of Start-up Engineer would extend beyond software development to control system start-up testing and coordination. This role allows the construction management team to retain the institutional knowledge gained during the Process Control System (PCS) software development throughout the field testing phase for the project.

The PCS Start-up Engineer will have the following duties:

- Participate in "Start-up testing" including but not limited to witnessed Process Control System field checks, communication network validation, and system functional testing.
- Attend project meetings.
- Coordinate key decisions with IRWD staff including operations and the CM team.
- Coordinate start-up testing with CM team members
- Review start-up submittals including test procedures and test schedules.
- Develop SCADA training program for operators including SCADA Operations and Maintenance Manual developed with as-built Process Control Descriptions, SCADA Operations and Maintenance training presentations and training videos showing operation of live SCADA screens.

Task 1b: Associate Automation Engineer

The Associate Automation Engineer will work under the direction of the Process Control Startup Engineer have the following duties:

- Witness the Process Control System bench-tests which test the PLC code and HMI screens again forced values.
- Witness the field testing for the Process Control System with live mechanical equipment, local control panels, and instrumentation.
- Witness functional acceptance testing of Process Control System where multiple systems are tested together under process conditions.
- Produce and maintain daily logs of test issues.
- Produce and maintain deficiency and punch lists for PCS related issues.
- Support SCADA training program for operators including SCADA Operations and Maintenance Manual, SCADA Operations and Maintenance training presentations and training videos showing operation of live SCADA screens.

Section 2

Schedule and Fee Breakdown

Schedule and Fee Breakdown

Purchase Order 518742 presently provides the budget for EI&C Engineering Inc. to provide support services full time until December 31, 2017 for a Startup Engineer and Software Test Engineer. This variance includes the cost to extend the schedule for Task 1 an additional 91 weeks from January 1, 2018 to July 12, 2019.

Table 1: Schedule Extension

Task	Role	Start	Finish	Weeks
1	Process Control Startup Engineer	January 1, 2018	July 12, 2019	79
	Associate Automation Engineer			

Table 2: Hourly Estimate

The on-site resources for Task 1 are anticipated to be utilized 100% until the end of the project with an additional 3 months to allow for project close-out tasks including final punch list verification and documentation. Table 2 shows an hourly estimate for Tasks based on the scheduled number of weeks.

Task	Role	Year	Weeks	Utilization	Hours
1	Process Control Startup Engineer	2018	52	100%	2080
		2019	27	100%	1080
	Associate Automation Engineer	2018	52	100%	2080
		2019	27	100%	1080

Table 3: Fee Estimate for Variance 2

The total fee for this variance is based on the estimated hours shown in the previous tables. The following table shows fee breakdown:

Task	Role	Year	Hours	Rate	Fee
1	Process Control Startup Engineer	2018	2080	\$166	\$345,280
		2019	1080	\$170	\$183,600
	Associate Automation Engineer	2018	2080	\$135	\$280,800
		2019	1080	\$138	\$149,040
				Total	\$958,720