NOTICE OF REGULAR MEETING
OF THE
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

ENGINEERING COMMITTEE
TELECONFERENCE MEETING

September 9, 2021
8:30 a.m.

Join Zoom Meeting by clicking on the link below:

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Meeting ID: 894 0207 2370
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NOTICE IS HEREBY GIVEN that a Regular Meeting of the South Orange County Wastewater Authority (SOCWA) Engineering Committee was called to be held by Teleconference on **September 9, 2021** at **8:30 a.m.** SOCWA staff will be present and conducting the call at the SOCWA Administrative Office located at 34156 Del Obispo Street, Dana Point, California. This meeting is being conducted via Teleconference pursuant to the California Governor Executive Order N-29-20.

MEMBERS OF THE PUBLIC ARE INVITED TO PARTICIPATE IN THIS TELECONFERENCE MEETING AND MAY JOIN THE MEETING VIA THE TELECONFERENCE PHONE NUMBER AND ENTER THE ID CODE. THIS IS A PHONE CALL MEETING AND NOT A WEB-CAST MEETING SO PLEASE REFER TO AGENDA MATERIALS AS POSTED WITH THE AGENDA THE WEB-SITE WWW.SOCWA.COM. ON YOUR REQUEST, EVERY EFFORT WILL BE MADE TO ACCOMMODATE PARTICIPATION. IF YOU REQUIRE ANY SPECIAL DISABILITY RELATED ACCOMMODATIONS, PLEASE CONTACT THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY SECRETARY'S OFFICE AT (949) 234-5452 AT LEAST SEVENTY-TWO (72) HOURS PRIOR TO THE SCHEDULED MEETING TO REQUEST DISABILITY RELATED ACCOMMODATIONS. THIS AGENDA CAN BE OBTAINED IN ALTERNATE FORMAT UPON REQUEST TO THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY'S SECRETARY AT LEAST SEVENTY-TWO (72) HOURS PRIOR TO THE SCHEDULED MEETING.

AGENDA EXHIBITS AND OTHER WRITINGS THAT ARE DISCLOSABLE PUBLIC RECORDS DISTRIBUTED TO ALL, OR A MAJORITY OF, THE MEMBERS OF THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY ENGINEERING COMMITTEE IN CONNECTION WITH A MATTER SUBJECT FOR DISCUSSION OR CONSIDERATION AT AN OPEN MEETING OF THE ENGINEERING COMMITTEE ARE AVAILABLE BY PHONE REQUEST MADE TO THE AUTHORITY ADMINISTRATIVE OFFICE AT 949-234-5452. THE AUTHORITY ADMINISTRATIVE OFFICES ARE LOCATED AT 34156 DEL OBISPO STREET, DANA POINT, CA ("AUTHORITY OFFICE"). IF SUCH WRITINGS ARE DISTRIBUTED TO MEMBERS OF THE ENGINEERING COMMITTEE LESS THAN SEVENTY-TWO (72) HOURS PRIOR TO THE MEETING, THEY WILL BE SENT TO

PARTICIPANTS REQUESTING VIA EMAIL DELIVERY. IF SUCH WRITINGS ARE DISTRIBUTED IMMEDIATELY PRIOR TO, OR DURING, THE MEETING, THEY WILL BE AVAILABLE IMMEDIATELY ON VERBAL REQUEST TO BE DELIVERED VIA EMAIL TO REQUESTING PARTIES.

AGENDA

1. **Call Meeting to Order**

2. **Public Comments**

   THOSE WISHING TO ADDRESS THE ENGINEERING COMMITTEE ON ANY ITEM LISTED ON THE AGENDA WILL BE REQUESTED TO IDENTIFY AT THE OPENING OF THE MEETING AND PRIOR TO THE CLOSE OF THE MEETING. THE AUTHORITY REQUESTS THAT YOU STATE YOUR NAME WHEN MAKING THE REQUEST IN ORDER THAT YOUR NAME MAY BE CALLED TO SPEAK ON THE ITEM OF INTEREST. THE CHAIR OF THE MEETING WILL RECOGNIZE SPEAKERS FOR COMMENT AND GENERAL MEETING DECORUM SHOULD BE OBSERVED IN ORDER THAT SPEAKERS ARE NOT TALKING OVER EACH OTHER DURING THE CALL.

3. **Operations Report**

   Recommended Action: Information Item

4. **Use Audit Flow and Solids Methodology – Annual Update FY 2020-21**

   Recommended Action: Staff requests approval of the Use Audit calculated results for close of the Use Audit for disbursement or collection of additional funds in fiscal year 2020-21.

5. **Capital Improvement Construction Projects Report**

   Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-2 Board of Directors to approve Olsson Construction Change Orders 24 through 28 for $104,554.

6. **J.B. Latham Treatment Plant Package B Liquids Contingency [Project Committee 2]**

   Recommended Action: Staff recommends that the Engineering Committee recommend to the PC 2 Board of Directors to approve the addition of $300,000 of contingency to the J.B. Latham Package B Liquids Project (3220-000) for a total Liquids contingency of $916,800 and to increase the project budget by $300,000 to $3,150,000 for the 2021/22 FY.

7. **Consequence of Failure Analysis Update [Project Committees 2, 15, and 17]**

   Recommended Action: Information Item

Adjournment

I hereby certify that the foregoing Notice was personally emailed or mailed to each member of the SOCWA Engineering Committee at least 72 hours prior to the scheduled time of the Regular Meeting referred to above.

I hereby certify that the foregoing Notice was posted at least 72 hours prior to the time of the above-referenced Engineering Committee meeting at the usual agenda posting location of the South Orange County Wastewater Authority and at www.socwa.com.

Dated this 2nd day of September 2021.

B. Burnett

Betty Burnett, General Manager/Secretary
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

Agenda Item 4

Engineering Committee Meeting

Meeting Date: September 9, 2021

TO: Engineering Committee

STAFF CONTACT: Amber Baylor, Director of Environmental Compliance

SUBJECT: Use Audit Flow and Solids Methodology – Annual Update FY 20-21

Summary

The Use Audit flow allocation methodology has relied on historical practice for allocation of costs. The intent of this agenda item is to review the methodology per project committee (PC) which is presented to the Engineering Committee members on an annual basis for review, comment, and approval for use in the annual Use Audit for FY 2020-21.

Results

Captured herein are the methodologies employed and the results by member agency based on the raw and calculated data. Please note that PC5 and PC24 are attributed to fixed costs.

PC2

Member agency average flows for the FY were used in the flow allocation and applied proportionally from the total combined flow from each tributary trunk line. The PC2 use audit uses FY flows and three-year FY average solid loadings to reconcile the budgeted amounts. Solids loadings are calculated from adding the average FY BOD and TSS and dividing by 2 and then multiplying the result by the flow and the 8.34 pounds conversion factor. In March 2018, PC2 members Moulton Niguel Water District (MNWD) and Santa Margarita Water District (SMWD) came to an agreement on how to allocate solids for budgeting and use audit purposes. The new method captures the influent loading at Plant 3A as it was recognized that this allocation would isolate MNWD's solids contributions to JBL to a single variable. SMWD solids to JBL would then be the balance of solids contributed by the Oso Creek Water Reclamation Plant, 3A and any other discharges to the Oso Trabuco line to JBL. Summary results for PC2 are included in Table 1.

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PC2 - JB Latham Plant					
Liquids Summary (mgd)					
	2020-2021	2020-2021	2020-2021	2020-2021	Total
Member	Budgeted	Budgeted	Total	Total	Percent
Agency	Flow (mgd)	Percent	Avg. Flow (mgd)	Billing Flow (mgd)	To Date
CSJC	2.07	33.06%	2.208	2.208	31.15%
MNWD	1.40	22.36%	Constant	1.400	19.76%
SCWD	1.69	27.01%	1.684	1.684	23.76%
SMWD	1.10	17.57%	3.195	1.795	25.33%
	6.26	100.00%	7.087	7.087	100.00%

Please refer to the MNWD & SMWD Agreement from 2018 for flow/solids splitting in the Oso-Trabuco line.

Solids Summary Loading (mgd)					
	2020-2021	2020-2021	Total	Total	Total
Member	Budgeted	Budgeted	Avg. Loadings	Avg. Loadings	Percent
				2020-2021	
Agency	Flow	Percent	FY 2020-2021	Billing Loading	To Date
CSJC	5706.00	27.34%	6318	6318	24.08%
MNWD	3859.00	18.49%	Constant	4006	15.27%
SCWD	5181.00	24.83%	6035	6035	23.00%
SMWD	6122.00	29.34%	13889	9882	37.66%
	20868.00	100.00%	26242	26242	100.00%

Table 1: PC2 Liquids and Solids Summary Table

PC12

The PC12 method of production is detailed by member agency in the following narrative. San Juan Capistrano it is the acre-foot sum of the Rosembaum well, the Mission Street Well, and the total reclaimed water from the SMWD/CSJC intertie. For MNWD it is the amount of reclaimed water produced from the Regional Treatment Plant (RTP) and the 3A Treatment Plant (split with SMWD). South Coast Water District (SCWD) is the total reclaimed water produced from the Coastal Treatment Plant (CTP). The Santa Margarita Water District (SMWD) is the combined sum of reclaimed water produced from the 3A Treatment Plant (split with MNWD), the Oso Creek Water Reclamation Plant (OCWRP), the Chiquita Water Reclamation Plant (CWRP), and the Nichols Water Reclamation Plant (NWRP). The Trabuco Canyon Water District (TCWD) is reclaimed water produced from the Robinson Ranch Water Reclamation Plant (RRWRP). Summary results for PC2 are included in Table 2.

PC 12 Recycled Water Master Recycled Water Permit 2020-2021		
Member Agency	Region 9 Recyled Production FY 2020-2021	% RW Produced FY 2020-2021
	acft	%
CSJC	417	2.65
MNWD	6562	41.72
SCWD	1088	6.92
SMWD	7084	45.03
TCWD	579	3.68
Total	**15731**	**100.00**

Table 2: PC12 Liquids and Solids Summary Table

PC15

Due to the lack of solids handling capacity at the Coastal Treatment Plant (CTP), allocation methodology is based on flows to the treatment plant. In addition, there is no current flow meters installed to account for any flow sent to CTP from MNWD so no flow is being accounted for in this PC flow allocation methodology. The City of Laguna Beach (CLB) is the average annual flow into CTP (metered). The Emerald Bay Services District (EBSD) is the average annual flow into CTP (calculated from monthly meter read from the lift station divided by the days in the month). The South Coast Water District (SCWD) is the average annual flow into CTP (metered). The meter calibration is performed annually in June. Summary results for PC2 are included in Table 3.

PC 15 Actual Flows FY 2020-2021 Coastal Treatment Plant		
Member Agency	Plant Flows MGD	Plant Flow Percent
CLB	1.566	58.11
EBSD	0.078	2.89
SCWD	1.051	38.99
MNWD	0.00	0.00
Total	2.69	100.00

Table 3: PC15 Liquids and Solids Summary Table

PC17

PC17 has liquid and solids contribution. The liquid flow allocation is based on influent flow to the plant. The influent flow is solely contributed by the MNWD. Due to liquid flow from CTP, the centrate flow is divided by 5 and distributed to each agency then summed to create a total liquid flow to the RTP. The flows are then distributed on a proportional basis. The solids contribution is based on the total daily average pounds contributed by each agency distributed proportionally. Additional ETWD solids samples were programmed into the report. The meter calibration is performed annually in June. Summary results for PC17 are included in Tables 4 and 5.

PC 17 Liquids Regional Treatment Plant FY 2020-2021				
Member Agency	Plant Flow (MGD)	Centrate Flow (MGD)	Total Flow (MGD)	Liquid Flow (%)
CLB	0.00	0.01307	0.00759	0.09802
EBSD	0.00	0.00066	0.00002	0.00025
SCWD	0.00	0.00870	0.00339	0.04376
ETWD	0.00	0.01529	0.01529	0.19737
MNWD	7.66	0.06623	7.72220	99.66060
Total	7.66	0.10395	7.74850	100.00

Table 4

PC 17 Solids Regional Treatment Plant FY 2020-2021		
Member Agency	#/Day	%
CLB	4514.39	12.46
ETWD	5329.55	14.71
EBSD	223.74	0.62
MNWD	23154.71	63.90
SCWD	3016.21	8.32
Total	36238.61	100.00

Table 5

Table 4 & 5: PC17 Liquids and Solids Summary Tables

Previous Committee Review

On August 12, 2021, the SOCWA Engineering Committee reviewed the methodology and associated raw data file. There were five general commenters on the item. The Moulton Niguel Water District requested a review of the data tables with SOCWA staff. SOCWA staff, Amber Baylor coordinated discussion meeting. South Coast Water District requested a review of the swing of percentage of budget versus actuals. SOCWA staff provided that information. The Santa Margarita Water District requested flow allocation accounting of water budget to MNWD. SOCWA staff added that information to the raw data set (Columns L & M in 'PC12 Raw Data' sheet) and provided tables to SMWD electronically. Emerald Bay Service District (EBSD) requested review of the PC17 sludge pounds tables. El Toro Water District (ETWD) requested incorporation of additional data points by ETWD's ELAP certified laboratory in the PC17 solids calculation. SOCWA staff responded to both requests through incorporation of the additional ETWD data points and updated Tables 4 & 5 presented in this agenda item.

Recommended Action: Staff requests approval of the Use Audit calculated results for close of the Use Audit for disbursement or collection of additional funds in fiscal year 2020-21.

Agenda Item 5

Engineering Committee Meeting

Meeting Date: September 9, 2021

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: Capital Improvement Construction Projects Report

Overview

Active Construction Project Updates:
Attached are the updated CIP reports. Please note that there are five new change orders for PC 2 J.B. Latham Package B project totaling $104,554.

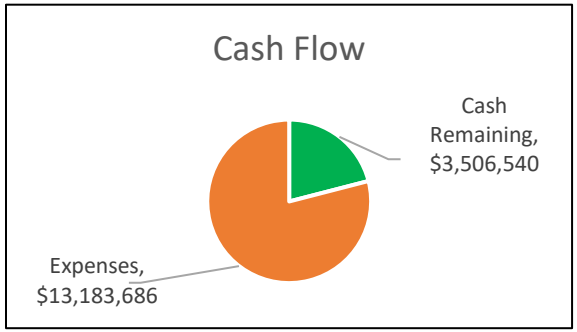
Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-2 Board of Directors to approve Olsson Construction Change Orders 24 through 28 for $104,554.

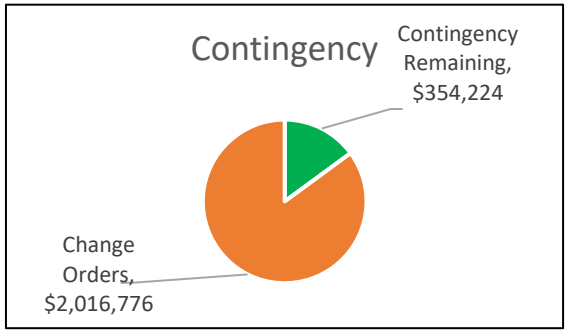
Project Financial Status

Project Committee	2
Project Name	Package B
Project Description	Plant 1 basin repairs, DAF rehabilitation, Energy Building seismic retrofit and minor rehabilitation, Digester 4 rehabilitation

Data Last Updated

August 31, 2021





Cash Flow

Collected	$16,690,226
Expenses	$13,183,686

Project Completion

Schedule	83%
Budget	57%

Contracts

Company	PO No.	Original	Change Orders	Total	Paid
Olsson	13497	$ 17,325,000	$ 1,176,444	$ 18,501,444	$ 9,985,577
Butier	13647	$ 895,727	$ 612,715	$ 1,508,442	$ 970,272
Carollo	13616	$ 846,528	$ 227,617	$ 1,074,145	$ 991,551
TetraTech	13605	$ 94,000	$ -	$ 94,000	$ 81,837
		$ 19,161,255	**$ 2,016,776**	**$ 21,178,031**	**$12,029,237**

Contingency

Area	Project Code	Amount	Change Orders	Total Remaining	Percent Used
Liquids	3220-000	$ 616,800	$ 591,544	$ 25,256	95.9%
Common	3231-000	$ 96,800	$ 67,205	$ 29,595	69.4%
Solids	3287-000	$ 1,657,400	$ 1,358,026	$ 299,374	81.9%
		$ 2,371,000	**$ 2,016,776**	**$ 354,224**	**85.1%**

Summary of New Change Orders

Change Order No	CSJC	MNWD	SCWD	SMWD	Amount
24	$20,352	$14,668	$13,568	$19,252	$67,839
25	$1,487	$1,072	$992	$1,407	$4,958
26	$2,598	$1,949	$2,436	$1,461	$8,444
27	$4,760	$3,570	$4,462	$2,677	$15,470
28	$2,353	$1,696	$1,569	$2,226	$7,843
Grand Total	**$31,550**	**$22,954**	**$23,026**	**$27,023**	**$104,554**

Change Orders

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
1	Olsson	3287-000	Addition of Loop Piping to the Existing Hot Water Lines Adjacent to Digester 3	Approved by Board of Directors	12/12/2019		$ 4,725
2	Olsson	3287-000	Asbestos Gaskets in Boiler hazardous disposal	Approved by Board of Directors	6/4/2020		$ 6,343
3	Olsson	3287-000	Add Analog Infrastructure and Cabling	Approved by Board of Directors	6/4/2020		$ 37,970
4	Olsson	3287-000	Digester 4 Coating Additional Sealant	Approved by Board of Directors	6/4/2020		$ 24,002
5	Olsson	3220-000	Valve Handwheel Ergonomic extension	Approved by Board of Directors	8/6/2020		$ 16,370

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
6	Olsson	3287-000	Change to DeZurik Plug Valves to match existing	Approved by Board of Directors	8/6/2020		$ 41,994
7	Olsson	3287-000	Digester 4 Additional Concrete Repair	Approved by Board of Directors	8/6/2020		$ 7,413
8	Olsson	3287-000	Repair Existing Damaged Electrical Box	Approved by Board of Directors	8/6/2020		$ (1,829)
9	Olsson	3220-000	Change the Telescoping Valve Boxes and Piping from Carbon Steel to Stainless Steel	Approved by Board of Directors	8/6/2020		$ 18,678
10	Olsson	3287-000	Duct bank J Interferences	Approved by Board of Directors	12/17/2020		$ 73,639
11	Olsson	3220-000	Blasting of Existing Influent Pipe Spools	Approved by Board of Directors	12/17/2020		$ 20,869
12	Olsson	3220-000	Duct bank K Interferences	Approved by Board of Directors	12/17/2020		$ 15,567
13	Olsson	3287-000	Digester 3/4 PLC Relocation	Approved by Board of Directors	12/17/2020		$ 41,368
14	Olsson	3287-000	Digester 4 Additional Tank Repair	Approved by Board of Directors	12/17/2020		$ 33,643
15	Olsson	3220-000	Duct bank O Interferences	Approved by Board of Directors	12/17/2020		$ 1,687

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
16	Olsson	3287-000	Digester 3/4 Control Building Roof Replacement	Approved by Board of Directors	2/4/2021		$ 42,780
17	Olsson	3287-000	MCC-D1 Modifications due to Change in Motor Size	Approved by Board of Directors	5/6/2021		$ 34,392
18	Olsson	3287-000	Integrator Additional Site Visits	Approved by Board of Directors	5/6/2021		$ 7,572
19	Olsson	3287-000	Multi-zone air conditioning unit in the Cogen MCC Room and Office	Approved by Board of Directors	6/3/2021		$ 29,417
20	Olsson	3220-000	Overhead Walkway Removal at Plant 1 Secondary Basins 5 through 9	Approved by Board of Directors	6/3/2021		$ 62,114
21	Olsson	3287-000	Cogeneration PLC Modifications and Integration	Approved by Board of Directors	6/3/2021		$ 42,923
22	Olsson	3220-000	Plant 1 Secondary Basins UV Rated Wear Strips	Approved by Board of Directors	9/2/2021		$ 28,965
23	Olsson	3287-000	MCC-F1 Design Change	Approved by Board of Directors	9/2/2021		$ 481,290

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
24	**Olsson**	**3287-000**	**DAF 2 Investigation Work and Inspection Blast**	**Within Contingency, to be reviewed by Engineering Committee**	**9/9/2021**		**$ 67,839**
25	**Olsson**	**3287-000**	**New Fiber Conduit in West Blower Building**	**Within Contingency, to be reviewed by Engineering Committee**	**9/9/2021**		**$ 4,958**
26	**Olsson**	**3220-000**	**Plant 1 Primary Basin Conduit Obstruction**	**Within Contingency, to be reviewed by Engineering Committee**	**9/9/2021**		**$ 8,444**
27	**Olsson**	**3220-000**	**Plant 1 Influent Channel Additional Coating between Primary Basins 5 and 6**	**Within Contingency, to be reviewed by Engineering Committee**	**9/9/2021**		**$ 15,470**
28	**Olsson**	**3287-000**	**MCC-F1 Lighting Changes**	**Within Contingency, to be reviewed by Engineering Committee**	**9/9/2021**		**$ 7,843**
1CM Common	Butier	3231-000	CM Change Order No. 1	Approved by Board of Directors	7/13/2021		$ 48,995

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
1CM Liquids	Butier	3220-000	CM Change Order No. 1	Approved by Board of Directors	7/13/2021		$ 294,125
1CM Solids	Butier	3287-000	CM Change Order No. 1	Approved by Board of Directors	7/13/2021		$ 269,595
1ESDC Common	Carollo	3231-000	ESDC Change Order No. 1	Approved by Board of Directors	6/3/2021		$ 18,210
1ESDC Liquids	Carollo	3220-000	ESDC Change Order No. 1	Approved by Board of Directors	6/3/2021		$ 109,256
1ESDC Solids	Carollo	3287-000	ESDC Change Order No. 1	Approved by Board of Directors	6/3/2021		$ 100,151
PCO 002	Olsson	3287-000	Digester 4 Rail Coating. The coating is not needed and resulting in a credit but some rehabilitation work will be needed.	Potential Change	(blank)	-$1,000	
PCO 004	Olsson	3287-000	Digester 4 Control Narrative needed	Potential Change	(blank)	$5,000	
PCO 005	Olsson	3287-000	TWAS Slab Modifications	Potential Change	(blank)	$50,000	
PCO 008	Olsson	3287-000	Conduit Routing Conflict from MCC-F1 and Relocation of MCC-F1	Potential Change	(blank)	$350,000	

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
PCO 009	Olsson	3287-000	PLC East Headworks Integration	Potential Change	(blank)	$10,000	
PCO 012	Olsson	3287-000	PCL-CG Integration	Potential Change	(blank)	$5,000	
PCO 014	Olsson	3287-000	Digester 4 Compressor Supply Line	Potential Change	(blank)	$18,146	
PCO 018	Olsson	3287-000	Duct bank L Interferences	Potential Change	(blank)	$10,000	
PCO 026	Olsson	3287-000	Gas Hatch Lids Mating Connection	Potential Change	(blank)	$7,771	
PCO 028	Olsson	3287-000	4" Gas Line Routing Modifications	Potential Change	(blank)	$18,147	
PCO 032	Olsson	3287-000	Gas Mixer Conduit Conflict	Potential Change	(blank)	$12,384	
PCO 037	Olsson	3231-000	Energy Building Monorail and Other Conflicts	Potential Change	12/10/2020	$10,000	
PCO 039	Olsson	3220-000	Diversion Structure Gate Actuator Power Feed Replacement	Potential Change	8/13/2020	$5,000	
PCO 050	Olsson	3220-000	Telescoping Valves Rework	Potential Change	12/23/2020	$27,884	
PCO 43	Olsson	3220-000	Telescoping Valve Pipe Support	Potential Change	(blank)	$3,754	
PCO 45	Olsson	3220-000	Telescoping Valve Pipe Support	Potential Change	(blank)	$3,754	
PCO 66	Olsson	3287-000	DAFT 1 and 2 Repairs	Potential Change	(blank)	$232,161	

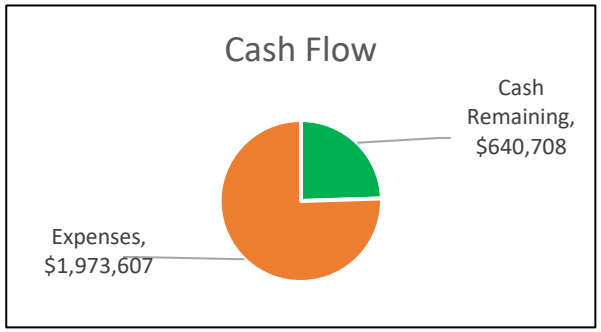
Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
PCO 83	Olsson	3220-000	Plant 1 Primary Basins Additional Repairs and Replacement	Potential Change	(blank)	$126,000	
PCO 86	Olsson	3220-000	Plant 1 Primary Basins Conduit Obstructions	Potential Change	(blank)	$8,444	
PCO 88	Olsson	3220-000	Plant 1 Primary Existing Coating Removal	Potential Change	(blank)	$36,000	
PCO 89	Olsson	3220-000	Plant 1 Influent Channel Additional Coating between Primary Basins 5 and 6	Potential Change	(blank)	$15,470	
PCO 98	Olsson	3220-000	Effluent Pump Station Descope (A1-A6)	Potential Change	(blank)	-$800,000	
PCO 99	Olsson	3223-000	Energy Building Modifications Descope (F1-F4, G1-G2, & H1-H2)	Potential Change	(blank)	-$600,000	
Grand Total						-$446,085	$ 2,016,776

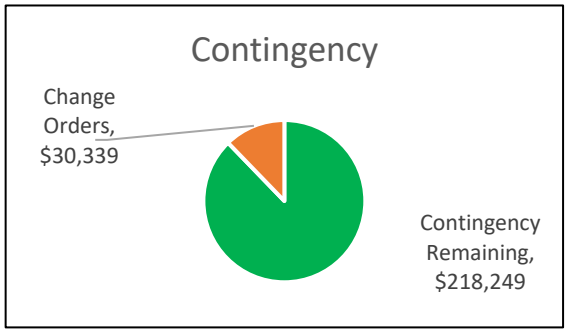
Project Financial Status

Project Committee	15
Project Name	Export Sludge Force Main Replacement
Project Description	New 6-inch HDPE force main replacing ageing 4-inch (x2) lines from the Coastal Treatment Plant to the Regional Treatment Plant through Aliso Canyon

Data Last Updated

August 31, 2021





Cash Flow

Collected	$2,614,315
Expenses	$1,973,607

Project Completion

Schedule	68%
Budget	46%

Contracts

Company	PO No.	Original	Change Orders	Total	Paid
Filanc	15949	$ 3,107,346	$ 30,339	$ 3,137,685	$ 1,491,244
Butier	16164	$ 226,100	$ -	$ 226,100	$ 105,105
PSOMAS	15961	$ 277,368	$ -	$ 277,368	$ 40,275
Dudek	15947	$ 387,750	$ -	$ 387,750	$ 190,459
Ninyo & Moore	16268	$ 65,790	$ 43,166	$ 108,956	$ 60,772
		$ 4,064,354	**$ 73,505**	**$ 4,137,859**	**$1,887,855**

Filanc Contingency

Area	Project Code	Amount	Change Orders	Total Remaining	Percent Used
Liquids	3541-000	$ 248,588	$ 30,339	$ 218,249	12.2%
		$ 248,588	**$ 30,339**	**$ 218,249**	**12.2%**

Summary of New Change Orders

Change Order No	CLB	EBSD	MNWD	SCWD	Amount
Grand Total					

Change Orders

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
1	Filanc	3541-000	Alternative Fiber Optic Conduit Installation at Jack and Bore	Approved by Board of Directors	6/3/2021		$ 5,690
2	Filanc	3541-000	HDPE Pipe Price Adjustment	Approved by Board of Directors	9/2/2021		$ 15,615
3	Filanc	3541-000	Existing 6-Inch Sludge Line Fix for Pressure Test	Approved by Board of Directors	9/2/2021		$ 6,666
4	Filanc	3541-000	18-Inch VCP Sewer Line Conflicts	Approved by Board of Directors	9/2/2021		$ 2,368

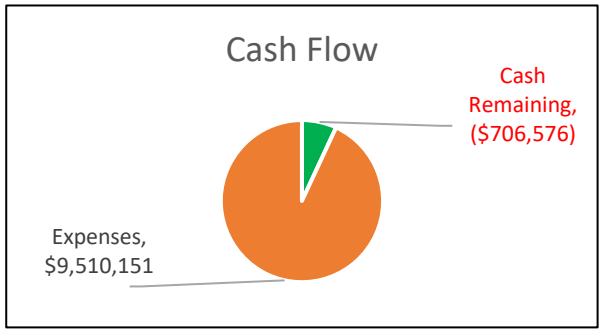
Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
PCO 007	Filanc	3541-000	Lost Production with Equipment Movement	Potential Change	(blank)		
PCO 008	Filanc	3541-000	Abandoned 4" PVC Water Line Interference	Potential Change	(blank)		
PCO 009	Filanc	3541-000	Wider Trench in Low Cover	Potential Change	(blank)	$36,000	
PCO 012	Filanc	3541-000	Jack and Bore Conflict	Potential Change	(blank)	$110,000	
PCO 013	Filanc	3541-000	Nesting Bird Restrictions	Potential Change	(blank)		
PCO 014	Filanc	3541-000	Abandoned 12" PVC Interference	Potential Change	(blank)	$5,462	
PCO 015	Filanc	3541-000	18-Inch VCP Sewer Line Conflict at Sta. 96+55	Potential Change	(blank)	$6,199	
PCO 016	Filanc	3541-000	ACWHEP Unknown Buried Concrete	Potential Change	(blank)	$30,000	
PCO 017	Filanc	3541-000	Encasement at Sta. 88+90 to 89+90	Potential Change	(blank)	$3,516	
Grand Total						$191,177	$ 30,339

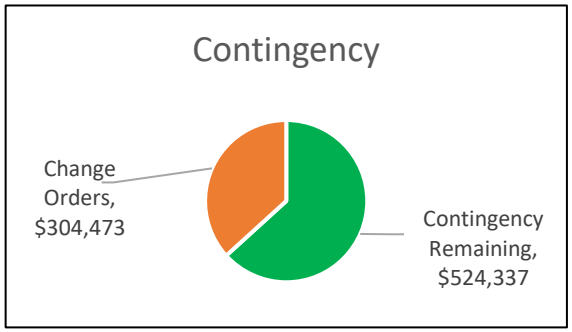
Project Financial Status

Project Committee	15
Project Name	Facility Improvements
Project Description	New ferric chloride system, new collection equipment in East Sedimentation basins, concrete repair, structural improvements, new switchgear and numerous electrical upgrades

Data Last Updated

August 31, 2021





Cash Flow

Collected	$8,803,575
Expenses	$9,510,151

Project Completion

Schedule	95%
Budget	96%

Contracts

Company	PO No.	Original	Change Orders	Total	Paid
PCL	13751	$ 9,209,000	$ (895,715)	$ 8,313,285	$ 8,106,713
Butier	13647	$ 812,288	$ -	$ 812,288	$ 812,228
Hazen & Sawyer	13648	$ 490,484	$ -	$ 490,484	$ 284,376
		$ 10,511,772	**$ (895,715)**	**$ 9,616,057**	**$9,203,317**

Contingency

Area	Project Code	Amount	Change Orders	Total Remaining	Percent Used
Liquids	3539-000	$ 828,810	$ 304,473	$ 524,337	36.7%
		$ 828,810	**$ 304,473**	**$ 524,337**	**36.7%**

Summary of New Change Orders

Change Order No	CLB	EBSD	MNWD	SCWD	Amount
Grand Total					

Change Orders

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
1	PCL	3539-000	Additional Potholing	Approved by Board of Directors	8/6/2020		$ 22,936
2	PCL	3539-000	Gas Line Replacement	Approved by Board of Directors	8/6/2020		$ 41,006
3	PCL	3539-000	Main Switchgear Building Underground Conflicts	Approved by Board of Directors	8/6/2020		$ 8,683
4	PCL	3539-000	Mud Valve Bolt Removal	Approved by Board of Directors	8/6/2020		$ 6,577
5	PCL	3539-000	Additional Anchor Bolt Removal	Approved by Board of Directors	8/6/2020		$ 15,271
6	PCL	3539-000	Slide Gate Concrete Repair	Approved by Board of Directors	8/6/2020		$ 3,396
7	PCL	3539-000	Sludge Collector Wear Strips	Approved by Board of Directors	8/6/2020		$ 5,304
8	PCL	3539-000	SCE Transformer Slab Box	Approved by Board of Directors	9/3/2020		$ 4,378
9	PCL	3539-000	Duct Bank 5 Buried Utility Conflicts	Approved by Board of Directors	10/1/2020		$ 32,224
10	PCL	3539-000	Telescoping Valve Modifications	Approved by Board of Directors	10/1/2020		$ 36,067
11	PCL	3539-000	Secondary Effluent Channel Improvements	Approved by Board of Directors	12/17/2020		$ 5,153

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
12	PCL	3539-000	Portable Generator Tap Enclosures in Buildings 2 & 15	Approved by Board of Directors	12/10/2020		$ 18,356
13	PCL	3539-000	Conduit, wiring, and mounting of LL1 fixtures	Approved by Board of Directors	12/10/2020		$ 5,001
14	PCL	3539-000	MCC Feeder Credit	Approved by Board of Directors	2/4/2021		$ (8,803)
15	PCL	3539-000	Switchgear Building Concrete Repair	Approved by Board of Directors	3/11/2021		$ 40,144
16	PCL	3539-000	Sludge Collector Mounting Plate Replacement	Approved by Board of Directors	3/11/2021		$ 10,623
17	PCL	3539-000	Basin Leaking Crack Repair in East Secondaries	Approved by Board of Directors	3/11/2021		$ 1,863
18	PCL	3539-000	Additional Spall Repair - Grit Channels	Approved by Board of Directors	3/11/2021		$ 26,405
19	PCL	3539-000	Mixed Liquor Channel Remobilization	Approved by Board of Directors	3/11/2021		$ 5,323
20	PCL	3539-000	Building 10 Roof Repairs	Approved by Board of Directors	3/11/2021		$ 2,245
21	PCL	3539-000	Building 8 Gas Line Rerouting	Approved by Board of Directors	3/11/2021		$ 717

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
22	PCL	3539-000	Additional Spall Repair - East Secondary Basins	Approved by Board of Directors	6/3/2021		$ 9,722
23	PCL	3539-000	Grit Chamber Conflicts	Approved by Board of Directors	6/3/2021		$ 3,888
24	PCL	3539-000	1/2" Ferric Line Conflicts	Approved by Board of Directors	6/3/2021		$ 784
25	PCL	3539-000	Helical Skimmer Wiring	Approved by Board of Directors	8/5/2021		$ 1,072
26	PCL	3539-000	MCC 15 Unmarked Wire Chasing	Approved by Board of Directors	8/5/2021		$ 6,138
27	PCL	3539-000	Unilateral Descope of Drainage Pump Station, East Basin RAS Channel, and West Secondary Sludge Collection Equipment	Approved	6/11/2021		$ (1,200,188)
28	PCL	3539-000	Unilateral for 21 calendar days for weather and COVID-19 delays	Approved	6/16/2021		$ -
PCO 006	PCL	3539-000	Additional Pothole Paving	Potential Change	(blank)	$5,000	
PCO 013	PCL	3539-000	Ferric Containment Foundation	Potential Change	(blank)	$15,000	

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
PCO 029	PCL	3539-000	Building 15 Concrete Restoration	Potential Change	(blank)	$20,000	
PCO 031	PCL	3539-000	Roll Up Door Fascia	Potential Change	(blank)	$3,000	
PCO 032	PCL	3539-000	DAF Stair Railing	Potential Change	(blank)	-$500	
PCO 038	PCL	3539-000	Aeration Channel Conflicts	Potential Change	(blank)	$8,000	
PCO 044	PCL	3539-000	Building 10 Wall Repair	Potential Change	(blank)	$2,638	
PCO 047	PCL	3539-000	West Telescoping Valve Improvements	Potential Change	(blank)	$12,168	
PCO 048	PCL	3539-000	West Secondary Effluent Channel Concrete Repair	Potential Change	(blank)	$20,000	
PCO 050	PCL	3539-000	RAS Box Leaks	Potential Change	(blank)	$0	
PCO 051	PCL	3539-000	Grit Grating Modifications	Potential Change	(blank)	$0	
PCO 053	PCL	3539-000	West Grit Channel Unforeseen Conflicts	Potential Change	(blank)	$10,294	
PCO 055	PCL	3539-000	Extra Work in Generator Building	Potential Change	(blank)	$3,000	
PCO 056	PCL	3539-000	Wire Size for Storm Water Pump Panel	Potential Change	(blank)	$3,714	

Change Order No.	Vendor Name	Project ID	Description	Status	Status Date	Potential Change Amount	Final Amount
PCO 057	PCL	3539-000	Power for Bldg 15 HVAC	Potential Change	(blank)	$2,301	
PCO 058	PCL	3539-000	Wiring for West Secondary Basins	Potential Change	(blank)	$5,000	
PCO 059	PCL	3539-000	Telescoping Valve Stand Modifications	Potential Change	(blank)	$5,000	
PCO 060	PCL	3539-000	Headworks Roofing Additions	Potential Change	(blank)	$3,500	
PCO 061	PCL	3539-000	Headworks bypass	Potential Change	(blank)	$20,000	
PCO 062	PCL	3539-000	Additional Ferric Area Work	Potential Change	(blank)	$10,000	
PCO 065	PCL	3539-000	SCE XFMR Slab Box	Potential Change	(blank)	$20,000	
PCO 066	PCL	3539-000	Ferric Tank LIT	Potential Change	(blank)	$5,000	
Grand Total						$173,115	$ (895,715)

Agenda Item 6

Engineering Committee Meeting

Meeting Date: September 9, 2021

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: J.B. Latham Treatment Plant Package B Liquids Contingency [Project Committee 2]

Overview

Over the past few engineering committee meetings, we have updated the committee on the progress of the J.B. Latham Package B project as well as some of the challenges we have encountered on the project. As reported in the most recent Capital Improvement Construction Report and in Table 1 below, the Liquids portion of the Package B project is nearly out of contingency. In order to prevent delays, we are requesting the approval of additional contingency for the Liquids portion of the project. We are requesting an additional $300,000 of contingency and budget for the J.B. Latham Package B Liquids (3220-000), bringing the total Liquids contingency to $916,800 and the total project contingency to $2,671,000 (15.4% of the original construction contract of $17,325,000).

Table 1 – Current Package B Contingency

Area	Project Code	Amount	Change Orders	Total Remaining	Percent Used
Liquids	3220-000	$616,800	$591,544	$25,256	95.9%
Common	3231-000	$96,800	$67,205	$29,595	69.4%
Solids	3287-000	$1,657,400	$1,358,026	$299,374	81.9%
	Total	**$2,371,000**	**$2,016,776**	**$354,224**	**85.1%**

We currently have an estimated $198,638 in potential change orders for the Liquids portion of the project as shown in Table 2.

Table 2 – Potential Change Orders for Package B Liquids

PCO 039	3220-000	Diversion Structure Gate Actuator Power Feed Replacement	Potential Change	$5,000
PCO 045	3220-000	Telescoping Valve Pipe Support	Potential Change	$3,754
PCO 050	3220-000	Telescoping Valves Rework	Potential Change	$27,884
PCO 083	**3220-000**	**Plant 1 Primary Basins Additional Repairs and Replacement**	**Potential Change**	**$126,000**
PCO 088	**3220-000**	**Plant 1 Primary Existing Coating Removal**	**Potential Change**	**$36,000**
Total				$198,638

The two major potential change orders are the Plant 1 Primary Basins Additional Repair and Replacement (PCO 083) and Plant 1 Primary Existing Coating Removal (PCO 088).

Plant 1 Primary Basins Additional Repair and Replacement:
Upon demolition of Plant 1 Primary Basins 5 and 6, the existing headshafts were heavily corrdoed and beyond repair. In addiiton, all the chain and flight equipment in the basins needs to be removed and reinstalled in order to properly coat the basins. Based on the progress in Basins 5 and 6, the assumption is that the remaining four baisns will need to be rehabiliated in a similar manner. This estimated cost includes all Plant 1 Primary Basins.

Plant 1 Primary Existing Coating Removal:
The existing coating removal within the Plant 1 primary basins and channels was limited to preparation, power washing and abrasive blast clean. However, upon completing the work per the Contract Document, the existing coating remains on the basin and channel walls. In order to apply the new coating system correctly, the existing coating would need to be removed completely in all the remaining basins and channels.

Fiscal Impact

As stated above, the current estimate for potential change orders is $198,638. Because of the nature of this project, there may be additional change orders not yet identified and the cost of identified potential change orders may vary as we progress. We are therefore requesting an additional $300,000 of contingency for the J.B. Latham Package B Liquids (3220-000), bringing the Liquids contingency to $916,800 and the total project contingency to $2,671,000 (15.4% of the original construction contract of $17,325,000). Any change orders against the contingency will be presented to the Engineering Committee and the Board for approval. The additional contingency will allow us to continue to direct work to be completed without causing delay to construction.

Table 3 – Agency Allocation for the Requested Contingency

Member Agency	3220-000 Facility Improvements B – Liquids Area Improvements
CSJC	$92,310.00
MNWD	$69,240.00
SCWD	$86,520.00
SMWD	$51,930.00
Total	$300,000.00

The recently approved Fiscal Year 2021/22 Capital Improvement Program Budget currently has $2,850,000 for the Package B Liquids Project (3220-000) and the increase in contingency would also increase the FY 2021/22 project budget by $300,000 to $3,150,000

As a reminder, we are also working through descoping several items that will reduce the construction contract amount for both Liquids and Common portions of the project. We are still working through the exact amount of the contract reduction but are currently estimating a conservative $1,400,000 for the overall Package B Project. The items being descoped have already been identified in separate projects in the Fiscal Year 2021/22 CIP Budget.

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC 2 Board of Directors to approve the addition of $300,000 of contingency to the J.B. Latham Package B Liquids Project (3220-000) for a total Liquids contingency of $916,800 and to increase the project budget by $300,000 to $3,150,000 for the 2021/22 FY.

Agenda Item 7

Engineering Committee Meeting

Meeting Date: September 9, 2021

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

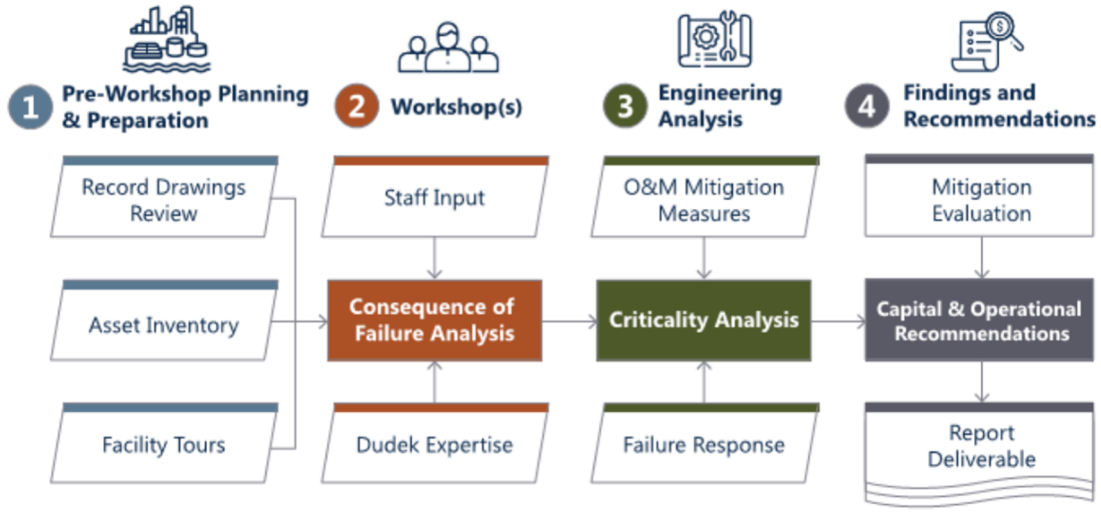
SUBJECT: Consequence of Failure Analysis Update [Project Committees 2, 15, and 17]

Overview

Last year SOCWA conducted a series of workshops with Dudek to identify and rank key components of the J.B. Latham Treatment Plant in a consequence of failure analysis (CoFA). The results will be used to update the Ten Year Plan and to provide clear direction on future projects and their timing. The CoFA process uses a scoring system to identify the consequence of a failure, the probability of that failure, and a weighting factor for specific categories. The end result is a risk designation for each item analyzed.

The final report for the J.B. Latham Treatment Plant is attached as Exhibit A.

Figure 1 – Consequence of Failure Analysis Flow Chart



The same format for the CoFA will be completed for the Coastal Treatment Plant starting later this year and early next year we plan on doing the same process for the Regional Treatment Plant. Once all three plants are completed, this information will be fed into the Ten Year Plan to help adjust the priority for identified projects.

Attached as Exhibit B is the proposal for the CoFA for the Coastal Treatment Plant.

Recommended Action: Informational only.

Exhibit A

DUDEK

FINAL

Consequence of Failure Analysis

For J.B. Latham Wastewater Treatment Plant

Prepared for:

South Orange County Wastewater Authority
34156 Del Obispo St
Dana Point, CA 92629
Contact: Jason Manning

August 2021

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APPENDICES

Executive Summary

The South Orange County Wastewater Authority contracted Dudek to prepare a Consequence of Failure Analysis (CoFA) for select process areas and facilities within the J. B. Latham Wastewater Treatment Plant (JBL plant). The CoFA is intended to identify and prioritize risk within these facilities to guide strategic O&M and CIP planning and scheduling for SOCWA in the short-term to mid-term future.

J. B. Latham WWTP

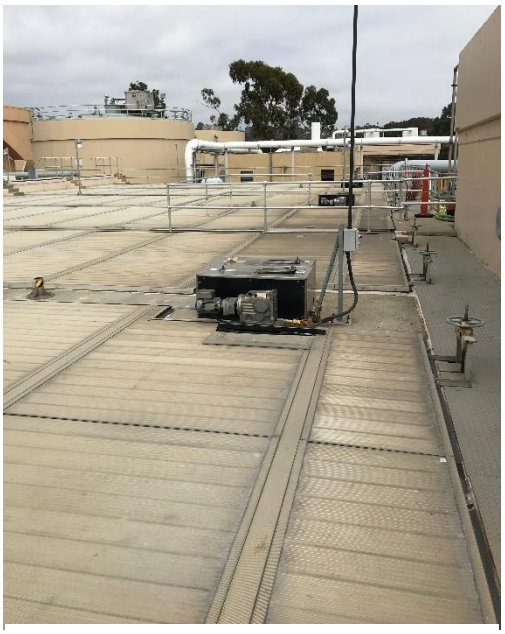
Summary of Findings

The analysis found that the JBL plant has several top priority project needs for capital investment to mitigate risk (i.e. consequences and probability of failure) within the facility. Current near-term budgeted CIP projects address some of these project needs, however, there are a few top priority project needs that are not addressed with near-term CIP projects. The majority of secondary and tertiary priority projects are addressed in SOCWA's current ten-year CIP, however, additional project needs and recommendations are made to either improve current budgeted project effectiveness or address a project need that is not currently identified in the CIP.

Summary of Recommendations

It is recommended that SOCWA proceed quickly with capital project planning, design, and construction of top priority projects. Where practical, it is recommended to implement Operations and Maintenance (O&M) recommendations made herein to mitigate risk of critical systems. Top priority capital project needs are identified below. Current CIP projects and/or recommendations to change priority and scope of CIP projects are summarized in **(bold parentheses)**.

- Replacement of hauling truck load cells with alternative weight measurement equipment. The equipment must address current deficiencies with the existing load cells including routine failure and calibration requirements, sensitivity to wash-down water, and difficulty of finding spare parts. **(Capital Improvements Program).**
- Replace Plant 2 primary clarifier covers with new safe-to-walk on covers and include upgrades to provide sufficient fall protection and safety measures. **(Capital Improvements Program)**
- Replace existing corroded gas line to flare with a new permanent line. Project can be done prior to or in conjunction with replacement of existing flare. **(Included in Project No. 2096 Plant 1 Liquids Buried Piping Reconstruction scheduled for FY 2030). Recommend re-prioritizing this project for near-term implementation.**



Plant 2 Primary Clarifier Covers

- MCC M Replacement. Recommend relocation of MCC M to indoor, climate-controlled environment to protect the equipment from weather and animals. **(Capital Improvements Program)**
- Complete a storage needs assessment and replace the existing storage shed with a modern facility that is practical for staff spare parts and equipment storage needs. Solution may also include various locations for equipment storage around the plant site. **(Included in Project No. 2344 and 2346 Storage Building Replacement scheduled for FY 2027). Recommend re-prioritizing this project for near-term implementation.**
- Reconfigure chlorine contact basin and process water system to create a fully isolated process water side stream that can be appropriately chlorinated to protect the process water system from snails and organic growth, minimize vector control issues in the CCB, and protect staff from exposure to undisinfected secondary effluent during routine wash-down operations. At SOCWA's option, consider construction of an approved Title 22 recycled water system to increase beneficial uses of the recycled water. **(Included in part with Project No. 2082 and 2083 Chlorine Contact Basin Isolation Gates and Structural Rehabilitation scheduled for FY 2023). Recommend additional scope of project to allow staff the ability to consistently chlorinate water without risking putting a chlorine residual out the outfall.**
- Construct sludge storage facilities (i.e. silos). Include facilities in the upgrades to allow for truck washing and septage receiving if possible. **(Not included in any current CIP project). Recommend including sludge storage and reconfiguration of solids handling facilities to improve reliability.**

It is recommended that slight adjustments are made to SOCWA's 10-year CIP implementation schedule and scope of projects to consider recommendations made herein. Top priority projects (i.e. projects that address one or more extra high risk failure modes) are recommended for expedited design and implementation. SOCWA's schedule for secondary priority and tertiary priority projects is suitable based on the project needs and associated risk designation. Tertiary priority projects may be candidate projects for deferred implementation if necessary. Refer to **Appendix A** for more information and detailed summary of each process area and failure mode assessed as part of this Consequence of Failure Analysis.

1 Introduction

The South Orange County Wastewater Authority (SOCWA) contracted Dudek to prepare a Consequence of Failure Analysis (CoFA) for select process areas and facilities at the J. B. Latham WWTP. The CoFA is intended to identify and prioritize risk within these facilities to guide strategic O&M and capital investments for SOCWA in the short-term to mid-term future.

J. B. Latham WWTP Facility Overview

The J. B. Latham WWTP (JBL plant) is a secondary treatment facility in Data Point, CA. The JBL plant is regulated by the State of California Regional Water Quality Control Board (RWQCB) San Diego Region, according to Waste Discharge Requirements Order No. R9-2012-0012 as Amended by Orders Nos. R9-2014-0105 and R9-2017-0013 NPDES No. CA0107417. Currently, the WWTP is permitted to treat and discharge 13 million gallons per day (mgd). The SOCWA JBL plant is a conventional activated sludge treatment facility providing wastewater treatment for four SOCWA member agencies Moulton Niguel Water District (MNWD), Santa Margarita Water District (SMWD), South Coast Water District (SCWD), and the City of San Juan Capistrano. There are two treatment trains: 9-side (Plant 1) and 4-side (Plant 2). All effluent from the JBL plant is discharged to the Pacific Ocean through the San Juan Creek Ocean Outfall (SJCOO).

Background description, function, and major equipment in each process area assessed as part of this CoFA are summarized in Table 1-1, which also served as the outline to the workshops for the JBL plant. Not all equipment in identified areas were considered in this analysis.

Table 1-1. JBL Plant CoFA Unit Process and Major Equipment Summary

Process Area	Description	Assets
Plant 1 Influent Sewer	Functions to convey raw sewage influent from the diversion structure into the Plant 1 headworks. Consists of a single 42" VCP pipeline.	• Plant 1 Influent sewer • Plant 1 Influent flow measurement
Bypass Sewer	Functions as an interconnecting 36" pipeline between Plant 2 influent and diversion structure to provide a bypass for either Plant 1 or Plant 2. Flow control gates are used to provide full plant bypass as necessary for maintenance activities.	• Bypass sewer • Influent gates
Plant 1 Headworks	Functions to remove rags and other large materials from the influent wastewater before entering downstream processes. Influent flow through the headworks is by gravity through a mechanical bar screen housed in the headworks building.	• Headworks building • Bar Screens • Screenings conveyor • Screenings compactor
Plant 1 Grit Handling	Functions to remove grit (fast-settling inorganic solids) from the influent wastewater before entering downstream processes. Grit removal is accomplished in an aerated grit chamber, and grit pumps pump the grit to a classifier and disposal dumpster.	• Grit conveyor • Grit chamber
Plant 1 Raw Sewage Pump Station	Functions to pump raw influent into the primary clarifiers. Grit effluent is collected in a wet well adjacent to the Plant 1 blower building. Raw sewage pumps are located in a dry well area in the basement of the Plant 1 blower building.	• Raw sewage wet well • Raw sewage pumps • Raw sewage VFDs
Plant 1 Primary Clarifiers	Functions to remove organic solids from the influent wastewater prior to secondary treatment and reduce aeration treatment requirements for the secondary process.	• Primary clarifier tanks • Sludge/scum collectors

Table 1-1. JBL Plant CoFA Unit Process and Major Equipment Summary

Process Area	Description	Assets
Plant 2 Primary Clarifiers	Functions to remove organic solids from the influent wastewater prior to secondary treatment and reduce aeration treatment requirements for the secondary process.	• Primary clarifier tanks • Scum drives • Covers • Troughs/scum collectors
Plant 1 Blower Building	Functions as a building to house backup blowers, raw sewage pumps, primary sludge pumps, RAS and WAS pumps and electrical equipment.	• Blower building • Plant 1 backup blowers
Plant 1 Mixed Liquor Channel	Functions to convey mixed liquor to the Plant 1 aeration basins.	• Channel concrete • Agitation air piping
Plant 1 RAS and WAS Pump Station	Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) function to recycle secondary sludge to the aeration basins (RAS) or waste the sludge (WAS) to the digesters for SRT and biomass control.	• Plant 1 RAS Pumps • Plant 1 WAS Pumps
Scum Pump Station	Functions to collect and remove scum from process and waste to the digesters. Pump station force main ties into primary sludge force main en route to digesters.	• Scum Pump Station
Digesters	Anaerobic Digesters function to stabilize and destroy volatile solids in a heated, anaerobic environment. Digesters rely on heat and mixing to maintain performance. Digester gas produced is sent to co-generation system or flared.	• Heat exchangers • Hot water supply piping
Centrifuge System	Functions to dewater anaerobically digested sludge using a centrifuge to increase total solids concentration in the sludge to 20% dry solids or better. Dewatered sludge cake is conveyed to hauling trucks via screw conveyors and diverter gates.	• Centrifuges • Centrate piping • Diverter gates • Sludge conveyors
Truck Loading Bay	Functions to facilitate hauling truck loading and weighing. Hauling trucks are parked on load cells and dewatered sludge cake is loaded into the trucks until the weight threshold is met.	• Truck load cells • Ventilation system • Sludge storage
Flare	Functions to transport and flare excess digester gas that is not used for the cogeneration system. Includes gas piping to flare and flare itself.	• Gas line • Flare
Chlorine Contact Basin / Process Water System	Process water system functions to provide secondary effluent throughout the plant for various uses such as wash-down, equipment seal water, etc. Staff rely on process water heavily for routine duties. Chlorine contract basin is a tank intended for chlorine disinfection of secondary effluent, however, it is not used for chlorination due to restrictions on chlorine residual in the ocean outfall.	• Chlorine contact tank • Process Water system
Storage Shed	Functions to provide equipment and spare part storage. Storage shed is approximately 1,000 square foot prefabricated metal with a 12' clearance.	• Storage Shed
Drainage Systems	Drainage systems consist of the flood control pump station which captures and pumps out stormwater from the neighboring apartment complex, as well as the plant drainage sump which collects plant site runoff and pumps it back into the headworks.	• Flood control pump station • Plant drain system
Plant 1 Emergency Generator	Functions to provide emergency backup power to certain Plant 1 MCC's in the event of a utility power outage.	• Plant 1 Emergency Generator
MCC's	Motor Control Centers (MCC's) provide power, motor control, and circuit breakers for mechanical equipment throughout the plant.	• MCC M • MCC CF • MCC 2 • MCC A-1

Table 1-1. JBL Plant CoFA Unit Process and Major Equipment Summary

Process Area	Description	Assets
Main Circuit Breakers	Main circuit breakers and meters function to provide utility power and disconnect to the plant as well as meters for power usage. The JBL plant contains 6 main circuit breakers.	• Plant 2 breaker • Effluent pump station breaker • ECP building breaker • Main office breaker • Co-gen breaker • Storm water PS breaker

1.1 Methodology

CoFA is a process that facilitates deliberate discussion and analysis of the criticality of process systems, drilling down to the component-level failure modes that may occur. Each process area identified for upgrade in the CIP is analyzed through the major assets and functions of that process and further by the failure modes of those assets. Through a workshop format, critical operations staff input is captured to expeditiously define a consequence of failure score and probability of failure score. **Figure 1-1** presents the CoFA flowchart.

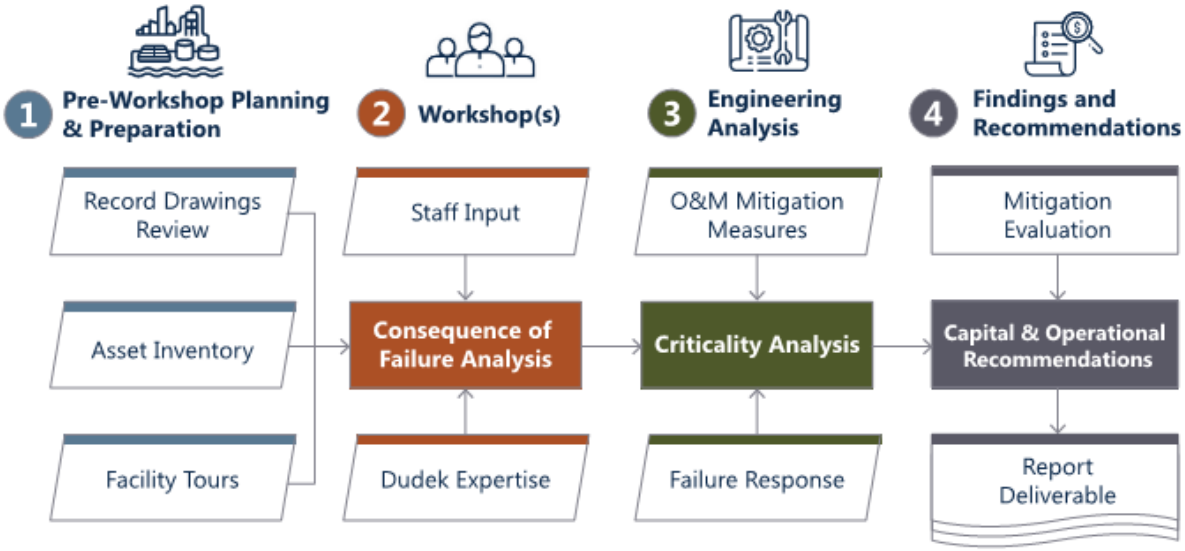


Figure 1-1. Consequence of Failure Analysis Flow Chart

Through the CoFA process, the project team establishes a risk profile of the facilities evaluated and provides conclusions and recommendations related to each process area and/or project. The outcomes of the CoFA process include:

- Prioritized list of CIP project needs based on mitigated risk vs. do-nothing alternative.
- Documentation of complete CoFA analysis and notes.
- O&M recommendations to mitigate risk, which may include process management adjustments, small projects, etc.
- Recommendations for adjusting scope of CIP projects, if applicable.

The Consequence of Failure (CoF) and Probability of Failure (PoF) are used to establish a risk designation that allows for the prioritization of risk-based strategic planning. Depending on the risk designation and the nature of

the defined failure mode, operational-based and/or capital-based recommendations are made to mitigate the risk by either reducing the defined consequence and/or probability of failure.

1.1.1 Consequence of Failure

Consequence of Failure (CoF) is a scoring metric to provide context to the effect of a failure and are conventionally focused on capacity, level of service, and mortality. The effects of a failure are categorized among four distinct categories: Health and Safety, Treatment Performance/Regulatory, Economic/Personnel Resources, and Public Image. Each CoF category is weighted to align with the SOCWA's risk management priorities and philosophies. The CoF categories, weight factors, and descriptions are summarized in **Table 1-2**.

Table 1-2. Description of Consequence of Failure Categories

CoF Categories	Weight Factor	Description
Health & Safety	7	Failure results in potential health and safety risk for Operations staff or visitors on WWTP site.
Treatment Performance/Regulatory	5	Failure results in treatment performance impacts and potential regulatory violations, penalties, fines, etc.
Economic/Personnel Resources	5	Failure results in economic resources cost and/or major staff time and resource allocation.
Public Image & Board Concerns	3	Failure results in potential negative public attention and scrutiny.

Each CoF category receives a numerical score, 1 to 5, for each failure mode based on the tolerance of failure of the process or equipment. The CoF scores for each category generally apply as follows:

1. Insignificant Consequence
2. Minor Consequence
3. Moderate Consequence
4. Major Consequence
5. Catastrophic Consequence

After the CoF score is determined for each category, the category scores are multiplied by the corresponding weight factor and summed (i.e., a sum-product is performed) to produce a comprehensive score defined as "criticality". The criticality of each unit process or asset is established by the criticality score(s) associated with its failure mode(s). The guidelines used to score each CoF category in detail are presented in **Table 1-3**. Using these weight factors the highest possible criticality score is 100 and the lowest possible criticality score is 20.

The baseline (existing conditions) CoF scores were defined given the assumption that no activity is performed to mitigate the consequence of failure to the process. The baseline CoF score is important for prioritizing recommendations for O&M mitigation measures. Additional O&M and/or CIP recommendations have considered existing mitigation and/or activities that reduce the risk potential of a given failure mode.

Table 1-3. Consequence of Failure Scoring Guideline

CoF Category	Weight Factor	CoF Score				
		1	2	3	4	5
Health & Safety	7	Negligible Injury	Minor injury, medical attention required	Serious injury hospitalization required	Serious injury, extensive hospitalization and/or permanent health impacts	Loss of Life
Treatment Performance/ Regulatory	5	Insignificant loss of treatment performance	Minor loss of treatment performance, impacts on multiple processes. No regulatory violations.	One-time regulatory violation.	Major loss of treatment performance, extended violation or multiple violations, regulatory sanctions	Plant-wide catastrophic failure, treatment process uncontrollable for 48 hrs+ regulatory sanctions.
Economic/ Personnel Resources	5	<$5,000	<$25,000	<$50,000	<$250,000	>$250,000
Public Image & Board Concerns	3	Insignificant effect or community/ Board concern	Minor community/ Board interest or complaints	Public community discussion and local paper coverage	Loss of confidence by community/ Board. Public agitation for action.	Public investigation, news coverage, management changes demanded.

1.1.2 Probability of Failure

While Consequence of Failure evaluates the effects of failure modes it lacks the context of defining the likelihood of the failure scenario actually happening. Therefore, it is equally important to evaluate the probability of the failure mode to complete a comprehensive risk assessment. Probability of Failure (PoF) is qualitatively assessed by assigning a relative probability level derived primarily upon input from Operations staff regarding past failures, current condition assessment, and current operational procedures. Probability of Failure is ranked according to the system described in **Table 1-4**.

The baseline (existing conditions) PoF scores were defined given the assumption that no activity is performed to mitigate the probability of failure to the process or equipment (i.e. routine maintenance, preventative maintenance, condition assessment, etc.). The baseline PoF score is important for justifying current O&M practices and identifying needs for additional mitigation measures to reduce the risk of a given failure.

Table 1-4. Probability of Failure Scoring Guideline

PoF	Likelihood of Occurrence	Current Probability of Condition Based Occurrence
A	Rare	3+ years
B	Unusual	Within 1 – 3 years
C	Annual	Within 6 – 12 months
D	Occasional	Within 1 – 6 months
E	Common	Within 1 month
F	Certain - Ongoing	Daily

1.1.3 Risk Exposure Designation

Following the workshop from which CoF and PoF scores are established for each failure mode, a risk exposure designation is assigned by combining the two scores. The risk exposure designation represents the relative level of risk associated with the failure mode evaluated. Risk exposure is designated according to four levels described in **Table 1-5**.

Table 1-5. Risk Exposure Designations

Risk Designation		Strategy for Risk Mitigation
L	Low	Reactive strategy is acceptable. The risk level does not suggest proactive monitoring strategies or capital improvement projects are necessary. Recommend that applicable CIP projects are maintained for current budget year or deferred.
M	Medium	Proactive strategy for monitoring performance and condition may be recommended. Mix of proactive and reactive strategies may also apply. Capital Improvement projects may be recommended to mitigate risk where applicable. Recommend that applicable CIP projects are maintained for current budget year.
H	High	Proactive planning and risk mitigation strategy is required. Capital Improvement projects will be recommended if operations and maintenance strategies are insufficient to mitigate risk to an acceptable level. Recommend that applicable CIP projects are maintained for current budget year or expedited where practical.
E	Extra High	Proactive planning and risk mitigation strategy is required immediately. Capital Improvement projects and operations and maintenance strategies must be developed and implemented as soon as possible to mitigate risk to an acceptable level. Recommend that applicable CIP projects are expedited where practical.

These levels of risk designations are assigned to each failure mode according to the PoF ranking and criticality score generated through workshop discussion according to the matrix presented in **Figure 1-2**.

PoF	Criticality							
	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100
A	L	L	L	L	L	M	M	M
B	L	L	L	M	M	H	H	H
C	L	L	M	M	H	H	H	E
D	L	M	M	H	H	E	E	E
E	L	M	H	H	E	E	E	E
F	L	M	H	H	E	E	E	E

Figure 1-2 – Risk Exposure Designation Matrix

Recommendations for risk mitigation are prioritized based on the resulting risk designations. Mitigation measures are categorized as O&M procedural adjustments or as recommended CIP projects. Depending on the risk designation, the recommendations can be prioritized over the planning horizon. Items with significant risk potential that cannot be adequately mitigated by O&M measures are recommended for CIP projects which could supersede programmed replacement scheduling.

1.1.4 Analysis and Recommendations

Each unit process and asset failure mode is categorized and ranked according to the risk designation that it received. Failure modes designated to result in high-to-extra high exposure to risk are prioritized and mitigation measures aimed to reduce the probability or consequence of failure are identified to mitigate risk to an acceptable level. Capital project recommendations identified through the CoFA process should be prioritized according to their risk designation and the criticality score within the designation. In most cases, medium risk is acceptable for critical assets and unit processes, and a low risk designation may not be achievable.

If a number of failure modes are designated to be high-risk, the priority of capital projects should be made to address the highest criticality scores as a first measure of priority and probability of failure ranking should be a secondary measure of priority.

2 Results

In total, 58 unique failure mode scenarios were identified and analyzed through the workshop process for the JBL plant. Of these 58 failure mode scenarios, 6 were identified as “Extra High” risk, 19 were identified as “High” risk, 12 were identified as “Medium” risk, and 21 were identified as “Low” risk. This breakdown is depicted in **Figure 2-1**.

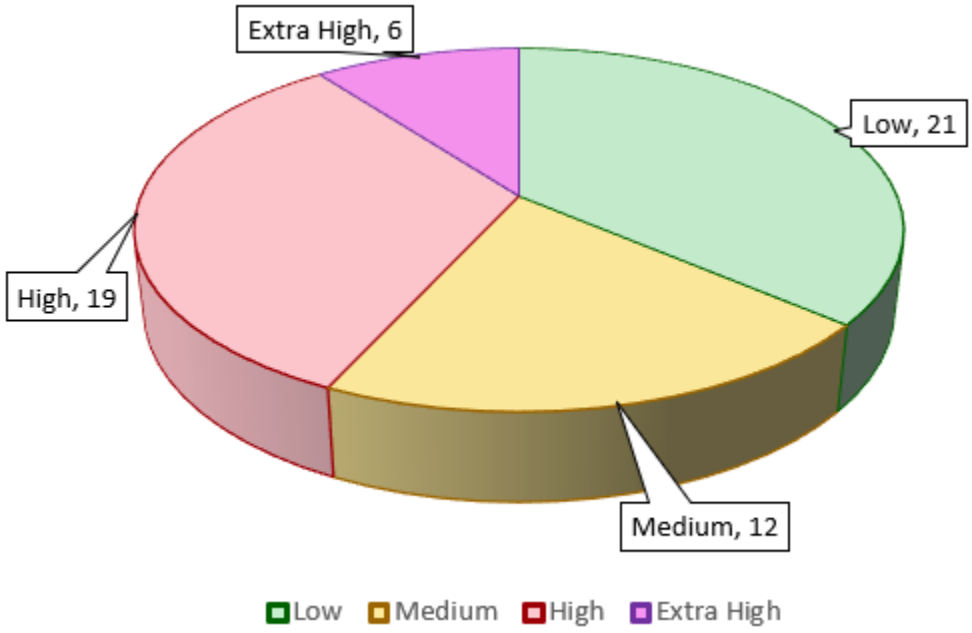


Figure 2-1. Risk Designations by Failure Mode

SOCWA faces a variety of treatment challenges as a result of aging infrastructure and equipment, limited space on the property for facility expansion, and changing conditions such as hauling and biosolids disposal reliability, air quality regulations, supply chain disruption, and energy reliability. Staff have taken appropriate and proactive measures to mitigate the consequences and probability of failure to critical process systems. Despite best efforts, failure events continue to stress critical process systems required to maintain compliance and safety.

Notes, scoring, and complete documentation of the workshops and recommendations are provided in full in **Appendix A** to this report. Appendix A documents all of the notes from the workshop, including current system performance and condition, current operations and maintenance mitigation measures, potential operational and maintenance adjustments that could be implemented by staff, as well as potential capital projects that could be used to mitigate risk and reduce consequences or probability of failure occurrence for each failure mode. Refer to the specific failure mode in **Appendix A** for more information.

The prioritized summary of Extra High, High, and Medium risk failure modes are summarized in **Table 2-1**.

Table 2-1. Prioritized Summary of Extra High, High, and Medium Risk Failure Modes

Failure Mode / Scenario	Criticality	Probability of Failure (PoF)	Risk Designation
Plant 2 Primary Clarifiers Cover Failure / Fall Hazard	85	F	E
Truck Bay Load Cell Failure	84	D	E
Gas Line to Flare Failure	81	F	E
MCC M Failure	73	D	E
Chlorine Contact Control Failure / Process Water System Failure	66	F	E
Lack of Sludge Storage	64	F	E
Plant 1 Headworks Building Odor Control System Failure	93	B	H
Flare Failure	70	B	H
MCC CF Failure	80	C	H
MCC 2 Failure	80	C	H
MCC A-1 Failure	80	C	H
Plant 1 Primary Clarifiers Concrete Failure/Degradation	55	F	H
Plant 2 Primary Clarifiers Concrete failure / degradation	55	F	H
Plant 1 Grit Chamber Performance Failure	51	F	H
Storage Shed Functionality and Useability Failure	50	F	H
Scum Pumping Control Failure	50	F	H
Diverter Gate Failure	48	E	H
Centrifuge Mechanical Failure	45	E	H
Plant 2 Primary Clarifiers Trough/Scum Beach Failure	44	F	H
Raw Sewage Wet Well Concrete Failure	43	F	H
Plant 1 Screenings Conveyor Mechanical Failure	43	E	H
Plant 1 Blower Building Area Classification Failure	42	F	H
Plant Drain Sump Pump Capacity Failure	42	F	H
Plant 1 Bar Screens Performance Failure	41	F	H
Centrate Piping hydraulic capacity failure	41	F	H
Plant 2 Main Breaker Failure	82	A	M
Sludge Conveyor Mechanical Failure	55	C	M
Plant 1 Emergency Generator Mechanical Failure	40	D	M
Digester Heat Exchangers Piping Failure	40	C	M
Plant 1 RAS Pumps Valves Failure	37	F	M
Plant 1 WAS Pumps Mechanical Failure	37	E	M
Plant 1 Mixed Liquor Channel Concrete failure / degradation	35	F	M
Plant 1 ML Channel Agitation Air Piping Failure	35	F	M
Plant 1 Blower Building Panel-mounted AC Unit Failure	40	D	M
Raw Sewage Pumps Valve Failure (Check Valve and Isolation Valve)	35	D	M
Plant 1 Screenings Compactor Mechanical failure	31	D	M
Plant 1 Grit Conveyor Mechanical Failure	31	D	M

3 Conclusions & Recommendations

The following **Table 3-1** summarizes the current O&M mitigation measures, recommendations for O&M best practices, and associated capital improvement projects with additional considerations aimed to mitigate risk to an acceptable level at the JBL plant.

Table 3-1. Summary of GVWWTP Mitigation Measures and Recommendations

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
E	Plant 2 Primary Clarifiers Cover Failure / Fall Hazard	Staff encourage everyone to not walk on covers, but the main issue is moving covers. Caution tape and cones are used when the covers are removed. Staff report unwritten policy to get help when moving covers so that at least two people are lifting the covers.	Prepare written SOP for moving primary clarifier covers to address safety risks with current covers.	Recommend replacement of existing covers. New covers should be installed and designed to include sufficient fall protection and safety features.
E	Truck Bay Load Cell Failure	Staff intentionally fill trucks light to mitigate the risk of overfilling the trucks and putting drivers safety at risk. Intentionally filling light leads to compounded additional costs for disposing less biosolids than what is being paid for.	No additional O&M mitigation measures are identified to mitigate this failure.	Storage and Truck Loading Rehabilitation project scheduled for FY 22. Recommend installation of alternative truck scales that are suitable and require less calibration than existing equipment.
E	Gas Line to Flare Failure	Operations plans to construct a new gas "high line" to bypass the corroded existing gas line to temporarily address the issue. The corroded gas line would then need to be replaced by a new permanent line installed by a contractor. Currently, staff manage this issue by reducing digester mixing and heating to minimize gas production during times when the flare is used, meaning that operations intentionally impairs digester performance due to this failure, actively hurting the overall process as a mitigation measure.	No additional O&M mitigation measures are identified to mitigate this failure.	Gas Flare Replacement scheduled for FY 23. Recommend ensuring that a permanent new gas line to flare is included in this project.

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
E	MCC M Failure	Conceptual design is in the works for rebuilding/relocating this MCC. Rat traps installed to mitigate rats. Arc Flash assessments done every 5 years for MCC and Electrical Safety Plan has detail on how to work on electrical gear whether live or deenergized. Agency has general written plans for how to work on gear. Lock-out/Tag-out procedures standard for 480V equipment.	No additional O&M mitigation measures are identified to mitigate this failure.	MCC-M Replacement scheduled for FY 22. Recommend replacement of this MCC is prioritized and relocated to an indoor location.
E	Chlorine Contact Control Failure / Process Water System Failure	Staff utilize low chlorine dose for a day to try to affect snails and growth in process water system. Staff feel their hands are tied because they cannot risk putting a chlorine residual out the outfall.	Recommend inspection of the CCB structure for any damage or corrosion. Structure serves as the foundation for Building 90 and hasn't been inspected in a long time.	Recommend project to create a fully isolated process water side stream that can be appropriately chlorinated to protect the process water system from snails and organic growth. Benefits for upgrade would mitigate issues with vector control at the CCB, mitigate staff exposure to undisinfected secondary effluent in the process water, improve equipment life relying on process water for seal water, and restore process water pressure at hose bibs.Also recommend consideration of on-site Title 22 recycled water treatment to provide recycled water uses around the plant.
E	Lack of Sludge Storage	Current O&M mitigation measures consist of performing critical, emergency repairs to equipment as quickly as possible. Biosolids is hauled outside the service area.	Perform sludge management review of solids facility upgrades to ensure that adequate sludge storage is provided in the design. Additionally, ensure that truck cleaning and biosolids management is included in long-term solids facilities management plan.	Storage and Truck Loading Rehabilitation project scheduled for FY 22. Recommend including sludge storage facilities in the upgrade project, as well as potentially truck washing and biosolids receiving facilities.

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
H	Plant 1 Headworks Building Odor Control System Failure	Operations project in progress to install a system to alarm from the outside when the H2S concentration inside is at a dangerous level. There is an active H2S monitor inside the headworks building and staff test H2S levels once per week.	Consider keeping critical spare parts for main fan on the shelf in case of a failure to the main fan.	Odor control scrubber is scheduled.
H	Flare Failure	Staff mitigate the amount of gas being fed to the flare to the extent possible. Staff report that the flare is run about 120 hours per year.	No additional O&M mitigation measures are identified to mitigate this failure.	Gas Flare Replacement scheduled for FY 23. The current project includes only one flare. It may be beneficial to construct a redundant flare for reliability, space permitting. New flares to comply with SCAQMD requirements have a larger footprint and require offsets from buildings and property lines. Recommend coordinating location for new flare with other projects to avoid utility and space conflicts.
H	MCC CF, 2 and A-1 Failures (Consolidated)	Arc Flash assessments done every 5 years for MCC and Electrical Safety Plan has detail on how to work on electrical gear whether live or deenergized. Agency has general written plans for how to work on gear. Lock-out/Tag-out procedures standard for 480V equipment.	No additional O&M mitigation measures are identified to mitigate this failure.	MCC CF, 2 and A-1 Project Scheduled for FY 27.
H	Plant 1 Primary Clarifiers Concrete Failure/Degradation	Staff installed custom rock traps in the primary sludge line to capture concrete chunks and protect pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend replacement of liner and concrete repair within the primary clarifier structures.
H	Plant 2 Primary Clarifiers Concrete failure / degradation	Staff installed custom rock traps in the primary sludge line to capture concrete chunks and protect pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend replacement of liner and concrete repair within the primary clarifier structures.

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
H	Plant 1 Grit Chamber Performance Failure	None. Grit that passes through the chamber will ultimately settle out in the primary clarifiers.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Grit Handling Upgrade scheduled for FY 24. Recommend engineering study to investigate grit removal system performance deficiencies and classify grit gradation coming into the plant based on micron size. Combination of flow conditions and grit gradation and load can be used to size additional grit chambers or otherwise design modifications to the grit removal system to improve performance.
H	Storage Shed Functionality and Useability Failure	Staff report plan to have a storage needs assessment and planning done at both JBL and Regional plants.	No additional O&M mitigation measures are identified to mitigate this failure.	Complete storage needs and planning assessment and replace existing storage shed or reconfigure storage at the plant per assessment recommendations.
H	Scum Pumping Control Failure	Staff have scum pumping control issue but have not been able to find a permanent fix. Issue thought to be because the line connects with Primary Sludge pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend CIP project to replace existing scum line with dedicated scum line to the digesters that does not connect with the primary sludge line.
H	Diverter Gate Failure	Staff have programmed auto-shutdown of centrifuge if the cake backs up due to the gate closing. Takes 2-4 hours to mitigate the issue and clean the unit and get it back and running again. Affects the dewatering/hauling schedule.	Replace and/or troubleshoot diverter gates to prevent unexpected closing of gates.	Reconfiguration and upgrade of solids handling facilities is required in near-term future. Considerations for improvement include silos for storage of sludge, reconfiguration of sludge conveyors for redundancy, and upgrading equipment which is approaching the end of its useful life.

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
H	Centrifuge Mechanical Failure	Staff keep all manufacturer recommended spare parts on the shelf due to frequent wear part failure. Staff are present during operation full-time to respond to failures and system needs. Staff time perform all maintenance in house except for high speed balancing. Staff have sent centrifuge 3 out to Texas for full rebuild. When one of the larger units goes down, things get uncomfortable for staff because they know it may take up to 20 weeks to get it back up and running, and need to make up dewatering by running smaller centrifuge longer hours to catch up.	No additional O&M mitigation measures are identified to mitigate this failure.	Reconfiguration and upgrade of solids handling facilities is required in near-term future. Considerations for improvement include silos for storage of sludge, reconfiguration of sludge conveyors for redundancy, and upgrading equipment which is approaching the end of its useful life.
H	Plant 2 Primary Clarifiers Trough/Scum Beach Failure	Rehab work is done in-house saving capital costs, but the work is difficult. Some health and safety risk due to the nature of the work.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 2 Primary Sedimentation Upgrade scheduled for FY 21. Plant 2 Primary Sludge Pumping Upgrade scheduled for FY 29.
H	Raw Sewage Wet Well Concrete Failure	Failure response time is very small due to the small size of the wet well. Pumps are run on VFD in attempt to maintain a water level in the wet well.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Raw Sewage Pump Station upgrade scheduled for FY 21. Project incorporates wet well concrete repair and new liner installation.
H	Plant 1 Screenings Conveyor Mechanical Failure	Routine preventative maintenance. Failure requires manual cleaning and screenings transfer performed by staff.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Headworks condition assessment project scheduled for FY 22. Subsequent Plant 1 Headworks upgrade scheduled for FY 26.
H	Plant 1 Blower Building Area Classification Failure	Staff wear personal gas monitors while working right now. Staff are working on installing permanent gas detectors in the buildings. Staff bring in a fan and force ventilate room when performing maintenance. Clean up any residual sludge on the ground from the maintenance.	Perform a detailed area classification study to clearly define all of the classified areas throughout the plant in accordance with NFPA 820.	Plant 1 Blower Building Structural and Infrastructure Upgrade scheduled for FY 23 Recommend project (O&M or capital) to clearly define area classifications throughout the plant.
H	Plant Drain Sump Pump Capacity Failure	Mitigation measures include setting up a temporary trash pump to help keep up with flows or send flows to the Plant 1 headworks in the event of a pump failure.	No additional O&M mitigation measures are identified to mitigate this failure.	Buried Drainage Pipe Reconstruction scheduled for FY 30

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
H	Plant 1 Bar Screens Performance Failure	None. Staff report rags are passing through the screens, indicating that screen bar spacing is too wide.	Operate the screen with finer bar spacing as a full-time duty screen and switch over to larger spacing screen during maintenance and repair of finer screen.	Plant 1 Headworks condition assessment project scheduled for FY 22. Subsequent Plant 1 Headworks upgrade scheduled for FY 26.
H	Centrate Piping hydraulic capacity failure	Staff have added water lines to the centrate piping to flush the lines and keep them clear of struvite, to the extent possible. Staff have also coordinated with centrifuge equipment manufacturer and verified polymer dosing to confirm issue is not operational, it is a plumbing issue.	Can identify struvite formation without disassembling piping by using an infrared gun on exposed piping to identify "cold" spots on the piping. Presence of "cold" spots on piping indicates struvite buildup within the pipe at that location.	Redesign in progress to replace piping and mitigate struvite issue.
M	Plant 2 Main Breaker Failure	Failure would result in an emergency situation - all hands. Portable generators would need to be hard-wired in to provide emergency power.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.
M	Sludge Conveyor Mechanical Failure	Staff keep spare parts on hand for emergency repair, including an extra screw. Repair takes about 6 hours. Would lead to overtime for ops to make up for lost dewatering time.	Recommend development of an action plan if one or all of the conveyors should happen to fail.	Solids Conveyor Replacement scheduled for FY 22
M	Plant 1 Emergency Generator Mechanical Failure	Exercised regularly. Maintenance and oil changes annually. Portable generator connection is available in the event generator does not start. Staff have done this in the past to mitigate failure. Currently adding a fiber loop that will connect all the PLCs in a loop as opposed to a daisy chain. Will make communication between the PLCs and SCADA system continuous and more reliable. The Co-Gen system would then be able to continue running through a blackout to help with power failure. Staff battery backup OIT's and PLC's because they drain the UPS quickly.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Emergency Generator scheduled for FY 23. The existing generator is over 30 years old. Recommend upsizing the generator to handle a greater portion of the plant 1 load.

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
M	Digester Heat Exchangers Piping Failure	3 way valve will get clogged from time to time. Water side of piping needs to be addressed. Currently no pressure gauges on the sludge and hot water lines. Monitor temp only. Most of the piping is thermal covered. Piping has not been rehabilitated since installation in 1990.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend condition assessment of digester heat exchangers. Uncertainty remains in future overall digester needs depending on the fallout of SB 1383 and availability of facilities to take sub class B biosolids. Recommend closely monitoring regulatory developments and updating biosolids management plan over time.
M	Plant 1 RAS Pumps Valves Failure	Valves part of exercise program, however, have become more and more difficult to operate.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 RAS and WAS Pump Station upgrade scheduled for FY 23.
M	Plant 1 WAS Pumps Mechanical Failure	Routine preventative maintenance.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 RAS and WAS Pump Station upgrade scheduled for FY 23
M	Plant 1 Mixed Liquor Channel Concrete failure / degradation	None. Staff report exposed aggregate and degradation of the top surface and exterior of channels. Structural rebar is exposed and corroding in some areas.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend channel rehabilitation project to address concrete degradation and damage to exterior channel walls.
M	Plant 1 ML Channel Agitation Air Piping Failure	Repair air leaks in agitation air piping when needed. Work is done by isolating the segment of pipe and pulling it out of the channel for repair.	No additional O&M mitigation measures are identified to mitigate this failure.	Replace agitation air. Staff have received a contractor quote for approximately $57,000.
M	Plant 1 Blower Building Panel-mounted AC Unit Failure	Serviced by third party HVAC technician annually, change filters. Staff do rounds and looking at the unit. Not a whole lot of maintenance on the unit.	No alarm or signal if A/C fails. Recommend installing a signal for A/C failure to mitigate risk of PLC overheating.	Plant 1 Blower Building Structural and Infrastructure Upgrade scheduled for FY 23.
M	Raw Sewage Pumps Valve Failure (Check Valve and Isolation Valve)	All valves in the raw sewage pump gallery are included in the monthly valve exercise program.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Raw Sewage Pump Station upgrade scheduled for FY 21. Project incorporates replacement of existing raw sewage pump gallery piping and valves.

Risk	Failure Mode/Scenario	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
M	Plant 1 Screenings Compactor Mechanical failure	Routine preventative maintenance. Rags are looking pretty dry with the new compactor. If the Vulcan compactor were to fail, one of the conveyors can be run in reverse to allow screen to continue to operate.	Test water content of screenings discharge from washer/compactor to determine if it meets local landfill requirements.	Plant 1 Headworks condition assessment project scheduled for FY 22. Subsequent Plant 1 Headworks upgrade scheduled for FY 26. Consider installation of a second washer/compactor for redundancy.
M	Plant 1 Grit Conveyor Mechanical Failure	Staff report that grit is wet on the conveyor indicating the classifier is not functioning efficiently. Routine preventative maintenance on conveyor.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Grit Handling Upgrade scheduled for FY 24.

SOCWA's Ten Year Capital Improvement Program (dated August 5, 2019) defines a robust capital improvement project list. Many of the considerations and recommendations made as part of the CoFA are addressed within the scope of the currently budgeted CIP projects. The results of the CoFA are intended to prioritize current CIP projects and where applicable, recommend adjustments to their scope to address deficiencies and mitigate risk.

In summary, the following capital improvement project needs are identified by priority for consideration in SOCWA's Capital Improvement Program. Project recommendations are separated by priority based on risk designation and where practical, lower priority projects are integrated with higher priority projects for synergy to consider practical implementation. Where applicable, current CIP projects that address the project need and comments on priority are included in **(bold parentheses)**.

Top Priority Projects (Address Extra High Risk Failure Modes)

- Replacement of hauling truck load cells with alternative weight measurement equipment. The equipment must address current deficiencies with the existing load cells including routine failure and calibration requirements, sensitivity to wash-down water, and difficulty of finding spare parts. **(Capital Improvements Program).**
- Replace Plant 2 primary clarifier covers with new safe-to-walk on covers and include upgrades to provide sufficient fall protection and safety measures. **(Capital Improvements Program)**
- Replace existing corroded gas line to flare with a new permanent line. Project can be done prior to or in conjunction with replacement of existing flare. **(Included in Project No. 2096 Plant 1 Liquids Buried Piping Reconstruction scheduled for FY 2030). Recommend re-prioritizing this project for near-term implementation.**
- MCC M Replacement. Recommend relocation of MCC M to indoor, climate-controlled environment to protect the equipment from weather and animals. **(Capital Improvements Program)**
- Complete a storage needs assessment and replace the existing storage shed with a modern facility that is practical for staff spare parts and equipment storage needs. Solution may also include various locations for equipment storage around the plant site. **(Included in Project No. 2344 and 2346 Storage Building Replacement scheduled for FY 2027). Recommend re-prioritizing this project for near-term implementation.**
- Reconfigure chlorine contact basin and process water system to create a fully isolated process water side stream that can be appropriately chlorinated to protect the process water system from snails and organic growth, minimize vector control issues in the CCB, and protect staff from exposure to undisinfected

secondary effluent during routine wash-down operations. At SOCWA's option, consider construction of an approved Title 22 recycled water system to increase beneficial uses of the recycled water. **(Included in part with Project No. 2082 and 2083 Chlorine Contact Basin Isolation Gates and Structural Rehabilitation scheduled for FY 2023). Recommend additional scope of project to allow staff the ability to consistently chlorinate water without risking putting a chlorine residual out the outfall.**

- Construct sludge storage facilities (i.e. silos). Include facilities in the upgrades to allow for truck washing and septage receiving if possible. **(Not included in any current CIP project). Recommend including sludge storage and reconfiguration of solids handling facilities to improve reliability.**

Secondary Priority Projects (Address High Risk Failure Modes)

- Plant 1 Headworks Building Odor Control System Upgrade. **(Included in Project No. 2054 and 2055 Plant 1 Headworks Upgrade scheduled for FY 2022/2026).**
- MCC CF Replacement. **(Included in Project No. 2536 MCC 2 and CF Replacement scheduled for FY 2022)**.
- MCC 2 Replacement. **(Included in Project No. 2536 MCC 2 and CF Replacement scheduled for FY 2022)**.
- MCC A-1 Replacement. **(Included in Project No. 2065 MCC A-1 Replacement scheduled for FY 2023).**
- Repair Plant 1 and Plant 2 Primary Clarifier structural concrete above the water surface and replace existing failed liner with new liner. **(Plant 2 Included in Project No. 2098 Plant 2 Primary Sedimentation Upgrade scheduled for FY 2022. Plant 1 Primary Sedimentation Upgrade not included in current CIP). Recommend including Plant 1 concrete repair as part of Project No. 2098.**
- Perform engineering study to classify grit, identify, and address grit removal system deficiencies. Perform grit removal system upgrade to address needs identified in study. **(Included in Project No. 2057 and 2068 Plant 1 and Plant 2 Headworks Upgrades). Recommend including additional scope to classify grit and performance evaluation on the aerated grit chambers in addition to mechanical upgrades.**
- Construct new dedicated scum pipeline to the digesters that does not interconnect with primary sludge. Dedicated scum pipeline will address pumping issues and corrosion concerns with the existing pipeline. **(Partially addressed in Project No. 2078 Scum Pump Station Upgrade). Recommend including scope of project to include scum pipeline replacement.**
- Reconfigure and replace biosolids dewatering facilities. Ideally, upgrades would reconfigure and replace existing centrifuges, screw conveyors, diverter gates, centrate piping, and associated equipment in a manner that allows better reliability and operational flexibility to respond to a failure. Capacity of dewatering equipment should be increased to handle current and future solids loads. **(Included in Project No. 2530 Dewatering System Reconstruction scheduled for FY 2022).**
- Replace Plant 2 primary clarifier troughs and scum beaches. **(Included in Project No. 2098 Plant 2 Primary Sedimentation Upgrade scheduled for FY 2022).**
- Rehabilitate Plant 1 Raw Sewage Pumps Wet Well and replace raw sewage pumps and valves. **(Included in Project No. 2060 Plant 1 Raw Sewage Pump Station Upgrade scheduled for FY 2023).**
- Perform Plant 1 headworks condition assessment and upgrade existing screenings conveyor, mechanical bar screens, screenings compactor, and grit conveyor. Recommend installing finer spaced bar screens for better screenings capture and protection of downstream process equipment. **(Included in Project No. 2054 Plant 1 Headworks Condition Assessment scheduled for FY 2022).**
- Have a professional area classification study performed to define classified areas throughout the plant in accordance with current NFPA 820 guidelines. Where upgrades are scheduled to mechanical and electrical equipment, it is recommended to address any area classification deficiencies over time to meet current NFPA 820 guidelines. **(Included in FY 2022).**

- Upsize the plant drainage sump and replace the plant drain sump pump with a larger pump capable of keeping up with site stormwater capture flows. Consider a second sump pump for reliability. **(Not included in any current CIP project).**

Tertiary Priority Projects (Address Medium Risk Failure Modes)

- Address electrical code compliance deficiencies in Plant 1 blower building MCC lineup. **(Needs should be addressed in Project No. 2058 Plant 1 Blower Building Condition Assessment, scheduled for FY 2020)**.
- Replace Plant 1 Emergency Generator. Consider upsizing the new generator to power a greater portion of the plant 1 load. **(Included in Project No. 2066 Plant 1 Emergency Generator, scheduled for FY 2023)**.
- Perform condition assessment and associated replacement of digester heat exchanger piping. **(Not included in any current CIP project).**
- Replace Plant 1 WAS pumps and RAS pump valves (i.e. isolation and check valves). **(Included in Project No. 2062 Plant 1 RAS and WAS Pump System Upgrade, scheduled for FY 2023).**
- Repair concrete degradation and exposed aggregate on the top corners of the Plant 1 mixed liquor channel. **(Not included in any current CIP project).**
- Replace Plant 1 agitation air piping (for mixed liquor channel). **(Not included in any current CIP project).**
- Replace existing Flare when SCAQMD requires a new flare to meet more stringent air quality requirements. **(Capital Improvements Program)**

In conclusion, it is recommended that slight adjustments are made to SOCWA's 10-year CIP implementation schedule and scope of projects to consider recommendations made herein. Top priority projects (i.e. projects that address one or more extra high risk failure modes) are recommended for expedited design and implementation. SOCWA's schedule for secondary priority and tertiary priority projects is suitable based on the project needs and associated risk designation. Tertiary priority projects may be candidate projects for deferred implementation if necessary. Refer to **Appendix A** for more information and detailed summary of each process area and failure mode assessed as part of this Consequence of Failure Analysis.

Appendix A

Complete CoFA Tables

CoFA - South Orange County Water Authority
JB Latham Treatment Plant

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Plant 1 Influent Sewer											
Influent Sewer								One (1) 42" VCP line from diversion structure to Plant 1 headworks. Dana point influent goes directly to Plant 2 and does not go through this line, unless Plant 2 is fully bypassed.			
Influent Sewer Pipe failure (Debris/Blockage)	1	2	3	3	41	B	L	Influent Sewer was CCTV'd in October 2018. Grit found to accumulate in the influent line. Staff report no historical blockage of the line that has led to a sewage backup and spill.	Pipe was CCTV'd for defects in October 2018.	CCTV the pipe every 3-5 years to check for defects.	Plant 1 Influent Sewer Condition Assessment scheduled for FY 21.
Influent Flow Meter								Plant #1 does not have an influent flow meter. Influent flow measurement for billing purposes is made in the collection system.			
Lack of Influent Flow Meter Measurement	1	2	1	1	25	F	L	Staff currently track Plant 1 influent flow via three flow meters: Oso Trabuco, San Juan creek, and south coast on discharge side of Victoria lift station. South cost side send a report once a month. Alternatives to a Parshall flume flow meter would include magnetic flow meter on the discharge side of the Raw Sewage Pumps, but staff report there is not enough space to fit the meter in the room. Long-term goal for Operations staff to see a flow meter put in, but make do with system currently in place.	Pull data from Oso trabuco sewer, san Juan creek sewer, and south coast via the Victoria lift station. Not ideal but works.	Consider alternative locations for a flow meter to capture Plant 1 flow. For example, could a flume be put in the primary effluent channel feeding the aeration basins? That flow + PS flow would give a close proxy to influent flow.	Plant 1 Headworks condition assessment scheduled for FY 22.
Plant 1 Bypass Sewer											
Bypass Sewer								36" line from diversion structure to Plant 2. Line can be used to divert full Plant 1 flow to Plant 2 or visa versa.			
Bypass Sewer Pipe Failure (Debris/Blockage)	1	2	3	2	38	B	L	Condition of the line is unknown, no recent CCTV done to the staff's knowledge. Original line was relocated when solids building was constructed. Valves and gates on the bypass line in the diversion structure are exercised monthly. Staff use the line 2 or more times per year on average to facilitate cleaning and rehabilitation projects at one of the two plants.	New smart cover and alarm sensor provide level monitoring and alarms in case there is a flow backup.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Bypass Sewer Condition Assessment scheduled for FY 21
Influent Gates								Influent gates function to allow for flow control and diversion between the two plants utilizing the bypass sewer.			
Diversion Structure Gates Failure (Plant 2)	3	2	3	1	49	B	L	Two gates are utilized in the diversion structure and two in the plant 2 headworks. The gates are currently manually operated. Routinely used to bypass Plant 1 or Plant 2 approximately 5 times per year. Failure would lead to an emergency repair.	Staff exercise gates monthly.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Bypass Sewer Condition Assessment scheduled for FY 21
Plant 1 Raw Sewage Pump Station											
Raw Sewage Wet Well								Small cast-in-place concrete wet well constructed in 1964.			
Raw Sewage Wet Well Concrete Failure	1	1	5	2	43	F	H	There is no liner in the raw sewage wet well. Concrete has degraded and aggregate is visible in the wet well above the waterline. There needs to be some corrosion mitigation. Staff report no odor issues, sewage is being moved quickly through the wet well and into the primary clarifiers. No forced ventilation in the wet well. Sealed off and one access point of entry.	Failure response time is very small due to the small size of the wet well. Pumps are run on VFD in attempt to maintain a water level in the wet well.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Raw Sewage Pump Station upgrade scheduled for FY 21. Project incorporates wet well concrete repair and new liner installation.

CoFA - South Orange County Water Authority
JB Latham Treatment Plant

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Raw Sewage Pumps								Centrifugal, 100 HP pumps located in Plant 1 Blower Building. Three (3) pumps installed in 1989. Lead-Lag-Standby configuration.			
Raw Sewage Pumps Mechanical Failure	1	1	3	1	30	B	L	Pumps are cycled monthly to maintain similar hours on each pump. Failure of a single pump would still allow full pumping capacity from other 2 installed pumps.	Pumps are rebuilt every 2 years in addition to normal PM's. Motors are also rebuilt every three years. 50% installed redundancy plus full shelf unit so effectively 100% redundancy. Critical spare parts are kept on the shelf including a backup drive shaft. Can and have hard wired a portable generator in the event of power failure. Full system is backed up by 2 diesel-driven Godwin emergency pumps capable of pumping the full influent flow.	Existing system is highly robust to mitigate system failure. No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Raw Sewage Pump Station upgrade scheduled for FY 21. Project incorporates replacement of existing raw sewage pumps.
Raw Sewage Pumps Valve Failure (Check Valve and Iscolation Valve)	1	2	3	1	35	D	M	Two of three discharge check valves have recently been replaced. Third is scheduled for replacement. Staff report that suction side isolation valves are difficult to maintain but can and has been done. Staff report that discharge isolation valves are in good condition.	All valves in the raw sewage pump gallery are included in the monthly valve exercise program.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Raw Sewage Pump Station upgrade scheduled for FY 21. Project incorporates replacement of existing raw sewage pump gallery piping and valves.
Raw Sewage Pump VFDs								Raw Sewage Pump VFDs function to adjust speed of pumps to maintain a water level in the influent wet well. One VFD for each pump housed in a NEMA 3X panel.			
Raw Sewage Pumps VFD Failure	1	1	3	1	30	B	L	Staff report the drives are older than 5 years. VFD's are housed in a NEMA 3X panel and controlled to maintain a water level in the influent wet well. Level instrumentation signaling VFD consists of a transducer and a bubbler which are rotated regularly to confirm operability. Calibration of level instrumentation is done every year, and recalibrated as necessary.	Proline does infrared testing every year on the breakers and VFDs. Level control redundancy between transducer and bubbler mitigates failure. There are float alarms in the wet well but these are not wired to control pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Raw Sewage Pump Station upgrade scheduled for FY 21. Project incorporates replacement of all three VFD's.
Plant 1 Headworks											
Headworks Building								Headworks building houses bar screens, influent channels, and screenings wash-press and grit classifier. Building underwent some rehabilitation in 2009.			
Plant 1 Headworks Building Odor Control System Failure	4	5	5	5	93	B	H	Existing ventilation and odor control system for Plant 1 headworks building is flawed. Staff report that forced ventilation over pressurized the building and caused escape of odors. Now, staff only utilize scrubber feed fan to maintain negative pressure in the building. This system works to prevent odors from escaping but do not effectively mitigate odors within the building. Primary scrubber feed fan is a custom unit with a lead time of 22 weeks. Failure of odor control system could result in unsafe work environment within the building and escape of odors violating permit. Staff test for H2S levels once per week as well as test air flow. Current system meets ACPH requirements for class 1, div 1 area.	Operations project in progress to install a system to alarm from the outside when the H2S concentration inside is at a dangerous level. There is an active H2S monitor inside the headworks building and staff test H2S levels once per week.	Consider keeping critical spare parts for main fan on the shelf in case of a failure to the main fan.	Odor control scrubber is scheduled.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Bar Screens								Existing: Two (2) Vulcan climber screens 1.5 HP, brake motor, SST construction. Year of install: 1999, one replaced in 2005. Vulcan has suffered past mechanical and structural damage. Need a backup motor for the Vulcan. Bar spacing tighter for screen 1 vs screen 2.			
Plant 1 Bar Screens Mechanical Failure (Wear Part)	1	2	2	3	36	C	L	Existing screens have been rebuilt and numerous parts have been replaced. Failure results in screen being taken offline for maintenance while flow is diverted to redundant screen. Differential level control is used to trigger the climber rake to remove screenings.	Climber rake has a backup timer such that the rake will activate after a certain period of time. Screens and instrumentation are maintenanced about once a week.	Operate the screen with finer bar spacing as a full-time duty screen and switch over to larger spacing screen during maintenance and repair of finer screen.	Plant 1 Headworks condition assessment project scheduled for FY 22. Subsequent Plant 1 Headworks upgrade scheduled for FY 26.
Plant 1 Bar Screens Performance Failure	1	2	3	3	41	F	H	Staff report that rags are getting through the screens which impact downstream processes, although not expected to cause any regulatory violations. Rag pass-through is an indication that bar screen spacing is too wide and that finer screens are required for better removal of rags and debris.	None.	Operate the screen with finer bar spacing as a full-time duty screen and switch over to larger spacing screen during maintenance and repair of finer screen.	Plant 1 Headworks condition assessment project scheduled for FY 22. Subsequent Plant 1 Headworks upgrade scheduled for FY 26.
Screenings Conveyor								Two belt conveyors in Plant 1 capture screenings discharge and convey to singular washer/compactor unit. Conveyors installed in 2005. One was failed at the time of field visit.			
Plant 1 Screenings Conveyor Mechanical Failure	2	2	2	3	43	E	H	Staff report and Dudek observed excessive wear on the conveyors and indications of corrosion. The screenings have a tendency to spill onto the floor and/or spill on the emergency shutoff cable trigger which stops the conveyor. The conveyor has also failed mechanically resulting in screenings build up onto the failed conveyor. Failure requires manual cleaning and screenings transfer by staff.	Routine preventative maintenance. Annual manual cleaning and screenings transfer performed by staff.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Headworks condition assessment project scheduled for FY22. Subsequent Plant 1 Headworks upgrade scheduled for FY26.
Screenings Compactor								Staff replaced old compactor with new Vulcan 900EWP washer/compactor last year.			
Plant 1 Screenings Compactor Mechanical failure	1	1	2	3	31	D	M	With old washer/compactor unit, the resulting water content in the screenings is too high to be sent to any other landfill in the state other than one. Staff replaced the unit with new unit with hopes to reduce water content of the screenings and make it possible to send the screenings to a local landfill and reduce disposal costs. Failure results in wet, unwashed screenings being sent to dumpster until unit is back online.	Routine preventative maintenance. Rags are looking pretty dry with the new compactor. If the Vulcan compactor were to fail, one of the conveyors can be run in reverse to allow screen to continue to operate.	Test water content of screenings discharge from washer/compactor to determine if it meets local landfill requirements.	Plant 1 Headworks condition assessment project scheduled for FY22. Subsequent Plant 1 Headworks upgrade scheduled for FY26. Consider installation of a second washer/compactor for redundancy.
Plant 1 Grit Handling											
Grit Conveyor								Existing unit: Wemco Model 1000C Belt Conveyor - 1 HP Motor, installed in 2005. Single-duty unit. Conveyor takes grit from classifier and transfers to bin.			
Plant 1 Grit Conveyor Mechanical Failure	1	1	2	3	31	D	M	Plant 1 grit and screenings get put into the same bin for disposal. Staff report that grit is fairly wet on the conveyor. If conveyor fails, staff put a bin underneath the classifier auger and manually transport grit to main disposal bin.	Staff report that grit is fairly wet on the conveyor. Routine preventative maintenance.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Grit Handling Upgrade scheduled for FY 24.
Grit Chamber								Aerated grit chamber is designed to remove grit from the screened influent.			
Plant 1 Grit Chamber Performance Failure	1	2	5	3	51	F	H	Staff report that the grit chamber is too small and doesn't adequately remove grit from the influent. There has been discussions about a combined headworks and engineering analysis of grit system but currently there is no explicit plan to upgrade the grit removal system. Grit passing through to downstream process causes abrasion to DS mechanical equipment such as clarifier and solids facility pumps and equipment.	None. Grit that passes through the chamber will ultimately settle out in the primary clarifiers.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Grit Handling Upgrade scheduled for FY 24. Recommend engineering study to investigate grit removal system performance deficiencies and classify grit gradation coming into the plant based on micron size. Combination of flow conditions and grit gradation and load can be used to size additional grit chambers or otherwise design modifications to the grit removal system to improve performance.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Plant 1 Primary Clarifiers											
Primary Clarifier Tanks								Primary clarifiers are earmarked for rehabilitation as part of the Package B upgrades. Not included in those upgrades are concrete rehabilitation for the primary clarifier tanks themselves.			
Plant 1 Primary Clarifiers Concrete Failure/Degradation	2	2	5	2	55	F	H	Staff report that concrete degradation and spalling exist within the tanks. The area above the water level is lined, but the liner is failing. Staff report that concrete spalling and degradation end up in the primary sludge and affect primary sludge pumps.	Staff installed custom rock traps in the primary sludge line to capture concrete chunks and protect pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend replacement of liner and concrete repair within the primary clarifier structures.
Scum Drives								Skimmers and beaches are being replaced as part of the Package B upgrades. The scum drives themselves are not included as part of Package B.			
Plant 1 Primary Clarifiers Scum Drive Mechanical Failure	1	1	1	1	20	C	L	Staff report that the scum drives on the Plant 1 side are the same age and appear to be in similar condition to the Plant 2 side, but they haven't had any problems with them on the Plant 1 side. No attention has been given to them.	Routine preventative maintenance.	Recommend keeping a shelf spare unit in the event of a drive failure.	Recommend replacement of scum drives as they are nearing the end of their useful life.
Plant 2 Primary Clarifiers											
Primary Clarifier Tanks								Primary clarifiers are earmarked for rehabilitation as part of the Package B upgrades. Not included in those upgrades are concrete rehabilitation for the primary clarifier tanks themselves.			
Plant 2 Primary Clarifiers Concrete failure / degradation	2	2	5	2	55	F	H	Staff report that concrete degradation and spalling exist within the tanks. The area above the water level is lined, but the liner is failing. Staff report that concrete spalling and degradation end up in the primary sludge and affect primary sludge pumps.	Staff installed custom rock traps in the primary sludge line to capture concrete chunks and protect pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend replacement of liner and concrete repair within the primary clarifier structures.
Scum Drives								Skimmers and beaches are being replaced as part of the Package B upgrades. The scum drives themselves are not included as part of Package B.			
Plant 2 Primary Clarifiers Scum Drive Mechanical failure	1	2	1	1	25	C	L	Staff report that the scum drives on the Plant 1 side are the same age and appear to be in similar condition to the Plant 2 side, but they haven't had any problems with them on the Plant 1 side. No attention has been given to them.	Routine preventative maintenance.	Recommend keeping a shelf spare unit in the event of a drive failure.	Recommend replacement of scum drives as they are nearing the end of their useful life.
Covers								Plant 1 primary clarifier covers are being replaced as part of the Package B upgrades. Plant 2 primary clarifier covers are not included as part of Package B. Includes full primary clarifier covers and covers over the scum troughs.			
Plant 2 Primary Clarifiers Cover Failure / Fall Hazard	5	2	5	5	85	F	E	Staff report that there is no fall protection in place when the covers are taken off which is a significant health and safety hazard. Staff feel reasonably comfortable walking on the covers but do not feel safe moving covers.	Staff encourage everyone to not walk on covers, but the main issue is moving covers. Caution tape and cones are used when the covers are removed. Staff report unwritten policy to get help when moving covers so that at least two people are lifting the covers.	Prepare written SOP for moving primary clarifier covers to address safety risks with current covers.	Recommend replacement of existing covers. New covers should be installed and designed to include sufficient fall protection and safety features.
Troughs/Scum Beaches								Plant 1 primary clarifier troughs/scum beaches are being replaced as part of Package B upgrades. Remaining old Plant 2 troughs and scum beaches are not included as part of Package B.			
Plant 2 Primary Clarifiers Trough/Scum Beach Failure	3	1	3	1	44	F	H	One old scum beach needs to be replaced. Staff have considered doing the replacement in-house but the work is very difficult to do. Units are fiberglass so the measurements have to be exact and the walls have blistered creating uneven surfaces. Weight was an issue for installation crew.	Rehab work is done in-house saving capital costs, but the work is difficult. Some health and safety risk due to the nature of the work.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 2 Primary Sedimentation Upgrade scheduled for FY 21. Plant 2 Primary Sludge Pumping Upgrade scheduled for FY 29.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Plant 1 Blower Building											
Blower Building								Blower building constructed in 1965. Houses backup blowers, Raw sewage pumps, primary sludge pumps, RAS and WAS pumps and electrical equipment.			
Plant 1 Blower Building Area Classification	2	2	3	1	42	F	H	Building was built prior to NFPA 820 and new projects will need to meet new standards. Lower part of the building is Class 1 Div 1 area because it is common for two to three inches of sludge or raw sewage when maintenance is being performed. Staff note that there are not clear records or defined area classifications for the plant.	Staff wear personal gas monitors while working right now. Staff are working on installing permanent gas detectors in the buildings. Staff bring in a fan and force ventilate room when performing maintenance. Clean up any residual sludge on the ground from the maintenance.	Perform a detailed area classification study to clearly define all of the classified areas throughout the plant in accordance with NFPA 820.	Plant 1 Blower Building Structural and Infrastructure Upgrade scheduled for FY 23 Recommend project (O&M or capital) to clearly define area classifications throughout the plant.
Plant 1 Blower Building Panel-mounted AC Unit Failure	1	4	2	1	40	D	M	3 ton AC for 9 MGD VFD Panel 461. Installed in 1995. Failure results in PLC heating up and failing, requiring RAS, WAS, and RSP equipment to be run in hand.	Serviced by third party HVAC technician annually, change filters. Staff do rounds and looking at the unit. Not a whole lot of maintenance on the unit.	No alarm or signal if A/C fails. Recommend installing a signal for A/C failure to mitigate risk of PLC overheating.	Plant 1 Blower Building Structural and Infrastructure Upgrade scheduled for FY 23.
Plant 1 Backup Blowers								Three (3) 300 HP Hoffman blowers with a capacity of 7,000 scfm each. These blowers are used as backup/additional capacity. At time of 2012 Facility Plan, it was estimated that the blowers have 10 years of useful remaining life.			
Plant 1 Backup Multistage Blower Failure	1	1	3	1	30	B	L	Hoffman blowers provide backup and supplemental air for redundancy and peak flows. Staff report that since new Aerzen blowers were put in, they've never needed to run more than one Hoffman blower. The Hoffman blowers are original and do need both running if the whole aerzen system is down. Hoffman blower #3 has reached the end of its useful life and will be removed. Blowers are positive displacement style, not very energy efficient. Cost over $50,000 to replace.	Hoffman blowers themselves are a mitigation measure for Aerzen blowers going down. Staff exercise blowers once a month to listen to them and verify performance.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Blower Building Structural and Infrastructure Upgrade scheduled for FY 23
Plant 1 RAS and WAS Pump Station											
Plant 1 RAS Pumps								Centrifugal, 20 HP, One (1) located next to #1 Secondary, the other three (3) located in Blower Room #1. Pumps function to return activated sludge to the aeration basins to maintain process MLSS and SRT. Pump #4 is a smaller size pump. Pump #2 and #3 are the same size.			
Plant 1 RAS Pumps Mechanical Failure	2	2	2	1	37	C	L	RAS pump located outside secondary #1 is never used. Pumps 2 through 4 are used two at a time, with one as a backup. Pumps run 24/7 on VFD. Staff run pump #2 and #3 as lead pump with #4 acting as a lag pump. Designed to prevent the wet well from pumping down too quickly.	Able to close suction side valve on pump #4. Difficult to close valves #2 and #3 are the hardest. #4 is ran as the lag pump, with #2 and #3 alternating as the lead pump. Intentional design so that the plant is not pumping down the wet well too quickly.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 RAS and WAS Pump Station upgrade scheduled for FY 23.
Plant 1 RAS Pumps Valves Failure	2	2	2	1	37	F	M	Staff report suction side valving is prone to sticking and needs to be replaced. Valve failure has similar consequences as a pump failure.	Valves part of exercise program, however, have become more and more difficult to operate.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 RAS and WAS Pump Station upgrade scheduled for FY 23.
Plant 1 RAS Flow Meter Failure	2	3	3	1	47	B	L	12" Magnetic Flow Meter, 0-3000 gpm range located in Plant 1 blower room. Flow meter is used to adjust RAS pump VFDs. Staff report that lead time for new mag meter is approximately 20 weeks or so given the current COVID affects on supply chains.	Flow meter is calibrated regularly.	Recommend procurement of shelf-spare mag meter in case of a failure to existing meter. Meter is critical for process control.	Plant 1 RAS and WAS Pump Station upgrade scheduled for FY 23.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
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	7	5	5	3							
Plant 1 WAS Pumps								Screw Centrifugal Hidrostal style pumps. 7.5 HP, Two (2) pumps, 460 V. 1999 year of install.			
Plant 1 WAS Pumps Mechanical Failure	2	2	2	1	37	E	M	Staff report numerous issues with WAS pumps including long lead time and poor availability of parts. Staff report that new WAS pumps are needed. Other issues include seal failure. Historically have had issues with rocks and debris getting into the pumps, thought to be concrete aggregate from tanks.	Installed rock trap to mitigate the effect of concrete aggregate affecting the pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 RAS and WAS Pump Station upgrade scheduled for FY 23
Plant 1 Mixed Liquor Channel											
Channel Concrete								Mixed liquor concrete channel functions to convey mixed liquor to the aeration basins.			
Plant 1 Mixed Liquor Channel Concrete failure / degradation	1	1	4	1	35	F	M	Staff report exposed aggregate and degradation on the top surface and exterior of the channels. Structural rebar is exposed and corroding in some areas. The concrete within the channel is in good condition, the mixed liquor is oxidized and is typically not a risk to create a corrosive environment. Isolating the mixed liquor channel would be tricky, and likely require installation of gates to isolate tanks depending on where the repairs need to be made.	None.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend channel rehabilitation project to address concrete degradation and damage to exterior channel walls.
Agitation Air Piping								Agitation air is fed to the channels to keep mixed liquor in suspension and solids from settling in the channel.			
Plant 1 ML Channel Agitation Air Piping Failure	1	1	4	1	35	F	M	There are broken pipes on the bottom of the channel and air leaks are common in the pipe. It is unknown if there is settling at the bottom of the channel because the channel is never taken offline. Main issue is that it's wasted air and energy when the piping fails.	Repair air leaks in agitation air piping when needed. Work is done by isolating the segment of pipe and pulling it out of the channel for repair.	No additional O&M mitigation measures are identified to mitigate this failure.	Replace agitation air. Staff have received a contractor quote for approximately $57,000.
Chlorine Contact Basin / Process Water System											
Chlorine Contact Tank Isolation Gates / Process Water System								CCB isolation gates consist of two 24" Sluice Gates, 304 Stainless Steel, Manual, Rising Stem. Installed in 1988. Process water system functions to provide plant water to hose bibs, seal water to pumps, and other miscellaneous uses throughout the plant. Staff rely on process water heavily for routine duties and needs.			
Chlorine Contact Control Failure / Process Water System Failure	2	4	4	4	66	F	E	Staff report mosquito issues when gates are closed. They have since opened the gates and kept water flowing, which mitigates the mosquito issues. Vector control comes out to inspect as much as twice a month and adds HTH tablets. Staff report concerns about the condition of the concrete structure which has not been inspected. Biggest staff concern is about chlorinating the process water for employee safety concerns and then de-chlorinating before discharging through the outfall. Staff report that without chlorination snails and slime growth becomes a major issue in process water system. Lines will get plugged up with snail shells, worms, and organic growth and kill water pressure at hose bibs and affect seal water and equipment relying on that seal water. Cannot put chlorine out the outfall, so any chlorination of process water is a very low dose and not done overnight. No permit requirement to chlorinate and dechlorinate.	Staff utilize low chlorine dose for a day to try to affect snails and growth in process water system. Staff feel their hands are tied because they cannot risk putting a chlorine residual out the outfall.	Recommend inspection of the CCB structure for any damage or corrosion. Structure serves as the foundation for Building 90 and hasn't been inspected in a long time.	Recommend project to create a fully isolated process water side stream that can be appropriately chlorinated to protect the process water system from snails and organic growth. Benefits for upgrade would mitigate issues with vector control at the CCB, mitigate staff exposure to undisinfected secondary effluent in the process water, improve equipment life relying on process water for seal water, and restore process water pressure at hose bibs. Also recommend consideration of on-site Title 22 recycled water treatment to provide recycled water uses around the plant.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Storage Shed											
Storage Shed								1,025 square feet metal prefab (Butler) Building. 12' tall. Approximate year of install 1990.			
Storage Shed Functionality and Useability Failure	2	2	4	2	50	F	H	Staff report safety issues with existing storage shed. Issues include that it's not well lit, stormwater runs through the shed, animals live inside, drainage issues exist, tripping hazards exist, and it is difficult to use so staff often do not utilize the storage shed and equipment is stored in scattered locations around the site. Lack of functional storage space affects the treatment performance because staff will not purchase certain spare equipment because it cannot be stored effectively. COVID-related supply chain issues exacerbate storage issues with lead times being 20-25 weeks for certain critical equipment.	Staff report plan to have a storage needs assessment and planning done at both JBL and Regional plants.	No additional O&M mitigation measures are identified to mitigate this failure.	Complete storage needs and planning assessment and replace existing storage shed or reconfigure storage at the plant per assessment recommendations.
Scum Pump Station											
Scum Pump Station								Scum pump is a single-duty, recessed impeller, 7.5 HP; pump located in scum pit. Year of install: 1979. Unknown condition, staff have observed corrosion in line.	Scum pump, recessed impeller, 7.5 HP; (located in scum pit) Year of install: 1979. Quantity: One (1)		
Scum Pumping Control Failure	2	2	4	2	50	F	H	Staff report major issues with controlling scum pumping. The scum line to the digesters combines with primary sludge, creating system curve pumping issues. Failure is major challenge for staff. Staff also report concerns about scum line condition, which has not been inspected and was installed in the late 70s. Staff report that they have observed corrosion on the exterior of the scum line.	Staff have scum pumping control issue but have not been able to find a permanent fix. Issue thought to be because the line connects with Primary Sludge pumps.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend CIP project to replace existing scum line with dedicated scum line to the digesters that does not connect with the primary sludge line.
Digesters (all 4)											
Heat Exchangers								Four (4) Heat exchangers designed and constructed as part of the 1990 Anaerobic Digester project. Heat exchangers function to provide heat to digesters and maintain performance. Current solids contract doesn't guarantee class B biosolids, however, Agency's goal is to meet Class B.			
Digester Heat Exchangers Piping Failure	1	2	4	1	40	C	M	If the piping failed, Digesters would lose heat and the Digester would be out of service. Only three out of four digesters are currently available, Digester 4 is currently down for rehabilitation. If another digester went down right now, they would not have enough digester capacity. If all four are available and one goes down they are still okay. Staff report no issue with digester heat exchanger performance, only concern about external condition.	3 way valve will get clogged from time to time. Water side of piping needs to be addressed. Currently no pressure gauges on the sludge and hot water lines. Monitor temp only. Most of the piping is thermal covered. Piping has not been rehabilitated since installation in 1990.	No additional O&M mitigation measures are identified to mitigate this failure.	Recommend condition assessment of digester heat exchangers. Uncertainty remains in future overall digester needs depending on the fallout of SB 1383 and availability of facilities to take sub class B biosolids. Recommend closely monitoring regulatory developments and updating biosolids management plan over time.
Hot Water Supply Piping								Digester hot water supply piping provide hot water to heat exchangers. Piping consists of one main insulated supply line and one main return line.			
Digester Heating Hot Water Piping Failure	1	2	3	1	35	C	L	Failure would temporary result in loss of ability to provide heat to digesters, but staff have the ability to quickly respond with bypass piping from boilers and keep facilities in operation. Staff report some concern about the piping because condition is unknown.	Piping is insulated to retain heat. Staff report that bypassing could be set up within 6 hours if piping failure occurs.	No additional O&M mitigation measures are identified to mitigate this failure.	Buried Digester Piping Reconstruction Scheduled for FY 24

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Centrifuge System											
Centrate piping								Centrate piping functions to collect and convey centrate water back to the headworks. Recently, condition assessment has been completed on centrate drainage piping.			
Centrate Piping hydraulic capacity failure	1	2	3	3	41	F	H	Staff report opening up centrate piping and observing struvite buildup on the 90 degree bends (approx. 10% of cross sectional area). Struvite formation in the centrate piping restricts the flow and can cause a backup into the centrifuge, adding wear and tear to the centrifuge. Struvite buildup also causes foaming of the centrate due to the added roughness in the piping.	Staff have added water lines to the centrate piping to flush the lines and keep them clear of struvite, to the extent possible. Staff have also coordinated with centrifuge equipment manufacturer and verified polymer dosing to confirm issue is not operational, it is a plumbing issue.	Can identify struvite formation without disassembling piping by using an infrared gun on exposed piping to identify "cold" spots on the piping. Presence of "cold" spots on piping indicates struvite buildup within the pipe at that location.	Redesign in progress to replace piping and mitigate struvite issue.
Centrifuges								Three (3) Andritz Centrifuges. (1) installed in 1999 with a capacity of 110 GPM, (2) and (3) installed in 2003 with individual capacities of 170 GPM. All units have varying levels of corrosion on the spring isolators. Centrate piping backs up into Centrifuges, possibly due to the high amount of 90 degree bends in the centrate piping. Single unit installed in 1999. Centrifuge (1) is the least used Centrifuge and is in relatively good condition (as of 2017). Some minor leaking around the units which could indicate worn out seals. Some struvite build up, and the elastic band above the cake discharge is cracked.			
Centrifuge Mechanical Failure	2	2	3	3	48	E	H	Staff report that centrifuge performance is good, they have more issues with the equipment mechanically. Staff report getting support for D5LL units is getting difficult. Parts are going obsolete. 6-18 week lead times and costs are going up. Customer support is not helpful when parts fail. Better luck with D5L, but D5LL are bigger and get run more time. Limited on operating ability because staff need to be present and trailer needs to be on-site while running. Run times are typically 5 hours a day, 7 days a week. Mechanical issues include bearings, high vibration, out of balance units. Run 2 out of 3 centrifuges, rotate 1 in from time to time. One trailer a day for a couple days, and then need to run 2 trailers a day for a day to catch up. Have in-house trucking and one is 3rd party (synagro). There have been times where driver is late or doesn't show. In-house truck or trucker has either broken down or failed. Overtime cost incurred due to hauling issues. Wind/Heat/Weather conditions can prevent sludge hauling to local landfill. Staff report that typically three truck loads sent to the landfill a day and $20,00-$40,000 a year in extra hauling costs are incurred due to hauling and disposal uncertainties.	Staff keep all manufacturer recommended spare parts on the shelf due to frequent wear part failure. Staff are present during operation full-time to respond to failures and system needs. Staff time perform all maintenance in house except for high speed balancing. Staff have sent centrifuge 3 out to Texas for full rebuild. When one of the larger units goes down, things get uncomfortable for staff because they know it may take up to 20 weeks to get it back up and running, and need to make up dewatering by running smaller centrifuge longer hours to catch up.	No additional O&M mitigation measures are identified to mitigate this failure.	Reconfiguration and upgrade of solids handling facilities is required in near-term future. Considerations for improvement include silos for storage of sludge, reconfiguration of sludge conveyors for redundancy, and upgrading equipment which is approaching the end of its useful life.
Diverter Gates								Flapper style gate on the cake discharge end of each centrifuge.			
Diverter Gate Failure	2	2	3	3	48	E	H	Staff report that the diverter gate will close randomly when the unit is running. This causes major issues because the cake backs up into the unit and has potential to damage the bearings/other parts. Failure affects the dewatering/ hauling schedule for the Agency and requires staff overtime. Failure gets worse if occurs when 1 centrifuge is already down for maintenance and/or if occurs during a weekend or holiday when only 2 operators are on site. Cleaning and restart of centrifuge is labor intensive process. Staff report failure occurs approximately 8-10 times per year.	Staff have programmed auto-shutdown of centrifuge if the cake backs up due to the gate closing. Takes 2-4 hours to mitigate the issue and clean the unit and get it back and running again. Affects the dewatering/hauling schedule.	Replace and/or troubleshoot diverter gates to prevent unexpected closing of gates.	Reconfiguration and upgrade of solids handling facilities is required in near-term future. Considerations for improvement include silos for storage of sludge, reconfiguration of sludge conveyors for redundancy, and upgrading equipment which is approaching the end of its useful life.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
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	7	5	5	3							
Sludge Conveyors								Four (4) conveyors in total. Rated 5, 6, 7, and 8 HP. Two are located in the solids building and two are located in the truck bays. Units were installed in 1999. Function to transport dewatered sludge cake to truck loading bays.			
Sludge Conveyor Mechanical Failure	3	2	3	3	55	C	M	Conveyor system not ideally designed for reliability. Critical conveyor of the system is conveyor 2, which is relied upon by all 3 centrifuges and all 3 truck loading bays. System can function with limitations if one of the other 3 conveyors are offline. Two of the conveyors are mounted on the ceiling of the truck bay approximately 12 feet in the air, creating a difficult work environment for staff attempting to make repairs.	Staff keep spare parts on hand for emergency repair, including an extra screw. Repair takes about 6 hours. Would lead to overtime for ops to make up for lost dewatering time.	Recommend development of an action plan if one or all of the conveyors should happen to fail.	Solids Conveyor Replacement scheduled for FY 22
Truck Loading Bay											
Truck Load Cells								Truck load cells installed in 2001. Function to weigh the hauling trucks to determine when they are full and track overall biosolids load trucked to landfill.			
Truck Bay Load Cell Failure	5	3	5	3	84	D	E	Previous assessment was completed on load cells. Assessment found that current load cells are not appropriate for this application. Cells routinely fail and lose calibration. Staff report consistent need to recalibrate load cells. Load cells are also affected by washdown water to clean the truck loading bays. Staff report that load cell parts are available. Failure results in safety concerns for the driver if the weight is too high. , cost, etc. Safety concerns for driver if weight is too high. No billing being done at the facility. Staff report that 80% of failures are because of the vibration of the truck, which bends feet and throws off reading of the load cell.	Staff intentionally fill trucks light to mitigate the risk of overfilling the trucks and putting drivers safety at risk. Intentionally filling light leads to compounded additional costs for disposing less biosolids than what is being paid for.	No additional O&M mitigation measures are identified to mitigate this failure.	Storage and Truck Loading Rehabilitation project scheduled for FY 22. Recommend installation of alternative truck scales that are suitable and require less calibration than existing equipment.
Ventilation System								System consists of ducting and fresh air supply fans and foul air fan feeding scrubber. Fresh air fan is not run as it will lead to positive building pressure and push odors outside to neighbors. System functions to remove nuisance odors and protect staff health in case ammonia gas levels get too high.			
Truck Loading Bay Odor Control/Ventilation Failure	1	1	1	3	26	F	L	2017 Assessment found that building was not in accordance with NFPA 820. Recommendation was made to install gas monitoring and alarm system. Staff report odors are a nuisance within the building but odors do not get out unless roll up doors are left open. No permanent gas monitor is installed in the building but the staff have portable gas detectors that are used. Staff report there has never been a situation where ammonia levels in the building have reached levels that pose a health risk to employees. Existing forced ventilation system is not run, only scrubber fan is run to maintain negative pressure in the building. Bad odors can come from trucks returning to plant from the landfill that have not been cleaned out.	Staff use personal gas detectors, however, would prefer to see a permanent building gas detector installed. Odors are most prevalent when trucks are entering/exiting.	Install permanent gas detector with alarm system.	Storage and Truck Loading Rehabilitation project scheduled for FY 22. Recommend including provisions for a truck washing station to clean out odorous trucks that return to the plant from the landfill.

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Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Sludge Storage								Existing facilities do not have any dewatered sludge cake storage. Sludge cake storage provides ability for staff to adjust dewatering schedule while maintaining consistent hauling operations.			
Lack of Sludge Storage	1	4	5	4	64	F	E	Staff report there have been times where freeways were closed due to wildfires, which limited options for biosolids disposal. Other weather circumstances can create similar problems where biosolids disposal is limited or challenging. In these situations not having biosolids storage creates a big problem for staff in managing disposals. Current storage consists of simply what can be stored in a trailer (approximately 1 day). Staff report that having biosolids storage would improve operational flexibility substantially. Additionally, staff report that there is no septage receiving facilities in the service area, which creates issues when cleaning of wastewater facilities is performed, the waste has to be hauled outside the service area. Having an on-site receiving station would provide broad support for the SOCWA service area.	Current O&M mitigation measures consist of performing critical, emergency repairs to equipment as quickly as possible. Biosolids is hauled outside the service area.	Perform sludge management review of solids facility upgrades to ensure that adequate sludge storage is provided in the design. Additionally, ensure that truck cleaning and biosolids management is included in long-term solids facilities management plan.	Storage and Truck Loading Rehabilitation project scheduled for FY 22. Recommend including sludge storage facilities in the upgrade project, as well as potentially truck washing and biosolids receiving facilities.
Flare											
Gas Line to Flare								Gas line to flare allows excess digester gas to be flared off if not being used by Cogen system. Gas line and flare is critical to operations.			
Gas Line to Flare Failure	3	5	4	5	81	F	E	Staff report that typically the gas flare stays off because the digester gas is fed to the Cogen. However, digester dome pressure will still sometimes get high enough and call the flare to light and burn off excess gas, especially when the Cogen engine is down for maintenance. Staff report that gas is restricted in the pipe to the flare, and instead gas is venting out of the digester dome relief valves instead of going to the flare. Staff report that repairs have been made to the flare itself, however, this did not address the issue. Staff also report that segments of gas line have been pulled and found that over 50% of the line is full of corroded material.	Operations plans to construct a new gas "high line" to bypass the corroded existing gas line to temporarily address the issue. The corroded gas line would then need to be replaced by a new permanent line installed by a contractor. Currently, staff manage this issue by reducing digester mixing and heating to minimize gas production during times when the flare is used, meaning that operations intentionally impairs digester performance due to this failure, actively hurting the overall process as a mitigation measure.	No additional O&M mitigation measures are identified to mitigate this failure.	Gas Flare Replacement scheduled for FY 23. Recommend ensuring that a permanent new gas line to flare is included in this project.
Flare Failure	3	4	4	3	70	B	H	Staff report that the flare has been repaired and replaced in pieces over time, such that all components have been replaced at different periods of time. The flare is not expected to meet upcoming South Coast AQMD regulations and will need to be replaced when that time comes.	Staff mitigate the amount of gas being fed to the flare to the extent possible. Staff report that the flare is run about 120 hours per year.	No additional O&M mitigation measures are identified to mitigate this failure.	Gas Flare Replacement scheduled for FY 23. The current project includes only one flare. It may be beneficial to construct a redundant flare for reliability, space permitting. New flares to comply with SCAQMD requirements have a larger footprint and require offsets from buildings and property lines. Recommend coordinating location for new flare with other projects to avoid utility and space conflicts.

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JB Latham Treatment Plant

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
Drainage Systems											
Flood Control Pump Station								Flood control pump station functions to pump floodwaters from neighboring areas out to the creek. There is only one pump at this time.			
Flood Control Pump Station Capacity/Mechanical Failure	2	1	1	2	30	B	L	Staff report that it would be nice to have some sort of screen to alleviate debris. Also, would be nice to have a larger containment area with a lead and lag pump for redundancy. If the wet well backs up, the neighbors get flooded.	Pump is typically able to keep up with stormwater flows. If necessary, bypass pump can be set up to pump water out of the wet well.	No additional O&M mitigation measures are identified to mitigate this failure.	Non-Potable Water Pump Station Reconstruction scheduled for FY 28
Plant Drain System								Plant drain system is plumbed by gravity to plant sump in corner of the property. There is a single pump in the sump controlled by a float to pump drainage water to the Plant 1 headworks.			
Plant Drain Sump Pump Mechanical Failure	2	1	1	1	27	B	L	Pumping issues have arisen when trash and debris gets into the sump. Maintenance staff installed a screen in the sump to try to protect the pump from trash and debris. When area is flooded, staff cannot access the pump to pull it in the event that it fails.	Mitigation measures include setting up a temporary trash pump to help keep up with flows or send flows to the Plant 1 headworks in the event of a pump failure.	No additional O&M mitigation measures are identified to mitigate this failure.	Buried Drainage Pipe Reconstruction scheduled for FY 30
Plant Drain Sump Pump Capacity Failure	2	1	4	1	42	F	H	Staff report that the pump is undersized and does not keep up during heavy rain events, single duty pump means single point of failure. System has flooded before both when the pump is running and cannot keep up with flows. The area around the sump is graded back to the sump so that when flooding does occur, it does not flow to another area of the plant, but still creates a flooded area that is a risk to staff safety and access in that area.	Mitigation measures include setting up a temporary trash pump to help keep up with flows or send flows to the Plant 1 headworks in the event of a pump failure.	No additional O&M mitigation measures are identified to mitigate this failure.	Buried Drainage Pipe Reconstruction scheduled for FY 30
Plant 1 Emergency Generator											
Plant 1 Emergency Generator								Installed in 1989. Class 1 Div 1 area. Caterpillar, Natural Gas;415 kW 600 HP input rpm=1800; (located outside 9 MGD Blower Room)	Will run equipment automatically. Shuts off on its own.		
Plant 1 Emergency Generator Mechanical Failure	2	2	2	2	40	D	M	Staff report there is a study to replace the equipment in progress. Generator does not run full plant, only enough equipment to keep the emergency equipment running. Staff report that sometimes there are issues switching from emergency power back to regular power and have to be manually reset. Other than this issue transfer and return/shut down is automatic. Controls were replaced last year as well as the ATS. The generator feeds E MCC B, E MCC AR, and MCC EA1. MCC D, MCC B, MCC C, and MCC F all shut off when the generator is running. When generator runs it handles raw sewage pumps, control panel for generator, A/C for raw sewage pumps, ATS, and headworks building and odor scrubber.	Exercised regularly. Maintenance and oil changes annually. Portable generator connection is available in the event generator does not start. Staff have done this in the past to mitigate failure. Currently adding a fiber loop that will connect all the PLCs in a loop as opposed to a daisy chain. Will make communication between the PLCs and SCADA system continuous and more reliable. The Co-Gen system would then be able to continue running through a blackout to help with power failure. Staff battery backup OIT's and PLC's because they drain the UPS quickly.	No additional O&M mitigation measures are identified to mitigate this failure.	Plant 1 Emergency Generator scheduled for FY 23. The existing generator is over 30 years old. Recommend upsizing the generator to handle a greater portion of the plant 1 load.

Unit Process / Asset / Failure Mode/Scenario	Consequence of Failure (CoF)				Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
	Health & Safety	Treatment Performance/ Regulatory	Economic/ Personnel Resources	Public Image							
	7	5	5	3							
MCC's											
MCC M								MCC main circuit breaker rating: 480/277 V, 3 Ph,1200 A; Supplies power to effluent pump station and related equipment. Installed in 1991.			
MCC M Failure	2	5	5	3	73	D	E	Staff report that MCC M is the biggest concern for MCC's in the plant. Staff report there are rats living in the MCC, presence of rat urine and feces on the bus bar and all around the inside of the cabinet, some corrosion is present. The MCC is located outdoors and is exposed to elements and rodents. Response to failure would be "all hands" emergency response to get critical equipment back on line.	Conceptual design is in the works for rebuilding/relocating this MCC. Rat traps installed to mitigate rats. Arc Flash assessments done every 5 years for MCC and Electrical Safety Plan has detail on how to work on electrical gear whether live or deenergized. Agency has general written plans for how to work on gear. Lock-out/Tag-out procedures standard for 480V equipment.	No additional O&M mitigation measures are identified to mitigate this failure.	MCC-M Replacement scheduled for FY 22. Recommend replacement of this MCC is prioritized and relocated to an indoor location.
MCC CF								MCC main circuit breaker Rating: 480/277V, 3 ph, 600 A; Supplies power to centrifuges and all related equipment, (located Odor Control Bldg. Upstairs) Installed in 2003			
MCC CF Failure	3	5	5	3	80	C	H	MCC CF feeds all of the Centrifuges, MCC 2 and MCC D. MCC is located indoors and in a classified area, however, the MCC is not designed to be located in a classified area. Typical things seen for MCC in classified area will result in corrosion to bus bar, stabs on back of buckets get pitted and arcing. Staff report that a condition assessment is planned but unsure if equipment can be de-energized to inspect bus bar. Response to failure would be "all hands" emergency response to get critical equipment back on line.	Arc Flash assessments done every 5 years for MCC and Electrical Safety Plan has detail on how to work on electrical gear whether live or deenergized. Agency has general written plans for how to work on gear. Lock-out/Tag-out procedures standard for 480V equipment.	No additional O&M mitigation measures are identified to mitigate this failure.	MCC 2 and MCC CF Project Scheduled for FY 27.
MCC 2								MCC main circuit breaker rating: 480/277 V, 3 Ph, 600 A; located in Odor Bldg. : MCC 1 downstairs supplies power to equipment on lower half of Odor Control Bldg./dewatering bldg., MCC 2 (upstairs) supplies power to the equipment on the upper floor of the Odor Control Bldg./dewatering bldg. Installed in 1985			
MCC 2 Failure	3	5	5	3	80	C	H	MCC 2 feeds odor scrubber for the solids building, which is a critical requirement for safety and compliance. MCC is located indoors and in a classified area, however, the MCC is not designed to be located in a classified area. Typical things seen for MCC in classified area will result in corrosion to bus bar, stabs on back of buckets get pitted and arcing. Response to failure would be "all hands" emergency response to get critical equipment back on line.	Arc Flash assessments done every 5 years for MCC and Electrical Safety Plan has detail on how to work on electrical gear whether live or deenergized. Agency has general written plans for how to work on gear. Lock-out/Tag-out procedures standard for 480V equipment.	No additional O&M mitigation measures are identified to mitigate this failure.	MCC 2 and MCC CF Project Scheduled for FY 27.
MCC A-1								MCC and Switchgear: Main Circuit breaker Rating: 400/277 V 3 Ph, 800A; 9 MGD Blower Room: Supplies power to various 9 MGD plant equipment. Installed in 1997.			
MCC A-1 Failure	3	5	5	3	80	C	H	MCC A-1 feeds blower building and critical systems. MCC is located indoors and in a classified area, however, the MCC is not designed to be located in a classified area. Typical things seen for MCC in classified area will result in corrosion to bus bar, stabs on back of buckets get pitted and arcing. Response to failure would be "all hands" emergency response to get critical equipment back on line.	Arc Flash assessments done every 5 years for MCC and Electrical Safety Plan has detail on how to work on electrical gear whether live or deenergized. Agency has general written plans for how to work on gear. Lock-out/Tag-out procedures standard for 480V equipment.	No additional O&M mitigation measures are identified to mitigate this failure.	MCC A-1 Replacement Project scheduled for FY 27.

Unit Process Asset Failure Mode/Scenario	Consequence of Failure (CoF) Health & Safety 7	 Treatment Performance/ Regulatory 5	 Economic/ Personnel Resources 5	 Public Image 3	Criticality	Probability of Failure (PoF)	Risk Designation	General Notes	Current O&M Mitigation Measures	O&M Recommendations	Capital Improvement Project
Main Circuit Breakers											
Main Circuit Breakers								Main circuit breakers and meters function to provide utility power to the plant and meter power consumption. The JBL plant contains 6 main circuit breakers: The 4 side breaker, Effluent pump station breaker, ECP building breaker, main office breaker, Co-Gen breaker, and storm water PS breaker.			
Plant 2 Main Breaker Failure	4	5	4	3	82	A	M	4 side breaker is four years old, was factory and field tested after installation. Failure would result in an emergency situation - all hands. Critical for permanent generator and process equipment.	Failure would result in an emergency situation - all hands. Portable generators would need to be hard-wired in to provide emergency power.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.
Effluent Pump Station Main Breaker Failure	1	1	4	1	35	C	L	Eff PS breaker is oldest main breaker at the plant installed in 1991. Staff report that the breaker is obsolete and hasn't been tested in 4-5 years. Reason for not testing is that staff run the risk of shutting it down and it not coming back online.	Staff keep a spare breaker on the shelf in case of a failure to this main breaker. Since the breaker is obsolete it will eventually need to be replaced completely. Effluent pump station has a natural gas system that can provide 100% backup for extended time.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.
ECP Building Main Breaker Failure	1	1	4	1	35	B	L	Staff report that the ECP building breaker is a smaller breaker in moderate condition. Not sure of exact installation date but thought to be in the 90s.	Failure would result in an emergency situation. Natural gas system can provide 100% backup for extended period of time.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.
Main Office Main Breaker	2	1	2	1	32	B	L	Main office breaker is a residential-type breaker with a generator backup. Staff report that it is a non-standard meter for SCE, because it needs to be read by opening up the cabinet. Failure would affect facilities for staff such as showers, locker rooms, etc. but mostly consequences would lead to non-ideal operating conditions but nothing catastrophic.	All office data is could-hosted and data is backed up off-site so that data and information is not compromised.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.
Co-Gen Main Breaker	1	1	2	1	25	A	L	Sub-meter to the 4-side breaker. Used for co-gen net metering. Failure not as serious as 4 side breaker. Would need to flare gas and buy power, but rest of consequences are minor.	No current O&M mitigation measures discussed.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.
Storm Water PS Main Breaker	1	1	3	4	39	A	L	Provides power service to the storm water pump, which affects the neighbors.	No current O&M mitigation measures discussed.	No additional O&M mitigation measures are identified to mitigate this failure.	No current Capital Improvement Project budgeted.

Exhibit B

DUDEK

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August 25, 2021

Jason Manning
Director of Engineering
South Orange County Wastewater Authority
34156 Del Obispo Street
Dana Point, CA 92629

Subject: Proposal for Consequence of Failure Analysis Prioritization of Coastal Treatment Plant CIP

Dear Mr. Manning:

Dudek is pleased to submit this proposal to South Orange County Wastewater Authority (SOCWA) for the preparation of a Consequence of Failure Analysis (CoFA) to assess risk and support prioritization of 10-year CIP projects for the Coastal Treatment Plant (CTP). The COFA is an effective tool to help SOCWA define the risk profile among their aging facilities and prioritize CIP improvements based on risk. In addition, our project team seeks to identify ways to help SOCWA mitigate risk with one-time Operations and/or Maintenance recommendations which may allow for project deferment to a later date. We look forward to the opportunity to provide SOCWA with high quality engineering consulting services at a competitive price.

1 Project Understanding

We understand the CTP is a conventional activated sludge plant with a design capacity of 6.7 mgd. A portion of the secondary effluent is treated with an advanced water treatment (AWT) facility to produce title 22 recycled water. Thickened primary sludge and waste activated sludge is pumped to the Regional Treatment Plant (RTP) for digestion, dewatering, and ultimate disposal.

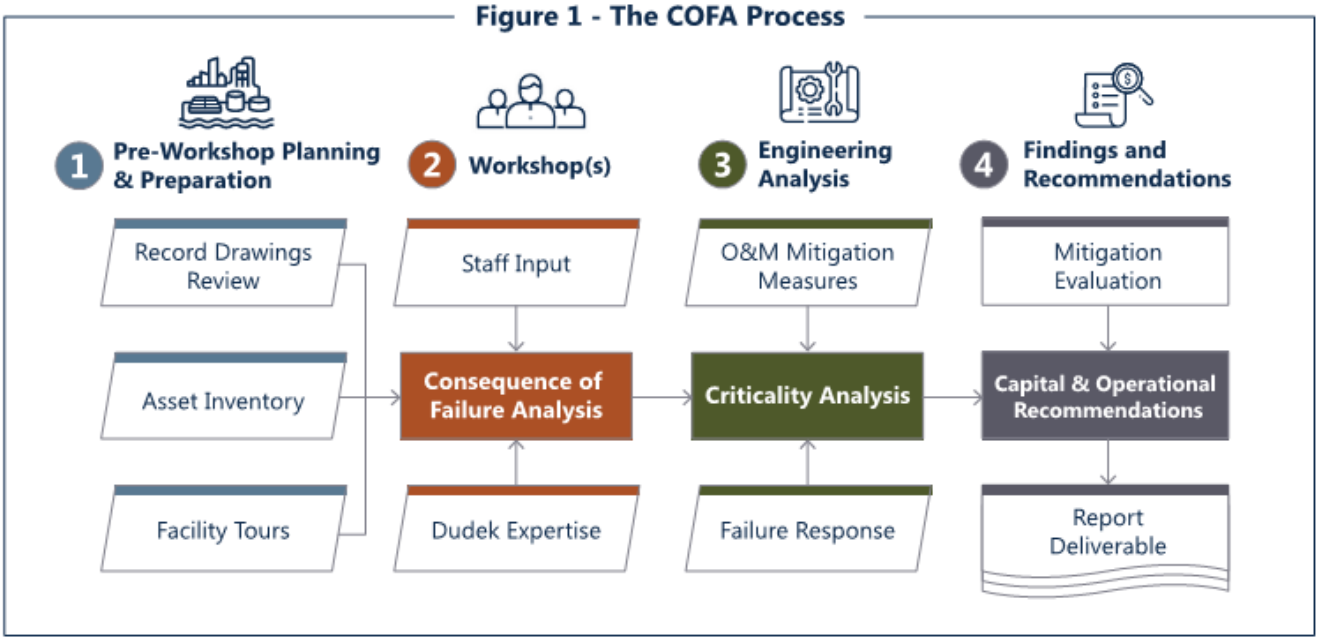
We understand that SOCWA is interested in performing a risk-based evaluation of the CTP to determine which projects are critical to maintain plant performance and operation, and which projects may be able to be deferred to a later date. SOCWA provided Dudek with the 10-year CIP plan, which contains a basic scope description for most projects. Based on the provided information, we understand that the following major assets/process areas are included for CIP project design, construction, or both within the current planning horizon.

- Aeration System
- Grit handling
- Odor control system
- Primary sludge pumps
- Chemical feed systems
- Vehicle storage
- Standby generators
- AWT filters
- Effluent EQ basin
- Headworks Screens
- Potable water system
- Primary sedimentation basins
- SCADA system
- Auxiliary blowers
- Personnel building
- Channel rehabilitation
- AWT building
- Scum handling
- Non-potable water system
- RAS/WAS pumping systems
- Maintenance building
- Yard piping
- Sludge pump station
- Operations building
- AWT chemical feed systems

2 Project Approach

Dudek recommends our Consequence of Failure Analysis (CoFA) process to assess risk and prioritize the CIP projects for SOCWA's use. CoFA is a process that facilitates deliberate discussion and analysis of the criticality of process systems, drilling down to the component-level failure modes that may occur. Each process area identified for upgrade in the CIP is analyzed through the major assets and functions of that process and further by the failure modes of those assets. Through a workshop format, critical operations staff input is captured to expeditiously define a consequence of failure score and probability of failure score. Figure 1 presents the CoFA flowchart.

Figure 1 - The COFA Process



Through the CoFA process, the project team will establish a risk profile of the facilities evaluated and provide conclusions and recommendations related to each project. The outcomes of the CoFA process include:

- Prioritized list of CIP projects based on mitigated risk vs. do-nothing alternative
- Documentation of complete CoFA analysis and notes.
- O&M recommendations to mitigate risk, which may include process management adjustments, small projects, etc.
- Recommendations for adjusting scope of CIP projects, if applicable.

3 Scope of Work

1. Data Collection and Review

    a. Request and review available record drawings, CIP list, CIP project descriptions and estimates, water quality data (i.e. monitoring and reporting to RWQCB), WDR, and other relevant data and

information, as applicable. Some of this information has already been received and reviewed by the project team.

2. Facilities investigations

    a. Key Dudek project team members travel to the CTP to generally observe the equipment, layout, and condition of facilities scheduled for CIP improvements prior to the workshops and analysis. We anticipate that one site investigation day will be required to observe all of the applicable facilities.

3. Consequence of Failure Analysis

    a. Prepare workshop materials, methodology, spreadsheet tools and pre-populate information as available.

    b. Prepare CoFA agenda, workshop and training materials, refine methodology, and set up analysis and documentation spreadsheets. Dudek coordinates with SOCWA to schedule and perform up to three four-hour workshops with key O&M staff and document consensus consequence of failure and probability of failure scoring for each WWTP unit process evaluated.

    c. Following the workshops, Dudek consolidates, completes, and inputs data into the CoFA risk model and review the results for consistency and logic. Our team prepares a concise summary of prioritized CIP projects based on mitigation of high-risk failure modes and submits to SOCWA. We refine the scoring and/or methodology to address SOCWA review comments where appropriate.

    d. Dudek then prepares a draft CoFA Report. Components of the report will:

        i. Define CoFA and summarize the purpose and methodology of the CoFA
        ii. Summarize the CoFA workshops and unit processes and facilities covered in the workshops.
        iii. Summarize risk profile of evaluated facilities.
        iv. Document each high-risk failure mode and provide recommendations for risk mitigation including operational adjustment, confirmation of capital project, or other.
        v. Provide conclusions and recommendations resulting in potential adjustments to CIP prioritization within the planning horizon.
        vi. Provide complete CoFA data and model as an attachment to the report
        vii. Incorporate one iteration of SOCWA review comments and resubmit as a final report.

4. Meetings and Project Management

    a. Dudek prepares meeting agenda and minutes for the following in-person meetings (or Zoom meetings, depending on timing and COVID-19 concerns):

        i. Kickoff Meeting
        ii. Draft CoFA Report review meeting

b. The Dudek project manager prepares monthly invoices and progress reports, is responsible for overall communication and coordination between the project team and the SOCWA project manager and applicable staff.

4 Project Team

Dudek is pleased to present a team of highly qualified professionals who have worked together on several similar assignments. Dudek will serve as the prime consultant providing overall management, engineering, and analysis, and will be responsible for coordinating with SOCWA staff. The project team will be comprised of the following key individuals. Two-page resumes and references are available upon request.

- Phil Giori, PE: Project Manager
- Greg Guillen, PhD, PE: Treatment Process Specialist
- Artin Oroujian, PE: Senior Mechanical Engineer
- Agata Bugala: Project Engineer
- Jim Hudson: Electrical Assessment (Rockwell Construction Services)

5 Fee

Dudek proposes a time and materials not-to-exceed fee of $49,970 for the scope of work outlined above. The staffing rates and estimated hours are included in Attachment A for reference. We appreciate the opportunity to provide this proposal for your consideration. Vice President Bob Ohlund is authorized to bind our firm and designates Phil Giori as Project Manager. If you have any questions, please do not hesitate to contact me (pgiori@dudek.com; 760.479.4173).

Sincerely,

Phil Giori, PE
Project Manager

Attachment A

Fee Estimate

South Orange County Wastewater Authority

Consequence of Failure Analysis - CTP CIP
DUDEK FEE ESTIMATE
8/25/2021

		Labor Hours and Rates							Subs	
	Project Team Role:	Project Manager	Process Engineer	Mechanical Engineer	Project Engineer	Admin			Electrical	
	Team Member:	P. Giori	G. Guillen	A. Oroujian	A. Bugala	M. Kinney			RCS	
	Billable Rate :	$235	$235	$240	$175	$125	TOTAL HOURS	DUDEK LABOR COST	Fee	TOTAL FEE
Task 100 - Pre-Workshop Data Collection and Assessment										
101	Kickoff meeting, agenda, & minutes	4	4	4	4		16	$ 3,540	$ 500	$ 4,040
102	Review of record drawings, data, and information.	4	2	2	4		12	$ 2,590	$ 1,000	$ 3,590
	Subtotal Task 100	**8**	**6**	**6**	**8**		**28**	**$ 6,130**	**$ 1,500**	**$ 7,630**
Task 200 - Consequence of Failure Analysis (COFA)										
201	Plant Tour and perform 3 COFA workshops with O&M staff.	24	24	24	24		96	$ 21,240	$ 3,000	$ 24,240
202	Complete and Refine COFA spreadsheet	8	4	4	40		56	$ 10,780	$ 500	$ 11,280
203	Draft and Final COFA report	4			20		24	$ 4,440		$ 4,440
	Subtotal Task 200	**36**	**28**	**28**	**84**		**176**	**$ 36,460**	**$ 3,500**	**$ 39,960**
Task 300 - Project Management										
301	Project Management	8				4	12	$ 2,380		$ 2,380
	Subtotal Task 300	**8**				**4**	**12**	**$ 2,380**	**$ -**	**$ 2,380**
	Total Hours and Fee	**52**	**34**	**34**	**92**	**4**	**216**	**$ 44,970**	**$ 5,000**	**$ 49,970**