

BASIS OF DESIGN

SYSTEM DESCRIPTION

THIS PHASE 2 OF THE PROCESS WATER MANAGEMENT SYSTEM (PWMS) IMPROVEMENTS PROJECT IS DESIGNED FOR THE MCMANIS FAMILY VINEYARDS LOCATED AT 18700 EAST RIVER ROAD, RIPON, CALIFORNIA 95366. THE IMPROVEMENTS PROJECT WILL BE CONSTRUCTED IN THE CENTER OF THE WINERY'S PARCEL. THE PWMS IS DESIGNED TO SUPPORT THE FACILITY'S COMPLIANCE WITH ITS CURRENT WASTE DISCHARGE REQUIREMENTS (WDR) AND MONITORING AND REPORTING PROGRAM (MRP). THE PWMS CONSISTS OF COARSE MECHANICAL PRESCREENING, A SCREENINGS MANAGEMENT AREA, EARTH-FILL TREATMENT PONDS LINED WITH A SYNTHETIC 60-MIL HDPE LINER, POND SURFACE AERATION FOR ODOR CONTROL, MIXING, AND REDUCTION OF ORGANIC MATERIAL, AND AN IRRIGATION PUMP STATION THAT TRANSFERS PWMS EFFLUENT TO THE WINERY'S DESIGNATED CROPPED LAND APPLICATION AREAS (LAA). WATER WILL BE APPLIED TO THE LAA USING THE EXISTING ENGINEERED SPRINKLER SYSTEM. UNDER NORMAL OPERATING CONDITIONS, PROCESS WATER STORED IN THE TREATMENT PONDS WILL BE AERATED AND TREATED POND EFFLUENT TRANSFERRED TO THE LAA WHERE TREATMENT WILL CONTINUE TO NATURALLY OCCUR THROUGH THE ATMOSPHERE. SOIL COLUMN OF THE LAA, AND CROPS. DURING TIMES OF NON-PROCESSING, THE WINERY WILL DIVERT CLEAN STORMWATER TO THE LINED STORMWATER STORAGE BASIN FOLLOWING PROCEDURES OUTLINED IN THE FACILITY'S PROCESS WATER AND STORMWATER MANAGEMENT PLAN APPROVED BY THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD (CRWQCB). SUPPLEMENTAL IRRIGATION WATER (SIW) CAN ALSO BE PUMPED FROM THE FACILITY'S ONSITE AG WELLS TO THE LAA, TREATMENT PONDS, AND/OR THE STORMWATER BASIN. SLUDGE WILL BE MEASURED EVERY 5 YEARS AND REMOVED AS NEEDED. ALL AREAS RECEIVING PROCESS WATER SHALL BE ENGINEERED AND CONSTRUCTED IN A MANNER THAT CONTAINS PROCESS WATER AND WASTES TO THE DESIGNATED AREAS. CONSTRUCTION SHALL BE OBSERVED BY THE OWNER'S CONSTRUCTION QUALITY ASSURANCE (CQA) CONSULTANT IN ACCORDANCE WITH REQUIREMENTS OF THE CQA PLAN APPROVED BY THE CRWQCB. A CONSTRUCTION COMPLETION REPORT WILL BE PREPARED BY THE ENGINEER OF RECORD AT THE END OF THE PROJECT, CONTAINING THE AS-BUILT INFORMATION PROVIDED BY THE CONTRACTOR, AND THE COMPLETION REPORT WILL BE SUBMITTED TO THE CRWQCB.

SYSTEM DESIGN CRITERIA

ESTIMATED CAPACITIES OF EXISTING PWMS COMPONENTS

PW SUMP MAX OPERATING CAPACITY = 5,700 GALS
 FLEX RAKE SCREEN PEAK FLOW = 100 TO 200 GPM
 SWT PUMPS PEAK FLOW = 1,000 GPM (2 PUMPS AT 500 GPM, 20 FT TDH)
 SWT PUMP DISCHARGE FLOW METERS > 1,000 GPM
 NORTH POND VOLUME = 1.2 MG MAX OPERATING @ 2 FT FREEBOARD (1.6 MG TOTAL)
 SOUTH POND VOLUME = 1.2 MG MAX OPERATING @ 2 FT FREEBOARD (1.6 MG TOTAL)
 DUAL POND SYSTEM MAX AVG FLOW FOR MONTH = 50,000 GPD (PER WDR FLOW LIMIT B.2)
 DUAL POND SYSTEM DETENTION TIME = 48 DAYS (AT MAX OPER VOLUME)
 DUAL POND SYSTEM ESTIMATED BOD REDUCTION = 99% (AT MAX OPER VOLUME)
 NORTH POND AERATION = 1 X 15HP BRUSH AERATOR, 2.25 LBS-O2/HP-HR, 810 LBS-O2/DAY CAPACITY
 SOUTH POND AERATION = 1 X 15HP BRUSH AERATOR, 2.25 LBS-O2/HP-HR, 810 LBS-O2/DAY CAPACITY

PROCESS WATER CHARACTERISTICS (DISCHARGE TO PWMS):

VALUES BASED ON INFORMATION PRESENTED IN WDR. BASED ON SAMPLES COLLECTED FROM PW SUMP WHEN NO STORMWATER

RAW PROCESS WATER SCREENED TO 0.02 INCHES (FLEX RAKE SCREEN SLOTS)
 pH = 3.5 TO 11.5 STD. UNITS
 [BOD] = 7,984 MG/L (AVG); 23,000 MG/L (MAX)
 [TDS] = 3,999 MG/L (AVG); 9,110 MG/L (MAX)
 [FDS] = 2,745 MG/L (AVG); 4,090 MG/L (MAX)
 [TN] = 72 MG/L (AVG); 190 MG/L (MAX)
 [NITRATE AS N] = 12.9 MG/L (AVG); 30.8 MG/L (MAX)
 [SULFATE] = 72 MG/L (AVG); 103 MG/L (MAX)
 TEMPERATURE = 20 TO 25 DEG CELSIUS; 120 DEG FAHRENHEIT MAX
 ESTIMATED DISCHARGE QUANTITIES = 3 MGY @ (E) 30,000-TON CRUSH; 5 MGY AT (F) 50,000-TON CRUSH

WASTE DISCHARGE REQUIREMENTS R5-2016-0097 REQUIREMENTS OF NOTE*

NOT AN ALL INCLUSIVE LIST OF REQUIREMENTS. REFER TO CURRENT WDR AND MRP FOR COMPLIANCE REQUIREMENTS

TOTAL ANNUAL PERMITTED EXISTING FLOW TO LAA = 6 MGY (INCLUDES AVG STORMWATER)
 MAX AVG DAILY EXISTING FLOW TO LAA = 50,000 GPD
 TOTAL ANNUAL PERMITTED FUTURE FLOW TO LAA (CRWQCB APPROVAL REQUIRED) = 7 MGY (INCLUDES STORMWATER FOR PROCESS MONTHS ONLY)
 MAX AVG DAILY FUTURE FLOW TO LAA (CRWQCB APPROVAL REQUIRED) = 80,000 GPD
 TREATED EFFLUENT LOADING LIMITS TO LAA (TREATED PROCESS WATER & STORMWATER, NO SIW)
 BOD < 150 LBS/ACRE/DAY
 TN < CROP DEMAND
 FDS < 5,400 LBS/ACRE/DAY
 TREATMENT POND REQUIREMENTS
 D.O. > 1.0 MG/L TOP 1 FT OF WATER SURFACE (3 CONSECUTIVE SAMPLING EVENTS)
 FREEBOARD > 2.0 FT AT ALL TIMES
 SLUDGE: MONITORED EVERY 5 YEARS. DESLUDGE IF SLUDGE > 3 FT DEPTH OR 25% OF POND CAPACITY
 POND LINER INTEGRITY: PERFORM INTEGRITY TESTS EVERY 5 YEARS

NEW PROCESS WATER TREATMENT POND SYSTEM

MAX OPERATING CAPACITY = 2.4 MG EA @ 2 FT FREEBOARD EACH POND
 POND TOTAL DEPTH = 18 FT
 POND INTERIOR SIDE SLOPE = 3 HORIZ : 1 VERT (3H:1V)
 POND MAXIMUM OPERATING DEPTH = 16 FT @ 2 FT MINIMUM FREEBOARD
 LINER SYSTEM = 60 MILS HDPE (GSE LINING SYSTEMS OR EQUAL)
 MAX DETENTION TIME AT (E) 50,000 GPD MAX AVG FLOW LIMIT = 96 DAYS
 MAX DETENTION TIME AT (F) 80,000 GPD MAX AVG FLOW LIMIT = 60 DAYS

BIOLOGICAL TREATMENT DEMANDS AND SIZING OF AERATION SYSTEM

PWMS ORGANIC LOADING CALCULATIONS:
 (E) CRUSH SEASON ORGANIC LOADING TO PWMS = 3.0 MG x 0.5 / 60 DAYS x 7,984 MG/L BOD x 8.34 = 1,670 LBS-BOD / DAY
 ORGANIC LOADING TO PWMS FOR (E) MAX AVG FLOW LIMIT = 50,000 GPD x 7,984 MG/L BOD x 8.34 = 3,330 LBS-BOD / DAY
 (F) CRUSH SEASON ORGANIC LOADING TO PWMS = 5.0 MG x 0.5 / 60 DAYS x 7,984 MG/L BOD x 8.34 = 2,770 LBS-BOD / DAY
 ORGANIC LOADING TO PWMS FOR (F) MAX AVG FLOW LIMIT = 80,000 GPD x 7,984 MG/L BOD x 8.34 = 5,330 LBS-BOD / DAY

PWMS AERATION DEMAND CALCULATIONS:
 (E) CRUSH SEASON AERATION DEMAND (EST. FLOW OF 25,000 GPD) = 2,340 LBS-O2 REQUIRED / DAY
 AERATION DEMAND FOR (E) MAX AVG FLOW LIMIT OF 50,000 GPD = 4,660 LBS-O2 REQUIRED / DAY
 (F) CRUSH SEASON AERATION DEMAND (EST. FLOW OF 41,700 GPD) = 3,880 LBS-O2 REQUIRED / DAY
 AERATION DEMAND FOR (F) MAX AVG FLOW LIMIT OF 80,000 GPD = 7,460 LBS-O2 REQUIRED / DAY

PWMS AERATION HORSEPOWER CALCULATIONS:
 BRUSH AERATION ESTIMATED DIRTY WATER OXYGEN TRANSFER EFFICIENCY = 2.5 LBS-O2 / HP-HR
 BRUSH HORSEPOWER REQUIRED FOR (E) CRUSH SEASON AERATION DEMAND (EST. FLOW OF 25,000 GPD) = 40 HP
 BRUSH HORSEPOWER REQUIRED FOR AERATION DEMAND FOR (E) MAX AVG FLOW LIMIT OF 50,000 GPD = 80 HP
 BRUSH HORSEPOWER REQUIRED FOR (F) CRUSH SEASON AERATION DEMAND (EST. FLOW OF 41,700 GPD) = 65 HP
 BRUSH HORSEPOWER REQUIRED FOR AERATION DEMAND FOR (F) MAX AVG FLOW LIMIT OF 80,000 GPD = 125 HP
 MINIMUM MIXING HORSEPOWER REQUIRED FOR TREATMENT POND = 2.6 MG x 12 HP / 1.0 MG = 30 HP

STORMWATER MANAGEMENT DESIGN CRITERIA

60-MINUTE, 100-YEAR STORM = 1.0 INCHES / HR
 24-HOUR, 10-YEAR STORM = 2.4 INCHES / DAY
 ANNUAL SW QUANTITIES = *SEE PRECIPITATION STORAGE CRITERIA TABLE BELOW.

PRECIPITATION STORAGE CRITERIA	RAIN DEPTH	VOLUME
85th-PERCENTILE 24-HR PRECIPITATION (WRCC MODESTO AIRPORT STATION 045738)	0.48 IN.	0.19 MG
10-YR, 24-HR STORM (NOAA ATLAS 14, VOLUME 6, VERSION 2, RIPON, CALIFORNIA)	2.25 IN.	0.89 MG
100-YR, 24-HR STORM (NOAA ATLAS 14, VOLUME 6, VERSION 2, RIPON, CALIFORNIA)	3.41 IN.	1.30 MG
HISTORIC HOUR - 25 JANUARY 1997 9AM (WRCC MODESTO AIRPORT STATION 045738)	0.83 IN.	0.33 MG
HISTORIC DAY - 4 MARCH 1978 (WRCC MODESTO AIRPORT STATION 045738)	2.72 IN.	1.08 MG
HISTORIC 3-DAY - 1 TO 3 APRIL 1958 (WRCC MODESTO AIRPORT STATION 045738)	4.08 IN.	1.61 MG
HISTORIC 7-DAY - 2 TO 8 FEBRUARY 1998 (WRCC MODESTO AIRPORT STATION 045738)	5.54 IN.	2.19 MG
HISTORIC 30-DAY - 27 JANUARY TO 19 FEBRUARY 1998 (WRCC MODESTO AIRPORT STATION 045738)	9.52 IN.	3.77 MG
10-YR, 24-HR (SAN JOAQUIN COUNTY STD DWG No. D-3)	2.40 IN.	0.95 MG
100-YR, 24-HR (SAN JOAQUIN COUNTY STD DWG No. D-3)	3.36 IN.	1.33 MG
AVERAGE WINTER - DECEMBER, JANUARY, FEBRUARY (WRCC MODESTO AIRPORT STATION 045738)	6.51 IN.	2.58 MG
WETTEST WINTER - DECEMBER, JANUARY, FEBRUARY (WRCC MODESTO AIRPORT STATION 045738)	12.46 IN.	4.93 MG
100-YR WINTER - DECEMBER, JANUARY, FEBRUARY (WRCC MODESTO AIRPORT STATION 045738)	12.08 IN.	4.78 MG

(E) STORMWATER BASIN

MAX OPERATING CAPACITY = 5.0 MG @ 2 FT FREEBOARD > 100-YR WETTEST WINTER ON RECORD
 POND TOTAL DEPTH = 18 FT
 POND INTERIOR SIDE SLOPE = 3 HORIZ : 1 VERT (3H:1V)
 POND MAXIMUM OPERATING DEPTH = 16 FT @ 2 FT MINIMUM FREEBOARD
 LINER SYSTEM = 60 MILS HDPE (GSE LINING SYSTEMS OR EQUAL)

CONTROLS AND FLOW METERING:

USE LEVEL TRANSDUCERS IN STILLING WELLS TO OBTAIN WATER LEVELS IN PONDS AND BASIN

AERATORS = OFF AT 5.0 FEET WATER DEPTH
 = ON AT 5.5 FEET WATER DEPTH
 IRRIGATION PUMPS = TBD (CROP DEMANDS, OPERATION NEEDS)
 HIGH WATER ALARM = 2.0 FEET FREEBOARD DEPTH

FLOW METERING (CONTINUOUS MONITORING & RECORDING)

SYSTEM FLOW - FLOW METERS WILL BE INSTALLED ON THE DISCHARGE PIPE OF EACH SWT AND IRRIGATION PUMP.

EQUIPMENT INFORMATION

*NOTE: EQUIPMENT SHALL BE SS, PVC, FRP OR EQUIVALENT CORROSION RESISTANT MATERIAL.

EQUIPMENT*	TYPE	OPERATING PT.	POWER REQMS.
FLEX RAKE SCREEN	DUPERON SS LINK DRIVEN, FRONT RETURN/CLEAN	100-200 GPM	0.5 HP EA
(E) NO. 1			
NO. 2	FLEXRAKE, 0.02-INCH SLOT WEDGEGWIRE	800 GPM	
(E) SCREEN WATER TRANSFER PUMPS	GORMAN RUPP SELF PRIMING CENTRIFUGAL	500 GPM AT 20 FT TDH	7.5 HP EA
INFLUENT FLOW METERS	TBD	-	NA
SURFACE AERATORS	HOUSE BRUSH	-	15-HP EA.
(E) PONDERSIBLE POND RECYCLE PUMP	OWNER TO PROVIDE INFORMATION	200 GPM AT ? TDH, CONFIRM WITH OWNER	7.5 HP 75-HP EA
LAA IRRIGATION PUMPS	GORMAN RUPP SELF-PRIMING CENTRIFUGAL	968 GPM @ 68.4 PSI *SEE RJM DESIGN DOCUMENTS AND AS-BUILTS FOR LAA SPRINKLER DETAILS	
IRRIG. PUMP FLOW METERS	TBD	-	NA

LINER INTEGRITY AND LEAK DETECTION

THE EARTH-FILL SUBGRADE AND SYNTHETIC LINER SYSTEM ARE DESIGNED TO ALLOW PERFORMANCE OF LEAK LOCATION TECHNIQUES USING ELECTRICAL DETECTION OF LEAK PATHS FOLLOWING ASTM STANDARDS (REF: ASTM D 6747).