ANDERSON ENGINEERING, INC.

Transmittal Memo:

Date: 11-2-2022

To: Utah Division of Water Quality

From: Kane Creek Preservation and Development LLC, William H. Anderson, P.E.

RE: Water and Wastewater Feasibility Report and ADR

Purpose of Submittal: To obtain feasibility approval for Grand County Design Review Team (DRT) for preliminary plat approval. The DRT required the following with Preliminary Plat submission:

> "Need approval of Preliminary Engineering Report from Utah DDW. Sanitary sewer system - need approval of Feasibility Study from Utah DWQ."
>
> Kane Springs has received approvals from DDW, attached herein.

The following in italics have been added responding to ADR and Supplemental Report Comments from 3-22-2022 email from Jeff Studenka (Attached):

Permit Application Form:

1. pp 1 - UPDES Permit No: UT0026204, *Added permit number.*
2. pp 16 (Part X) - The designated uses should also include "Domestic Water Supply" since 1C, *Checked box on page 16.*
3. pp 16 (Part X) - The Antidegradation Category is not beneficial uses. It should be Category 3, *Changed to Category 3.*
4. pp 17 (B2) - Should be checked Yes. *Checked yes.*
5. pp 19 (C) - The report name should be provided, not the LLC. *Added Kane Creek Preservation and Development, LLC, Water and Wastewater Feasibility Report, 10-18-2022.*
6. pp 20 (C6) - Since, this is a 1C beneficial use, should be checked Yes. Also indirect reuse since treat and use. *Checked yes and removed indirect reuse from report.*
7. pp 20 (D) - Need ambient concentration of all parameters in the effluent, not WLA POCs. This means DWQ needs to know source water(s) and all additions to treatment. DWQ then provides POCs, then they evaluate alternatives. Potential POCs

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include TSS, Se, E. coli, pH and water temperature (for NH3). *Added water test results from proposed public water supply wells in report. Page 4 of report.*

8. pp 20 (D) - DWQ will provide Applicant ambient concentration data for the Colorado River in order to determine POCs. Typical POCs for treated sanitary sewer effluent include, but not limited to, nitrate-nitrite, ammonia, TN, TP, BOD, pH, DO and TDS. Also, TDS concentration not load. *Attached spread sheet with data from the last year of sampling on the Colorado River. Please identify POCs, also do you want an average of all the years, or is 1981 winter and summer Colorado River results satisfactory?*

9. pp 21 (E1) - No should be checked, since it is not a permit renewal. *Checked No.*

10. pp 22 (E4) - This needs to be reviewed by DWQ Engineering to verify proper evaluation. *Included additional information on Page 11 of report.*

11. pp 22 (E4) - Pollutant trading is checked feasible. Document why it is feasible and how. This may be incorporated into permit. *Pollutant trading was checked No.*

12. pp 22 (E4) - No discharge is checked not feasible. If permittee is doing water reuse, land app, etc., then why is no discharge not an option. Must be explained. *The project is designed to minimize consumptive use. No discharge options involve irrigation which and uses which are 100% consumptive. The discharge is planned to use some discharge for drip irrigation and discharge 70% to the Colorado River.*

13. pp 22 (E5) - There is no analysis with the single provided treatment option. Describe other options. Does on site soils mean difficulty constructing a pipe to Moab WWTP? *Added narrative to Page 12 of report regarding cost and level of treatment. Yes, site soils do create issues with constructing a pipe line to Moab WWTP.*

14. pp 23 (E6) - This question is not answered appropriately. Preferred option least polluting feasible alternative is not correct when the single other option is to connect to WWTP. *Added treatment levels to the preferred option. The proposed plant will be less polluting in that it is removing more POCs than the Moab WWTP.*

Supplemental Report:

1. pp 2 (Report) - Several sources indicate the average UT primary daily average is ~170 GPD, not 150 GPD. This would greatly increase the overall peak daily discharge. All estimates and the MBR plant are engineered without uncertainty in this estimate. *The peak daily flow is based on R317-4-13 Table 3, 150GPD/Bed Room. The public water supply and wastewater treatment system will be metered to reduce water use and for conservation.*

2. pp 3 (Water Sources) - The 4th sentence states Utah Division of Water Quality but should be Drinking Water or Water Rights. *Changed to UDDW and DNR.*

3. pp 3 (Water Sources) - "Source demand based on peak daily flow is 270,000 gpd which is 188 gpm." Again, the estimate of 150 GPD per room may be conservative. *The source water is required to meet peak daily demands.*

4. pp 3 (Water Sources) - "If groundwater sources cannot meet the peak daily demand, then water from the Colorado River will be treated as an additional source." DWQ needs to know ALL sources or potential sources to derive the pollutants of concern (POC). *Kane Creek Preservation and Development LLC has completed development of well 4 and planning to drill well 3 in the near future. The Colorado River will not be required for a source at this time.*

5. pp 5 (Wastewater Treatment) - "Indirect Potable Reuse uses an environmental buffer, such as a lake, river, or a groundwater aquifer, before the water is treated at a drinking water treatment plant." This text needs details to verify. More information must be provided. *Removed indirect potable reuse from report and application.*

6. pp 5 (Wastewater Treatment) - "...potential to improve stream habitat and increase potable water supply in the aquifer". While BOD, TSS, Turbidity, TN, TP are monitored, other constituents like pharmaceuticals or endocrine disruptors need to be identified. *The wastewater treatment system will monitor/test for pharmaceuticals or endocrine disruptors.*

7. pp 6 (C1) “Proposed uses are outlined in the Wastewater and Water table in this report. The project will provide employment in construction, tourism and other industries. The completed development will provide a substantial increase in property, lodging, sales, and other tax revenue.". This is the only part of the answer to C1 that vaguely answers the question. What is substantial? Response needs to have metrics, numbers, or values to this. *Added metrics that compare current vs developed tax revenues based on 2021 tax rates. There is additional narrative on jobs.*

8. pp 6 (C2) - The project does not provide environmental benefit. It is a mitigation for the activity of the development, not benefiting the environment had the development not been introduced. *Added more explanation on environmental benefits. This is a significant development and involves many phases that will be combined into a single sewer system. The proposed level of treatment is beyond the minimum required standards.*

9. pp 6 (C2) - "The estimated consumptive use with irrigation is 30%." Where is the data to support this statement? *Approximately 27% of the discharge is planned for drip irrigation on 25 acres when the project is fully developed. The domestic indoor use is a closed system; however it is estimated the 3% of this water will be consumed or leave the site.*

10. pp 7 (C4) - This question is regarding downstream impacts of using assimilative capacity. You need downstream community info. This requires POC concentration on ambient conditions and how effluent is affecting or minimizing assimilative capacity.

11. pp 7 (C4) - "As a water and sewer district other lands could apply for inclusion within the district boundaries through annexation." First, there is no assimilative capacity for this project as there are ELS and endangered species present. Also, suggesting others might be included in this district is nought, similar to the reasons stated why the project cannot connect to Moab WWTP. *Added language on page 10 of report for*

adjoining lands and additional capacity. Additional capacity would be analyzed for ELS and endangered species if additional capacity is required.

12. pp 7 (C5) - "No other structures are proposed within or adjacent to receiving waters." There are 33 residential plots that are immediately adjacent to the Colorado River east bank. *Do not know where the 33 units come from? The discharge is at the down gradient edge of the development. Description has been added to page 10 of narrative.*

13. pp 7 (Alternate Treatment Options) - There seem to be only 2 options: Moab WWTP - expensive, and other Colorado R - the best choice. Engineering determines whether centralization is important and costs. *Engineering for the Kane Springs Improvement District determined that the proposed facility is the best alternative.*

14. pp 7 (Alternate Treatment Options) - "...plus $3,500,000.00 for reconstruction/repairs to Kane Springs Blvd." without the Kane Springs Blvd issues, the cost is less to connect to Moab WWTP. Is this something that the City may be interested in and willing to work out? *The cost provided did not include expansion of the City Plant. Connection costs and other factors have been updated and Kane Springs Preservation and Development LLC selected to not connect to the City of Moab. Kane Springs Preservation and Development LLC is planned to be developed in 10 Phases. The treatment plant is proposed to be built with the first phase and the Kane Springs Preservation and Development LLC wishes to be in control of future development on this property.*

15. pp 8 (Baseline Treatment Alternative) - "The proposed treatment of wastewater is to meet tertiary standards for water recycling and reuse. Therefore, meeting a minimum standard is not the goal and objective for the Kane Creek project. A minimum treatment analysis was not completed for this report." Is this something that Engineering needs to evaluate? Compare recycle and reuse to WLA limits? *The intent of the statement is the treatment plant was not designed to meet minimum standards set by regulatory agencies, but to exceed standards of for Type 1 treatment.*

16. pp 8 (Proposed Effluent Limits, 1. Selenium) - Selenium is part of an approved TMDL and load based limit may not be appropriate. Chronic load limit calculation incorrect - should use 0.135 MGD for max monthly design flow not max daily, which results in 2.35 g/day. Se under approved TMDL, not a POC for ADR. *Calculation was corrected to 0.135 MGD and is noted as a TMDL.*

Submission ID: DWQ-2022-025328

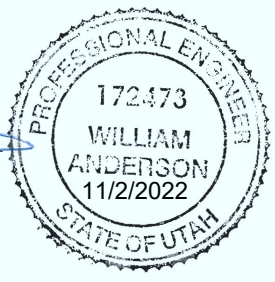
ANDERSON ENGINEERING, INC.

KANE CREEK PRESERVATION AND DEVELOPMENT LLC

Water and Wastewater Feasibility Report

October 18, 2022

William H. Anderson, P.E

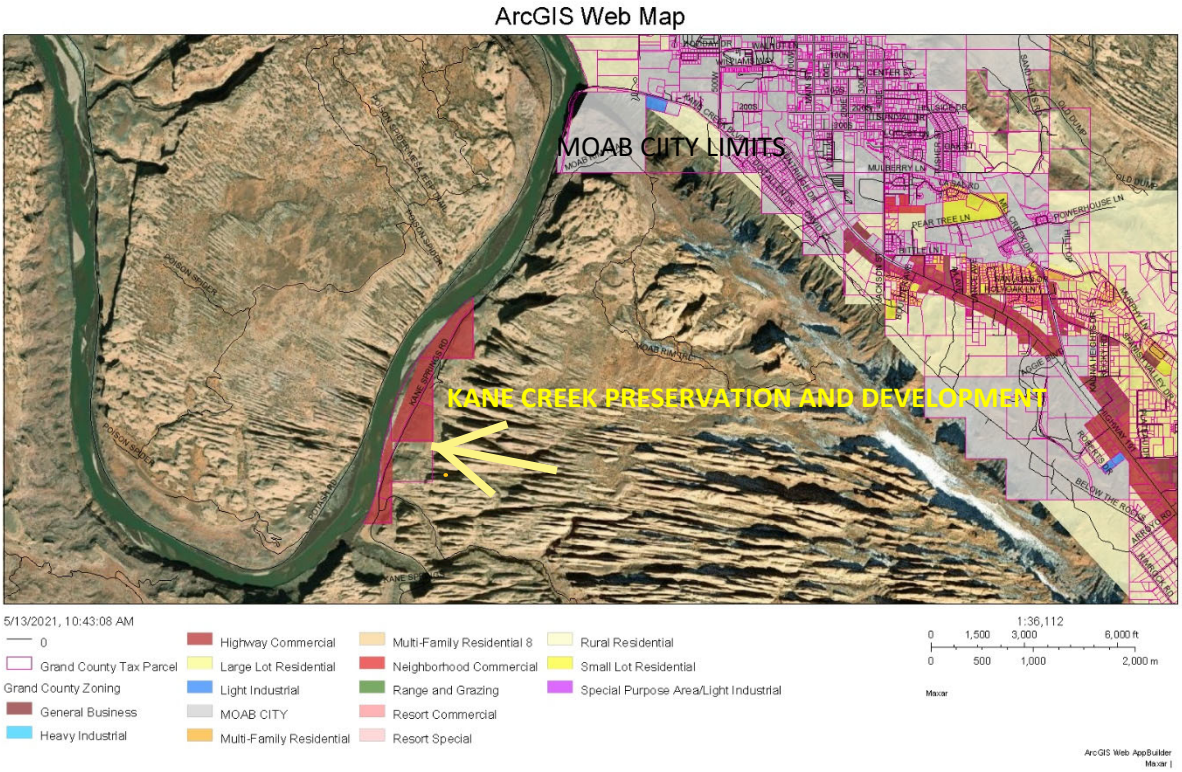


KANE CREEK PRESERVATION AND DEVELOPMENT PUBLIC WATER SUPPLY AND WASTEWATER TREATMENT

GRAND COUNTY, UT:

The Kane Creek Preservation and Development is proposed in Grand County Utah. The Development in Grand County is located 1.6 miles south of Moab city limits on Kane Creek Blvd. The water and wastewater improvements are proposed to be completed within the development property boundary.

The following map shows the project location.



Proposed water and wastewater estimates are shown on the following table. The proposed uses are based on preliminary plans and documents and grouped into Areas 1 thorough 6. Phases 1 through 10 are shown on Sheet C-204 "Master Phasing Plan":

KANE CREEK PRESERVATION AND DEVELOPMENT LLC Wastewater & Water 1-21-2022					
Proposed Uses:	**Design Capacity:**	**Unit per**	**# of Units**	**GPD**	**Notes**
Name					
AREA 1, Phases 1, 2, 3, 4, and 5					
1. Residential/Mixed Use, Riverside	450	Unit	268	120600	R317-4-13 Table 3, 150 GPD/Bed Room
1. Commercial, Riverside, 56,000 SF	11	Employee	60	660	R317-4-13 Table 3, Stores
1. Public Restrooms, Riverside	500	Bathroom	4	1846.15	R317-4-13 Table 3, per public toilet room
1. Restaurant, Riverside	35	Seat	200	7000	R317-4-13 Table 3, Ordinary Restaurant
AREA 2, Phase 8					
2. Residential/Mixed Use, Riverside	450	Unit	51	22950	R317-4-13 Table 3, 150 GPD/Bed Room
2. Commercial, Riverside, 16,000 SF	11	Employee	32	352	R317-4-13 Table 3, Stores
2. Public Restrooms, Riverside	500	Bathroom	2	1000	R317-4-13 Table 3, per public toilet room
2. Restaurant, Riverside	35	Seat	150	5250	R317-4-13 Table 3, Ordinary Restaurant
AREA 3, Phase 10					
3. Overnight Accommodations	125	Space	102	12750	R317-4-13 Table 3, RV Parks or Hotel Rooms
3. Commercial, OA, 10,000 SF	11	Employee	20	220	R317-4-13 Table 3, Stores
3. Public Restrooms, OA	500	Bathroom	4	2000	R317-4-13 Table 3, per public toilet room
3. Restaurant, OA	35	Seat	100	3500	R317-4-13 Table 3, Ordinary Restaurant
AREA 4, Phase 6					
4. Residential/Mixed Use, Upper	450	Unit	28	12600	R317-4-13 Table 3, 150 GPD/Bed Room
4. Commercial, Upper, 10,000 SF	11	Employee	20	220	R317-4-13 Table 3, Stores
4. Public Restrooms, Upper	500	Bathroom	2	1000	R317-4-13 Table 3, per public toilet room
4. Restaurant, Upper	35	Seat	30	1050	R317-4-13 Table 3, Ordinary Restaurant
AREA 5, Phase 7					
5. Residential/Mixed Use, Upper	450	Unit	132	59400	R317-4-13 Table 3, 150 GPD/Bed Room
5. Commercial, Upper, 6,000 SF	11	Employee	12	132	R317-4-13 Table 3, Stores
5. Public Restrooms, Upper	500	Bathroom	2	1000	R317-4-13 Table 3, per public toilet room
5. Restaurant, Upper	35	Seat	30	1050	R317-4-13 Table 3, Ordinary Restaurant
AREA 6, Phase 9					
6. Single Family Lots	750	Each	5	3750	R317-4-13 6.4 A, 150 GPD/bedroom
			586	**258330**	
GPD = Peak Daily Flow, Use 270,000GPD					

Domestic water and wastewater estimates based on UDEQ, R317-4-13, Table 3. Total estimated peak day demand for the project is 270,000 gallons per day and average day demand is 135,000 gallons per day.

Governmental approvals: Proposed public water and wastewater systems will require approval from Utah Department of Environmental Quality (UDEQ), Utah Department of Natural Resources (DNR), Southeastern Utah District Health Department, and Grand County. The PWS will be owned and operated by Kane Springs Water Company. The Wastewater system will be owned by Kane Creek Preservation and Development and managed by Grand Water and Sewer Association.

Governmental agency approvals for water and wastewater will be obtained to coincide with the Grand County approval process. Sheet C-206 "Phase 1 Utility Plan" shows improvements required for development of Phase 1 shown on Sheets C-205 "Phase 1 Site Plan" and C-207 "Phase 1 Grading Plan.

Kane Creek Preservation and Development will be developed to provide service to the various phases shown on Sheet C-204.

PUBLIC WATER SUPPLY:

Kane Creek Preservation and Development will be serviced by a community water supply and distribution system. Sheets C-600, "Public Water Supply Components Overview" shows the proposed layout. The PWS will be managed by Kane Springs Water Company. Final permitting documents will be submitted pending preliminary plat approval from Grand County.

Water Sources: Ground water wells are proposed for the development. A test well was drilled in 2019. This well is identified as Well 1 and testing indicated a sustainable yield at 60 gpm. The Utah Division of Drinking Water generally uses 2/3 of this initial pump test as the estimated production rate. The estimated production rate for this well is 40 gpm. This well will be further developed to determine a sustainable yield greater than 40 gpm. Well 1 was approved as a PWS well by the DNR and UDDW (Utah Division of Drinking Water) in the location shown on Sheet C-600

Well 4 has been completed and tested. The well was test pumped for 24 hours at a flow rate of 115 gpm. Well 4 was approved as a PWS well by the DNR and UDDW in the location shown on Sheet 600.

Wells 1 and 4 along with 3 additional wells (Wells 2, 3, and 5) are shown on Sheet C-600. The wells and locations have been approved by UDDW – Source Water Protection Program. Wells 3 and 5 are in the process of being drilled and test pumped to provide evidence of capacity required for the project. The total estimated water requirement is 200 gpm based on peak day demand. Source demand based on peak daily flow is 270,000 gpd which is 188 gpm.

Initial water source water requirements are 800 gpd per ERC for a new water source. Application will be made to reduce the 800 gpd per ERC based on actual water usage on Phase 1 as outlined in R309-510-5.

The table 0n the following page summarizes the source water quality for wells 1 and 4.

PRIMARY INORGANIC CONTAMINANTS CONTAMINANT MAXIMUM, 40 CFR 141 (2008)					
	Contaminant	**LEVEL**	**AWAL Well 1**	**Well 4**	Unit
1	Antimony	0.006 mg / L	< 0.00400	ND	mg/L
2	Arsenic	0.010 mg/L	**0.0022**	**0.0019**	mg/L
3	Asbestos	7 Million Fibers / liter(longer than 10 um)	*	*	Count
4	Barium	2 mg / L	**0.049**	**0.075**	mg/L
5	Beryllium	0.004 mg / L	< 0.00200	ND	mg/L
6	Cadmium	0.005 mg / L	< 0.000500	0.0002	mg/L
7	Chromium	0.1 mg / L	< 0.00200	ND	mg/L
8	Cyanide	(as free Cyanide) 0.2 mg / L	< 0.00500	ND	mg/L
9	Fluoride	4.0 mg / L	**2.27**	**0.2**	mg/L
10	Mercury	0.002 mg / L	< 0.00009	ND	mg/L
11	Nickel	Future	< 0.00200	ND	mg/L
12	Nitrate	10 mg / L (as Nitrogen)	**0.525**	**0.5**	mg/L
13	Nitrite	1mg / L (as Nitrogen)	**0.557**	**ND**	mg/L
14	Total Nitrate and Nitrite	10 mg / L (as Nitrogen)	<0.01	NA	mg/L
15	Selenium	0.05 mg / L	**0.0021**	**0.0023**	mg/L
16	Sodium ---	Future	**43.1**	**59.9**	mg/L
17	Sulfate	1000 mg/L, 500mg/L preferred	**190**	**40.7**	mg/L
18	Thallium	0.002 mg / L	< 0.00200	ND	mg/L
19	Total Dissolved Solids	2000 mg / L	**250**	***312**	mg/L
SECONDARY INORGANIC CONTAMINANTS					
1	Aluminum	0.05 to 0.2 mg / L	<0.1	*0.7	mg/L
2	Chloride	250 mg / L	**29.6**	**68.2**	mg/L
3	Color	15 Color units	**1**	***20**	CU
4	Copper	1 mg / L	< 0.00300	ND	mg/L
5	Corrosivity	Non-corrosive	0.434	NA	SI
6	Fluoride	2.0 mg / L	0.378	0.2	mg/L
7	Foaming	Agents 0.5 mg / L	*	*	mg/L
8	Iron	0.3 mg / L	< 0.100	**0.45**	mg/L
9	Manganese	0.05 mg / L	**0.0089**	**0.009**	mg/L
10	Odor	3 Threshold Odor Number	< 1.00	ND	T.O.N.
11	pH	6.5-8.5	**7.84**	**6.8**	
12	Silver	0.1 mg / L	< 0.00200	ND	mg/L
13	Sulfate	250 mg / L	**57**	**40.7**	mg/L
14	TDS	500 mg / L	**250**	***300**	mg/L
15	Zinc	5 mg/L	< 0.00600	ND	mg/L
ADDITIONAL CONTAMINANTS					
1	Ammonia as N		<0.0500	ND	mg/L
2	Boron		< 0.500	0.12	mg/L
3	Calcium		**33.3**	**28.1**	mg/L
4	Lead		< 0.00200	ND	mg/L
5	Magnesium		**6.04**	**18.6**	mg/L
6	Potassium		**4.1**	**4.4**	mg/L
7	Turbidity, as NTU	5 NTU	**0.419**	***15**	NTU
8	Specific Conductivity at 25°C		**439**	-	µmhos/cm
9	Bicarbonate		**140**	-	mg/L
10	Carbon Dioxide		< 5.00	-	mg/L
11	Carbonate		< 10.0	-	mg/L
12	Hydroxide		< 10.0	-	mg/L
13	Phosphate, Ortho as P		< 0.0500	ND	mg/L
14	Silica, dissolved as SiO_2		**4.83**	**13.9**	mg/L
15	Surfactant as MBAS				
16	Total Hardness as $CaCO_3$		**191**	**147**	mg/L
17	Alkalinity as $CaCO_3$		**140**	**ND**	mg/L
	Corrosivity-Langelier		0.096	-1.1	SI

Water Storage and Supply:
Water storage tanks will be engineered to provide domestic plus fire flow for the development. There are no existing water storage tanks on the property. Sheet C-600 shows the location of 2 storage tanks, 1-750,000 gallon concrete tank and 1-120,000 gallon storage tank. The storage tanks are proposed to be filled from production wells through the distribution system. Each well will be equipped with disinfection equipment and pipeage prior to discharging to the distribution system.

The water storage tanks and distribution systems will be sized to supply domestic storage plus fire flows of 1500 gpm for 4 hours in commercial/mixed use and 1000 gpm for 2 hours in the single family areas. Water storage includes capacity for interior fire sprinklers if required. Fire hydrants will be located within 250' of buildings and final locations will be approved by the County Fire Chief.

Water Pressures:
Sheet C-600 Shows the estimated water pressures for the development. Generally, the water pressure will be 70 psi along the riverside developments and 40 psi in the Shaded Booster System Area shown on C-600. Booster stations will be required to maintain a minimum of 40 psi in the shaded areas (Booster System Areas) on Sheet C-600.

Public Water Supply Summary
A site-wide distribution system will provide domestic, irrigation (minimal), and fire supply to all buildings.

The water supply and distribution systems will service the entire development. The water distribution system will be phased as required for Proposed Uses, in areas 1 through 6 as these parcels are developed.

Proposed design requirements for Kane Creek Preservation and Development public water system:

- Irrigation will be minimized for the development.
- Natural vegetation, saving striped vegetation and replanting.
- Lawns requiring irrigation should be minimized.
- Flower beds and low growing shrubbery allowed adjacent to structures.
- Water bars required on all disturbances to hold water and promote aquifer recharge.
- Wastewater for drip irrigation will be treated to Type 1 standards.
- Initial water source water requirements are 800 gpd per ERC for a new water source.
- Water usage will be monitored for a reduction to the 800 gpd requirement.
- Treated wastewater (Type I) will be used for drip irrigation whenever possible.
- *Consumptive use of water is targeted to be under 30% of the average day demand.
- Promote ground water recharge to enhance Colorado River flows and quality.
- Join the WaterSense organization. (https://www.epa.gov/watersense/watersense-partners)

*Consumptive use of 30% for Kane Springs is defined as follows: 3% domestic indoor use + drip irrigation 27%. Definition of consumptive use is water that is no longer available; such as evaporation, irrigation, etc.

The water distribution system will be constructed using C900 PVC (poly-vinyl chloride) pipe and standard cast iron valves and fittings. All mains will be sized to provide ample capacity with respect to Peak Hour Demands and fire flow requirements. As with most small water distribution systems,

the fire flow requirement (1,500 gallons per minute) plus interior fire sprinklers will drive the design of the system.

PUBLIC WASTEWATER CONCEPTUAL PLAN:

Kane Creek Preservation and Development plans to permit a site-wide sewage collection and treatment system. Sheet 700, "PWTS Components Overview" shows the general layout of the system. The wastewater system will require UDEQ, Southeastern District Health, and Grand County approvals. The system will be maintained with oversight by a Level 4 certified wastewater system operator licensed in the state of Utah. The Wastewater system will be serving multiple units under separate ownership. Governmental agency approvals for water and wastewater will be obtained to coincide with the Grand County Preliminary and Final Plat approval process.

Collection System:

The collection system will convey raw sewage to 5 lift stations as shown on Figure 2. The 5 lift stations lift raw sewage to the proposed 270,000 gpd treatment plant shown on Figure 2. Kane Creek Preservation and Development engineers will collaborate with UDEQ, DDW, and DNR to minimize impacts of development to the natural environment. Sheet C-700 shows the conceptual plan for wastewater collection, lift stations, and location of the treatment system.

Wastewater Treatment:

Wastewater produced in the development will be treated on site using an engineered treatment system. The proposed system is an engineered plant bult by Cloacina (https://www.cloacina.com/) and a separate design report document is attached herein. Treated water from the treatment plant will meet (at a minimum) the following Standards: BOD5 < 10 mg/L, TSS < 10 mg/L, Turbidity <5 NTU, Total N < 5 mg/L, NH3 <2.2, Phosphorous < 1 mg/L, TDS < 300, disinfection is less than 2.2 colony forming units (CFU) per 100ml.

Preliminary wastewater treatment analysis and design have been completed by Advanced Pump and Equipment (Clearfield, UT) and Cloacina using an engineered treatment plant. A preliminary design and analysis from Cloacina are attached. Discharge from the plant will be treated to a Type I use standard. Uses for wastewater treated to a Type I Use Standard, 317-3-11.4 are residential irrigation, including landscape irrigation of individual houses (drip systems). Urban uses for Kane Creek development include open space irrigation (drip system).

To meet Kane Creek Preservation and Development design goals, the preferred discharge would be river flow augmentation, and irrigation. Project permitting is focused on drip irrigation and discharge to the Colorado River.

Irrigation has the potential of storing and holding water and releasing it later in the season. Type I treated wastewater would be used in irrigation operations during seasonal months (spring, summer, fall). Facilitating the use of water bars in stormwater design and directing runoff to infiltration galleries will keep water from running directly off areas to sensitive habitat and rivers. The concept "flattens" the streamflow runoff during storm events.

Type I wastewater may meet most drinking water standards, however direct use for human consumption is not permitted. Bodily contact with Type I wastewater may be permitted at the discretion of UDEQ, when it can be shown to be safe for the proposed use. A Utah UPDES Municipal (POTW) discharge permit from the UDEQ is required along with an Antidegradation Review. The wastewater is treated to meet Colorado River water quality. A Level II ADR is required to meet parameter concentrations of the Colorado River supplied by DWQ.

Part X. Antidegradation Review for the Level II ADR is as follows:

C1. Describe the social and economic benefits that would be realized through the proposed project, including the number and nature of jobs created and anticipated tax revenues:

The Kane Creek subdivision is a mixed-use development consisting of both residential and commercial uses on 137 acres of land zoned highway commercial (HC) and 39 acres of land zoned range and grazing (RG). The Overnight Accommodations Overlay zone for recreational vehicles (OAO-RV/CG) overlays approximately 40 acres of the subdivision; the underlying zoning designation for this acreage is HC. Located to the south and southwest of Moab City, between the Colorado River and Pritchett Canyon, the Kane Creek subdivision is served by Kane Creek Blvd.

Each proposed use within the Kane Creek subdivision is a permitted use within Section 3.1 of the Grand County Land Use Code (LUC, "Use Table"). The campground development located in the southern reaches of the subdivision is permitted vis-à-vis the OAO-RV/CG; while not part of this preliminary plat review and approval process, the site plan for this campground will be governed by the settlement agreement between Grand County and Kane Springs, LLC and Section 4.6 of the LUC. Non-lodging commercial development is planned on several proposed lots and will be presented in future, discrete site plan applications. Our proposed residential densities are lower than the maximum allowable density by roughly five-fold. Our residential densities in the RG zoned land reflect the reductions imposed by Section 5.4.1.B.D, Constrained Lands.

Proposed uses are outlined in the Wastewater and Water table on page 2 of this report. The project will provide employment in construction, tourism and other industries. The completed development will provide a substantial increase in property, lodging, sales, and other tax revenue.

In the future the wastewater treatment will be part of a district which can service additional camping facilities, public lands, and recreational facilities.

The project would create 40-60 new direct jobs plus 100's of indirect jobs from $500,000,000.00 in development spending over 10 years of build out.

Property tax with an estimated base of $275,950,000.00 at the end of buildout generates $2,994,885.35 based on 2021 tax rates. Current property taxes are $19,253.42. The total property tax increase is $2,975,631.94.

The following are property tax estimates based on 2021 tax rates:

KANE CREEK PRESERVATION AND DEVELOPMENT LLC		
Current Taxes based on 2021 Rates		
Parcel Number	**Taxable Value**	**Tax - 2021**
03-0016-0002	$344,872	$3,742.89
03-0016-0001	$163,812	$1,777.85
03-0015-0102	$34,752	$377.17
03-0015-0101	$58,882	$639.05
03-0015-0100	$61,988	$672.75
03-0015-0099	$705,419	$7,655.91
03-0010-0100	$68,259	$740.81
03-0010-0099	$336,034	$3,646.98
Total	**$1,774,018**	**$19,253.41**

KANE CREEK PRESERVATION AND DEVELOPMENT LLC, Projected Taxes based on 2021 Rates.				
Proposed Uses:	**# of Units**			
AREA 1, Phases 1, 2, 3, 4, and 5*		**Taxable Value/Unit**	**Total Taxable**	**2021 Total Rate**
1. Residential/Mixed Use, Riverside	268	$500,000.00	$134,000,000.00	$1,454,302.00
1. Commercial, Riverside, 56,000 SF	1	$9,800,000.00	$9,800,000.00	$106,359.40
1. Public Restrooms, Riverside	4			
1. Restaurant, Riverside, 200 Seats	1	$800,000.00	$800,000.00	$8,682.40
AREA 2, Phase 8*				
2. Residential/Mixed Use, Riverside	51	$500,000.00	$25,500,000.00	$276,751.50
2. Commercial, Riverside, 16,000 SF	1	$2,800,000.00	$2,800,000.00	$30,388.40
2. Public Restrooms, Riverside	2			
2. Restaurant, Riverside	1	$900,000.00	$900,000.00	$9,767.70
AREA 3, Phase 10*				
3. Overnight Accommodations	102	$50,000.00	$5,100,000.00	$55,350.30
3. Commercial, OA, 10,000 SF	1	$1,750,000.00	$1,750,000.00	$18,992.75
3. Public Restrooms, OA	4			
3. Restaurant, OA, 100 Seats	1	$400,000.00	$400,000.00	$4,341.20
AREA 4, Phase 6*				
4. Residential/Mixed Use, Upper	28	$750,000.00	$21,000,000.00	$227,913.00
4. Commercial, Upper, 10,000 SF	1	$1,750,000.00	$1,750,000.00	$18,992.75
4. Public Restrooms, Upper	2			
4. Restaurant, Upper, 30 Seats	1	$300,000.00	$300,000.00	$3,255.90
AREA 5, Phase 7*				
5. Residential/Mixed Use, Upper	132	$500,000.00	$66,000,000.00	$716,298.00
5. Commercial, Upper, 6,000 SF	1	$1,050,000.00	$1,050,000.00	$11,395.65
5. Public Restrooms, Upper	2			
5. Restaurant, Upper, 30 Seats	1	$300,000.00	$300,000.00	$3,255.90
AREA 6, Phase 9*				
6. Single Family Lots/homes	5	$900,000.00	$4,500,000.00	$48,838.50
Total			**$275,950,000.00**	**$2,994,885.35**
*See Sheet C 204, Master Phasing Plan.				

Grand County Utah - Projected Tax		
Taxing Units/Entities	**Tax Rate (2021)**	**Tax Due/Entity**
GRAND COUNTY GENERAL	0.001951	$538,378.45
SCHOOL - GENERAL	0.005553	$1,532,350.35
SCHOOL - STATE BASIC LEVY	0.001661	$458,352.95
MULTICOUNTY ASSESSING & COLLECTING	0.000012	$3,311.40
COUNTY A&C	0.000337	$92,995.15
LIBRARY	0.000445	$122,797.75
GRAND COUNTY CEMETERY	0.000165	$45,531.75
MOAB MOSQUITO ABATEMENT	0.000205	$56,569.75
MOAB VALLEY FIRE	0.000382	$105,412.90
CHARTER SCHOOL STATE LEVY	0.000071	$19,592.45
LIBRARY - DEBT	0.000071	$19,592.45
Total Tax Rate and Tax by Entities	**0.010853**	**$2,994,885.35**

An analysis for additional sales, lodging, gas, employment, and other tax revenues have not been estimated at this time.

C2. Describe any environmental benefits to be realized through implementation of the proposed project.

The project is being developed in 10 phases. The primary environmental benefit will allow each phase to be combined into a single sewer system. The district could also be available to service additional lands in the area. The goals are to preserve and create habitat for existing wildlife throughout the development where ever feasible. Additionally, the proposed level of wastewater treatment is beyond the minimum required standards. Water conservation, where possible, is also one of the primary project goals.

C3. Describe any social and economic losses that may result from the project, including impacts to recreation or commercial development.

No projected social or economic losses are expected from this development.

C4. Summarize any supporting information from the affected communities on preserving assimilative capacity to support future growth and development.

Property surrounding Kane Springs is public, therefore future growth and development surrounding the treatment system is anticipated to be minimal.

C5. Please describe any structures or equipment associated with the project that will be placed within or adjacent to the receiving water.

An outfall pipe will be installed at the lower end of the project in the bed and bank of the Colorado River. Sheet C-206, "Phase 1 Utility Plan" shows the location of the discharge pipe. The discharge pipe with a well screen will be placed in a gravel bed below the bed of the river. A sample tap will be provided for water sampling near the end of the discharge lone. No other structures are proposed within or adjacent to receiving waters in this area.

E2. Attach as an appendix to this form a report that describes that following factors for all alternative treatment options (see 1) a technical description of the treatment process, including construction costs and continued operation and maintenance expenses, 2) the mass and concentration of discharge constituents, and 3) a description of the reliability of the system, including the frequency where recurring operation and maintenance may lead to temporary increases in discharged pollutants. Most of this information is typically available from a Facility Plan, if available.

1. Alternate Treatment Option, Connect to City of Moab Facility:

This alternative requires a lift station and a number of improvements within the City of Moab to get wastewater to the facility. The facility is operated under UPDES Permit Number UT0020419. The current treatment plant was permitted for a maximum average flow 1.75MGD.

The Kane Creek Development property was not included in the City of Moab treatment plant service area. The City of Moab treatment plant is approximately 2.1 miles away from the development and

there are concerns related to the force main crossing wetlands and streams to access the Moab treatment facility.

Kane Creek would be a 15% increase in discharge to the current treatment plant capacity. The additional discharge would require expanding the facility for a 0.27MGD increase in flow. The treatment plant expansion is estimated at $2,295,000.00 based on a cost at $8.50/gal.

Construction Costs to connect to the Moab City plant was estimated to be $6,000,000.00. This cost includes $2,500,000.00 for pump stations and 2.1 mile force mains plus $3,500,000.00 for reconstruction/repairs to Kane Springs Blvd and Moab City streets. The total estimated cost to connect to the City of Moab's plant is $8,295,000.00 (including expansion of facility). The costs do not include damages to wetlands, streams, and environmental permitting for wetland mitigation.

Continued operation and maintenance would require cleaning and monitoring pumps stations. This cost has not been analyzed for this study.

2. Mass & Concentration of Discharge Constituents: The City of Moab discharge permit UT0020419 sets effluent limitations. These limits would require further analysis which were not completed for this report.

3. Reliability of system: The City of Moab treatment system is required to report monitoring to be compliance with their current discharge permit. If the system fails to meet discharge standards, then modifications to treatment processes will be required. These modifications are unknown at this time.

Temporary Increases in discharge pollutants were not analyzed for this report. Cost and environmental concerns were the determining factor; however, the level of treatment is a consideration which is compared in section E3.

E3. Describe the proposed method and cost of the baseline treatment alternative. The baseline treatment alternative is the minimum treatment required to meet water quality based effluent limits (WQBEL) as determined by the preliminary or final wasteload analysis (WLC) and any secondary or categorical effluent limits.

Baseline Treatment Alternative: The proposed treatment of wastewater is to meet tertiary standards for water used for drip irrigation and discharge to the Colorado River (Type I). Therefore, meeting a minimum standard is not the goal and objective for the Kane Creek project. A minimum treatment analysis for the proposed plant is not relevant.

E5. Preferred alternative on site treatment:
Cloacina MEMPAC – M130 Engineered Wastewater Treatment Plan: A 4-Stage Bardenpho Process MBR plant is proposed for Kane Creek. The process simulation is attached herein. The treatment process and plant costs are attached to this report. The treatment plant and facilities are estimated at $2,500,000.00.

Proposed Effluent limits:

1. Selenium in-stream chronic TMDL std: 0.0046 mg/L (4.6 ug/L), or 2.35 g/day as a loading limit based upon 0.135 MGD design flow (4.6 x 0.135MGD x 3.79cf). Our well sample was 0.0021mg/L, however the Colorado River currently is 1.43 to 10.2 ug/L. (Under approved TMDL)

2. Total ammonia as nitrogen NH3, (mg/L): Chronic Ammonia limit (Monthly Avg) of 2.2, Acute Ammonia limit (Daily Max) of 13.3.
3. TDS: 1 ton/day or 400mg/L over source water. Kane Creek source water is 250-300mg/L based on well 1 & 4 water samples, use <400mg/L.
4. BOD5 < 10 mg/L
5. TSS < 10mg/L
6. Turbidity < 5NTU
7. Total N < 5 mg/L
8. Disinfection < 2.2 Colony Forming units (CFU) per 100ml.
9. Total Phosphorus < 1mg/L annual average for TP
10. TDS < 300mg/L

Percentage of removal of POCs is as follows:

Treatment % Removal					
	Influent		**Effluent**		**% removed**
BOD5	225	mg/L	10.00	mg/L	95.56%
TSS	219	mg/L	10.00	mg/L	95.43%
TKN	38	mg/L	5.00	mg/L	86.84%
NH3	23	mg/L	2.20	mg/L	90.43%
P	10	mg/L	1.00	mg/L	90.00%
TDS	300	mg/L	250.00	mg/L	N/A

Land Application of Biosolids: Biosolids will be collected and discharged to a landfill and or approved land application site. Sewage sludge is considered solids, until treatment or testing shows that the solids are safe, and meet beneficial use standards. After the solids are tested or treated, the solids are then known as biosolids. Class A biosolids, may be used for high public contact sites, such as home lawns and gardens, parks, or playing fields, etc. The treatment plant is designed to add a sludge drying system to add a sludge composting component to the system as a future phase. Class B biosolids may be used for low public contact sites, such as farms, rangeland, or reclamation sites, etc. The biosolids are discharge to a 18,000 gallon storage system for removal to a land fill.

The sewage collection and treatment systems will be designed and constructed in accordance with UDEQ, DDW, and DWQ standards and approval. The standards are found in R317 and R309 Regulations.

Emergency generators will be installed to provide uninterrupted service to electrically powered components of the sewage collection and treatment system.

It is anticipated that most of the development can be serviced by a gravity sewer collection System and lift stations. The gravity system will discharge to a lift station to bring raw sewage to the treatment plant. There are 5 lift stations proposed for the development shown on Sheet C-700. Sewer lines will be phased with the development and certified for service as needed. The sewage collection system will be designed and constructed in accordance with UDEQ/DWQ standards and will require UDEQ approval.

Parameters of Concern:

Rank	Pollutant	Ambient Concentration Colorado River	Effluent Concentration
1	BOD		<10mg/L
2	Nitrogen	5.8	<5mg/L
3	Phosphorus	0.04 mg/L 1981	<1mg/L
4	Total dissolved Solids	753 mg/L Av 1981	<300mg/L
5	TSS	29.5 mg/L Av 1981	<10mg/L
6	Disinfection	NA	<2.2CFU/100ml

Alternatives Analysis:

Alternative preferences were analyzed to meet requirements for water conservation, treatment, operation, and future expansion.

The City of Moab wastewater treatment facility is a sequencing batch reactor (SBR). The construction costs were $13,086.00 ($7.50/gal) in 2018, however filters and chemical additions may be required to obtain the treatment levels of the preferred alternative.

Comparison of treatment plant area: The proposed treatment plant will be housed in a 44' x 100 ft area (0.10 acres) which is 0.01 sf/gal. The City of Moab Plant is on 4.1 acres and is approximately 0.10sf/gal. The proposed Kane Springs MBR treatment process requires 1/10th of the land area as the Moab SBR plant therefore land disturbance and visual impact are minimized.

The preferred alternative is treating water to a higher standard.

R317-2-3.5 Requirements	**Connect to City of Moab Alternative**	**Baseline Alternative Requirements**	**Preferred Onsite Treatment Alternative**
Innovative or alternative treatment options		X	x
More effective treatment options or higher treatment levels		X	x
Connection to other wastewater treatment facilities	X		
Process changes or product or raw material substitution		x	x
Seasonal or controlled discharge options to minimize discharging		x	x

during critical water quality periods			
Use Standard Treatment		x	x
Water Conservation		X	x
Water Recycle and use for drip irrigation		X	x
Alternative discharge locations or alternative receiving waters		x	x
Land Application		X	x
Total Containment		x	x
Improved operation and maintenance of existing treatment systems	x	x	x
Lowest Cost			X

In any scenario, there will be no direct discharge of **untreated** effluent into the Colorado. The sewage treatment system will be designed and constructed in accordance with UDEQ standards and will require UDWQ approval.

Kane Creek Preservation and Development will support local efforts to minimize consumptive water use and support water saving technologies. Water discharge for irrigation is considered a 100% consumptive use by the DNR which indicates that water is not being returned to streams or aquifers. A primary design goal of the engineering team for the Kane Creek Preservation and Development to minimize consumptive use and return Type I treated water to the Colorado River.

DRIP IRRIGATION DISCHARGE, R317- 5 and 4:

It is anticipated that 27% of the MBR effluent will be used for drip irrigation for shrubbery, trees, and general landscaping. The effluent would be disinfected and distributed through a "purple Pipe" irrigation system throughout the proposed development. The drip system will be designed to meet Large Underground Wastewater Disposal (LUWD) systems.

R317-5-4. Feasibility Determinations and Approval-in-Concept:

4.1. General Criteria for Determining LUWD System Feasibility.

The division shall determine the feasibility of using a LUWD system. Upon favorable determination for feasibility an approval-in-concept will be granted by the division. Required information is as follows:

R317-5-6.1 Design requirements state that disposal shall meet Sections R317-4-6 with the following exceptions:

A. The LUWD will serve multiple single family residences and commercial operations. The Single wastewater flow was estimated at 450 gpd per dwelling which is more than the 400 gpd required in this section.
B. The minimum separation distance from the bottom of the drip irrigation systems will be 24 inches based on the MBR treatment to the maximum ground water table.

6.2. Components required in a LUWD System:

A. A septic Tank is not required for the MBR treatment system.
B. An effluent filter is not required for the MBR Plant.
C. A pressurized subsurface disposal system is proposed.

CONCLUSION:

Following the feasibility review and discussions with the UDEQ and DWQ complete construction grade design drawings will be prepared and submitted to the department. The attached drawings are included to provide conceptual understanding of the proposed system configuration and primary components. Feedback regarding code requirements for proposed components and any concerns with the approvability of the overall concept would be greatly appreciated at this in the design process.

ATTACHMENTS:

- UPDES Permit Application (draft)
- UPDES Map
- Preliminary Civil Review Set
- MEMPAC – Engineered Treatment System design report
- MEMPAC – Computer Modeling and Simulation Report
- MEMPAC – Preliminary Drawing Set
- Ambient Source Concentrations Spread Sheet

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UPDES Municipal (POTW) Permit Application

Part I. General Information (40 CFR 122.21(j)(1) and (9))

UPDES Permit No.: UT0026204

Facility Name: Kane Creek Preservation and Development, LLC

Facility Location: 2481 Kane Creek Boulevard

City Moab State UT Zip 84532

Facility Mailing Address: 10466 Iverson Lane

City Highland State UT Zip 84003

Facility Contact: William H. Anderson, P.E. **Title:** Project Engineer

Phone Number: 406 925 0590 **Email Address:** bill@andersonmontana.com

Name of Signatory: William Anderson **Title:** Project Engineer

Is the applicant the facility owner, operator or both? (check only one response.)

☒ Owner ☐ Operator ☐ Both

Indicate below any existing environmental permits. (Check all that apply and type the corresponding permit number for each.)

☐ RCRA (hazardous waste) ☐ UIC (underground injection control) ☐ PSD (air emissions)

☐ Nonattainment program (CAA) ☐ NESHAPs (CAA) ☐ Dredge or fill (CWA Section 404)

☐ Other (specify)

Nature of Business CFR (40 CFR 122.21(f)(8))

Describe the nature of your business

Kane Creek Preservation and Development LLC is a proposed development on the Colorado River. The project includes recreational facilities, commercial spaces, restaurants, overnight accommodations, single family lots, and mixed use residential.

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Part II. Facility Information

Population served?	1650

Design and Actual Flow Rates

Provide design and actual flow rates in designated spaces.

Design Flow Rate	
0.27	mgd

Annual Average Flow Rates (Actual) New System

Five Years Ago		**Four Years Ago**		**Three Years Ago**	
	mgd		mgd		mgd
Two Years Ago		**Last Year**		**Current Year**	
	mgd		mgd		mgd

Maximum Daily Flow Rates (Actual)

Five Years Ago		**Four Years Ago**		**Three Years Ago**	
	mgd		mgd		mgd
Two Years Ago		**Last Year**		**Current Year**	
	mgd		mgd		mgd

Describe the treatment for each outfall

	Outfall No. [1] _____	**Outfall No.** _____	**Outfall No.** _____
Highest Level of Treatment (check all that apply per outfall)	☐ Primary ☐ Equivalent to secondary ☐ Secondary ■ Advanced ■ Other (specify) MBR	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify) _____	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify) _____
Design Removal Rates by Outfall			
BOD_5	96 %	%	%
TSS	96 %	%	%
Phosphorus	☐ Not applicable 90 %	☐ Not applicable %	☐ Not applicable %
Nitrogen	☐ Not applicable 85 %	☐ Not applicable %	☐ Not applicable %
Other (specify) NH3	☐ Not applicable 85 %	☐ Not applicable %	☐ Not applicable %

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Part II. Facility Information *continued*

Does the POTW use chlorine for disinfection, use chlorine elsewhere in the treatment process, or otherwise have reasonable potential to discharge chlorine in its effluent? ■ YES ☐ NO

Describe the type of disinfection used for the effluent for each outfall. If disinfection varies by season, describe below.

MBR filtration and Chlorine Disinfection. Treated effluent will be discharge through a 6400 ft., 4" PVC. Effluent will be aerated prior to discharge to minimize chlorines in the river.

	Outfall No. 1	**Outfall No.** 2	**Outfall No.** _____
Disinfection type	Cl	Cl	
Seasons used	Year Round	Spring, Summer, Fall	
Dechlorination used?	☐ Not applicable ■ Yes ☐ No	☐ Not applicable ■ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No

MAP: Attach a USGS topographic map or aerial photo extending one mile beyond the property boundaries of the site, the facility or activity boundaries, any treatment area(s), outfall(s), major drainage patterns, and the receiving surface waters stated above.

■ Map Attached

UPDES Municipal (POTW) Permit Application

Part II. Facility Information *continued*

Are improvements to the facility scheduled?

■ YES If YES, explain below.

☐ NO If NO, Skip to Part III

Briefly list and describe the schedule improvements.

1. Wastewater Collection sytem for development - 2023

2. MBR Treatment Plant - 2023

3.

4.

Provide scheduled or actual dates of completion for improvements.

Scheduled or Actual Dates of Completion for Improvements

Scheduled Improvement (from above)	Affected Outfalls (list outfall number)	Begin Construction (MM/DD/YYYY)	End Construction (MM/DD/YYYY)	Begin Discharge (MM/DD/YYYY)	Attainment of Operational Level (MM/DD/YYYY)
1. 2023	1	07/01/2023	12/30/2023	12/30/2023	07/01/2028
2. 2023	2	07/01/2023	12/30/2023	12/30/2023	07/01/2028
3.					
4.					

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Part III. Sampling Information N/A

Provide all parameter sampling data with analytical results, reporting limit and any laboratory flags on an Excel spreadsheet. *An Excel Spreadsheet will be provided upon request.*

Has WET testing been conducted during the last 5 years? ☐ YES ■ NO

Indicate the acute and chronic WET tests (PASS or FAIL) results for the past 5 years. If no WET testing for the quarter, then leave blank (e.g., for semi-annual or annual testing or missed testing events).

Year	Outfall No. ________				Outfall No. ________				Outfall No. ________			
	Acute		Chronic		Acute		Chronic		Acute		Chronic	
	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
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	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL
	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL

Describe any cause(s) of toxicity:

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Part IV. Compliance Information N/A

Has the facility had an parameter exceedances over the past five years? ☐ YES ☑ NO

If Yes, provide the below information:

Parameter	Exceedance	Month/Year	Cause

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Part IV. Compliance Information ***continued***

Facility monitoring data. N/A

Please provide the past **five years** of all parameters required to be monitored in the UPDES permit. The data can be entered in the section below or an excel spreadsheet. Attached additional sheets if needed.

Month	Year	Parameter	Min	Max	Avg	MDL/RL*

*MDL/RL is the analysis method detection limit or reporting limit located on the laboratory analysis report.

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Part V. Outfalls and Receiving Water(s)

Provide the latitude and longitude to the nearest second for each dewatering outfall. The specified location should be after all treatment and before release to the receiving water. Provide the name of the initial receiving water. If the initial receiving water is unnamed, please also indicate the closed named drainage the receiving water flows into (i.e. unnamed tributary of City Creek). Attach additional sheets if necessary for more outfalls.

Each outfall to a different receiving water segment is subject to additional application fees and annual fees.

Outfall No.	Average daily flow rate	Latitude	Longitude	Receiving Surface Waters (Name)
1	0.135 mgd	38 O 32 ‘ 6.73 “	109 O 36 ‘ 2.94 “	Colorado River
	mgd	O ‘ “	O ‘ “	
	mgd	O ‘ “	O ‘ “	

Do any of the outfalls described above have a season or periodic discharges?

☒ YES ☐ NO

If so, provide the following information for each applicable outfall.

	Outfall No. 1	Outfall No. _____	Outfall No. _____
Number of times per year discharges occurs	Daily		
Average duration of each discharge (specify units)	Continuously		
Average flow of each discharge	0.135 mgd	mgd	mgd
Months in which discharge occurs	Jan - December		

Part VI. Collection System

Service Area(s)	Population Served	Miles of Pipe
Kane Creek Preservation & Dev.	1650	3.75
Total Population Served	1650	**Total Miles of Pipe**

USMP Program implemented? ☐ YES ☒ NO

UPDES Municipal (POTW) Permit Application

Part VII. Pretreatment Information N/A

Does the facility have an approved pretreatment program? ☐ YES ■ NO

If YES, skip to next section

If No, complete the below industrial user forms and inspections as needed.

A. Industrial Pretreatment Wastewater Survey N/A

Check any of the following that have occurred in the past five years either at the wastewater treatment plant or in the collection system:

- ☐ Foaming
- ☐ Unusual colors
- ☐ Plugged collection lines caused by grease
- ☐ Plugged collection lines caused by sand
- ☐ Plugged collection lines caused by other debris
- ☐ Discharging of excessive BOD
- ☐ Discharging of excessive suspended solids
- ☐ Smells unusually bad or unusual smells
- ☐ Upsets of the treatment plant due to unknown conditions

Does the facility have any industrial users (IUs) which meet any of the following criteria:

1. **Has a lot of process wastewater (5% of the flow at the waste treatment facility or more than 25,000 gallons per work day.)**
   a. Examples: food processor, dairy, slaughterhouse, industrial laundry.

☐ YES ■ NO

1. **Is subject to federal categorical pretreatment standards**;
   a. Examples: metal plating, cleaning or coating of metals, blueing of metals, aluminum extruding, circuit board manufacturing, tanning animal skins, pesticide formulating or packaging, and pharmaceutical manufacturing or packaging,

☐ YES ■ NO

2. **Is a concern to the POTW.**
   a. Examples: septage hauler, restaurant and food service, car wash, hospital, photo lab, carpet cleaner, commercial laundry.

☐ YES ■ NO

Do any users of the water treatment facility caused any of the following to occur: N/A

☐ YES ☐ NO A discharge which creates a fire or explosion hazard in the collection system.
☐ YES ☐ NO A discharge which creates toxic gases, vapor or fumes in the collection system.
☐ YES ☐ NO A discharge of solids or thick liquids which creates flow obstructions in the collection system.
☐ YES ☐ NO An acidic discharge (low pH) which causes corrosive damage to the collection system.
☐ YES ☐ NO Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause problems in the collection system or at the waste treatment facility.
☐ YES ☐ NO Waste haulers are prohibited from discharging without permission.
☐ YES ☐ NO Does the facility believe that illegal dumping is occurring in the jurisdiction?

UPDES Municipal (POTW) Permit Application

Part VII. Pretreatment Information *continued* N/A

Complete and submit a preliminary inspection of each business that is discharging process wastewater to the wastewater treatment plant

B. PRELIMINARY INSPECTION FORM

Inspection Date: TBD Inspection Time: _____

Name of Business: Kane Creek Preservation and Development, LLC Person Contacted: TBD

Street Address: 2481 Kane Creek Boulevard City: Moab

Email Address: TBD Phone Number: TBD

Description of Business:

Principal product or service:

Raw Materials used:

Production process is: ☐ Batch ■ Continuous ☐ Both

If yes, briefly describe seasonal production cycle.

This facility generates the following types of wastes (check all that apply):

1. ■ Domestic wastes (Restrooms, employee showers, etc.)
2. ☐ Cooling water, non-contact
3. ☐ Boiler/Tower blowdown
4. ☐ Cooling water, contact
5. ☐ Process
6. ■ Equipment/Facility washdown
7. ☐ Air Pollution Control Unit
8. ☐ Storm water runoff to sewer
9. ☐ Other describe

Wastes are discharged to (check all that apply):

- ☐ Evaporation
- ☐ Ground water
- ■ Sanitary sewer
- ■ Other (describe below)
- ☐ Storm sewer
- ■ Surface water
- ■ Waste haulers

Drip irrigation system

Name of waste hauler(s), if used

_____ _____ _____

Is a grease trap installed? ■ Yes ☐ No

Is it operational? ☐ Yes ☐ No

UPDES Municipal (POTW) Permit Application

Part VII. Pretreatment Information *continued* N/A

B. PRELIMINARY INSPECTION FORM *continued*

Does the business discharge a lot of process wastewater?

- More than 5% of the flow to the waste treatment facility? ☐ Yes ☒ No
- More than 25,000 gallons per work day? ☐ Yes ☐ No

Does the business do any of the following or manufacture any of the following?

- ☐ Adhesives
- ☐ Aluminum Forming
- ☐ Battery Manufacturing
- ☐ Car Wash
- ☐ Carpet Cleaner
- ☐ Copper Forming
- ☐ Dairy
- ☐ Electric & Electronic Components
- ☐ Explosives Manufacturing
- ☐ Food Processor
- ☐ Foundries
- ☐ Hospital
- ☐ Industrial Porcelain Ceramic Manufacturing
- ☐ Inorganic Chemicals Mfg. or Packaging
- ☐ Iron & Steel
- ☐ Laundries
- ☐ Metal Finishing, Coating or Cleaning
- ☐ Mining
- ☐ Nonferrous Metals Manufacturing
- ☐ Organic Chemicals Manufacturing or Packaging
- ☐ Paint & Ink Manufacturing
- ☐ Pesticides Formulating or Packaging
- ☐ Petroleum Refining
- ☐ Pharmaceuticals Manufacturing or Packaging
- ☐ Photo Lab
- ☐ Plastics Manufacturing
- ☐ Restaurant & Food Service
- ☐ Rubber Manufacturing
- ☐ Septage Hauler
- ☐ Slaughter House
- ☐ Soaps & Detergents Manufacturing
- ☐ Steam Electric Generation
- ☐ Tanning Animal Skins
- ☐ Textile Mills

Are any process changes or expansions planned during the next three years? ☐ Yes ☒ No

If yes, attach a separate sheet to this form describing the nature of planned changes or expansions.

Inspector Name Printed _____ Wastewater Treatment Facility _____

Any questions regarding the form or assistance with inspecting business please contact

Jennifer Robinson
Pretreatment Coordinator
Division of Water Quality
P. O. Box 144870
Salt Lake City, Utah 84114-4870

Phone: (801) 536-4383
Fax: (801) 536-4301
E-Mail:jenrobinson@utah.gov

UPDES Municipal (POTW) Permit Application

Part VII. Pretreatment Information *continued*

Either list all businesses below or provide a list of business licenses issued in the facilities service area.

	Name of Business	Jurisdiction	SIC Codes	Total Average Process Flow (gpd)	Total Average Facility Flow (gpd)	Facility Description (dentist, manufacturing [state product], dairy, assisted living facility, etc.)
1	See attached proposed uses.					
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

UPDES Municipal (POTW) Permit Application

Part VIII. Bisolids Information N/A

Was the Biosolids Annual Report submitted? ☐ YES ■ NO

☐ Attach a Biosolids Management Plan with application

Serve Connections? _____

Provide the total dry metric tons per the latest 365-day period of sewage sludge generated, treated, used and disposed of:

Practice	Dry Metric Tons per 365-day Period
Amount generated at the facility	
Amount treated at the facility	
Amount used (i.e., received from offsite) at the facility	
Amount disposed of at the facility	

Treatment Provided at Your Facility

Identify the treatment process(es) used at your facility to reduce pathogens in sewage sludge

- ☐ Preliminary operations (e.g., sludge grindling and degritting)
- ☐ Stablilization
- ■ Composting
- ☐ Disinfection
- ☐ Heat drying
- ☐ Methane or biogas capture and recovery
- ■ Thickening (concentration)
- ☐ Anaerobic digestion
- ☐ Conditioning
- ■ Dewatering (e.g. centrifugation, sludge drying beds, sludge lagoons)
- ☐ Thermal reduction

Sewage Sludge Disposal Method TBD

Land Application of Bulk Sewage Sludge

Is sewage sludge form your facility applied to the land? ■ YES ☐ NO If No, Skip to next section

Total dry metric tons per 365-day period of sewage sludge applied to all land sites:

Surface Disposal

Is sewage sludge from your facility placed on a surface disposal site?

☐ YES ■ NO If No, Skip to next section

Total dry metric tons of sewage sludge from your facility placed on all surface disposal sites per 365-day period: _____

Do you own or operate all surface disposal sites to which you send sewage sludge for disposal?

☐ YES ■ NO If No, complete the below information

Surface disposal site *you do not operate*

Site name TBD

Mailing address _____

City _____ State _____ Zip _____

Contact Name _____ Title _____

Phone Number _____ Email Address _____

UPDES Municipal (POTW) Permit Application

Part VIII. Bisolids Information *continued* N/A

Incineration

Is sewage sludge from your facility fired in a sewage sludge incinerator?
☐ YES ■ NO If No, Skip to next section

Total dry metric tons of sewage sludge from your facility fired in all sewage sludge incinerators per 365-day period: _____

Do you own or operate all sewage sludge incinerators in which sewage sludge from facility is fired?
☐ YES ☐ NO If No, complete the below information

Incinerator location *you do not operate*

Site name _____

Mailing address _____

City _____ State _____ Zip

Contact Name _____ Title _____

Phone Number _____ Email Address _____

Disposal in a Municipal Solid Waste Landfill

Is sewage sludge from your facility placed on a municipal solid waste landfill?
■ YES ☐ NO If No, Skip to next section

Total dry metric tons of sewage sludge from your facility placed in this municipal solid waste landfill per 365-day period: TBD

Do you own or operate the municipal solid waste landfill in which sewage sludge is disposed?
☐ YES ■ NO If No, complete the below information

Municipal Solid Waste Landfill *you do not operate*

Site name TBD

Mailing address _____

City _____ State _____ Zip _____

Contact Name _____ Title _____

Phone Number _____ Email Address _____

UPDES Municipal (POTW) Permit Application

Part IX. Reuse Information

Is wastewater applied to land?
☐ YES ■ NO If YES, complete the below information.

Land Application Site and Discharge Data

Location	Size	Average Daily Volume Applied	How often
	acres	gpd	☐ Seasonal ☐ Continuous ☐ Intermittent
	acres	gpd	☐ Seasonal ☐ Continuous ☐ Intermittent
	acres	gpd	☐ Seasonal ☐ Continuous ☐ Intermittent

Seasonal land application.

Indicate months of seasonal land application

☐ January	☐ April	☐ July	☐ October
☐ February	☐ May	☐ August	☐ November
☐ March	☐ June	☐ September	☐ December

Where is the Reuse water distributed

- ☐ Residential irrigation
- ☐ Urban uses
  - ○ Non-residential landscape irrigation
  - ○ Golf course irrigation
  - ○ Toilet flushing
  - ○ Fire protection
- ☐ Irrigation of food crops (direct contact with edible part) – spray irrigation
- ☐ Irrigation of food crops *(Non direct contact with edible part) – no spray irrigation*
- ☐ Irrigation
  - ○ Sod farms
  - ○ Silviculture
  - ○ Limited access highway rights of way
  - ○ Other areas where human access is restrict or unlikely to occur
- ☐ Irrigation of animal feed crops other than pasture for milking animals
- ☐ Impoundment of wastewater where direct human contact is not allowed or is unlikely to occur
- ☐ Cooling water
- ☐ Soil compaction or duct control in construction areas
- ☐ Other

☐ **Attached an updated Reuse Project Plan**

An updated Reuse Project Plan is required during every permit renewal.

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review

The objective of antidegradation rules and policies is to protect existing high quality waters and set forth a process for determining where and how much degradation is allowable for socially and/or economically important reasons. In accordance with Utah Administrative Code (UAC R317-2-3), an antidegradation review (ADR) is a permit requirement for any project that will increase the level of pollutants in waters of the state. The rule outlines requirements for both Level I and Level II ADRs, as well as public comment procedures. This review form is intended to assist the applicant and Division of Water Quality (DWQ) staff in complying with the rule but is not a substitute for the complete rule in R317-2-3.5. Additional details can be found in the *Utah Antidegradation Implementation Guidance* and relevant sections of the guidance are cited in this review form.

ADRs should be among the first steps of an application for a UPDES permit because the review helps establish treatment expectations. The level of effort and amount of information required for the ADR depends on the nature of the project and the characteristics of the receiving water. To avoid unnecessary delays in permit issuance, DWQ recommends that the process be initiated at least one year prior to the date a final approved permit is required.

DWQ will determine if the project will impair beneficial uses (Level I ADR) using information provided by the applicant and whether a Level II ADR is required. The applicant is responsible for conducting the Level II ADR. For the permit to be approved, the Level II ADR must document that all feasible measures have been undertaken to minimize pollution for socially, environmentally or economically beneficial projects resulting in an increase in pollution to waters of the state.

For permit requiring a Level II ADR, this antidegradation form must be completed and approved by DWQ before any UPDEs permit can be issued. Typically, the ADR form is completed in an iterative manner in consultation with DWQ. The applicant should first complete the statement of social, environmental and economic importance (SEEI) in Section C and determine the parameters of concern (POC) in Section D. Once the POCs' are agreed upon by DWQ, the alternatives analysis and selection of preferred alternative Section E can be conducted based on minimizing degradation resulting from discharge of the POCs. Once the applicant and DWQ agree upon the preferred alternative, the review is considered complete, and the form is submitted to DWQ.

What are the designated uses of the receiving water (R317-2-6)?

- ☒ Domestic Water Supply
- ☒ Recreation
- ☒ Aquatic Life
- ☒ Agricultural Water Supply
- ☐ Great Salt Lake

Antidegradation Category 1, 2 or 3 of receiving water (R317-2-3.2, -3.3, and -3.4): Category 3

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

Effluent flow reviewed: *typically, this should be the maximum daily discharge at the design capacity of the facility. Exceptions should be noted.*

270,000 gpd

What is the application for? (Check all that apply)

- ☒ A UPDES permit for a new facility, project, or outfall.
- ☐ A UPDES permit renewal with an expansion of modification of an existing wastewater treatment works.
- ☐ A UPDES permit renewal requiring limits for a pollutant not covered by the previous permit and/or an increase to existing permit limits.
- ☐ A UPDES permit renewal with no charges in facility operations.

Section B. Is a Level II ADR required?

This section of the form is intended to help applicants determine if a Level II ADR is required for specific permitted activities. In addition, the Executive Secretary may require a Level II ADR for an activity with the potential for major impact on the quality of waters of the state (R317-2-3.5a.1).

B1. The UPDES permit is new or is being renewed and the proposed effluent concentration and loading limits are higher than the concentration and loading limits in the previous permit and any previous antidegradation review(s).

- ☒ YES – (Proceed to B3 of the Form)
- ☐ NO – No Level II ADR is required and there is no need to proceed further with the review questions. Continue to the Certification Statement and Signature page.

B2. Will any pollutants use assimilative capacity of the receiving water, i.e. do the pollutant concentrations in the effluent exceed those in the receiving waters at critical conditions? For most pollutants, effluent concentrations that are higher than the ambient concentrations require an antidegradation review? For a few pollutants such as dissolved oxygen, and antidegradation review is required if the effluent concentrations are less than the ambient concentrations in the receiving water. (Section 3.3.3 of Implementation Guidance)

- ☒ YES – (Proceed to B4 of the Form)
- ☐ NO – No Level II ADR is required and there is no need to proceed further with the review questions. Continue to the Certification Statement and Signature page.

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

B3. Are water quality impacts of the proposed project temporary and limited (Section 3.3.4 of Implementation Guidance)? Proposed projects that will have temporary and limited effects on water quality can be exempted form a Lev le II ADR.

☐ YES – Identify the reason used to justify this determination if B4.1 and proceed to Section G. No Level II ADR is required.

☒ NO – A Level II ADR is required (Proceed to Section C)

B3.1 Complete this question only if the applicant is requesting a Level II review exclusion for temporary and limited projects (See R317-2-3.5(b)(3) and R317-2-3.5(b)(4)). For projects requesting a temporary and limited exclusion please indicate the factor(s) used to justify this determination (check all that apply and provide details as appropriate) (Section 3.3.4 of Implementation Guidance):

☐ Water quality impacts will be temporary and related exclusively to sediment or turbidity and fish spawning will not be impaired.

Factors to be considered in determining whether water quality impacts will be temporary and limited:

a) The length of time during which water quality will be lowered:	
b) The perfect change in ambient concentrations of pollutants:	
c) Pollutants affected:	
d) Likelihood for long-term water quality benefits:	
e) Potential for any residual long-term influences on existing uses:	
f) Impairment of fish spawning, survival and development of aquatic fauna excluding fish removal efforts:	
Additional justification, as needed:	

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

Level II ADR

Section C, D, E, and F of the form constitute the Level II ADR Review. The applicant must provide as much detail as necessary for DWQ to perform the antidegradation review. Questions are provided for the convenience of applicants; however, for more complex permits it may be more effective to provide the required information in a separate report. Applicants that prefer a separate report should record the report name here and proceed to Section G of the form.

Option Report Name: Kane Creek Preservation and Development, LLC, Water and Wastewater Feasibility Report, 10-18-2022

Section C. Is the degradation from the project socially and economically necessary to accommodate important social or economic development in the area in which the waters are located? *The applicant must provide as much detail as necessary for DWQ to concur that the project is socially and economically necessary when answering the questions in the section. More information is available in Section 6.2 of the Implementation Guidance.*

C1. Describe the social and economic benefits that would be realized through the proposed project, including the number and nature of jobs created and anticipated tax revenues.

Page 8

C2. Describe any environmental benefits to be realized through implementation of the proposed project.

Page 10

C3. Describe any social and economic losses that may result from the project, including impacts to recreation or commercial development.

Page 10

C4. Summarize any supporting information from the affected communities on preserving assimilative capacity to support future growth and development.

Page 10

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

C5. Please describe any structures or equipment associated with the project that will be placed within or adjacent to the receiving water.

Treated wastewater is planned to be discharged as shown on attached map. A discharge line will be installed from the MBR Treatment plant to the discharge location. The discharge will distributed through a rock/rip rap bed along the river bed&bank. Discharge from the plant is disinfected and treated to exceed drip irrigation and discharge standards.

Page 10

C6. Will the discharge potentially impact a drinking water source, e.g., Class 1C waters? Depending upon the locations of the discharge and its proximity to downstream drinking water diversions, additional treatment or more stringent effluent limits or additional monitoring, beyond that which may otherwise be required to meet minimum technology standards or in stream water quality standards, may be required by the Director in order to adequately protect public health and the environment (R317-2-3.5 d.).

- ☒ YES
- ☐ NO

Section D. Identify and rank (from increasing to decreasing potential threat to designated uses) the parameters of concern. *Parameters of concern are parameters in the effluent at concentrations greater than ambient concentrations in the receiving water. The applicant is responsible for identifying parameter concentrations in the effluent and DWQ will provide parameter concentrations for the receiving water. More information is available in Section 3.3.3 of the Implementation Guidance.*

Parameters of Concern: Ambient Source Concentrations Attached Spread Sheet.

Rank	Pollutant	Ambient Concentration	Effluent Concentration
1.	TDS	763 mg/L	<250 mg/L + 400 mg/L
2.	TSS	16 mg/L	<10 mg/L
3.	Ammonia - N	0.09 mg/L	<2.2 mg/L
4.	P	0.04 mg/L	<1 mg/L
5.			

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

Pollutants Evaluated that are not Considered Parameters of Concern:

Pollutant	Ambient Concentration	Effluent Concentration	Justification
1. BOD	-	<10	
2. TSS	40	<10	MBR Treament
3. TDS	740mg/l	< 1Ton/day(240)	
4.			
5.			

Section E. Alternative Analysis Requirements of Level II Antidegradation Review. *Level II ADRs require the applicant to determine whether there are feasible less-degrading alternatives to the proposed project. More information is available in Section 5.5 and 5.6 of the Implementation Guidance.*

E1. The UPDES permit is being renewed without any changes to flow or concentrations. Alternative treatment and discharge options including changes to operations and maintenance were considered and compared to the current processes. NO economically feasible treatment or discharge alternatives were identified that were not previously considered for any previous antigradation review(s).

☐ YES – (Proceed to Section F)
☒ NO or Does Not Apply (Proceed to E2)

E2. Attach as an appendix to this form a report that describes that following factors for all alternative treatment options (see 1) a technical descriptions of the treatment process, including construction costs and continued operation and maintenance expenses, 2) the mass and concentration of discharge constituents, and 3) a description of the reliability of the system, including the frequency where recurring operation and maintenance may lead to temporary increases in discharged pollutants. Most of this information is typically available from a Facility Plan, if available.

Report Name: Kane Creek Preservation and Development, Water & Wastewater Feasibly Report

E3. Describe the proposed method and cost of the baseline treatment alternative. The baseline treatment alternative is the minimum treatment required to meet water quality based effluent limits (WQBEL) as determined by the preliminary or final wasteload analysis (WLC) and any secondary or categorical effluent limits.

See Page 11 of report..

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

E4. Were any of the following alternatives feasible and affordable?

Alternative	Feasible	Reason Not Feasible/Affordable
Pollutant Trading	☐ YES ■ NO	
Water Recycling/Reuse	☐ YES ■ NO	
Land Application	■ YES ☐ NO	
Connection to Other Facilities	☐ YES ■ NO	Environmental concerns, cost, level of treatment
Upgrade to Existing Facility	☐ YES ■ NO	Environmental concerns, cost, level of treatment
Total Containment	☐ YES ■ NO	N/A
Improved O&M of Existing Systems	☐ YES ☐ NO	N/A
Seasonal or Controlled Discharge	■ YES ☐ NO	
New Construction	■ YES ☐ NO	
No Discharge	☐ YES ■ NO	Combination of drip irrigation and discharge.

E5. From the applicant's perspective, what is the preferred treatment option?

The preferred treatment option is a MBR treatment process with the addition of post treatment. The Water and Wastewater Feasibility Report includes an analysis of the treatment process. The objective is to obtain a discharge permit that exceeds regulatory requirements, produces high quality water for drip irrigation and discharge for downstream water users.

Connecting to the City of Moab treatment plant was considered. The preferred alternative was selected because of cost, permitting wetland disturbances, rock excavation, and level of wastewater treatment with connecting to the City of Moab treatment plant.

Page 11

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

E6. Is the preferred option also the least polluting feasible alternative?

☒ YES ☐ NO

If No, what were less degrading feasible alternative(s)?

If No, provide a summary of the justification for not selecting the least polluting feasible alternative and if appropriate, provide a more detailed justification as an attachment.

Section F. Optional Information

F1. Does the applicant want to conduct optional public review(s) in addition to the mandatory public review? Level II ADRs are public noticed for a thirty day comment period. More information is available in Section 3.7.1 of the Implementation Guidance.

☐ YES ☒ NO

F2. Does the project include an optional mitigation plan to compensate for the proposed water quality degradation?

☒ YES ☐ NO

Report Name: Kane Creek Preservation and Development, LLC, Water and Wastewater Feasibility Report

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

Division of Water Quality (DWQ)
UPDES Program

UPDES Municipal (POTW) Permit Application

Part XI. Certification Statement and Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with system designed to assure that quailed personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations.

Craig Weston		President	4/25/23
PRINT Signatory Authority	**Signature**	**Title**	**Date**

The Division of Water Quality may request addition information.

Important: The UPDES Permit Application will not be considered complete unless you answer every question. If an item does not apply to you, enter "Not Applicable" to show that you considered the question.

The UPDES Permit Application, must be signed as follows:

1) For a corporation, a responsible corporate officer shall sign the NOT, a responsible corporate officer means:
   a. A President, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or
   b. The manager of one or more manufacturing, production, or operating facilities, if
      i. The manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental statutes and regulations:
      ii. The manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and
      iii. Authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
2) For a partnership of sole proprietorship, the general partner or the proprietor, respectively; or
3) For a municipality, state or other public agency, either a principal executive officer or ranking elected official shall sign the application; in this subsection, a principal executive officer of any agency means;
   a. The chief executive officer of the agency; or
   b. A senior executive officer having responsibility for the overall operations of a principal geographic unit or division of the agency.

Where to File the UPDES Permit Application form:

Please submit the original form with a signature in ink to the below address. Remember to retrain a copy for your records.

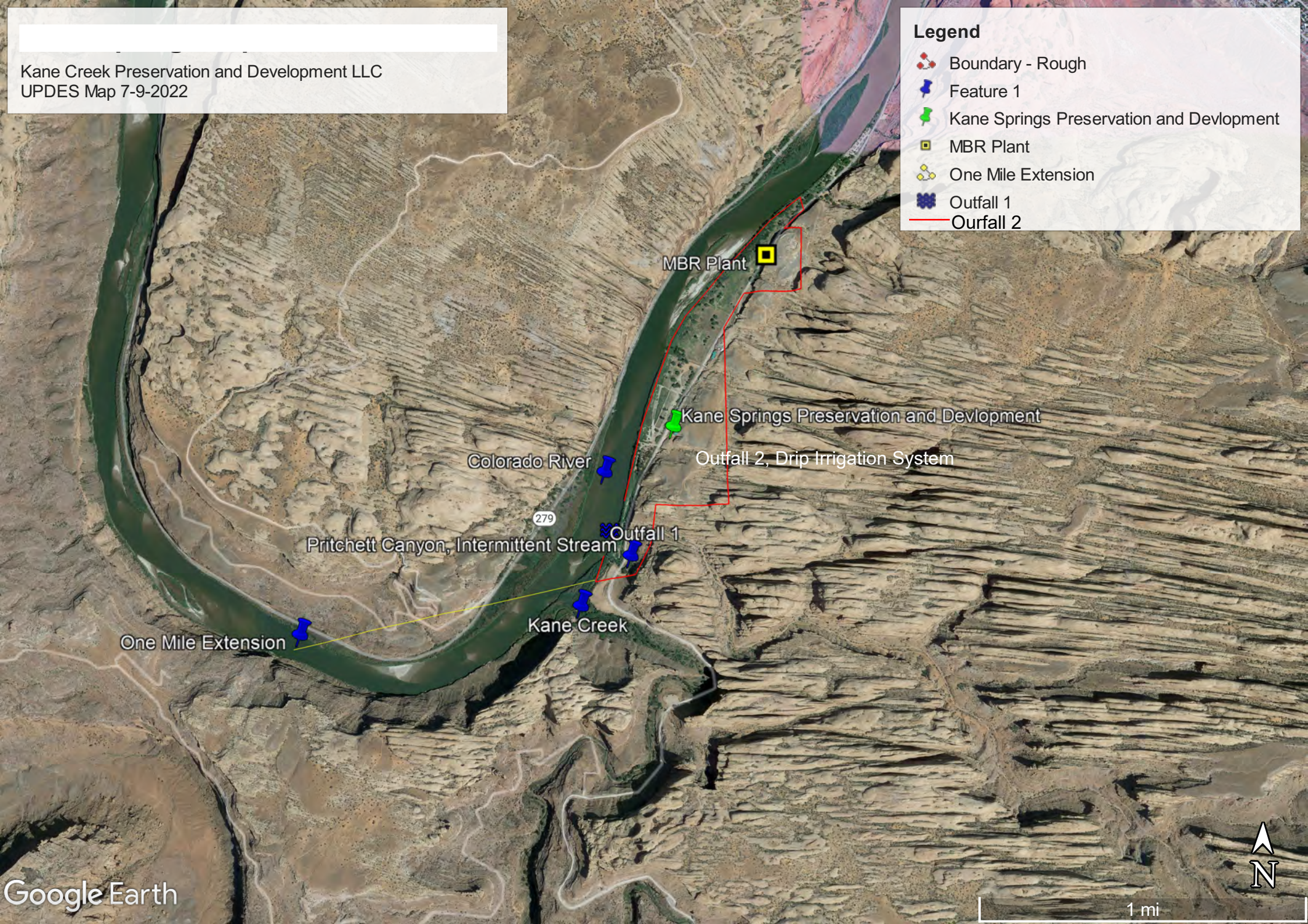
UPDES sent by mail:

Division of Water Quality
195 North 1950 West
PO Box 144870
Salt Lake City, UT 84114-4870

OFFICE USE ONLY

Date received: / / **Received by:** _____ **Document No:** _____

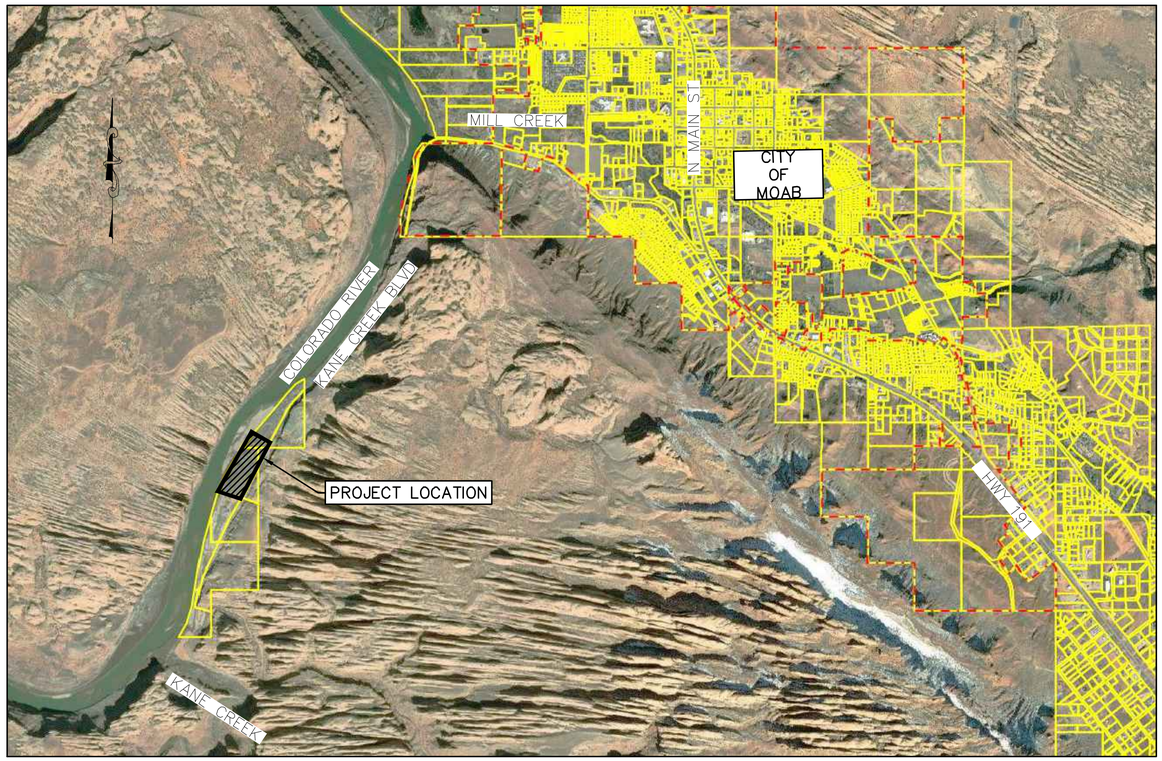
via: ☐ Email ☐ Fax ☐ Webportal ☐ Mail ☐ Hand Delivery


Kane Creek Preservation and Development LLC
UPDES Map 7-9-2022
Legend
Boundary - Rough
Feature 1
Kane Springs Preservation and Devlopment
MBR Plant
One Mile Extension
Outfall 1
Ourfall 2
MBR Plant
Kane Springs Preservation and Devlopment
Outfall 2, Drip Irrigation System
Colorado River
279
Outfall 1
Pritchett Canyon, Intermittent Stream
Kane Creek
One Mile Extension
Google Earth
N
1 mi

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
PHASE 1
MOAB, UTAH

PLAN SET FOR FEASIBILITY REVIEW ONLY

REVIEW SET
FOR PRELIMINARY PLAT



VICINITY MAP
NTS

LAND USE DATA:

PARCEL ID:	03-0010-0099 03-0010-0100 03-0015-0099 03-0015-0100 03-0015-0101
ZONE:	HC
LAND AREA:	29.4 AC. ± DISTURBED
SETBACKS:	PER CODE
BLDG HEIGHT:	PER CODE
WATER SUPPLY ID#	UTAH 10048

PHASE 1 PROJECT SUMMARY:
xxxxxxxxxx LOTS WITH ROADWAY, UTILITY, & STORMWATER INFRASTRUCTURE

LEGAL DESCRIPTION & BASIS OF BEARINGS:
REFER TO PRELIM PLAT BY RED DESERT SURVEY DATED XX/XX/2022.

COORDINATE SYSTEM & DATUM:
UTAH STATE PLANES, CENTRAL ZONE, US FT, NAD83

OWNER
KANE CREEK PRESERVATION AND DEVELOPMENT LLC & KANE SPRINGS LLC

OWNER'S REPRESENTATIVE
CRAIG WESTON
10466 IVERSON LANE
HIGHLAND, UTAH 84003
801-318-7100

SURVEYOR
RED DESERT LAND SURVEYING
30 SOUTH 100 EAST, SUITE 2
MOAB, UTAH 84532
LUCAS BLAKE
436-259-8171

CIVIL ENGINEER
SET ENGINEERING, LLC
1309 E. 3RD AVE. #206
DURANGO, CO 81301
JEFF PILLUS, PE
970-403-5088

WATER/WASTEWATER ENGINEER
ANDERSON ENGINEERING
WILLIAM ANDERSON, PE
406-925-0590

SYNERGY ENGINEERING
& KONSULTING
MARLENE SADAJ, PE
406-624-6137

UTILITIES
GWSSA
3025 SPANISH TRAIL RD,
MOAB, UT 84532
435-259-8121
ROCKY MOUNTAIN POWER
888-221-7070

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PRELIMINARY SET INCLUDES
SHEETS C-100 - C-208
AND SHEETS C-600 - C-706

ANDERSON ENGINEERING, INC.

GWSSA APPROVAL:

SIGNATURE DATE

GRAND COUNTY APPROVAL:

SIGNATURE DATE

Know what's below. Call 811 before you dig.
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UTILITY NOTIFICATION CENTER, INC.
www.bluestakes.org
1-800-662-4111

Revisions:
#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
COVER SHEET
MOAB, UTAH

SET ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C100

Sheet 1 of x
Project: 2019-024
Date: 07/06/2022
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Checked By: JG

PRELIMINARY
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NOT FOR CONSTRUCTION

c:\users\chrishawkins\dropbox (set engineering, llc)__set business__set projects current\2019-024_kane springs\cad\plonsheets\c100 c101 cover notes legend.dwg

GENERAL NOTES

1. ALL WORK SHALL BE CONSTRUCTED ACCORDING TO THE STANDARDS AND SPECIFICATIONS OF GRAND COUNTY, UTAH APWA, GWSSA, LOCAL UTILITY PROVIDERS, AND PROJECT CIVIL ENGINEER.
2. THE CONTRACTOR SHALL OBTAIN A CAD FILE DIRECTLY FROM THE ENGINEER FOR SITE LAYOUT.
3. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK ON THE PROJECT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE OWNER/DEVELOPER OF ANY PROBLEMS IN CONFORMING TO THE APPROVED PLANS FOR ANY ELEMENT OF THE PROPOSED IMPROVEMENTS PRIOR TO ITS CONSTRUCTION.
5. THE OWNER/DEVELOPER SHALL BE THE RESPONSIBLE PARTY DURING CONSTRUCTION ACTIVITIES TO RESOLVE CONSTRUCTION PROBLEMS DUE TO CHANGED CONDITIONS OR DESIGN ERRORS ENCOUNTERED BY THE CONTRACTOR DURING THE PROGRESS OF ANY PORTION OF THE PROPOSED WORK. IF THE MODIFICATIONS PROPOSED BY THE DEVELOPER TO THE APPROVED PLANS INVOLVE SIGNIFICANT CHANGES TO THE CHARACTER OF THE WORK OR TO FUTURE CONTIGUOUS PUBLIC OR PRIVATE IMPROVEMENTS, THE DEVELOPER SHALL BE RESPONSIBLE FOR SUBMITTING REVISED PLANS TO THE APPROPRIATE AGENCIES FOR APPROVAL PRIOR TO ANY FURTHER CONSTRUCTION RELATED TO THAT PORTION OF THE WORK. ANY IMPROVEMENTS CONSTRUCTED NOT IN ACCORDANCE WITH THE APPROVED PLANS OR THE APPROVED REVISED PLANS, SHALL BE REMOVED AND THE IMPROVEMENTS SHALL BE RECONSTRUCTED ACCORDING TO THE APPROVED PLANS.
6. THE CONTRACTOR SHALL CONTACT THE APPROPRIATE AGENCIES FOR LOCATION OF UNDERGROUND WATER, SEWER, GAS, ELECTRIC, AND TELEPHONE UTILITIES AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE ONLY, AND ALL EXISTING LINES MAY NOT BE SHOWN.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A COPY OF "RECORD DRAWING" PLANS TO THE APPROPRIATE AGENCIES PRIOR TO FINAL ACCEPTANCE OF WORK.
8. THE CONTRACTOR SHALL RESET ALL SURVEY MONUMENTS DISTURBED DURING CONSTRUCTION WITHIN 60 DAYS OF PROJECT COMPLETION.
9. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS AT AND ADJACENT TO THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
10. THE DUTY OF THE OWNER'S REPRESENTATIVE IS TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE.
11. ALL EXISTING IMPROVEMENTS SHALL BE PROTECTED IN PLACE UNLESS OTHERWISE NOTED.
12. ALL INLETS SHALL HAVE BICYCLE-SAFE GRATING INSTALLED.

GRADING, DRAINAGE, AND EROSION CONTROL NOTES

1. CONTRACTOR SHALL PREPARE A CONSTRUCTION PHASE STORMWATER MANAGEMENT PLAN AND OBTAIN REQUIRED PERMITS (STATE AND LOCAL)
2. ANY SETTLEMENT OR SOIL ACCUMULATIONS BEYOND THE PROPERTY LIMITS DUE TO GRADING OR EROSION SHALL BE REPAIRED IMMEDIATELY BY THE CONTRACTOR.
3. ANY CONSTRUCTION DEBRIS OR MUD TRACKING IN THE PUBLIC RIGHT-OF-WAY SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR. THE CONTRACTOR SHALL IMMEDIATELY FIX ANY EXCAVATIONS OR EXCESSIVE PAVEMENT FAILURES CAUSED BY THE DEVELOPMENT AND SHALL PROPERLY BARRICADE THE SITE UNTIL CONSTRUCTION IS COMPLETE.
4. THE PLACEMENT OF FILL MATERIALS MUST BE VERY CLOSELY MONITORED TO VERIFY THAT THE FILL MATERIALS ARE OF GOOD QUALITY, INCLUDING BEING FREE OF GYPSUM AND OR OTHER POOR-QUALITY MATERIALS, AND ARE COMPACTED SUFFICIENTLY.
5. THE MATERIAL SHOULD BE PLACED BETWEEN OPTIMUM MOISTURE CONTENT TO ABOUT 2% ABOVE OPTIMUM MOISTURE CONTENT AND COMPACTED TO AT LEAST 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DEFINED BY THE MODIFIED PROCTOR TEST (ASTM D1557).
6. THE FILL MATERIALS SHOULD BE TESTED DURING EVERY DAY OF FILL PLACEMENT, AT 1-FOOT INCREMENTS, WITH A TEST PERFORMED FOR EVERY 1,000 CUBIC YARDS OF MATERIAL PLACED.
7. IF LARGE RIDE-ON COMPACTION EQUIPMENT IS USED THEN IT IS LIKELY POSSIBLE TO PLACE FILL MATERIAL TO A LOOSE LIFT THICKNESS OF UP TO 12 INCHES PRIOR TO COMPACTION.
8. THE TESTING FREQUENCY SHOULD BE HIGHER AT THE START TO ESTABLISH A GOOD PLACEMENT PATTERN AND MOISTURE CONTROL, IN THE RANGE OF EVERY 500 CUBIC FEET AND EVERY 1-FOOT DEPTH INTERVAL.
9. FIELD DENSITY (COMPACTION) TESTING MUST BE PERFORMED ON A REGULAR BASIS THROUGHOUT THE PLACEMENT OF FILL MATERIALS. THIS WILL MOST LIKELY REQUIRE A FULL-TIME TECHNICIAN DURING THE PLACEMENT OF FILL MATERIALS.
10. A QUALIFIED CONSTRUCTION INSPECTOR SHOULD OVERSEE THE PLACEMENT OF FILL MATERIALS TO VERIFY THAT LIFT THICKNESSES, MOISTURE CONDITIONING, AND COMPACTION EFFORT IS MAINTAINED THROUGHOUT THE ENTIRE FILL PLACEMENT OPERATIONS.
11. THE WHITE COLORED SANDS THAT CONTAIN SIGNIFICANT GYPSUM SHOULD NOT BE USED FOR ANY FILL OF IMPORTANCE SUCH AS BELOW ROADS OR STRUCTURES. THESE LOCATIONS MAY BE APPROXIMATELY SIZED AND LOCATION NOTED ON THE PROJECT CIVIL PLANS. THERE MAY BE SOME LOSS OF AVAILABLE MATERIAL DUE TO THE SCATTERED GYPSUM DEPOSITS AROUND THE SITE.
12. SITE SPECIFIC GEOTECHNICAL ENGINEERING STUDIES SHOULD BE PERFORMED ON A STRUCTURE SPECIFIC BASIS AS THE DEVELOPMENT PROGRESSES.
13. ALL DISTURBED AREAS SHALL BE RESEEDED AND THE VEGETATION ESTABLISHED TO AT LEAST 70% COVERAGE PRIOR TO FINAL APPROVAL.

STREET CONSTRUCTION NOTES

1. WITH NOTIFICATION OF THE RESPECTIVE OWNER, ADJUST RIMS OF ALL CLEANOUTS, MANHOLES, VALVE COVERS AND SURVEY MONUMENTS TO FINISH GRADE PRIOR TO FINAL LIFT PAVING.
2. THE CONTRACTOR SHALL PROVIDE ALL LIGHTS, SIGNS, BARRICADES, FLAGMEN OR OTHER DEVICES NECESSARY TO PROVIDE FOR PUBLIC SAFETY IN ACCORDANCE WITH THE CURRENT MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
3. THE CONTRACTOR SHALL PROVIDE INGRESS AND EGRESS TO PRIVATE PROPERTY ADJACENT TO THE WORK THROUGHOUT THE PERIOD OF CONSTRUCTION.
4. PRIOR TO FINAL PLACEMENT OF SURFACE PAVEMENT, ALL UNDERGROUND UTILITY MAINS SHALL BE INSTALLED AND SERVICE CONNECTIONS STUBBED OUT TO BEYOND CURB LINE OR SHOULDER WHEN ALLOWED BY THE UTILITY. SERVICE FROM PUBLIC UTILITIES AND FROM SANITARY SEWERS SHALL BE MADE AVAILABLE FOR EACH LOT IN SUCH A MANNER THAT WILL NOT BE NECESSARY TO DISTURB THE STREET PAVEMENT, CURB, GUTTER, AND SIDEWALK WHEN CONNECTIONS ARE MADE.
5. CONTRACTOR SHALL RELOCATE STREET SIGNS TEMPORARILY DURING CONSTRUCTION, THEN REPLACE AS REQUIRED, INCLUDING T-LOCK BASE, METAL POST, MOUNTING HARDWARE, ETC.
6. CONTRACTOR SHALL OBTAIN APPROPRIATE PERMITS FROM UDOT FOR ACCESS AND UDOT ROW IMPROVEMENTS.

UTILITY NOTES

1. ALL WATER, IRRIGATION, AND SEWER WORK SHALL BE COMPLETED PER GWSSA CONSTRUCTION STANDARDS.
2. THE CONTRACTOR SHALL HAVE IN HIS POSSESSION AT ALL TIMES ONE (1) SIGNED COPY OF PLANS AND SPECIFICATIONS WHICH HAVE BEEN APPROVED BY THE UTILITY.
3. THE EXISTING SANITARY SEWER LINES SHALL REMAIN IN SERVICE DURING THE NEW SEWER LINE CONSTRUCTION.
4. ALL WATER PIPE BENDS AND TEES OF 4" OR GREATER SHALL HAVE CONCRETE THRUST BLOCKS IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS. ALL CONCRETE THRUST BLOCKS SHALL BE 3,000 PSI MINIMUM COMPRESSIVE STRENGTH PLANT REDI-MIX DELIVERED TO THE SITE BY TRUCK.
5. ALL VERTICAL BENDS SHALL HAVE CONCRETE THRUST BLOCKS INSTALLED.
6. THE KANE SPRINGS IMPROVEMENT DISTRICT WILL OPERATE ALL IN SERVICE WATER VALVES AS PART OF THIS PROJECT. COORDINATION BETWEEN THE CITY AND THE CONTRACTOR IS REQUIRED FOR ALL WATER MAIN TIE-INS. CONTRACTOR IS RESPONSIBLE FOR INTERRUPTION OF WATER SERVICE PERMIT. THREE (3) BUSINESS DAYS NOTICE TO THE CITY IS REQUIRED PRIOR TO PLANNED OUTAGES FOR MAIN LINE CONNECTIONS.
7. THE CONTRACTOR SHALL REPAIR OR REPLACE THE EXISTING SITE AND LANDSCAPING, IN KIND, THAT WAS REMOVED OR DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL GUARANTEE SAID REPAIRS FOR ONE (1) YEAR AFTER THE FINAL ACCEPTANCE OF CONSTRUCTION.
8. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY PUBLIC OR PRIVATE IMPROVEMENTS, IN KIND, INCLUDING, BUT NOT LIMITED TO: RESIDENTIAL SERVICES, WATER LINES, SEWER LINES, STORM DRAINS, ETC., THAT WERE REMOVED OR DAMAGED DURING CONSTRUCTION.
9. THE CONTRACTOR MAY TEMPORARILY BACKFILL TRENCHES TO THE EXISTING ROADWAY SURFACE WITH CLASS 6 ABC, PROVIDING A SMOOTH DRIVING SURFACE. IN THIS MANNER THE CONTRACTOR CAN ASPHALT PAVE LARGE SECTIONS OF TRENCH AT ONE TIME WHILE STILL PROVIDING A USABLE ROADWAY.
10. WHERE CONSTRUCTION OCCURS IN OR ACROSS ASPHALT OR CONCRETE PAVEMENT, SAW CUT THE PAVEMENT FOR A CLEAN STRAIGHT EDGE 6" OUTSIDE THE TRENCH LIMITS TO ALLOW CLEAN REMOVAL AND A GOOD SURFACE FOR PROPER PATCHING.
11. ALL PAVEMENT SAW CUTS SHALL BE 90° TO ONE ANOTHER.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL EXISTING ASPHALT FROM CONSTRUCTION EQUIPMENT. DAMAGED ASPHALT SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
12. ALL INLETS SHALL HAVE BICYCLE SAFE GRATING INSTALLED.
13. ALL CURB INLET FACE OPENINGS SHALL BE SET TO 9-INCHES OPEN.
14. SEWER INVERTS, PIPE LENGTHS, AND SLOPES SHOWN ARE TO 24" OFFSET FROM CENTER OF MANHOLE, COINCIDENT WITH INNER WALL OF 48" MANHOLES.

LEGEND:

LINETYPE/HATCH	DESCRIPTION
EXISTING CONDITIONS:	
	EXISTING ROAD CENTERLINE
	EXISTING CONCRETE
	EXISTING FLOWLINE
	EXISTING EASEMENT BOUNDARY
X	EXISTING FENCE
G	EXISTING GAS LINE
	EXISTING GRAVEL ROAD/PATH
IRR	EXISTING IRRIGATION LINE
	EXISTING VEGETATION
	EXISTING PROPERTY BOUNDARY
P	EXISTING POWER
	EXISTING RAILROAD
	EXISTING ASPHALT PAVEMENT EDGE
	EXISTING RIGHT-OF-WAY BOUNDARY
S	EXISTING SEWER (GENERIC OR SERVICE LINE)
8S	EXISTING SEWER MAIN (SIZE DENOTED)
24D	EXISTING STORM DRAIN (SIZE DENOTED)
T	EXISTING TELECOMM
OHE/C/FO	EXISTING COMBINATION OVERHEAD POWER/CABLE/FIBER
OHE/CATV	EXISTING COMBINATION OVERHEAD POWER/CATV
OHE/T	EXISTING COMBINATION OVERHEAD POWER/TELECOMM
	EXISTING LANDSCAPE WALL
6W	EXISTING WATER MAIN (SIZE DENOTED)
WS	EXISTING WATER SERVICE LINE
	EXISTING ITEM TO BE DEMOLISHED/REMOVED/RELOCATED (PER PLAN)
	EXISTING CONTOUR (LABELED W/ ELEVATIONS)
PROPOSED IMPROVEMENTS:	
0+00 1+00	PROPOSED CONTOUR (LABELED W/ ELEVATIONS)
	CENTERLINE/ALIGNMENT W/ STATIONING
	CONCRETE PAVEMENT
	FLOWLINE (DIRECTION DENOTED W/ ARROWS)
	EASEMENT BOUNDARY
	SETBACK BOUNDARY
x x	FENCE
G	GAS MAIN
	GRAVEL ROAD/SHOULDER/PATH
IRR	EXISTING IRRIGATION LINE
	PROPERTY BOUNDARY
P	POWER (UNDERGROUND)
OHP	POWER (OVERHEAD)
	PAVEMENT MARKING
	ASPHALT PAVEMENT
	RIGHT-OF-WAY BOUNDARY
4S	SEWER SERVICE LINE (SIZE DENOTED)
	SEWER MAIN (PER PLAN & PROFILE)
	STORM DRAIN (PER PLAN & PROFILE)
T	TELECOMM
OHE/C/FO	COMBINATION OVERHEAD ELECTRIC/CABLE/FIBER
OHE/CATV	COMBINATION OVERHEAD ELECTRIC/CATV
OHE/T	COMBINATION OVERHEAD ELECTRIC/TELECOMM
	CONCRETE WALL
	LANDSCAPE BOULDER WALL
6W	WATER MAIN (SIZE DENOTED)
WS	WATER SERVICE (PER PLAN)
	RIP RAP OUTFALL/LINER
	BUILDING/STRUCTURE
	PROJECT BOUNDARY
1	REVISION CLOUD & TRIANGLE (REV. # DENOTED)

SYMBOL LEGEND:

	PROPERTY PIN
bm	BENCHMARK
W	WATER MANHOLE
WV	WATER VALVE
	WATER METER
	FIRE HYDRANT
W	WATER WELL
WS	WATER SHUT-OFF
	WATER LINE CAP
	WATER SPRINKLER
	WATER SPIGOT
S	SEWER MANHOLE
	SEWER CLEANOUT
GV	GAS VALVE
D	STORM DRAIN MANHOLE
	STORM DRAIN FLARED END SECTION
	STORM DRAIN AREA INLET
	STORM DRAIN CURB INLET
P	POWER MANHOLE
	LIGHT POLE
	LUMINAIRE
	TRANSFORMER
	GUY WIRE
TP	TELECOMM PEDESTAL
T	TELECOMM MANHOLE
MB	MAILBOX
	SIGN
	BOULDER
	ADA PARKING SPACE MARKING
	PEDESTRIAN RAMP
	CONIFEROUS TREE
	DECIDUOUS TREE

NOTATION LEGEND:

- ℄ = CENTERLINE
- (E) = EXISTING
- EG = EXISTING GRADE
- FG = FINISH GRADE
- FL = FLOWLINE
- IE = INVERT ELEVATION
- BOP = BOTTOM OF PIPE
- TOP = TOP OF PIPE
- BTM = BOTTOM
- GB = GRADE BREAK
- TBOC = TOP BACK OF CURB
- BFE = BASE FLOOD ELEVATION
- BFE(I) = BASE FLOOD ELEVATION INTERPOLATED
- FF = FINISH FLOOR
- R/W = RIGHT-OF-WAY
- 29 = LOT, TRACT, OR UNIT NUMBER
- TH = TWIN-HOME LOT
- SF = SINGLE-FAMILY LOT
- EOP/A/C/G = EDGE OF PVMT/ASPHALT/CONCRETE/GRAVEL

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
GENERAL NOTES & LEGEND
MOAB, UTAH

SET ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

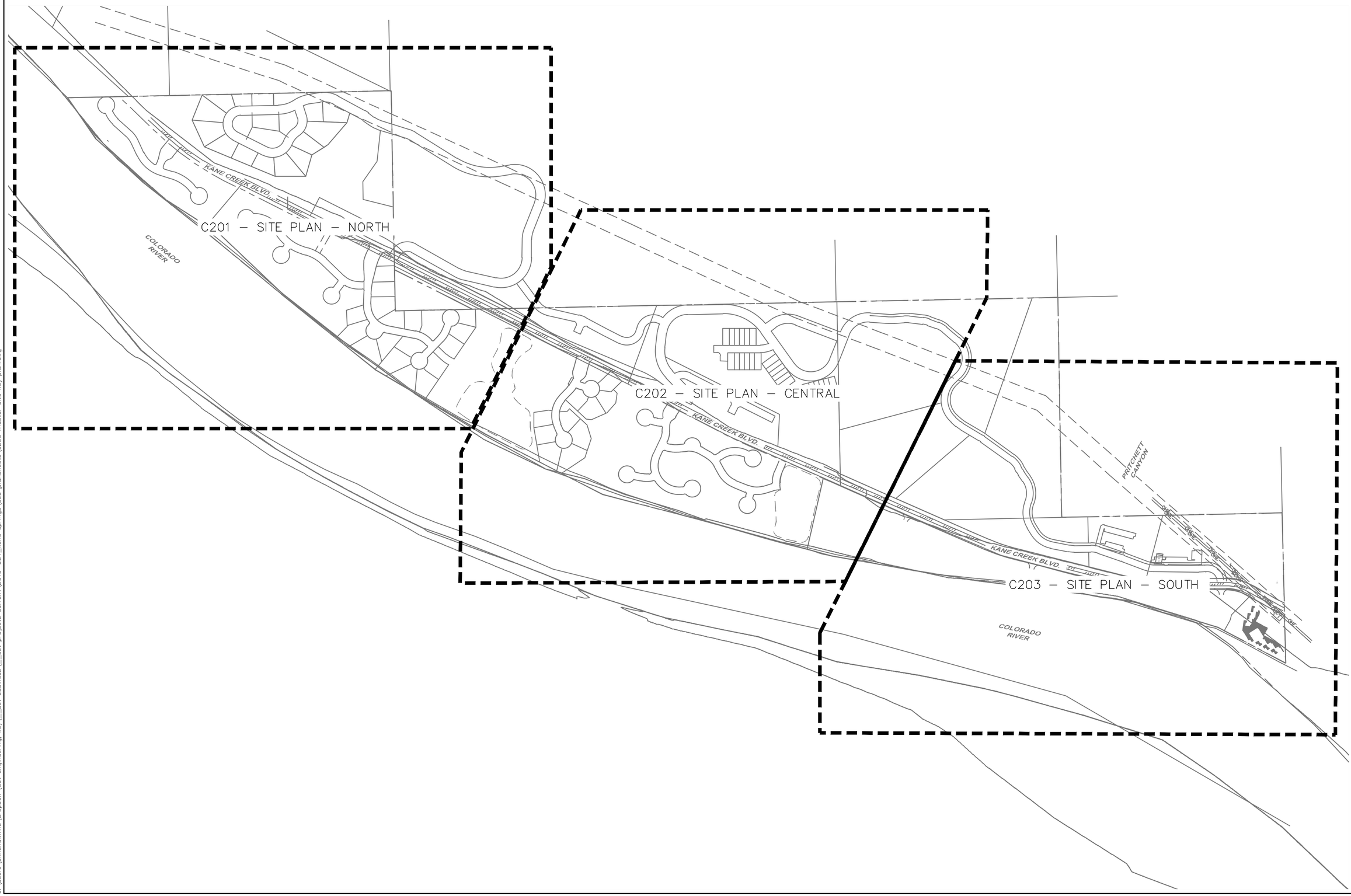
PLAN NO.

C101

Sheet 2 of x
Project: 2019-024
Date: 07/06/2022
Drawn By: CH
Checked By: JG

PRELIMINARY

FOR REVIEW ONLY NOT FOR CONSTRUCTION



GRAPHIC SCALE
0 125 250 FEET 500

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
MASTER SITE KEY PLAN
MOAB, UTAH

ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.

C200

Sheet 3 of x

Project:2019-024

Date: 07/06/2022

Drawn By: CH

Checked By: JG

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PROP 24" CULVERT

PROPOSED GRADE
4110.0

FUTURE
WELL 5

PROP 24" CULVERT

KANE CREEK BLVD.

FUTURE
WATER TANK 2
120K GALLONS
WATER SURFACE ELEV. 4100.0'

PROPOSED SEWER TREATMENT PLANT LOCATION

SEWER LIFT STATION
40K GALLON TANK

IRRIGATION MAIN FROM TREATMENT
FACILITY TO DRIP IRRIGATION

SEWER FORCE MAINS

PROP 24" CULVERT

POTENTIAL PARKING FOR BLM LAND
ACCESS

PROP 8X8 BOX CULVERT

GATED EMERGENCY ACCESS

EXISTING 8X8 CULVERT

PHASE 3

PHASE 2

PHASE 1

KANE CREEK BLVD.

COLORADO
RIVER

RE-ALIGN
KANE CREEK BLVD @
PHASE 1 DEVELOPMENT

SEWER LIFT STATION

PROP 30x5 BOX CULVERT

48' BRIDGE (BY OTHERS)

AMENITY AREA

MATCHLINE - SEE SHEET C102

NOTES:

1. GRADING SHOWN HEREON IS PRELIMINARY AND SUBJECT TO FUTURE SITE DESIGNS.
2. FLOODPLAIN, FLOODWAY, AND BASE FLOOD ELEVATIONS SHOWN HEREON PROVIDED BY BOWEN AND COLLINS.
3. ROADS SHOWN HEREON ARE PRELIMINARY AND SUBJECT TO FUTURE SITE DESIGNS.
4. TOPOGRAPHY SHOWN HEREON PROVIDED BY RED DESERT LAND SURVEYING.
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6. ADDITIONAL GRADING AND DRAINAGE IMPROVEMENTS MAY BE REQUIRED PER SUBSEQUENT SITE DESIGNS.
7. REFER TO ANDERSON ENGINEERING'S PRELIMINARY WATER AND SEWER DESIGN.
8. BASE FLOOD ELEVATIONS (BFE) ARE BASED ON LOMR #49019C1775D, DEVELOPED BY BOWEN COLLINS & ASSOCIATES, INC.
9. EASEMENTS THROUGH BLM CURRENTLY BEING PROCESSED, ROAD LAYOUT PENDING EASEMENT APPROVAL.
10. PROPOSED GRADE ELEVATIONS ARE MODELED AT A MINIMUM 1.1' ABOVE INTERPOLATED BFE VALUES.

PROJECT EARTHWORK ESTIMATE	
CUT	208,000 CY
FILL	834,000 CY
NET	626,000 CY <FILL>

GRAPHIC SCALE
0 50 100 FEET 200

Revisions:

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KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
MASTER SITE PLAN - NORTH
MOAB, UTAH

SET ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C201

Sheet 4 of x
Project: 2019-024
Date: 07/06/2022
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FILL	834,000 CY
NET	626,000 CY <FILL>

GRAPHIC SCALE
0 125 250 FEET 500

Revisions:

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MASTER SITE PLAN - CENTRAL
MOAB, UTAH

ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C202

Sheet 5 of x
Project: 2019-024
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PROJECT EARTHWORK ESTIMATE	
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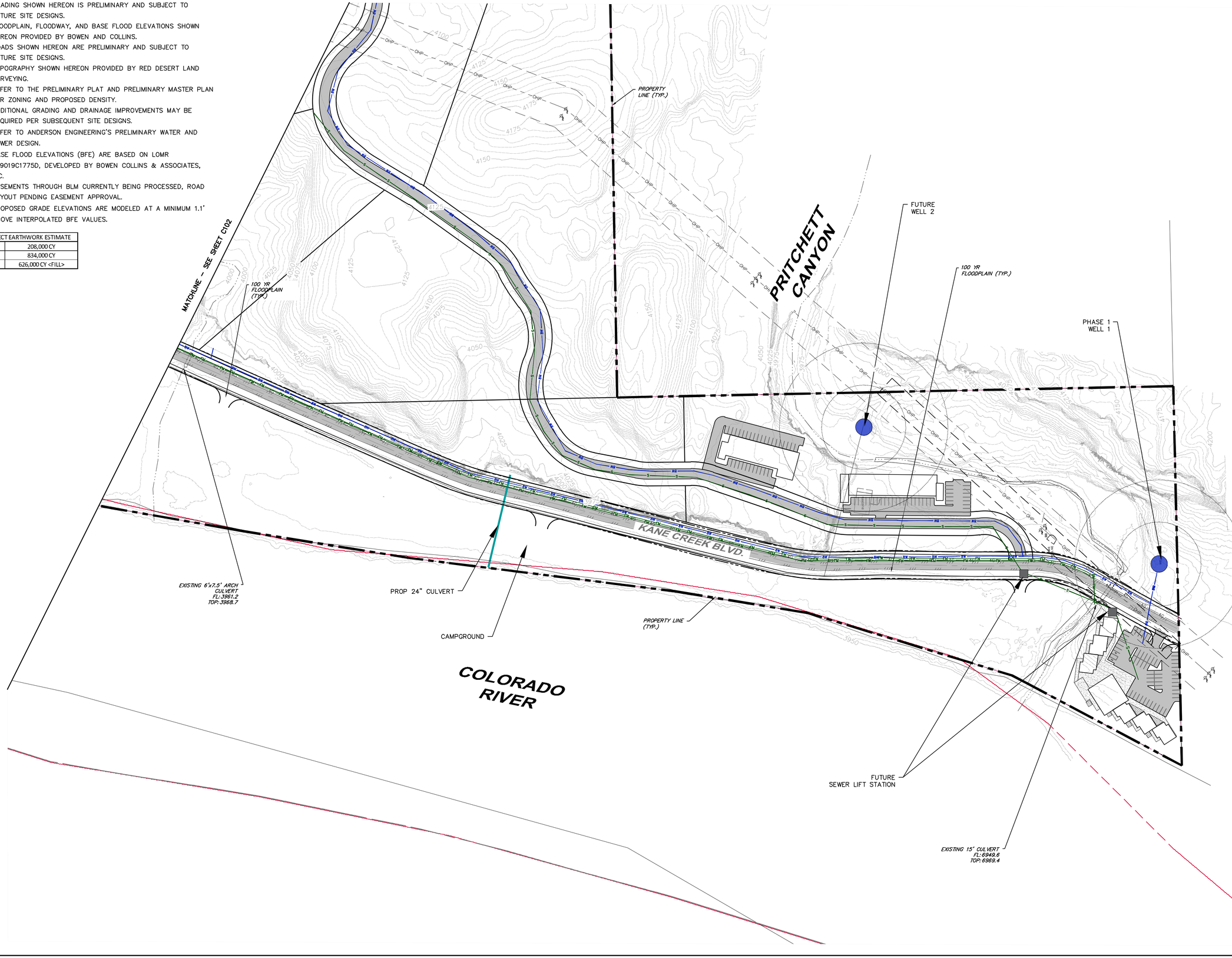

GRAPHIC SCALE
0 125 250 FEET 500

Revisions:

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KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
MASTER SITE PLAN - SOUTH
MOAB, UTAH

ENGINEERING LLC
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Durango, CO 81301
970-403-5088

PLAN NO.
C203

Sheet 6 of x
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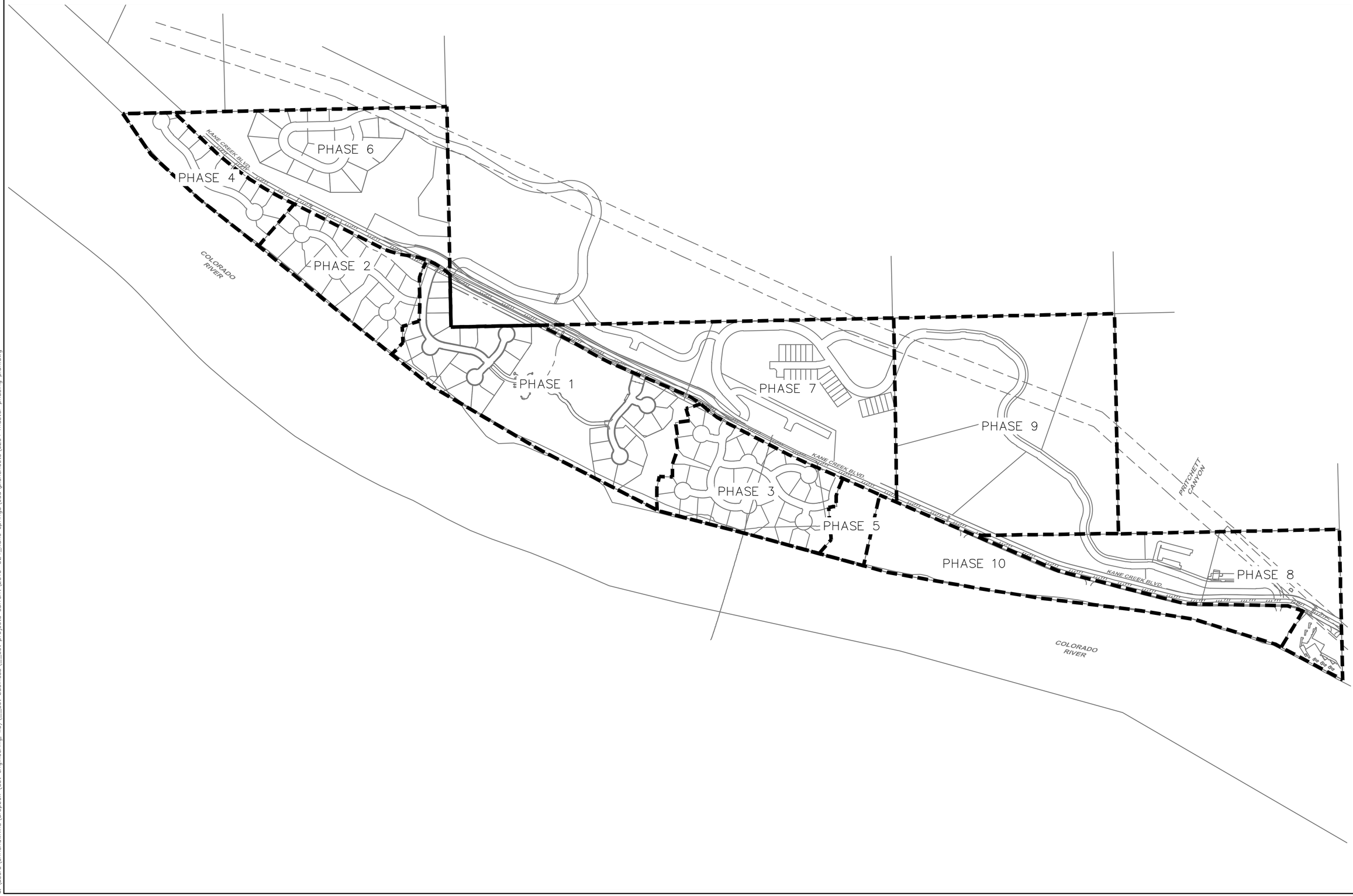

GRAPHIC SCALE
0 125 250 FEET 500

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
MASTER PHASING PLAN
MOAB, UTAH

ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C204

Sheet 8 of x
Project: 2019-024
Date: 07/06/2022
Drawn By: CH
Checked By: JG

PRELIMINARY
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KANE CREEK BOULEVARD
(RE-ALIGNED)

EXISTING COUNTY ROAD
(GRAVEL) TO REMAIN

PROPERTY BOUNDARY

FORCEMAIN JUNCTION

WASTEWATER TREATMENT PLANT BY OTHERS
SEE ANDERSON ENGINEERING PLANS

EXISTING 4" HP GAS AND 2" LP GAS TO REMAIN

PARCEL H

BLM LAND

EXISTING PAVEMENT TO REMAIN

TRANSITION ROAD

EXISTING PAVEMENT TO BE REMOVED

SEDIMENT / DEBRIS BASIN DRAINAGE FOREBAY

BOX CULVERT
30"Wx5'Tx105' LONG
WITH WINGWALL-HEADWALLS

EXISTING BOX CULVERT TO REMAIN

EXISTING CULVERT TO BE REMOVED

EXISTING 4" HP GAS AND 2" LP GAS TO REMAIN

EXISTING PAVEMENT TO BE REMOVED

BOX CULVERT
40"Wx6'Tx105' LONG
WITH WINGWALL-HEADWALLS

WATER STORAGE TANK

WASTEWATER DISCHARGE PIPE TO PRITCHETT CANYON

TRANSITION ROAD

EXISTING PAVEMENT TO REMAIN

EACH LOT IS A "TWNHOME" LOT. EACH LOT SHALL HAVE 2 WATER SERVICES, SEWER SERVICES, ETC. IN ORDER TO SERVE EACH UNIT SEPARATELY (TYP)

FORCEMAIN JUNCTION

PROPERTY BOUNDARY

LOT 36

LOT 34

LOT 35

LOT 33

LOT 32

LOT 31

LOT 30

LOT 29

LOT 28

LOT 27

LOT 26

LOT 25

LOT 24

LOT 23

LOT 22

LOT 21

LOT 20

LOT 19

TRACT A
(COMMON AREA)

DRAINAGE CHANNEL 1

CONCRETE WATERWAY

CONTECH BRIDGE

GRACE LANE

OHIO CIR.

GHOST FALLS CIR.

GETAWAY CIR.

NAVAJO ROCKS CIR.

SEWER LIFT STATION

SIDEWALK CHASE (STORMWATER)

FIRE HYDRANT (TYP)

TRACT B
(COMMERCIAL)

TRACT B
(COMMON AREA)

ZEN DRIVE

GOOSEBERRY CIR.

LOT 19

LOT 17

LOT 18

LOT 14

LOT 15

LOT 13

LOT 12

LOT 8

LOT 9

LOT 11

LOT 10

EXISTING CULVERT TO BE REMOVED

SIDEWALK CHASE (STORMWATER)

SEWER LIFT STATION

DRAINAGE CHANNEL 2

TRACT I
COMMON AREA

TOP OF EXISTING DIKE TO REMAIN. TIE-IN POINT FOR TOE OF FILL SLOPE.

DRAINAGE CHANNEL 1 WEIR AND SPILLWAY

DRAINAGE CHANNEL 2 WEIR AND SPILLWAY

COLORADO RIVER

GRAPHIC SCALE
0 40 80 FEET 160

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
PH. 1 SITE PLAN
MOAB, UTAH

SET ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C205

Sheet 9 of x
Project: 2019-024
Date: 07/06/2022
Drawn By: CH
Checked By: JG

PRELIMINARY

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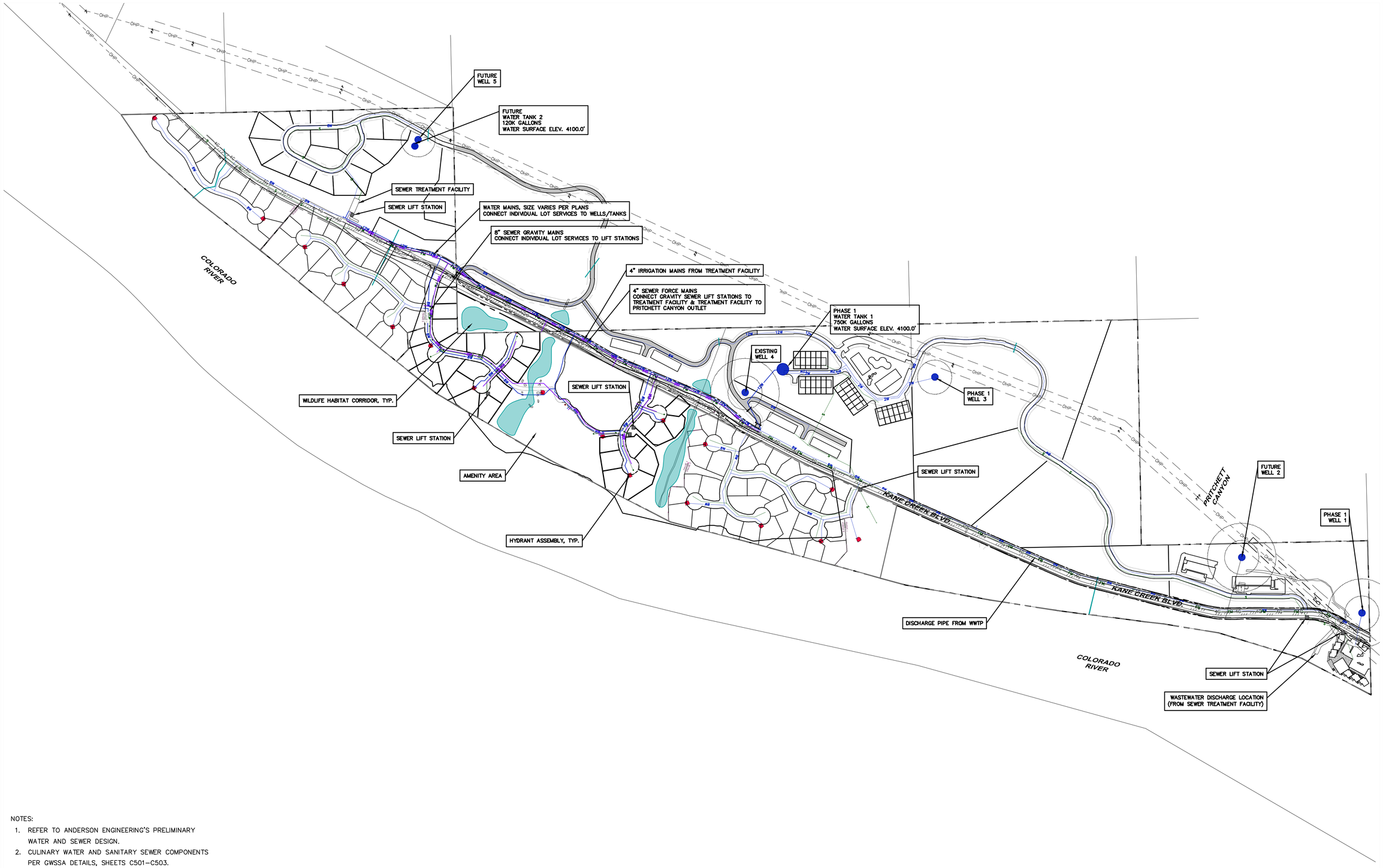

NOTES:

1. REFER TO ANDERSON ENGINEERING'S PRELIMINARY WATER AND SEWER DESIGN.
2. CULINARY WATER AND SANITARY SEWER COMPONENTS PER GWSSA DETAILS, SHEETS C501–C503.
3. EASEMENTS THROUGH BLM CURRENTLY BEING PROCESSED, ROAD LAYOUT PENDING EASEMENT APPROVAL.

GRAPHIC SCALE
0 125 250 FEET 500

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
PH. 1 UTILITY PLAN
MOAB, UTAH

ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C206

Sheet 7 of x
Project: 2019-024
Date: 07/06/2022
Drawn By: CH
Checked By: JG

PRELIMINARY
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GRADING NOTES:

1. ALL CURBS, GUTTERS, SIDEWALKS, AND PAVEMENT SECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH UTAH APWA STANDARDS/DETAILS AND PROJECT STANDARD DETAILS.
2. SITE TO BE GRADED AS TO ELIMINATE PONDING WITHIN THE PROJECT ZONE WITHOUT IMPACT TO ADJACENT PROPERTIES.
3. GRADING LIMITS TO MATCH EXISTING GROUND AT REASONABLE GRADE TRANSITION FOR ACCESS AS REQUIRED. NOTIFY GRAND COUNTY AND ENGINEER OF ANY DISCREPANCIES OR CONFLICTS.

GRAPHIC SCALE
0 40 80 FEET 160

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC
PH. 1 GRADING PLAN
MOAB, UTAH

ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C207

Sheet 10 of x
Project: 2019-024
Date: 07/06/2022
Drawn By: CH
Checked By: JG

PRELIMINARY

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SANITARY SEWER TREATMENT FACILITY
CONSTRUCT IN EXISTING CAVE

SANITARY SEWER LIFT STATION

12" CAP

4" SEWER FORCE MAIN FROM DEVELOPMENT TO TREATMENT FACILITY

4" SEWER FORCE MAIN FROM TREATMENT FACILITY LIFT STATION
TO PRITCHETT CANYON & DRIP IRRIGATION SYSTEMS WITHIN PROJECT

4" IRRIGATION MAIN TO DEVELOPMENT

10' MIN. SEPARATION

12" C900 WATER MAIN

PARCEL H

0+00

1+00

BEGINNING OF PHASE 1 KANE CREEK BLVD TRANSITION TO NEW ROADWAY ALIGNMENT

GRAPHIC SCALE
0 10 20 FEET 40

Revisions:

#	DATE	DESCRIPTION

KANE CREEK PRESERVATION AND DEVELOPEMENT, LLC

TREATMENT FACILITY CONNECTION
MOAB, UTAH

ENGINEERING LLC
1309 E. 3rd Ave., #206
Durango, CO 81301
970-403-5088

PLAN NO.
C208

Sheet 11 of x
Project:2019-024
Date: 07/06/2022
Drawn By: CH
Checked By: JG

PRELIMINARY
FOR REVIEW ONLY NOT FOR CONSTRUCTION

c:\users\chrishawkins\dropbox (set engineering, llc)__set business__set projects current\2019-024_kane springs\cad\plansheets\c208 treatment facility connection.dwg

LEGEND

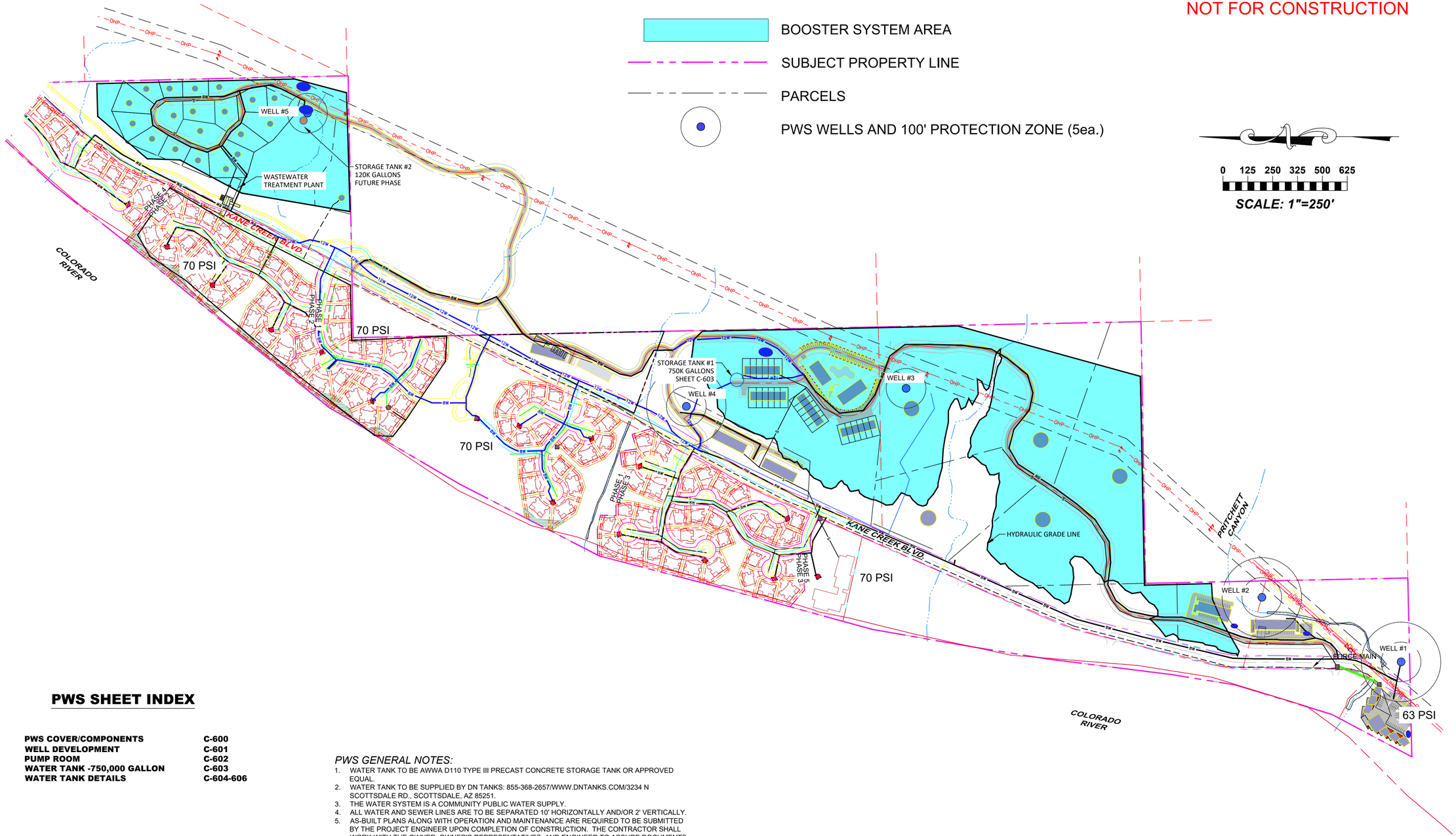
BOOSTER SYSTEM AREA

SUBJECT PROPERTY LINE

PARCELS

PWS WELLS AND 100' PROTECTION ZONE (5ea.)

PRELIMINARY
NOT FOR CONSTRUCTION



PWS SHEET INDEX

PWS COVER/COMPONENTS	**C-600**
WELL DEVELOPMENT	**C-601**
PUMP ROOM	**C-602**
WATER TANK -750,000 GALLON	**C-603**
WATER TANK DETAILS	**C-604-606**

PWS GENERAL NOTES:

1. WATER TANK TO BE AWWA D110 TYPE III PRECAST CONCRETE STORAGE TANK OR APPROVED EQUAL.
2. WATER TANK TO BE SUPPLIED BY DN TANKS: 855-368-2657/WWW.DNTANKS.COM/3234 N SCOTTSDALE RD., SCOTTSDALE, AZ 85251.
3. THE WATER SYSTEM IS A COMMUNITY PUBLIC WATER SUPPLY.
4. ALL WATER AND SEWER LINES ARE TO BE SEPARATED 10' HORIZONTALLY AND/OR 2' VERTICALLY.
5. AS-BUILT PLANS ALONG WITH OPERATION AND MAINTENANCE ARE REQUIRED TO BE SUBMITTED BY THE PROJECT ENGINEER UPON COMPLETION OF CONSTRUCTION. THE CONTRACTOR SHALL WORK WITH THE OWNER, OWNER'S REPRESENTATIVES, AND ENGINEER TO ASSURE DOCUMENTS ARE ACCURATE.
6. ALL WORK IS TO BE COMPLETED IN A SAFE AND WORKMAN LIKE MANNER AND CORRECTED AT THE REQUEST OF THE ENGINEER.
7. THE WATER SYSTEM REQUIRES DISINFECTION PRIOR TO PLACEMENT INTO SERVICE. THE PROJECT ENGINEER SHALL HAVE 48 HOURS NOTICE FROM THE CONTRACTOR TO WITNESS THE TESTING. SPECIAL WATER SAMPLES ARE REQUIRED PRIOR TO ROUTINE WATER SAMPLES. THIS PROCESS COULD TAKE UP TO 10 WEEK DAYS.
8. NO CHANGES CAN BE MADE TO APPROVED PLANS WITHOUT PRIOR WRITTEN APPROVAL.
9. THE SITE SHALL BE AVAILABLE FOR INSPECTION BY DWQ EMPLOYEES AS REQUIRED BY LAW.
10. THE CONSTRUCTION SITE IS TO BE KEPT CLEAN AND FREE OF ANY HAZARDS OR ENVIRONMENTAL DAMAGES.
11. ALL WATER PIPE IS CL200 HDPE OR PVC WATER SERVICE LINE WITH LEAD FREE BRASS FITTINGS.
12. ALL WATER LINES ARE TO BE DISINFECTED WITH NSF 61 CHLORINE TO A 25PPM CONCENTRATION AND ALLOWED CONTACT TIME FOR 60 MINUTES PRIOR TO FLUSHING, C652-92 AWWA REQUIREMENTS.

SHEET C-600

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH

William H. Anderson, P.E

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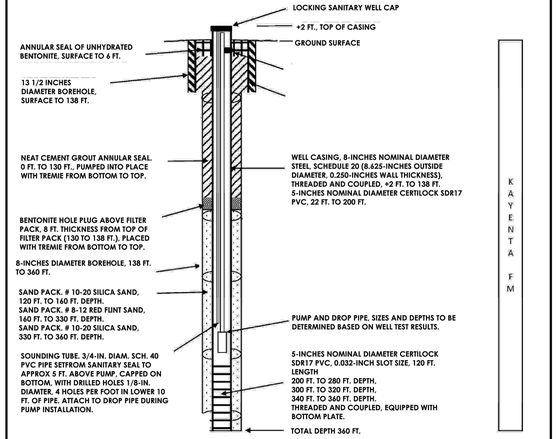
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
PWS COMPONENTS OVERVIEW

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

Filename:KANE SPRINGS - BM - PRELIM PLAT 7.5.1.DWG Sheet:C-600 PWS Location:F:\DROPBOX FILES\SEAK DROPBOX\SEAK PROJECTS\MOAB - KANE SPRINGS\CAD\ENGINEERING - CAD Plotted:9/23/2022 Plotted by:MARLENE

KANE SPRINGS WATER COMPANY WELL #1



NOTES:

1) PROOF OF WELL DISINFECTION PER INITIAL WELL DRILLING SPECIFICATIONS.

2) WELL TESTED FOLLOWING COMPLETION. TESTS PERFORMED: 1) STEP DRAWDOWN TEST, AND 2) FOLLOWING RECOVERY FROM THE STEP DRAWDOWN TEST, A CONSTANT-RATE TEST FOR 24 HOURS. SEE ATTACHED WELL TEST LOGS.

3) INITIAL CHEMICAL SAMPLING

4) PITLESS ADAPTER TO BE INSTALLED AT DEPTH OF 4 FT. BELOW GROUND SURFACE OR AS INSTRUCTED BY ENGINEER.

5) PUMP AND DROP PIPE SIZE AND DEPTH TO BE DETERMINED BASED ON WELL TEST RESULTS.

ENGINEERING
1309 E 3rd Ave, #206
Durango, CO 81301
(970)403-5088

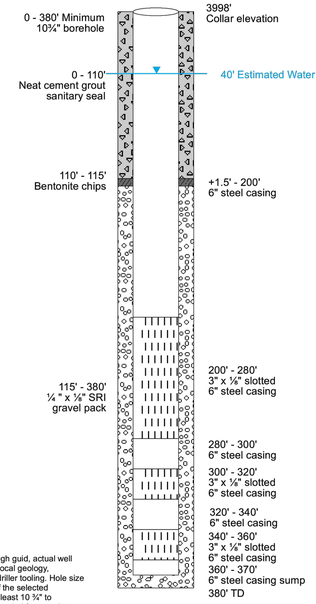
KANE SPRINGS, LLC

KANE SPRINGS WATER COMPANY WELL #1 AS BUILT WELL DESIGN

Project No.:	2019-024
Date:	March 10, 2020
Designed By:	ES
Figure No.	3

F:\Kane Creek CO\Kane\Cheek\CSP\Figures_2019-05-20\Figures

WELL 2 PROPOSED WELL CONSTRUCTION DIAGRAM



*Well construction diagram is a rough guid, actual well construction will be dependent on local geology, hydrology, drilling conditions, and driller tooling. Hole size can be dependent on the tooling of the selected contractor but must be drilled to at least 10 ½" to accommodate the annular space needed for a sanitary seal. The well will be constructed in accordance with all Utah Codes pertaining to Public Water Supply Facility Design and Operation: Source Development code R309-515 and Water Well Construction Requirements R655-4.

Vertical Scale: 1 inch equals 50 feet

Figure 3a. Proposed Well Construction Diagram for Kane Springs Well 2

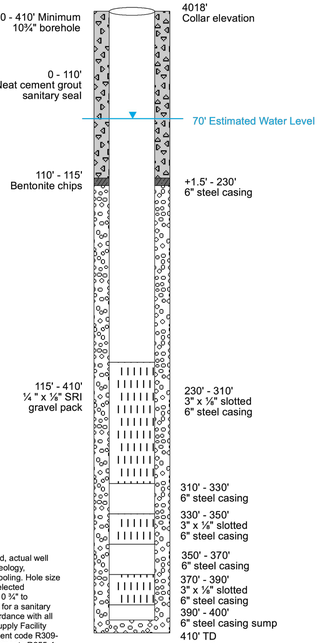
CASCADE WATER RESOURCES

Drawn By: G3 Mapping Rich Emerson rich@g3mapping.com

Project Manager: John Files

Date: December 2021

WELL 3 PROPOSED WELL CONSTRUCTION DIAGRAM



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Vertical Scale: 1 inch equals 50 feet

Figure 2b. Proposed Well Construction Diagram for Kane Springs Well 3

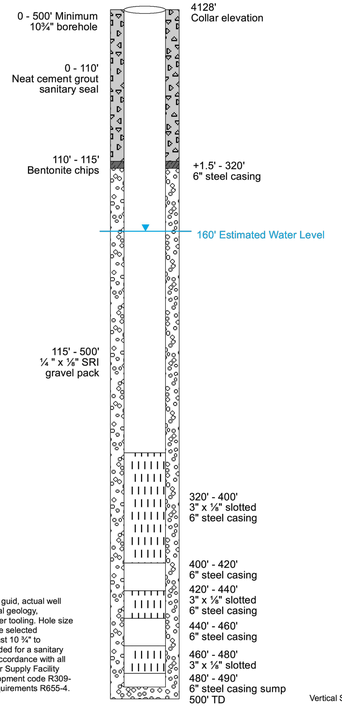
CASCADE WATER RESOURCES

Drawn By: G3 Mapping Rich Emerson rich@g3mapping.com

Project Manager: John Files

Date: December 2021

WELL 4 PROPOSED WELL CONSTRUCTION DIAGRAM



*Well construction diagram is a rough guid, actual well construction will be dependent on local geology, hydrology, drilling conditions, and driller tooling. Hole size can be dependent on the tooling of the selected contractor but must be drilled to at least 10 ¾" to accommodate the annular space needed for a sanitary seal. The well will be constructed in accordance with all Utah Codes pertaining to Public Water Supply Facility Design and Operation: Source Development code R309-515 and Water Well Construction Requirements R655-4.

Vertical Scale: 1 inch equals 55 feet

Figure 2c. Proposed Well Construction Diagram for Kane Springs Well 4

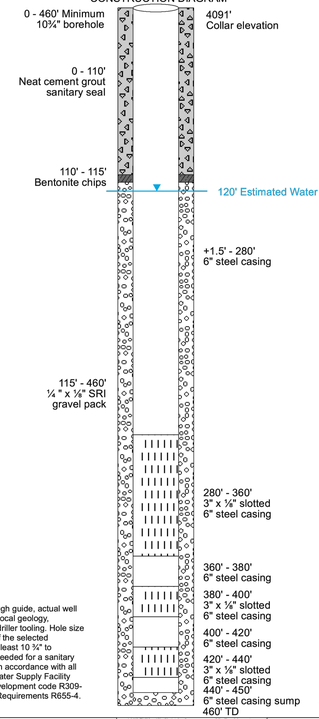
CASCADE WATER RESOURCES

Drawn By: G3 Mapping Rich Emerson rich@g3mapping.com

Project Manager: John Files

Date: December 2021

WELL 5 PROPOSED WELL CONSTRUCTION DIAGRAM



*Well construction diagram is a rough guide, actual well construction will be dependent on local geology, hydrology, drilling conditions, and driller tooling. Hole size can be dependent on the tooling of the selected contractor but must be drilled to at least 10 ¾" to accommodate the annular space needed for a sanitary seal. The well will be constructed in accordance with all Utah Codes pertaining to Public Water Supply Facility Design and Operation: Source Development code R309-515 and Water Well Construction Requirements R655-4.

Vertical Scale: 1 inch equals 50 feet

Figure 2d. Proposed Well Construction Diagram for Kane Springs Well 5

CASCADE WATER RESOURCES

Drawn By: G3 Mapping Rich Emerson rich@g3mapping.com

Project Manager: John Files

Date: December 2021

PRELIMINARY
NOT FOR CONSTRUCTION

SHEET C-601

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH

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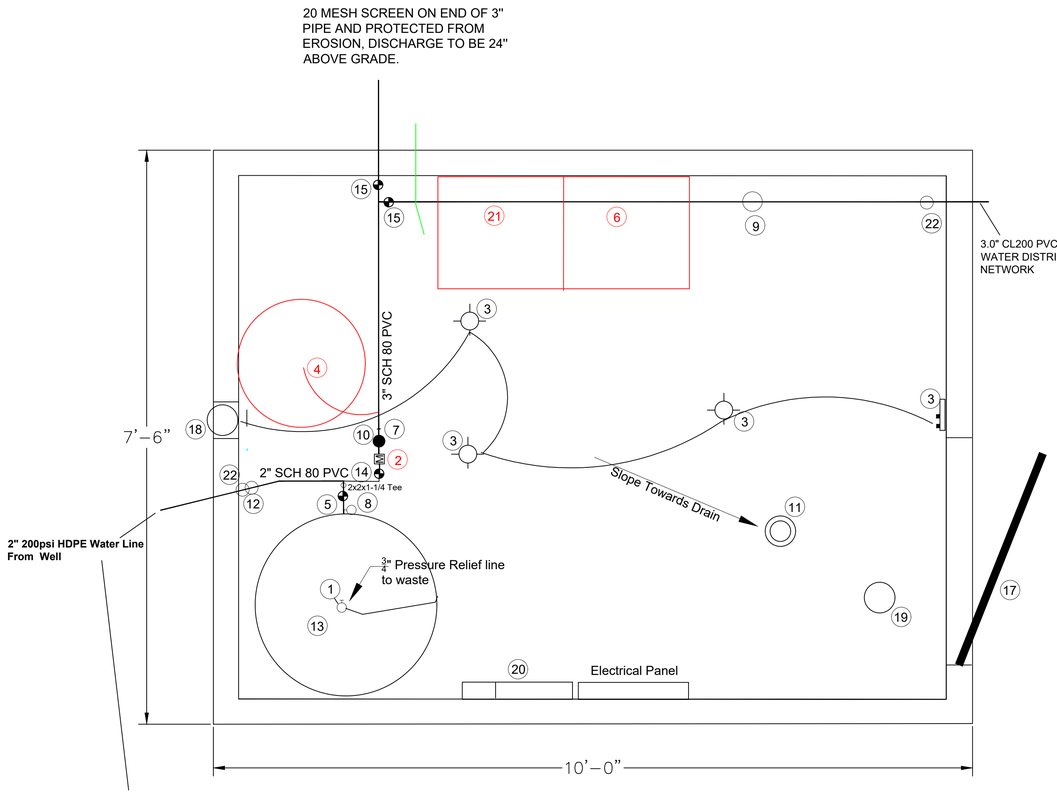
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
WELL DEVELOPMENT

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

PUMP HOUSE ROOM SCHEMATIC
(General Layout - NTS)



Public Wells 1-5
WELL SUBMERSIBLE PUMP, TBD
2" PITLESS ADAPTER

Chlorination System Components

LEGEND

1. PRESSURE RELIEF VALVE, $\frac{3}{4}$", set at 60psi.
2. FLOW METER, 2" Seametrics PULSE WATER METER
3. LIGHTS, 100 WATT IN NSF SAFETY INCLOSURE & SWITCH
4. SODIUM HYPOCHLORITE TANK, PUMP AND INJECTION ASSEMBLY, PCM, PROPORTIONAL FEED , 45MHP22 STENNER PUMP W/ 30 GALLON CLEAR TANK WITH 30 GALLON CONTAINMENT.
5. BALL VALVE, 1-1/4" DIA.
6. SPILL ABSORBENT STORAGE FOR CHLORINE, HATCH CHLORINE FREE & TOTAL TEST KIT CN-66 FOR DPD COLORIMETRIC METHOD, and OSHA APPROVED PROTECTIVE EQUIPMENT.
7. 3"x3" COUPLER
8. LIQUID FILLED PRESSURE GAUGE
9. HOSE BIB WITH BACKFLOW PREVENTION
10. SAMPLE TAP, SMOOTH NOSE, 18" ABOVE FLOOR.
11. 8" FLOOR DRAIN RECESSED 1.5" WITH P-TRAP, 4" PIPE TO DAYLIGHT, 24 MESH SCREENED END
12. 2" X 2" Coupler
13. Well Tank, Well-Rite WR-360-OLC, 119 GALLON OR EQUAL with pressure control switch.
14. BALL VALVE, 2"
15. BALL VALVE, 3"
16. NOT USED
17. INSULATED STEEL DOOR WITH LOCK ASSEMBLY, THRESHOLD 12" ABOVE FINISHED GRADE.
18. 12" VENT FAN, 1800CFM WIRED WITH LIGHT SWITCH, LOUVERED EXHAUST VENT
19. LOUVERED FRESH AIR INTAKE VENTS 12"
20. WELL PUMP CONTROL PANEL WITH TELEMETRY CONNECTED TO 750,000 GALLON WATER TANK.
21. EYE WASH STATION MUST MEET ANSI Z358.1 STANDARDS AND IPC.
22. PLUMB PIPE VERTICALLY THROUGH FLOOR FOR 4 FEET OF COVER OUTSIDE BUILDING, 2 PLACES.

PRELIMINARY
NOT FOR CONSTRUCTION

SHEET C-602

PROFESSIONAL ENGINEER 17247 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH

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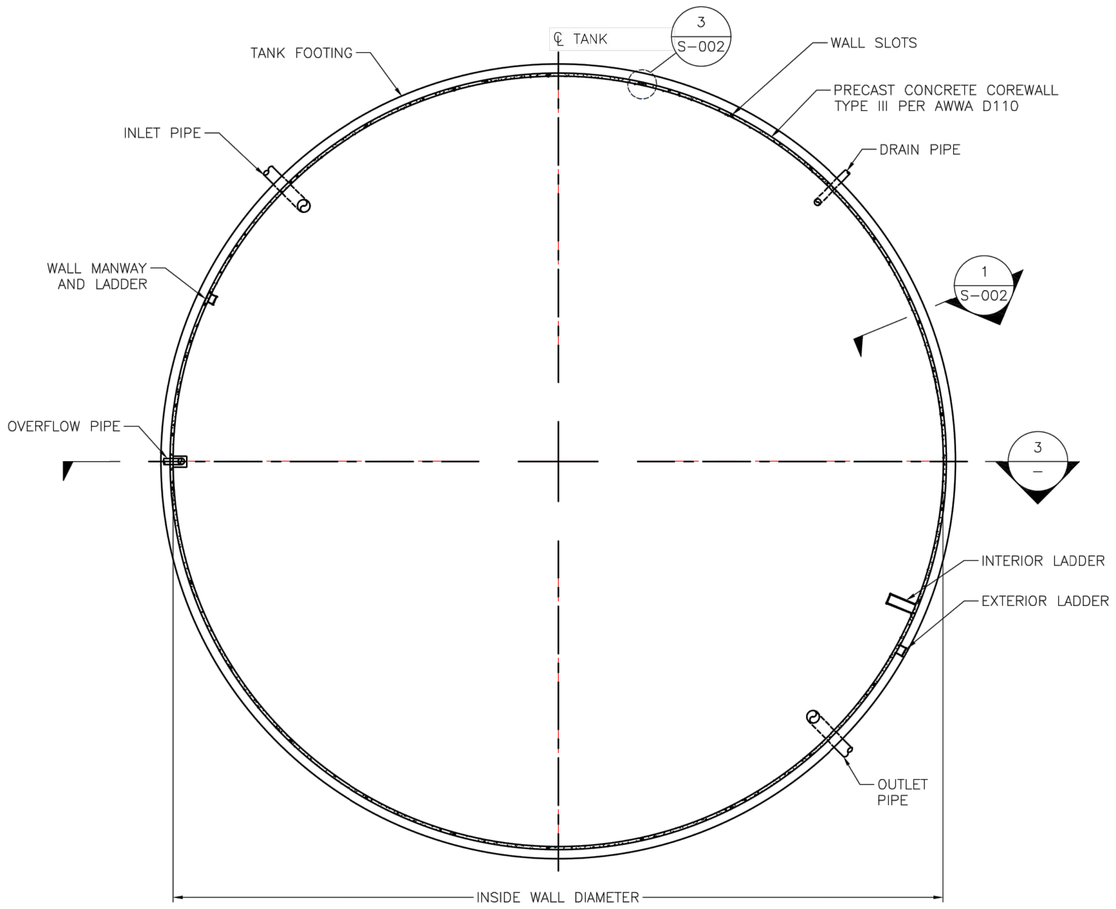
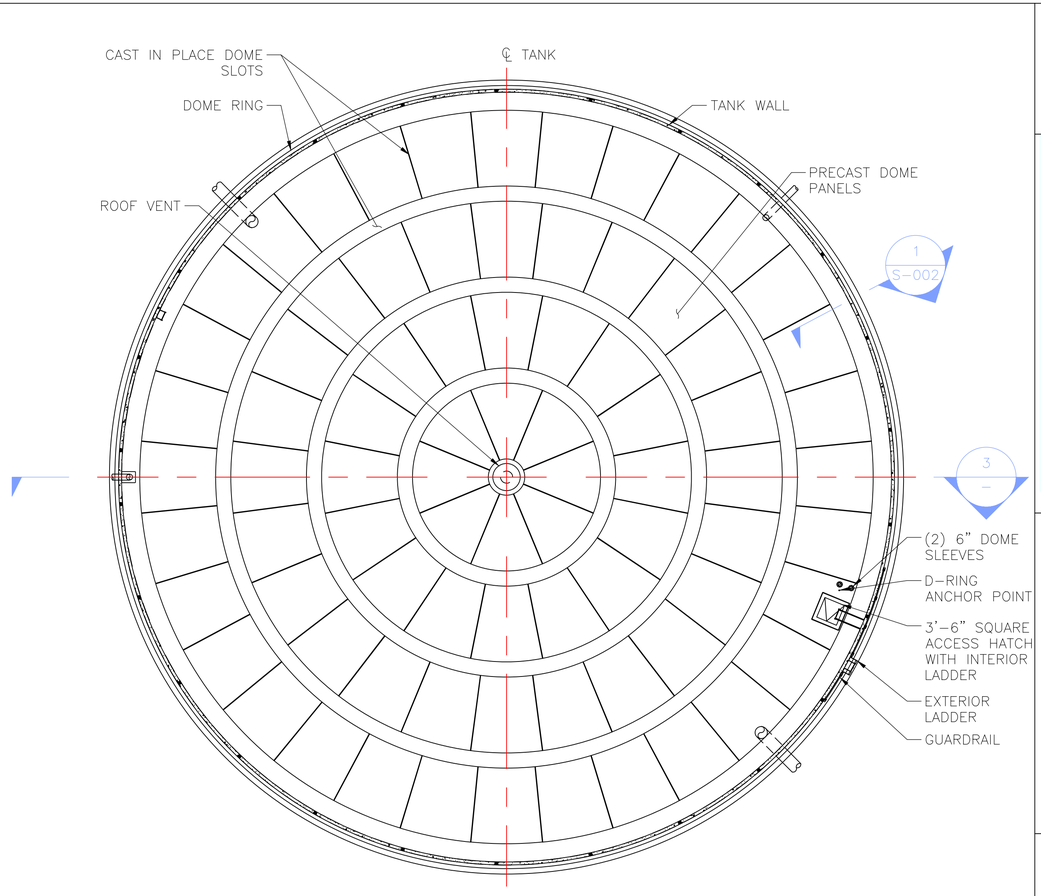
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
TYPICAL PUMP ROOM LAYOUT

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

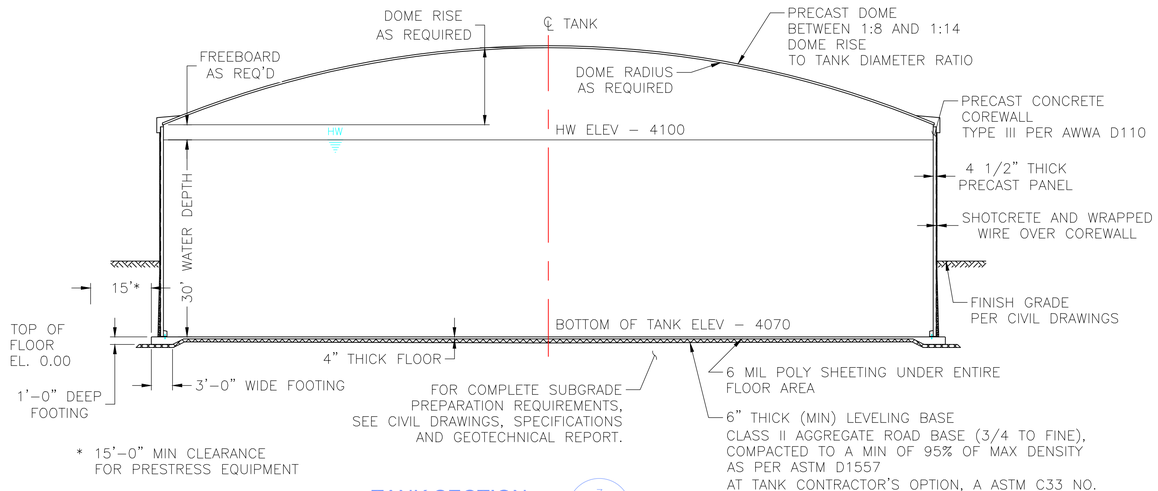


FLOOR PLAN 1



ROOF PLAN 2

PRELIMINARY
NOT FOR CONSTRUCTION



TANK SECTION 3

GENERAL NOTES:
*ALL DIMENSIONS SHOWN ARE MINIMUM REQUIREMENTS. TANK CONTRACTOR, AS DEFINED IN THE SPECIFICATIONS, TO VERIFY DIMENSIONS WITH STRUCTURAL CALCULATIONS.

A. DESIGN LOADS
1. ROOF LOAD : 20.0 PSF LIVE; SNOW
2. LIQUID (WATER) : 62.4PCF
3. Ri, IMPULSIVE STRUCTURAL RESPONSE COEFFICIENT : 3.25 (ASCE 7 WITH CABLES) 1.50 (ASCE 7 W/O CABLES) 3.50 (AWWA WITH CABLES) 1.50 (AWWA W/O CABLES)
4. Rc, CONVECTIVE STRUCTURAL RESPONSE COEFFICIENT : 1.0
5. ANALYSIS PROCEDURE USED : EQUIVALENT LATERAL FORCE ANALYSIS BASED ON AWWA D110 AND ACI 350.3

B. CONCRETE AND SHOTCRETE
1. FLOOR, AND FOOTINGS : 4000 PSI
2. DOME, DOME RING AND DOME SLOTS : 4000 PSI
3. PRECAST WALL : 4000 PSI
4. SHOTCRETE FOR WIRE COVER (1C:3S) AND COVER COAT (1C:4S) : 4500 PSI
5. SEE TECHNICAL SPECIFICATION FOR COMPLETE MIX DESIGN INFORMATION INCLUDING MINIMUM CEMENT CONTENT, MAXIMUM WATER-CEMENT RATIO, AGGREGATE SIZE AND ACCEPTABLE ADMIXTURES.
6. SEE TECHNICAL SPECIFICATION FOR CONCRETE PLACING AND FORMING PROCEDURES.

C. METALS
1. ALL STAINLESS STEEL (SST) TO BE 304L UNLESS OTHERWISE NOTED.

D. REINFORCING STEEL
1. ALL REINFORCING IN TANK SHALL CONFORM TO ASTM A615 GRADE 60 UNLESS OTHERWISE NOTED ON THESE DRAWINGS.
2. REINFORCING STEEL CALLED OUT AS GALVANIZED SHALL HAVE A CLASS 1 COATING IN ACCORDANCE WITH ASTM A767, WITHOUT CHROMATE.

E. EARTHWORK REQUIREMENTS
1. MINIMUM COMPACTION OF CRUSHED ROCK AND SUBGRADE UNDER AND AROUND PIPE BLOCKS AND UNDER FLOOR AND FOOTINGS SHALL EQUAL 95% RELATIVE COMPACTION AS DETERMINED IN ACCORDANCE WITH ASTM D1557.
2. COMPACTION OF BACKFILL AROUND TANK SHALL EQUAL 90% RELATIVE COMPACTION AS DETERMINED IN ACCORDANCE WITH ASTM D1557. USE ONLY HAND HELD COMPACTION EQUIPMENT WITHIN 5' OF TANK WALL AND LIGHTWEIGHT EQUIPMENT (15,600 LBS MAX) BEYOND THE 5' AND WITHIN 15' OF THE TANK SO AS NOT TO DAMAGE THE WALL. BRING UP THE BACKFILL AROUND THE TANK IN UNIFORM LIFTS WHEN POSSIBLE. DIFFERENCE IN BACKFILL HEIGHTS DURING INSTALLATION SHALL NEVER EXCEED THE FINAL DIFFERENCE IN BACKFILL HEIGHTS.

SHEET C-603

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
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Phone: (406) 925-0590

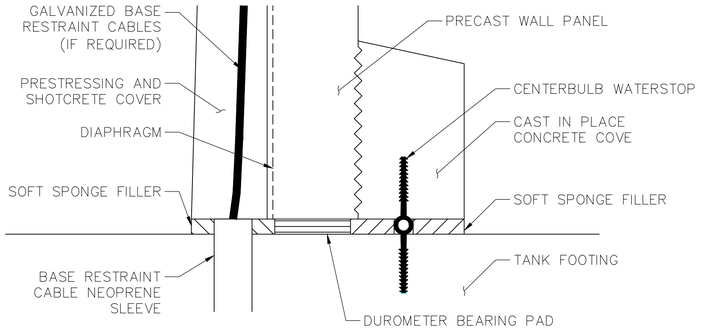
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
WATER TANK-750,000 GALLONS

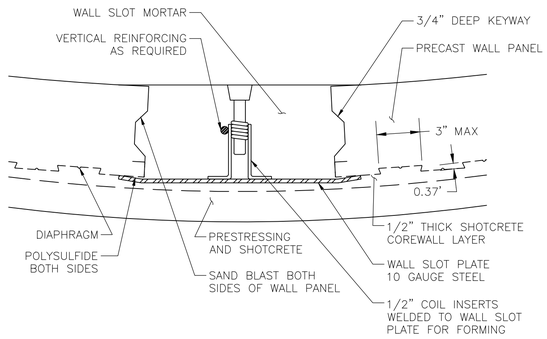
Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

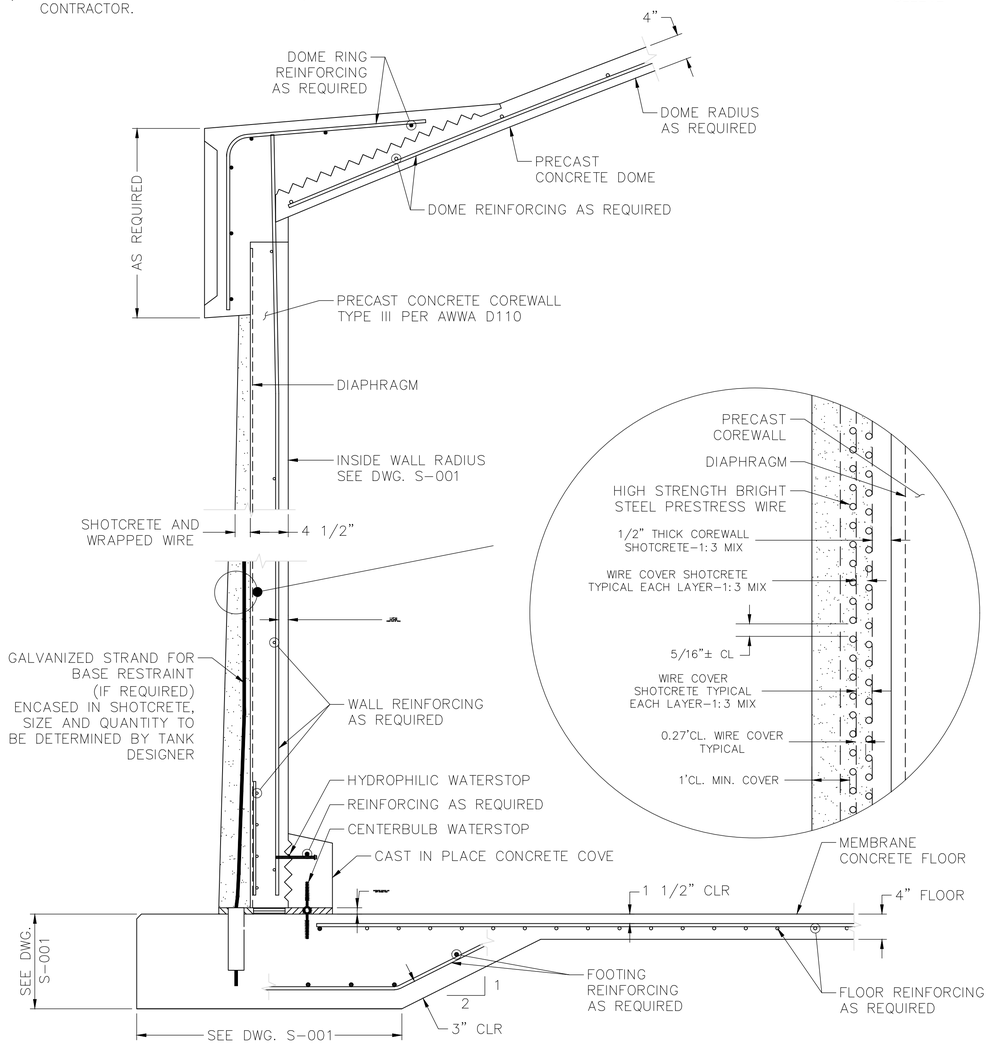
Filename:KANE SPRINGS - BM - PRELIM PLAT 7.5.1.DWG Sheet:C-603 TANK Location:F:\DROPBOX FILES\SEAK DROPBOX\SEAK PROJECTS\MOAB - KANE SPRINGS\CAD\ENGINEERING - CAD Plotted:9/23/2022 Plotted by:MARLENE

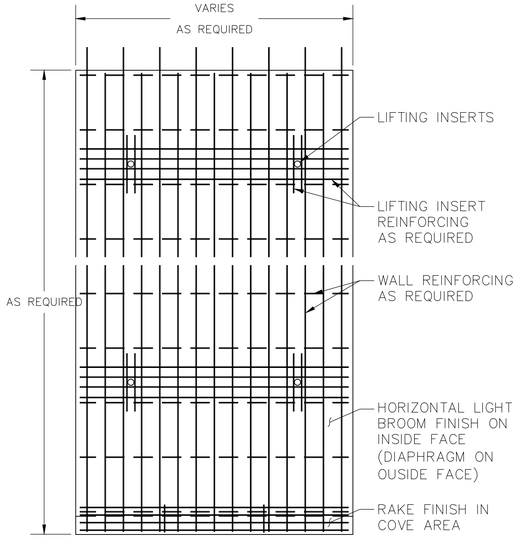
PRELIMINARY
NOT FOR CONSTRUCTION

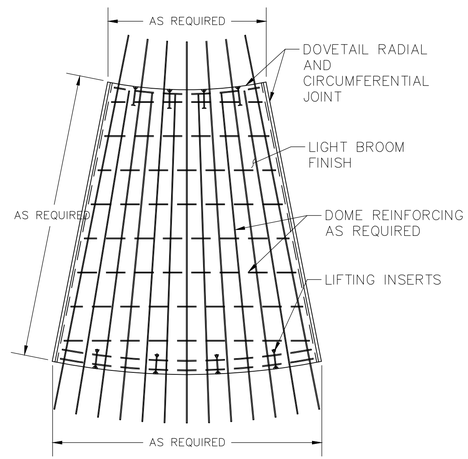
NOTES:
1) FOOTING AND FLOOR TO BE FINISHED PER SPECIFICATIONS.
2) MAINTAIN CLEARANCE BETWEEN THE INDIVIDUAL STRANDS IN THE BASE RESTRAINT CABLE SETS (DO NOT BUNDLE). CABLES MAY TOUCH WITHIN 2' OF THE BOOT.
3) THE COMBINED FLOOR AND WALL FOOTING SHALL BE POURED MONOLITHICALLY UNLESS APPROVED BY THE ENGINEER.
4) BASE RESTRAINT CABLES MAY BE BENT PRIOR TO INSTALLATION.
5) BASE RESTRAINT CABLE DESIGN REQUIREMENTS TO BE DETERMINED BY TANK CONTRACTOR.











SHEET C-604

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
William H. Anderson, P.E

ANDERSON ENGINEERING, INC.
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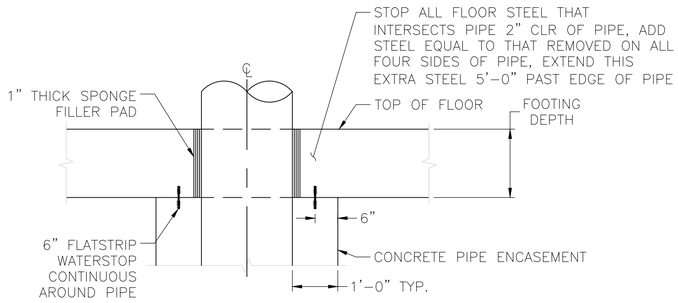
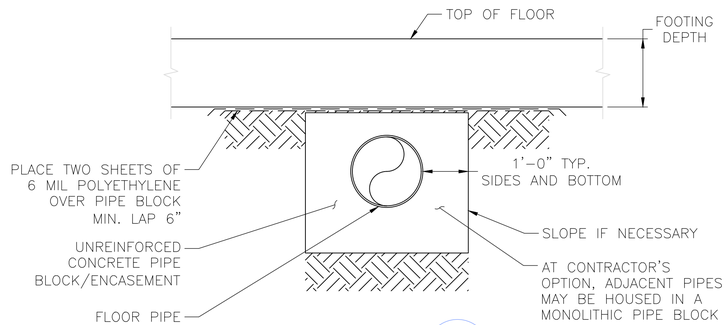
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
WATER TANK-DETAILS

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

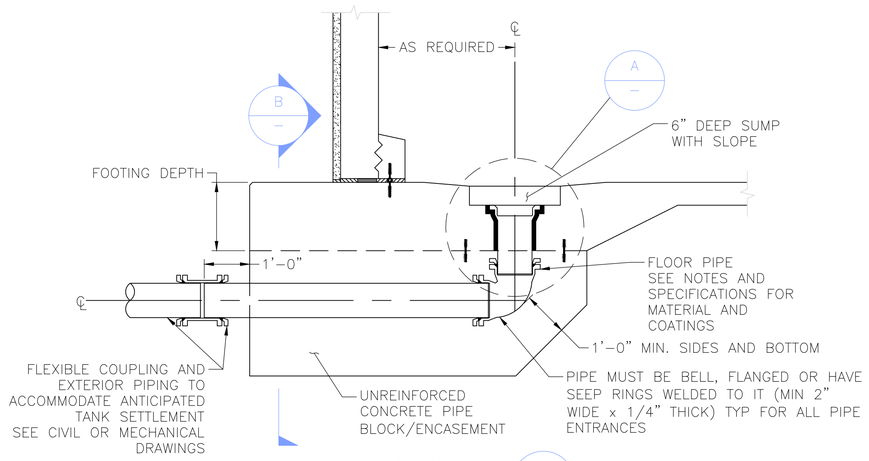
PRELIMINARY
NOT FOR CONSTRUCTION



TYPICAL FLOOR PIPE ENTRANCE A

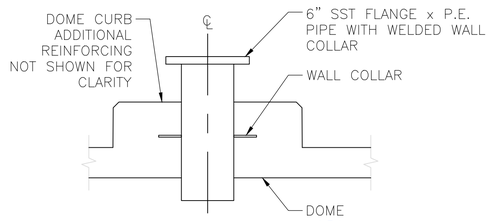


PIPE SECTION B

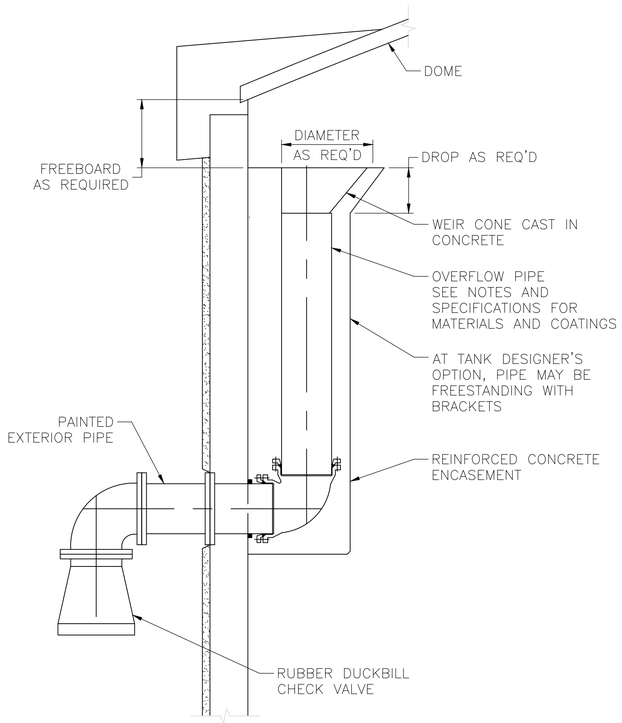


DRAIN PIPE 2 S-001

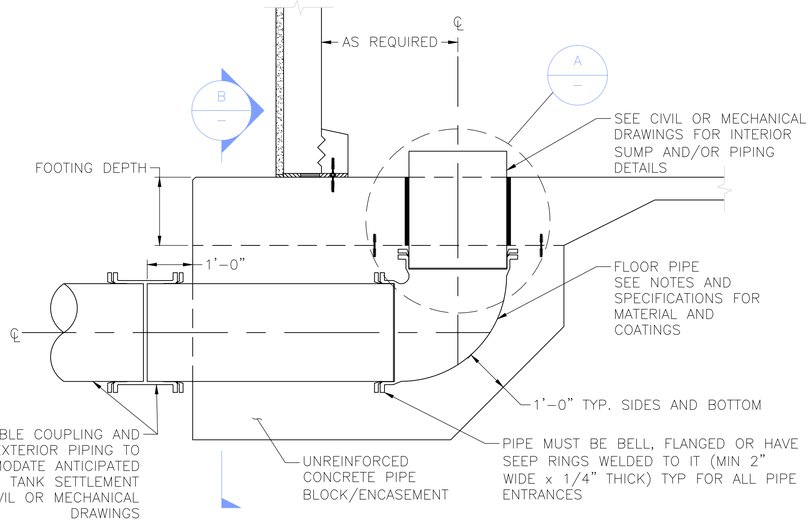
PIPING NOTES:
1. ALL PIPE MATERIAL TO BE D.I.C.L. UNLESS NOTED OTHERWISE.
2. EPOXY COAT EXTERIOR OF PIPING INSIDE TANK. NO COATING ON PIPE IN CONTACT WITH CONCRETE.
3. EXTERIOR PIPING CONNECTION TO BE DESIGNED TO TOLERATE EXPECTED TANK SETTLEMENT.



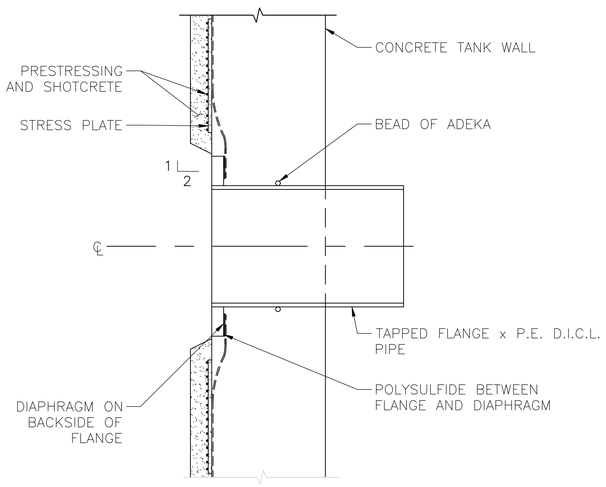
DOME SLEEVE
2 REQ'D 3 S-001



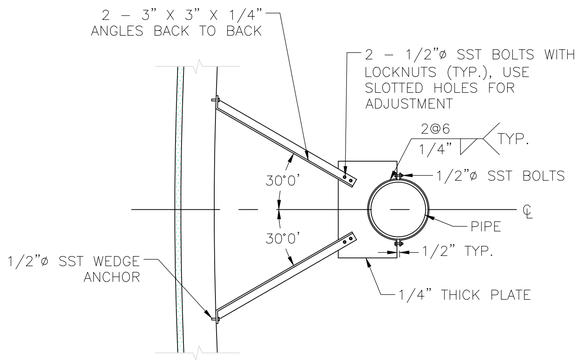
OVERFLOW PIPE 4 S-001



TYPICAL FLOOR PIPE 1



TYPICAL WALL PIPE ENTRANCE C



PIPE BRACKET D

SHEET C-605

PROFESSIONAL ENGINEER 17473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
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ANDERSON ENGINEERING, INC.
PO BOX 1342, Bozeman, MT 59771
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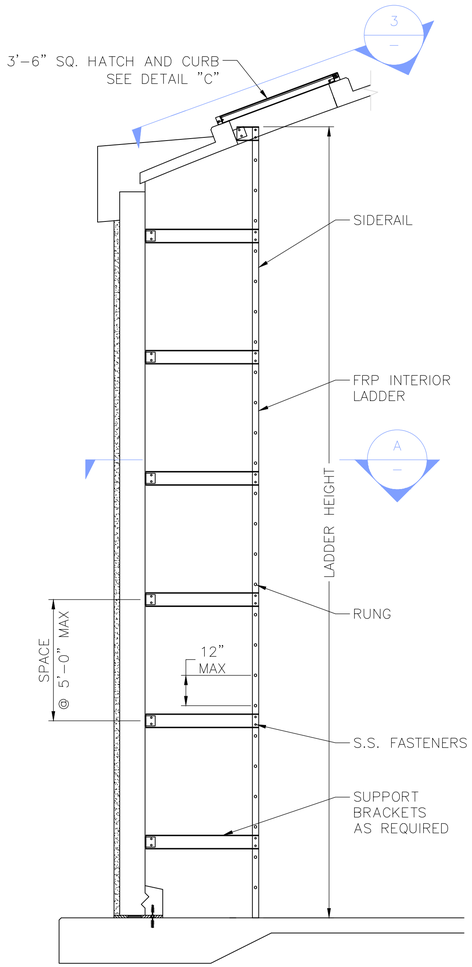
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
WATER TANK-DETAILS

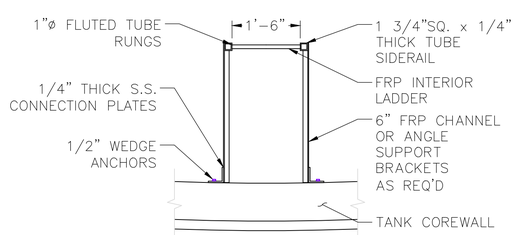
Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

PRELIMINARY
NOT FOR CONSTRUCTION

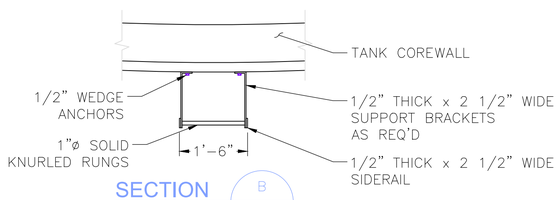


INTERIOR LADDER
1 REQ'D S-001

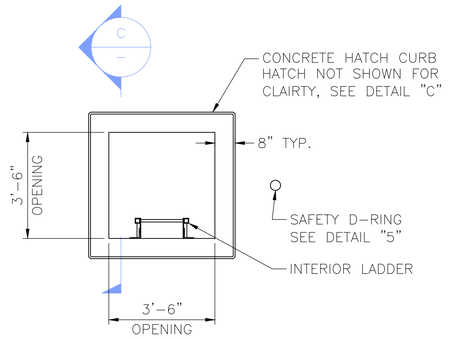
INTERIOR LADDER NOTES:
1) LADDER MATERIAL SHALL BE FRP.
2) OSHA COMPLIANT FALL PREVENTION DEVICE SHALL BE INSTALLED (SST).
3) LADDER RUNGS TO BE SOLID BARS AND FLUTED.
4) USE SST WEDGE ANCHORS FOR ALL CONNECTIONS TO CONCRETE UNLESS NOTED OTHERWISE.



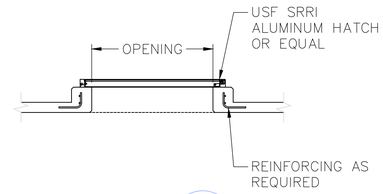
SECTION A



SECTION B

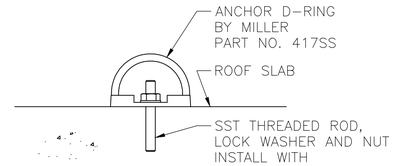


3'-6" SQ. ACCESS HATCH
1 REQ'D S-001

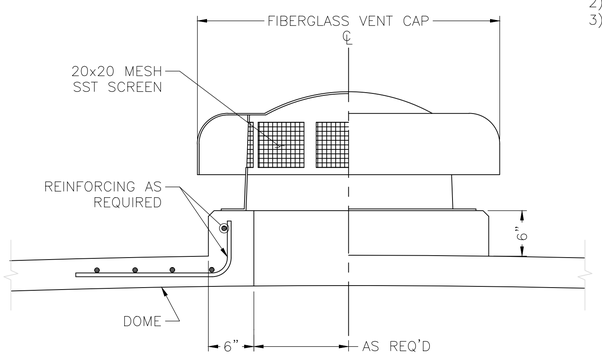


SECTION C

ROOF HATCHES NOTES:
1) HATCHES TO BE SINGLE LEAF USF SRRI ALUMINUM HATCHES OR EQUAL.
2) ALL ALUMINUM IN CONTACT WITH CONCRETE MUST BE COATED WITH A HEAVY BITUMASTIC COATING, EPOXY PAINT OR SHIMMED USING PVC.
3) USE SST WEDGE ANCHORS FOR ALL CONNECTIONS TO CONCRETE UNLESS NOTED OTHERWISE.
4) WHERE SST BOLTS ARE IN CONTACT WITH DISSIMILAR METALS, USE INSULATING SLEEVES AND PHENOLIC WASHERS TO ELECTRICALLY ISOLATE THE BOLTS.



SAFETY D-RING
1 REQ'D @ EACH HATCH



ROOF VENT
AS REQ'D 2 S-001

ROOF VENT NOTES:
1) VENT TO BE FIBERGLASS REINFORCED POLYMER
2) SIZE PER PROJECT VENTING RATES.
3) USE SST WEDGE ANCHORS FOR ALL CONNECTIONS TO CONCRETE UNLESS NOTED OTHERWISE.

SHEET C-606

PROFESSIONAL ENGINEER 17247 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
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KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
WATER TANK-DETAILS

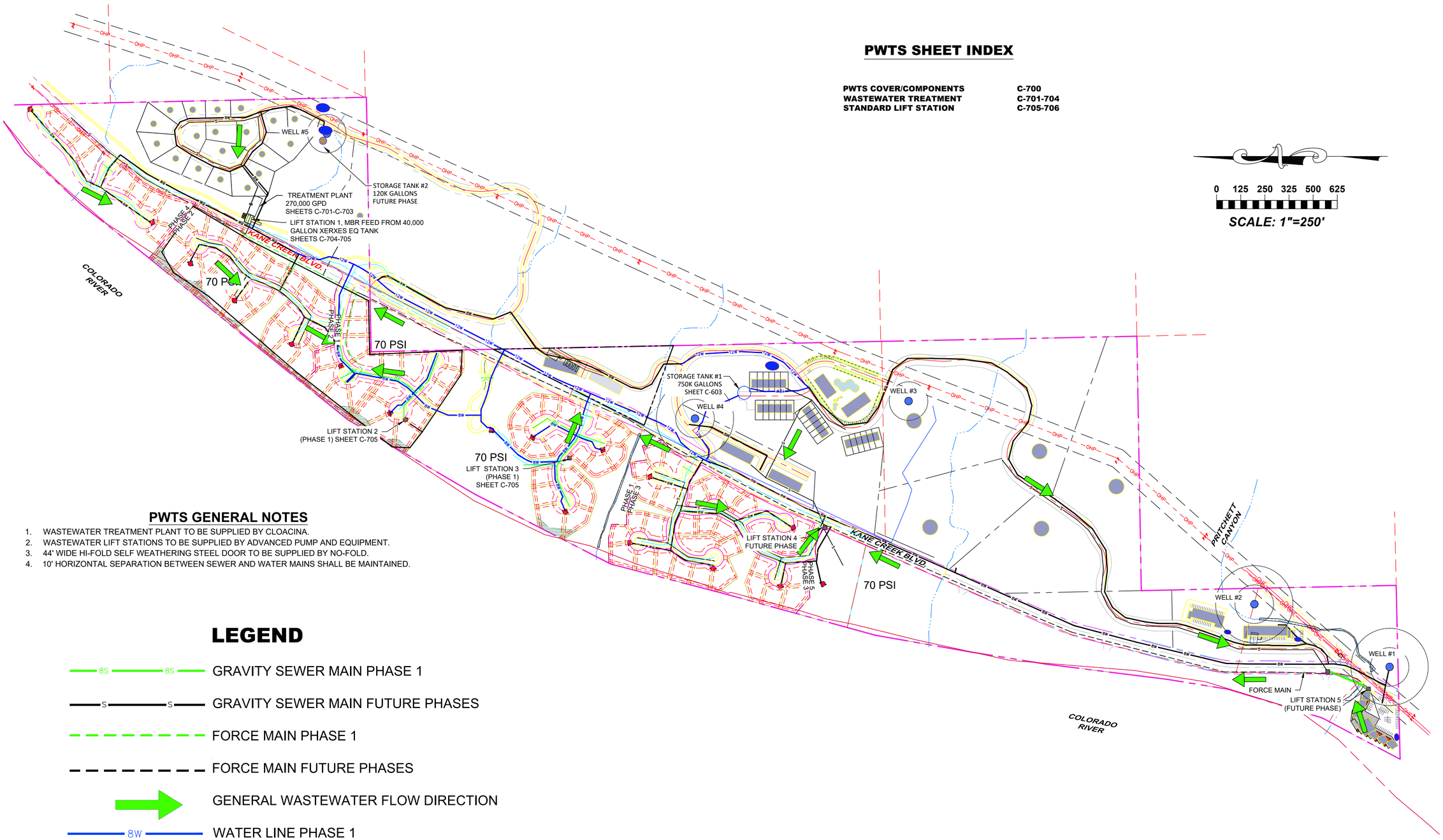
Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

PWTS SHEET INDEX

PWTS COVER/COMPONENTS	C-700
WASTEWATER TREATMENT	C-701-704
STANDARD LIFT STATION	C-705-706

0 125 250 325 500 625

SCALE: 1"=250'



PWTS GENERAL NOTES

1. WASTEWATER TREATMENT PLANT TO BE SUPPLIED BY CLOACINA.
2. WASTEWATER LIFT STATIONS TO BE SUPPLIED BY ADVANCED PUMP AND EQUIPMENT.
3. 44' WIDE HI-FOLD SELF WEATHERING STEEL DOOR TO BE SUPPLIED BY NO-FOLD.
4. 10' HORIZONTAL SEPARATION BETWEEN SEWER AND WATER MAINS SHALL BE MAINTAINED.

LEGEND

- 8S — 8S — GRAVITY SEWER MAIN PHASE 1
- S — S — GRAVITY SEWER MAIN FUTURE PHASES
- FORCE MAIN PHASE 1
- FORCE MAIN FUTURE PHASES
- GENERAL WASTEWATER FLOW DIRECTION
- 8W / 12W — WATER LINE PHASE 1
- W — WATER LINE FUTURE PHASES
- SUBJECT PROPERTY LINE
- PARCELS
- PUMP STATION (5ea.)

PRELIMINARY
NOT FOR CONSTRUCTION

SHEET C-700

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH

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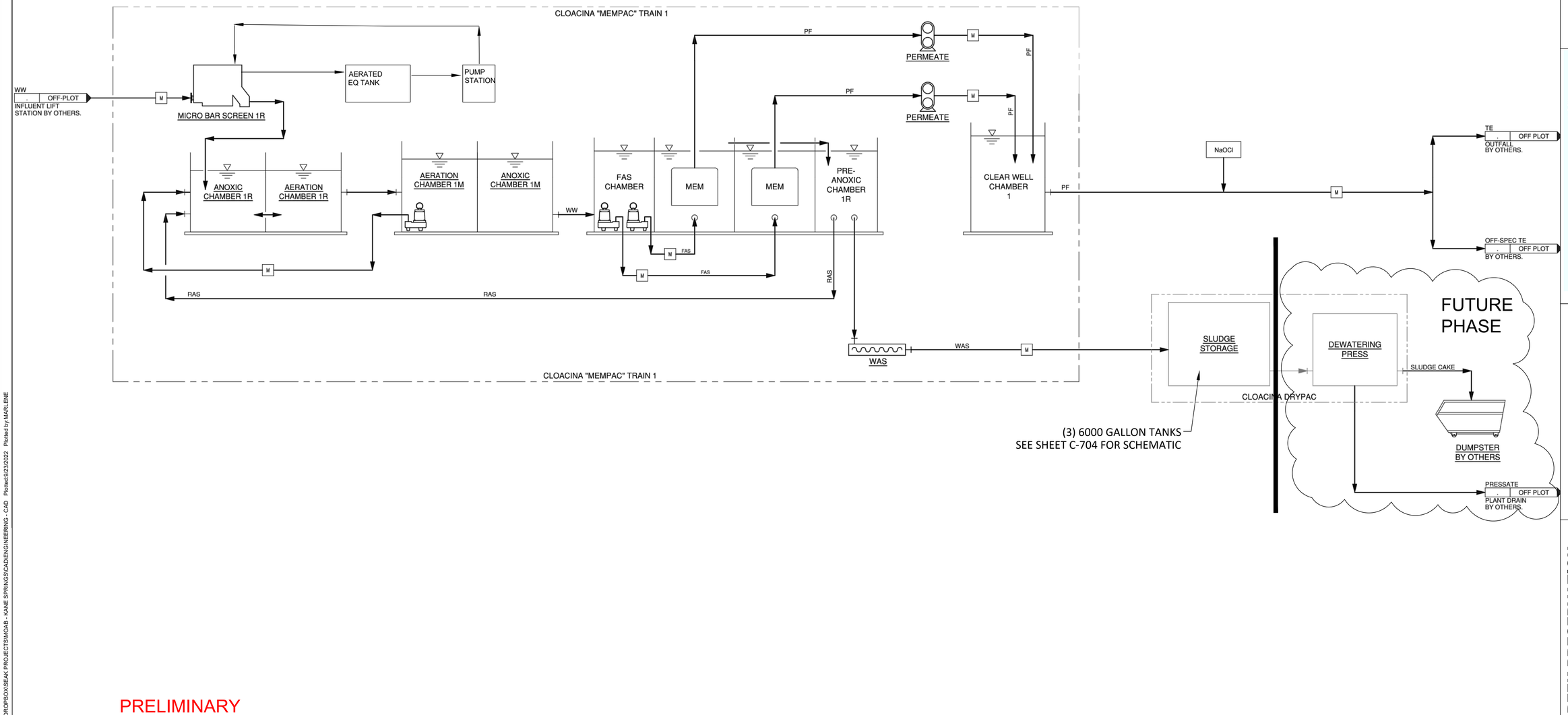
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
PWTS COMPONENTS OVERVIEW

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5



PRELIMINARY
NOT FOR CONSTRUCTION

Brian Snow 4/5/22

BRIAN D. SNOW, PE DATE
C.E. 80472 EXP. 3/31/23

LEGEND

PRESENT-M170
FUTURE (F)-M250
FUTURE

ISSUED FOR 70% COMPLETE
2022-04-05

NOTES:

1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-04-05		

SCALE: NOT TO SCALE
DATE: 2022-03-30
DRAWN BY: JWL
JOB #: CL21-022

P.O. BOX 1647
ARROYO GRANDE, CA
PHONE: 888.483.8469
FAX: 888.483.6134
info@cloacina.com

CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PROCESS FLOW DIAGRAM

REV NO. A | SHEET: P-001 | 01 OF 01 SHEETS

SHEET C-701

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
William H. Anderson, P.E

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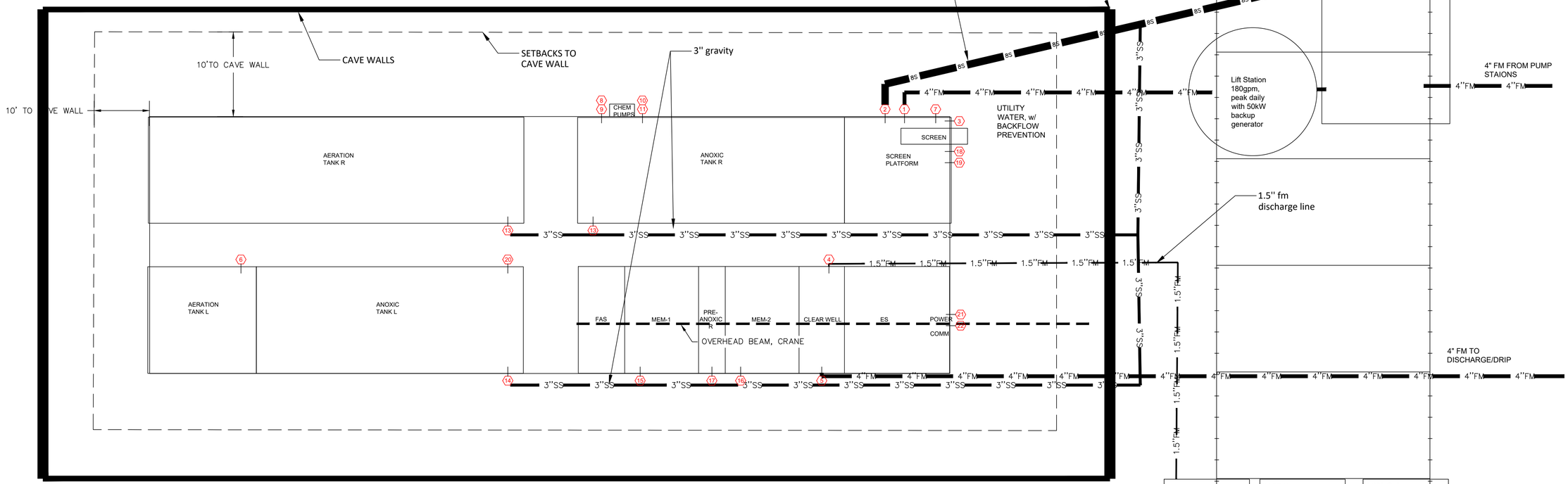
Phone: (406) 925-0580

KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
PWTS TREATMENT

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

TIE-IN LIST			
TIE PT.	LINE SIZE/SPEC	PROCESS	NOTES
1	4"	WW INLET	180 GPM, PEAK
2	8"	OVERFLOW	TO EQ TANK
3	1 1/2"	UW INLET	UTILITY WATER, COMPACTOR, DOUBLE BACK FLOW PREVENTOR
4	1 1/2"	WAS OUTLET	WASTE ACTIVATED SLUDGE TO STORAGE TANK
5	4"	PF OUTLET	CLEAR WELL, CLEAN WATER DISCHARGE, PUMP FOR DRIP 180 GPM PEAK
6	6"	RECIRC- AERATION L	ABOVE GROUND
7	6"	RECIRC- ANOXIC R	6 AND 7 CONNECT TOGETHER
8	3/8"	CITRIC ACID	
9	3/8"	NaOCl	
10	3/8"	NaOH	
11	3/8"	COD	OPTIONAL PUMP AND STORE IF CARBON IS REQUIRED
12	3"	DR ANOXIC R	DRAINS TO EQ
13	3"	DR AERATION R	DRAINS TO EQ
14	3"	DR ANOXIC L	DRAINS TO EQ
15	3"	DR MEM 1	DRAINS TO EQ, 4000 GAL
16	3"	DR MEM 2	DRAINS TO EQ, 4000 GAL
17	3"	DR PRE ANOXIC R	DRAINS TO EQ, 1500 GAL
18	2"	FOUL AIR- HEADWORKS	SCRUBBER FOR SCREEN, ETC, AIR LINE
19	2"	FOUL AIR- ANOXIC R	AIR LINES
20	2"	FOUL AIR- ANOXIC L	AIR LINES
21	2"	POWER IN	
22	2"	COMM IN	



PRELIMINARY
NOT FOR CONSTRUCTION

SHEET C-702

PROFESSIONAL ENGINEER 17473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH

William H. Anderson, P.E

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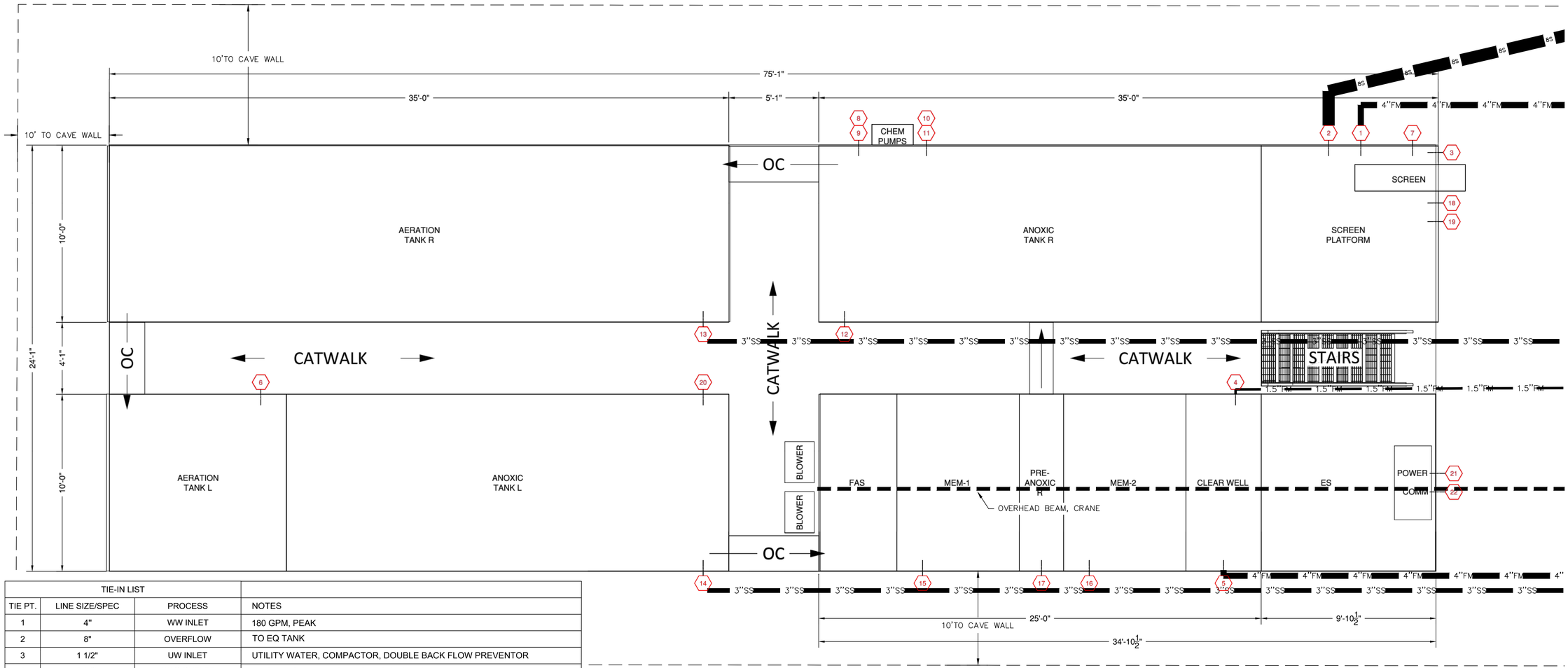
KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
PWTS TREATMENT

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5



TIE-IN LIST			
TIE PT.	LINE SIZE/SPEC	PROCESS	NOTES
1	4"	WW INLET	180 GPM, PEAK
2	8"	OVERFLOW	TO EQ TANK
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5	4"	PF OUTLET	CLEAR WELL, CLEAN WATER DISCHARGE, PUMP FOR DRIP 180 GPM PEAK
6	6"	RECIRC- AERATION L	ABOVE GROUND
7	6"	RECIRC- ANOXIC R	6 AND 7 CONNECT TOGETHER
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12	3"	DR ANOXIC R	DRAINS TO EQ
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14	3"	DR ANOXIC L	DRAINS TO EQ
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16	3"	DR MEM 2	DRAINS TO EQ, 4000 GAL
17	3"	DR PRE ANOXIC R	DRAINS TO EQ, 1500 GAL
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19	2"	FOUL AIR- ANOXIC R	AIR LINES
20	2"	FOUL AIR- ANOXIC L	AIR LINES
21	2"	POWER IN	
22	2"	COMM IN	

PRELIMINARY
NOT FOR CONSTRUCTION

Brian Snow 4/5/22

BRIAN D. SNOW, PE — DATE
C.E. 80472 — EXP. 3/31/23

ISSUED FOR 70% COMPLETE
2022-04-04

NOTES:

1. TIE-IN LOCATIONS REPRESENTED IN THIS DRAWING ARE APPROXIMATE AND ARE SUBJECT TO CHANGE.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS			
A	ISSUED FOR 70% COMPLETE	JWL SEA BDS	2022-04-04

SCALE: AS NOTED
DATE: 2022-04-04
DRAWN BY: JWL
JOB #: CL21-022

P.O. BOX 1647
ARROYO GRANDE, CA
PHONE: 888.483.8469
FAX: 888.483.6134
info@cloacina.com

CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
MEMPAC-M130
WASTEWATER TREATMENT PLANT

GENERAL ARRANGEMENT
REV NO. A
SHEET: G-005
01 OF 01 SHEETS

SHEET C-703

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
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GRAND COUNTY, UT
PWTS TREATMENT

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

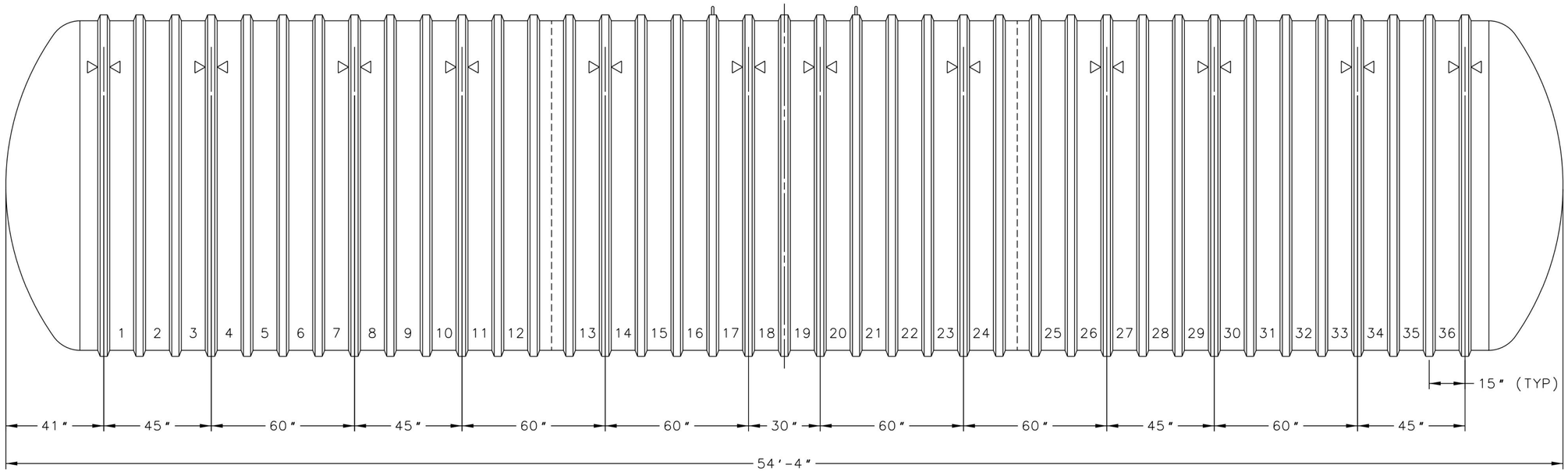
C:\Users\steveo\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek – CL21–022 MPAC MBR M–130\PID DWG\G–005.dwg – Steveo – Apr 05, 2022 – 4:55pm

XERXES®
a ZCL company

TITLE
12' DIA. S.W.T.
CAP. 40,000 GALLONS

DATE 1-12 | DR. NO. S10-899.04

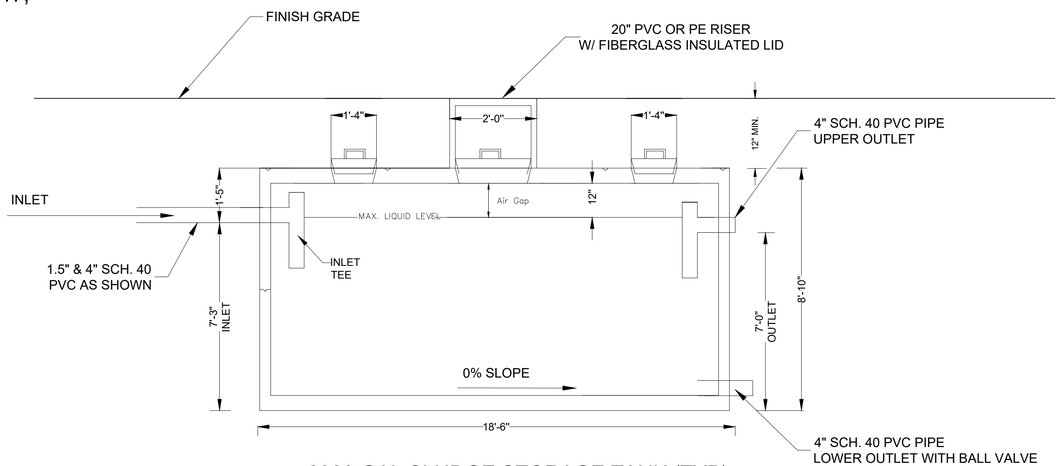
SHEET C-704



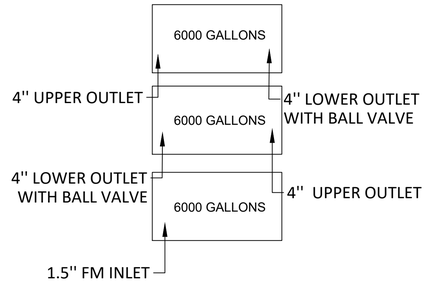
For non UL-listed configurations only.

EQ TANK

EQ TANK NOTES:
1. TANK TO BE AERATED.
2. 4" FORCE MAIN CONNECTION
3. LIFT STATION & CONNECTIONS (2, 1, 13, 14, 15, 17, AND 16) TO TREATMENT PLANT.
4. TANK ACCESS AND VENTING.
5. ODOR CONTROL VENTING.



6000 GAL SLUDGE STORAGE TANK (TYP)
N.T.S.



18000 GAL SLUDGE STORAGE SCHEMATIC
N.T.S.

PRELIMINARY
NOT FOR CONSTRUCTION

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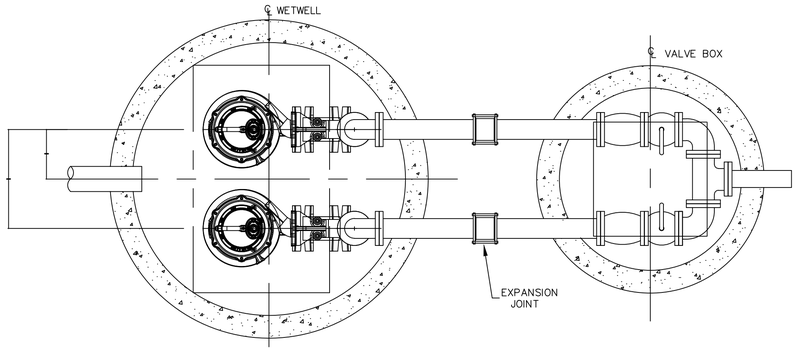
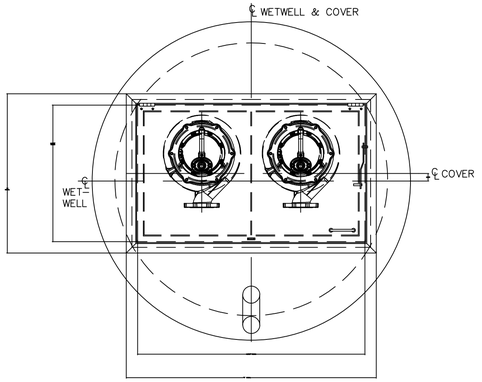
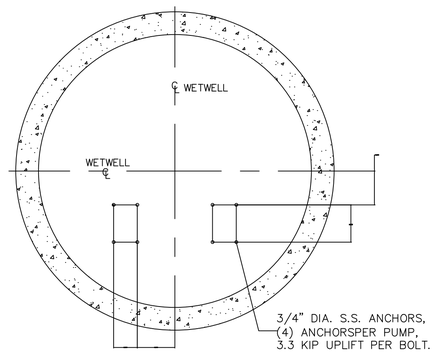
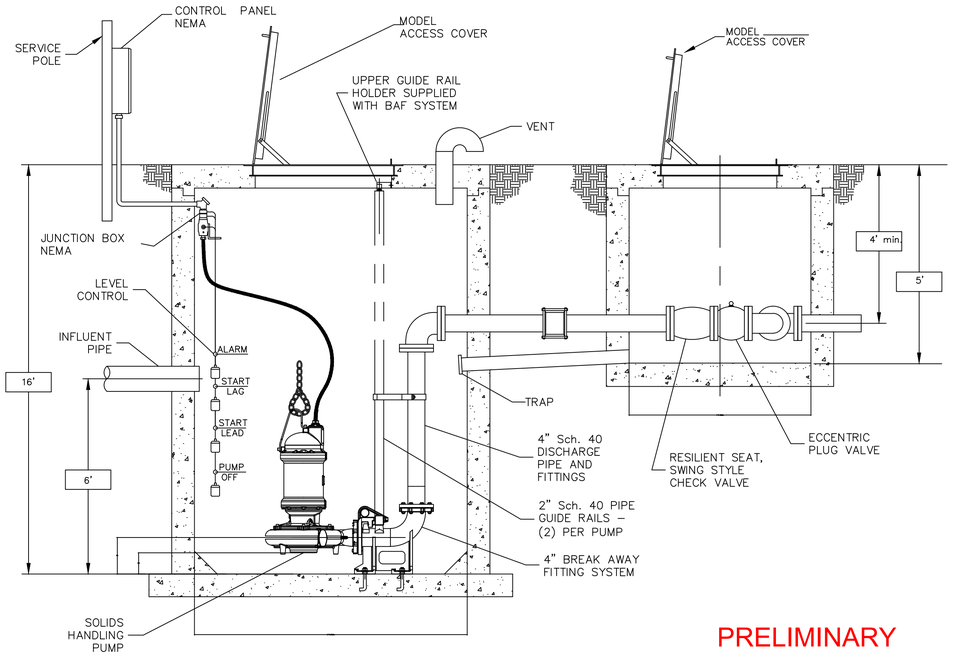
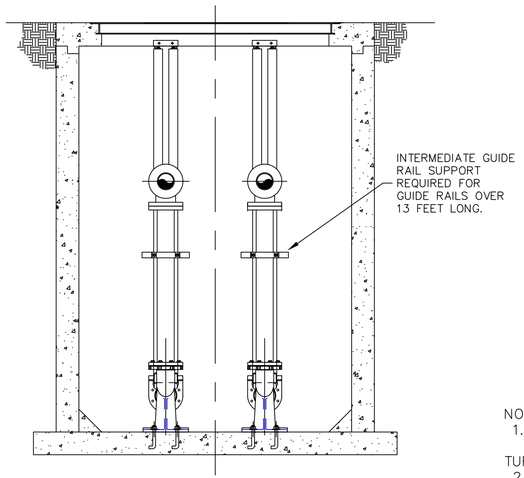


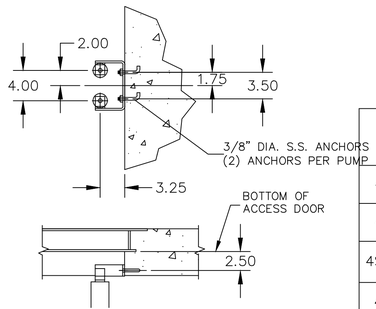




ANCHOR BOLT LAYOUT







UPPER GUIDE RAIL BRACKET MOUNTING DETAIL
SCALE : 1=8

COVER OPTIONS			
DOOR MODEL	"A"	"B"	MAT'L
J6D–AL	67.50	43.50	ALUMINUM
J6D–HD	66.00	47.00	ALUMINUM

NOTES:
1. LEVEL CONTROLS MUST BE INSTALLED OUT OF THE INFLUENT FLOW TO AVOID TURBULENCE.
2. ELECTRICAL CONDUIT & FITTINGS ACCORDING TO STATE AND LOCAL CODES.

PUMP MODEL NUMBER	DIM. "A" INCHES (MM)	DIM. "B" INCHES (MM)
4SHVA/4XSHVA	4.00 (102)	7.00 (178)
4SHVB/4XSHVB	4.00 (102)	7.00 (178)
4SHVBA/4XSHVBA	4.25 (108)	7.40 (188)
4SHMS/4XSHMS	3.75 (95)	7.40 (188)
4SHMC/4XSHMC	4.25 (108)	7.60 (193)
4SHDF/4XSHDF	3.75 (95.3)	7.40 (188)
4SHDG/4XSHDG	4.25 (108)	7.60 (193)
4SHMD/4XSHMD	4.75 (121)	8.50 (216)
4SHME/4XSHME	6.00 (152.4)	9.60 (244)
4SHMEA/4XSHMEA	6.00 (152.4)	9.60 (244)
4SHDI/4XSHDI	6.00 (152.4)	9.60 (244)

NOTE: DIMENSION "A" IS RECOMMENDED CLEARANCE BASE ON HYDRAULIC INSTITUTE STANDARD 9.8.2.3.2.2

PRELIMINARY
NOT FOR CONSTRUCTION

THIS DRAWING IS APPROVED FOR UNCONTROLLED DISTRIBUTION

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TITLE
4" SH SERIES DUPLEX PUMP INSTALLATION W/ VALVEBOX

CAGE NO
96046

DWG NO
CD131139

REV
B

CRANE® PUMPS & SYSTEMS

BURKS PUMPS · BARNES · SELLERS
PROSSER · WEINMAN · DEMING

SHEET C-705

PROFESSIONAL ENGINEER 172473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
William H. Anderson, P.E

ANDERSON ENGINEERING, INC.
PO BOX 1342, Bozeman, MT 59771
Phone: (406) 925-0590

KANE CREEK PRESERVATION AND DEVELOPMENT, LLC
10466 N IVERSON LANE
HIGHLAND, UT 84003
GRAND COUNTY, UT
PWTS LIFT STATIONS

Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

Pump Data Sheet - Crane Barnes.60

Company: Advanced Pump & Equipment 22-204
Name: Robert Schauer
Date: 05/04/2022

Pump:

Size:	3ESHVRA / 3XESHVRA	Dimensions:	
Type:	envie ESH 3" Solids Har	Suction:	---
Synch Speed:	3600 rpm	Discharge:	3 in
Dia:	135 mm		
Curve:	---		

Fluid:

Name:	Water		
SG:	1	Vapor Pressure:	0.256 psi a
Density:	62.4 lb/ft³	Atm Pressure:	14.7 psi a
Viscosity:	1.1 cP		
Temperature:	60 °F	Margin Ratio:	1

Search Criteria:

Flow:	75 US gpm	Near Miss:	---
Head:	100 ft	Static Head:	0 ft

Pump Limits:

Temperature:	104 °F	Sphere Size:	2.62 in
Wkg Pressure:	---		

Motor:

Standard:	NEMA	Size:	25 hp
Enclosure:	TEFC	Speed:	3600 rpm
Frame:	284TS		
Sizing Criteria:	Max Power on Design Curve		

Pump Selection Warnings:
None

--- Duty Point ---

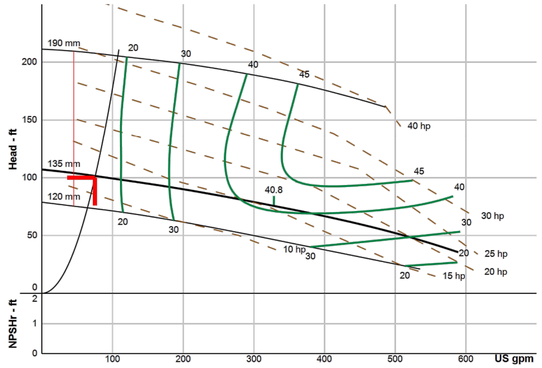
Flow:	75.5 US gpm
Head:	101 ft
Eff:	14.6%
Power:	12.6 hp
NPSHr:	---
Speed:	3450 rpm

--- Design Curve ---

Shutoff Head:	107 ft
Shutoff dP:	46.3 psi
Min Flow:	45 US gpm
BEP:	40.8% @ 328 US gpm
NOL Power:	22.7 hp @ 589 US gpm

--- Max Curve ---

Max Power: 39.9 hp @ 422 US gpm



Performance Evaluation:

Flow	Speed	Head	Efficiency	Power	NPSHr
US gpm	rpm	ft	%	hp	ft
90	3450	100	17	13.1	---
75	3450	101	15	12.5	---
60	3450	103	12	12	---
45	3450	104	10	11.5	---
30	3450	---	---	---	---

Selected from catalog: Barnes.60, Vers 4/23/20

PRELIMINARY
NOT FOR CONSTRUCTION

Average fuel consumption

Fuel consumption – natural gas

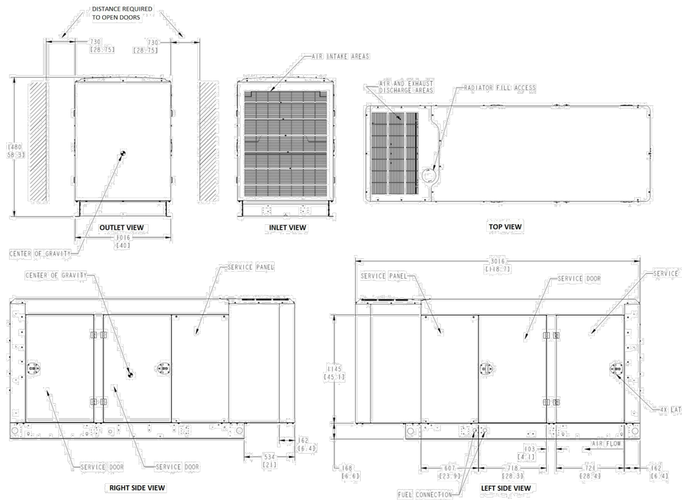
Load:	¼	1/2	3/4	Full
Ft³/hr:	341.3	481.6	624.6	806.3
M³/hr:	9.66	13.6	17.7	22.8

Fuel consumption – LP vapor

Load:	1/4	1/2	3/4	Full
Ft³/hr:	144.8	204.7	254.3	321.6
M³/hr:	4.10	5.80	7.20	9.11
Gal/hr:	3.98	5.63	6.99	8.84

Conversion factor:
8.58 ft³ = 1 lbs
0.535m³ = 1 kg
36.39 ft³ = 1 gal

Basic dimensions



Note: This outline drawing is provided for general reference only and is not intended for use in design or installation.
For more information, see Operators and Installation manuals or contact your distributor or dealer for assistance.

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BACK UP GENERATOR - 50KW
(FOR LIFT STATIONS)

SHEET C-706

PROFESSIONAL ENGINEER 17-6473 WILLIAM ANDERSON 7-06-2022 STATE OF UTAH
William H. Anderson, P.E

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Date: 07/06/2022
Drawn By: MS
Checked By: WHA
Revisions: 7.5

MEMPAC-M130 Municipal MBR
Engineered Treatment System

PROJECT NAME	**Kane Creek**	**ESTIMATE DATE**	**2/19/21**
CLIENT NAME	**Bill Anderson, P.E.**	**PROJECT NUMBER**	**CL21-022**
CONTACT NAME	**Brian Nilsen**	**REVISION NUMBER**	**07**
CONTACT EMAIL	**briann@cloacina.com**	**REVISION DATE**	**5/4/2022**
CONTACT NUMBER	**805-540-3114**		

1 PROJECT INFORMATION

The project is designed as a single treatment train.

1.1 PROCESS FLOW DESCRIPTON

The following describes the process flow of the MEMPAC-M unit:

Headworks

The influent flow will pass through an influent flow meter prior to discharge into an influent screen. The influent screen is a 2MM fine bar screen with a washer and compactor. Screened solids will be discharged into an endless bagger unit to be dumped into a client provided receptacle. Screened influent will discharge to the anoxic chamber.

Biological Nutrient Removal

Screened influent will mix with return activated sludge (RAS) which has gravity-returned from the pre-anoxic chamber to form “mixed liquor.” Nitrates conveyed by RAS flow from the aeration basin to the oxygen-lean anoxic chamber serve to oxidize some of the influent biological oxygen demand (BOD) by which process these nitrates are converted to nitrogen gas, ultimately lowering effluent total nitrogen (TN).

Secondary Treatment

Mixed liquor proceeds from the anoxic process to the aeration process where nitrification occurs by which process BOD is oxidized and ammonia is converted to nitrates, ultimately lowering their respective effluent concentrations. This is achieved by introducing compressed air through fine bubble diffusers on a carefully designed aeration network.

Membrane Clarification

At the end of the activated sludge process, wastewater is pumped from the aeration process to the individual membranes cassette chambers using forward activated sludge (FAS) pumps. These membrane cassettes have a vacuum applied across them by permeate pumps, pulling clear water “permeate” through the membranes and leaving solids behind, outside of the membranes. The permeate pumps convey their permeate to a “clear well” reservoir of water used for periodic membrane cleaning, i.e. “backpulsing,” and clean-in-place (CIP) procedures which are fully automated.

Waste Sludge

Solids concentration will be monitored by an on-line suspended solids meter located in the FAS Chamber. A sludge wasting pump will remove a calibrated portion of activated sludge to an exterior sludge storage (by others).

2 PROJECT DESIGN

The following outlines the parameters used to design standard supplied system:

2.1 Influent Parameters

Daily Flow (Q)	Average Annual (AAF)	Maximum Daily (MDF)	Peak Daily (PDF)	Peak Hour (PDF)
Peaking Factor		1.35	2.0	4.0
Gallons per Day	135,000	182,250	270,000	
Gallons per Minute	93.8	126.6	187.5	375

Organic Concentration	BOD5	TSS	TKN	NH3	P
Influent (mg/l)	225	219	38	23	10
Screen Removal %	4%	9%	0%	0%	2%
Screened Influent (mg/l)	216	199	37	23	10

Organic Loading (lbs/day)	AAF	MDF
Ratio of Average loading at MAX Flow		1.00
BOD5	243.2	328.3
TSS	224.1	302.6
TKN	41.4	55.9
NH3	26.0	35.1
P	6.9	9.3

Effluent Limitations	BOD5	TSS	TN	NH3	P
Effluent (mg/l)	<10	<10	<5	<2.2*	<1**

**Monthly Average. Daily Max<13.3 mg/L* ***Engineering to verify once under contract.*

Note 1. Effluent Limits are dependent on acceptance of Bardenpho Process in Section 5.1.9.

2.1.1 Flow Definitions

Wastewater flow can be described in a multitude of ways, related to varied time periods, wet and dry weather, seasonal populations, and permit definitions. To ensure that the estimated system meets the project needs, the following terms **shall** be used to define the capacity of the proposed system:

Term	Definition
Average Annual Flow (AAF)	The average flow of a one-day period which is the influent volume in one year divided by the number of days in that year. AAF is typically the nominal capacity of a plant.
Maximum Daily Flow (MDF)	The maximum daily flow occurring over a 24-hour period. Cloacina utilizes MDF for maximum biological design and the maximum sizing of the treatment equipment.
Peak Daily Flow (PDF)	The single greatest flow of a one-day (24hr) period in a year. PDF serves for design of plant hydraulic capacity. Flow rates greater than PDF, including Peak Hour Flow (defined below), are to be equalized to PDF by influent storage (by others) that augments the treatment plant.
Peak Hour Flow (PHF)	The flow over a 60-minute period which is the influent flow of the highest flow hour in the Peak Day. For applications in which influent is screened prior to equalization, screens shall be sized for PHF. In the absence of a PHF specified by the Client, PHF will be calculated as a function of the plant's service population per "Metcalf & Eddy".

2.1.2 Influent Loading

The following outlines the organic loading used to develop this estimate.

Term	Definition
Maximum Daily Flow (MDF) Loading	It is assumed that the influent concentrations outlined below are applied 100% to the Maximum Day Flow (MDF), unless otherwise indicated.
PEAK Daily Flow (PDF)	It is assumed that no additional influent constituent loading is contributed by flows more than MDF. Loading defined for MDF is assumed to be diluted at PDF such that PDF loading shall equal MDF loading multiplied by the ratio of MDF to PDF.
PDF Equation	• $BOD_{PD} = BOD_{MMDF} \times \frac{MDF}{PDF}$ • $TSS_{PD} = TSS_{MMDF} \times \frac{MDF}{PDF}$ • $TKN_{PD} = TKN_{MMDF} \times \frac{MDF}{PDF}$

2.2 PROCESS DESIGN PARAMETERS

ACTIVATED SLUDGE	AAF	MDF
Volume Under Aeration (gal)	79,055	
Hydraulic Residence Time (hrs)	14.1	10.4
MLSS (mg/l)	8,300	9,300
MLSS (lbs)	5,472	6,132
MLSS/MLVSS Ratio	0.69	
MLSS (lbs)	3,776	4,231
F:M	0.06	0.08
MCRT (Days)	39.5	30.1
Recirculation Rate (*Q)	5	
Recirculation Rate (gpm)	501	676

AERATION	AAF	MDF
Project Altitude (ft)	400	
lb O_2/lb BOD	1.25	
lb O_2/lb NH_3-N	4.60	
Air Requirement (SCFM)	296	399

NUTRIENT REDUCTION	AAF	MDF
Anoxic Residence Time (hrs)	4.0	2.9

WASTE ACTIVATED SLUDGE (WAS)	AAF	MDF
lbs WAS/lbs Inf BOD	0.57	0.62
lbs WAS/day	139	204
WAS Concentration (mg/l)	9,960	11,160
WAS Volume/Day (gal)	1,669	2,187

MEMBRANE CLARIFICATION	Each Cassette	N	N+1
Cassettes Supplied	1	1	2
Membrane Area (ft²)	16,280	16,280	32,560
Flux at AAF (gal/ft²/day)	8.3	8.3	4.1
Flux at MDF (gal/ft²/day)	11.2	11.2	5.6
Flux at PDF (gal/ft²/day)	16.6	16.6	8.3
PEAK Flow per Cassette (gpm)	200	200	100
Air Flow per Cassette (SCFM)	166	166	331
Estimated Production Time (min)	1,348		

Membrane Cassette	SUEZ	ZW500D-44
Cassettes Supplied	2	

CHEMICAL USAGE	CL2	Citric
gal per Cycle	11.9	9.9
Estimated gal per Year	618	515

2.3 System Parameters

SYSTEM DIMENSIONS	Length	Width	Height
Outside Dimensions of System Tanks and Skids (ft)	75.0	24.0	14
Required area with attached equipment and access walkways (ft)	85.0	34.0	18

SYSTEM WEIGHT	System Only	System at Operating Depth
lbs	93,025	752,347

ELECTRICAL REQUIREMENTS	Voltage	Phase	Amperage
The FLA's are approximate and subject to change based on actual options/upgrades chosen.	480	3	200

3 SCOPE OF SUPPLY

3.1 Headworks

Equipment	Description	Quantity
Influent Flowmeter	Endress+Hauser, electromagnetic flowmeter	1
Influent Screen	2 mm fine bar screen with washer compactor rated at 350 GPM	1

3.2 Anoxic Process

Equipment	Description	Quantity
Level Sensor	Endress+Hauser hydrostatic level transducer	1
ORP Probe	Endress+Hauser, ORP probe	1
Anoxic Mixer	Submersible on Slide Rail	1

3.3 Aeration Process

Equipment	Description	Quantity
Level Sensor	Endress+Hauser, level transducer	1
Dissolved Oxygen Sensor	Endress+Hauser, DO Sensor	1
Aeration Blower	FPZ regenerative blower	2
Blower Pressure Sensor	Endress+Hauser, pressure sensor	4
Aeration Diffusers	OTT, Magnum 2000 Flexsil fine bubble	40

3.4 Waste Activated Sludge (WAS) Process

Equipment	Description	Quantity
MLSS Sensor	Endress+Hauser, TSS Sensor	1
WAS Pumps	Progressive cavity pump	1
WAS Flowmeter	Endress+Hauser, electromagnetic flowmeter	1

3.5 Membrane Process

3.5.1 Forward Activated Sludge (FAS) Process

Equipment	Description	Quantity
Level Sensor	Endress+Hauser hydrostatic level transducer	1
FAS Pump	Submersible pump with slide rail and base	2
FAS Flowmeter	Endress+Hauser, electromagnetic flowmeter	2

3.5.2 Membrane Equipment

Equipment	Description	Quantity
Level Sensor	Endress+Hauser hydrostatic level transducer	2
Membrane Cassette	SUEZ ZW500D	2
Permeate Pump	Positive Displacement Rotary Lobe Pump	2
Permeate Flowmeter	Endress+Hauser, electromagnetic flowmeter	2
Permeate Pressure Sensor	Endress+Hauser, pressure sensor	2
Air Scour Blower	FPZ regenerative blower	2
Blower Pressure Sensor	Endress+Hauser, pressure sensor	4
Mass Air Flowmeter	Endress+Hauser, thermal mass flowmeter	2

3.5.3 Clean in Place (CIP) Equipment

Equipment	Description	Quantity
Clear Well Level Sensor	Endress+Hauser hydrostatic level transducer	1
Chemical Pump	Peristaltic Metering Pump	4
Injector Solenoid	Hayward SV, True union solenoid valve	4

3.6 Effluent Equipment

Equipment	Description	Quantity
Effluent Flow Meter	Endress+Hauser, electromagnetic flowmeter	1
Effluent Turbidity	Endress+Hauser, Turbidity Sensor	1

3.7 Utility Equipment

Equipment	Description	Quantity
Probe Wash Solenoid	ASCO Solenoid valve	1
Water Regulator	ZURN Water pressure regulator	1
Water Y-Strainer	HIPCO Y-Strainer	1

3.8 Electrical and Control Equipment

Equipment	Description	Quantity
Control Panel	U.L. Listed 480V, 3-Phase, NEMA 4X, Stainless Steel Panel	1
HMI	15-inch touch screen computer	1
Control Transmitter	Endress+Hauser Liquiline, digital transmitter	1

4 Project Support

4.1 Documents

Document	Description	Quantity
Electrical Control Panel	Equipment drawings	1
Project Submittals	Detailed information for all supplied equipment	1
Factory Acceptance Testing Documents	Detail of all equipment tests prior to shipping	1
Equipment Manual	Detailed Operations and Maintenance Manual	1

4.2 Labor

Scope	Description	Hrs
On-site Startup	On-site startup and commissioning	64
Operator Training	On-site Operator training	16
Remote Support	Phone and web support after completion of startup	20

5 Optional Equipment

5.1.1 Sound Attenuated Equipment Room

Cloacina will enclose the area between the Anoxic and Aeration Tanks to create an equipment room.

Equipment	Description	Quantity
Enclosures	Cloacina will provide (1) wall panel with louver, (1) wall panel with man door and lockset, (1) roof panel to go under catwalk/grating.	(1) Lot
Door(s)	30” steel access door	1
Insulation	Cloacina will provide sound board mounted on all interior wall/surfaces between verts of the blower corridor walls	(1) Lot
Ventilation	ventilation fan with shutters, louvers and thermal calculations	(1) Lot

5.1.2 Headworks/Anoxic Enclosure

If odor control equipment will be installed on the system, the influent screen(s) and Anoxic Chamber(s) will be supplied completely enclosed. All mechanical and sensory equipment will have access hatches for inspection and maintenance. This option will also include a stainless-steel threaded coupling for connection to odor control equipment.

Equipment	Description	Quantity
Tank Covers	Welded stainless steel covers with necessary supports. (1) 12”x18” inspection hatch for each anoxic zone. Covers are bolted down. Does not include gaskets/guaranteed perfect seal, assumes negative draft to be pulled by odor scrubber unit	1
Fittings	2” SS flanges for odor scrubber ducting (screen and anoxic)	2
Odor Scrubber	Syneco 3x3 with up to 80 scfm (upsized unit)	1

5.1.3 Extended Low Flow Operating Equipment

Cloacina can provide a low-flow solution which allows the system to operate in at an average daily flow of 10,000 GPD. The Low Flow option includes the following:

- Process modeling/simulations
- Low level interconnect lines
- TEBC motors for permeate systems for maximal turn-down
- Anoxic Mixer extensions

5.1.4 Bardenpho Process

Based on modeling data to meet effluent criteria for a discharge permit (see Note 1), Cloacina recommends a Bardenpho process. The Bardenpho process consists of the following equipment:

1. Internal Recycle Pump
    a. (1) Additional Flygt concertor pump (matching FAS pumps for spare purposes) placed at the end of the aerobic process.
        i. Capable of returning up to 4Q, either manually or automatically adjusted, hooked to flowmeter.
        ii. Slide rail system and T-slot base elbow tank connections, same as FAS Chamber arrangement.

b. Post Anoxic chamber
    i. Installation of baffle with flow through weir in Aeration (AT-MB). This will compartmentalize tankage into aeration and anoxic (AN-MB).
    ii. Installation of Anoxic Mixer, SS slide rail system.
    iii. Installation of secondary ORP probe into Anoxic/FAS chamber for recycle rate tuning.
c. Panel upgrades to include spare/equipment for the above.
d. Programming modifications for the above.
e. Labor
    i. Design, Engineering, PM and implementation of all the above in similar workmanship to Cloacina standards.

5.1.5 Chlorine Pump and Analyzer

Cloacina will provide Chlorine chemical pump, chemical pump stand, and chemical analyzer with Cl probe with integration to Cloacina Main Control Panel. Price does not include installation.

Equipment	Description	Quantity
Pump	Peristaltic pump – capable of 100gph	1
Pump Stand	Pre-fabricated stand with partitions for chemical containment.	1
Instrumentation	Endress and Hauser Chlorine Probe and Mounting kit	1
Controls	Integration to Cloacina Control panel for automated monitoring and reporting	1

5.1.6 Sludge Storage Tank

In addition to the above MBR system, Cloacina can provide sludge storage. This tank can be used with a future addition of a DRYPAC Dewatering System for increased dewatering efficiency. Price includes sound attenuation for the blower. Decanting Manifold will allow for clear liquor to be drained from tank at various heights to thicken waste sludge.

Equipment	Description	Quantity
Treatment Train	DRYPAC™ Treatment Train (10’ H X 10’ W X 30’L)	1
Treatment Train	Inspection stairs	1
Aeration Chamber	Aeration Blower (~75 CFM) with Sound Attenuation	1
Aeration Diffusers	Aeration Header with 15 diffusers	1
Decanting Manifold	4x drain ports at different elevations combined into manifold.	1

5.1.7 EQ Blower and Diffusers

Cloacina recommends and can provide an aeration blower and diffusers for freshening influent in buried EQ storage tank supplied by others. Price includes sound attenuation for blower and additional components in main control panel. Price is assuming blower will be mounted near EQ tank with piping connections and installation to be done by others.

Equipment	Description	Quantity
Aeration Blower	(~50 CFM) with sound attenuation	1
Diffusers	EDI - Disc Diffusers 12” High Cap	8

6 Pricing Summary

Please denote the selected optional equipment from the "CLIENT SELECTED" column in the table below:

SECTION	EQUIPMENT/SERVICE	DESCRIPTION	PRICE	CLIENT SELECTED (Yes/No)
1-4	MEMPAC-M	M130 BASE	**$1,687,230.00**	**Yes**
5.1.1	Sound Attenuated Equipment Room	Per Scope	**$23,792.50**	**Yes**
5.1.2	Anoxic/Headworks Covers	Per Scope	**$28,991.80**	**Yes**
5.1.3	Low flow	Per Scope	**$55,000.00**	**Yes**
5.1.4	Bardenpho Process Adder	Per Scope	**$119,927.25**	**Yes**
5.1.5	Chlorine Pump and analyzer	Per Scope	**$24,866.14**	Yes
5.1.6	Sludge Storage Tank	Per Scope	**$138,258.23**	(Yes/No)
5.1.7	EQ Blower and Diffusers	Per Scope	**$14,884.65**	(Yes/No)
7	Design Hold Contract	See below	**-$88,966.75**	
6.1	**BASE PRICE**	**THE BASE PRICE IS INCLUDED & REQUIRED**	**$1,687,230.00**	**X** (Initial)
6.2	**TOTAL FOR ALL SELECTED OPTIONS**	**PLEASE WRITE IN THE TOTAL PRICE OF THE DESIRED ADDITIONAL EQUIPMENT AND SERVICES PURCHASED**	**$**	**X** (Initial)
6.3	**TOTAL PRICE INCLUDING UPGRADES**	**PLEASE TOTAL ALL SELECTIONS AND BASE PRICE**	**$**	**X** (Initial)

Note: The above pricing subject to the Cloacina Standard Terms and Conditions being accepted in their entirety.

7 Design Hold Option:

For those Clients wishing to proceed with contractually obligating Cloacina for the purposes of coordinating with their Civil Engineer, holding a position in the production queue, and assisting with DEQ/RWQCB permitting, there is a "Design Hold" option available. This design hold allows for a more limited deposit amount than the traditional immediate release Cloacina requires for faster moving projects. The design hold will provide the Client with the following Cloacina deliverables:

- GPSX Process Model and simple report supporting design flows
- Equipment Selection and Design Coordination with Civil Engineer
- PFD
- P&ID's
- GA Drawings for the following equipment;
    - MBR and appurtenances
        - Includes any optional equipment selected from pricing summary in section 6
    - The above design to include the following components to support design;
        - Overall MBR Dimensions
        - Wet/Dry utility layout
        - FLA's
- Structural Engineering for Cloacina tanks

7.1.1 To be provided by the Client for Coordination:

- Civil Site Engineering/Design
- Building Site Plan in CAD (.dwg format)
- Soils Report
- Water Balance Study/engineering
- Regional Board Permitting
- Electrical Supply Design
- Structural Engineering for Slab

7.1.2 Not included in this Scope of Services:

- Topographical or boundary survey
- Soils/Geotechnical Engineering
- Architectural Design
- Permit Fees
- Offsite Improvements

For clarification, this fixed fee is not in addition to the original Cloacina Proposal. The total amount billed against this engineering/design portion at the time of execution is subtracted from the Cloacina overall project amount. Project to be progress billed monthly.

If a sub vendor/supplier requires a deposit amount to provide final design drawings of their equipment, that cost will be passed along in addition to the above amount.

8 Standard Assumptions

8.1 Domestic Facility

The system will be designed to receive only domestic wastewater, as outlined in Section 2, above.

8.2 Unnecessary Waste

All unnecessary process waste will be diverted from entering the treatment system. Examples of unnecessary process waste are:

- Rainwater, excess flow during rain events should be prevented by identifying areas with potential for Infiltration and Intrusion (I & I).
- Industrial Dischargers, high strength dischargers should be identified, and associated waste streams should be evaluated for impact on the treatment facility. Industrial waste can increase the loading on the treatment facility and result in poor performance or reduction in hydraulic capacity.
- Inorganic Solids, efforts should be made to keep excess dirt and grit from entering the treatment facility.
- Fats, Oils and Greases (FOG) should be prevented from entering the facility by ensuring all restaurants have properly installed and maintained grease traps.

8.3 Effluent Disposal

Effluent will flow by gravity from Clear Well, the final disposal location is to be determined. Effluent pumps can be provided as an option in addition to this engineered system.

8.4 Installation Location

The system will be installed outdoors on an engineered concrete slab. The site will have enough access to allow the delivery of the individual treatment tanks fully assembled.

9 Exclusions

9.1 Taxes are not included in the above pricing

9.2 Equalization

Any diurnal flows needing to be attenuated are by others.

9.3 Installation

Treatment system quoted does not include installation costs.

9.4 Civil Engineering

Site civil engineering is not provided as part of this budgetary estimate.

9.5 Slab

Equipment slab design and construction is not included as part of this budgetary estimate.

9.6 Permitting

Permit costs of any kind are not included as part of this budgetary estimate

9.7 Secondary Containment

Secondary containment is not included in this budgetary estimate.

9.8 Thermal Protection

Thermal protection of hydraulic piping is not included in this budgetary estimate.

9.9 Painting

No surface preparation and/or painting of any surfaces is included in above pricing unless specifically mentioned.

9.10 Security

Safety and security items such as fencing, locking ladders, lighting etc. are not included in this budgetary estimate.

9.11 Shipping

Shipping and crane costs are not included in this budgetary estimate unless otherwise stated.

9.12 Dissolved Solids (TDS)

The unit will not address dissolved solids through biological treatment. Dissolved Solids should be managed through source control.

9.13 Initial Seed Sludge

Adequate and acceptable seed sludge is the responsibility of the Client.

9.14 Bonding

No bonding is included in the estimate.

9.15 Disinfection

Disinfection is not included in the base pricing unless specifically stated or offered as an option.

Cloacina Terms and Conditions

1 Invoicing and Payment Schedule

The pricing quoted in this proposal is based on the following terms of payment:

1.1 30% due upon receipt of executed contract or issuance of Purchase Order

A payment for 30% of the total contract amount, including all upgrades and/or options, must accompany the executed contract or PO in order for any work on the project to commence. Failure to accompany the PO with the deposit check may cause project delays.

1.2 30% due upon approval of submittals and release for fabrication

A payment for 30% of the total contract amount, including all upgrades and/or options, must accompany the approved submittals and release for fabrication. Production of the system will not begin until this payment has been received.

1.3 35% due prior to shipping

A payment for 35% of the total contract amount, including all upgrades and/or options, must be received 7 calendar days prior to scheduled ship date to allow for checks to clear. Cloacina will not allow any equipment to be loaded for shipment to the jobsite or contractor's facility without the 95% payment being received and processed.

1.4 5% due Net 30 days from the date of ready to ship.

A payment for 5% of the total contract amount, including all upgrades and/or options, must be received by Cloacina 30 days from the date of being ready to ship. Retention is not to be held for longer than 30 days for any reason. Should the client/contractor delay payment past 30 days, late fees and penalties will apply as detailed below. Ready to ship is the date in which Cloacina has completed the project such that the FAT, QA/QC process is complete and it's ready to leave the Factory. This does not take into consideration the Client's readiness.

1.5 Payment Delay

Any delays in meeting the above payment milestones will cause delays in and/or stoppage of the project and production schedules until the payment has been received. Additionally, any Client delays during the project may result in the Client being charged for items such as: increased materials costs, storage fees, placement of the system in/out of production and/or increased project management costs.

2 Pricing and Payment Terms

2.1 Pricing is valid for 30 calendar days

Pricing is valid for 30 calendar days from the date listed on the coversheet of this document. Cloacina reserves the right to cancel or withdraw this quotation at any time with or without notice or cause prior to acceptance by the Client.

2.2 Bonding

No bonds of any kind are included in the above price. Any required bonds can be provided by Cloacina upon request, but will result in additional charges to the Client.

2.3 Currency

All prices quoted are in United States Dollars (USD).

2.4 Taxes

The above pricing does not include any taxes. Any applicable sales tax, value added tax, local, state/provincial, federal or international taxes, duties and/or tariffs are the sole responsibility of the Client.
Additionally, any future amendments or change orders do not include sales tax, value added tax, local, state/provincial, federal or international taxes, duties and/or tariffs unless specifically stated in the change order or amendment.

2.5 Credit Application

Cloacina may, at its discretion, require the Client to complete a credit application. Cloacina reserves the right to require payment in advance and otherwise modify credit terms should the Client's credit standing not meet Cloacina's acceptance.

2.6 Finance Charge

In the event payment is not made when due, or retention is held longer than 30 days from the date of start-up, the Client agrees to pay Cloacina a service or finance charge of the lesser of 1.5% per month/18% per annum or the highest rate permitted by applicable law on the unpaid balance of the invoice from and after the invoice due date. The Client is responsible for all costs and expenses associated with any checks returned due to insufficient funds. Export shipments will require payment prior to loading for shipment or an appropriate Letter of Credit.

2.7 Changes in Client Status and/or Financial Security

If, during the performance of the contract with the Client, the financial responsibility or condition of Client is such that Cloacina in good faith deems itself insecure or if the Client becomes insolvent, a material change in the ownership of the Client occurs, the Client fails to make any payments in accordance with the terms of this document, then Cloacina is not obligated to continue performance under the contract and may stop equipment in transit and defer or decline to make delivery of equipment, except upon receipt of satisfactory security or cash payments in advance, or Cloacina may terminate the order upon written notice to the Client without further obligation to Client whatsoever.

2.8 Insurance

Cloacina pricing is based on standard insurance coverage being suitable for the project. Any additional riders or policies necessary to meet Contractor/Client requirements will be at the cost of the Client/Contractor.

2.9 Failure to Make Payments

If the Client fails to make payments or fails to furnish security satisfactory to Cloacina, then Cloacina shall also have the right to enforce payment of the full contract price of the work completed and in process. Acceptance by Cloacina of less than full payment shall not be a waiver of any of its rights hereunder. The Client shall not assign or transfer this agreement or any interest in it, or monies payable under it, without the written consent of Cloacina. Any assignment made without such consent shall be null and void.

In the event that the Client has failed to make payments in accordance with the terms and conditions set out herein Cloacina reserves the right to do any or all of the following after 30 days' notice; remove the project from the Cloacina design/production schedule, charge handling and storage fees, charge financing fees, resell the product to another Client, put the product into a rental/leasing fleet. Should the latter of these occur, Cloacina will reimburse the Client for the actual labor (burden rate) and materials for the build portion of the product/project only. Mark-up and overhead will not be reimbursed, nor the project specific design/project management labor. In the event that the Client settles the outstanding balance, but any of the actions have already been taken, the costs to perform the above tasks will be added to the Client's outstanding balance.

2.10 Price Escalations

Material prices are volatile in nature, especially those associated with Steel/Stainless Steel. As such, we do not cover pricing escalations from the time the project is bid to when the PO's are issued and raw materials are released for purchasing. As such, Cloacina will utilize the following major cost indexes for the purposes of determining delta increase/decreases from the date of proposal to purchase order/contract execution. The following CI's shall be the determining indexes;

2.10.1 Stainless Steel:

https://www.atimetals.com/specialtyrolledproducts/Pages/stainless-steels-surcharge-report.aspx

2.10.2 Material Sub-Vendors

In the event that sub-vendors have passed along material escalations, Cloacina will provide proof of these escalations for factoring into escalations.

2.11 Engineering and Design Deposit

If an engineering and design deposit is made part of the project, then the above payment schedule will only be applied after the point in which the system is released. Engineering and Design Deposits will either be lump sum or progress billed and will be spelled out in the contract documents. In the event they are not specified, they will be lump sum due at the time of signing the contract.

2.11.1 If the project design parameters change, require re-engineering of work already performed, additional equipment is requested by the Client, or additional unanticipated equipment is required to meet the project goals then the re-design and engineering required to make these changes will be billed as either a lump sum or time and materials change order.

2.11.2 If the engineering and design deposit option is provided and selected and the Client wishes to hold back the release of equipment once the engineering and design is complete, then the Client will be responsible for any material escalations between the time the project was ready to release by Cloacina's engineering and design team and when it is released for fabrication. If there were project/Client related reasons that stopped Cloacina from progressing on the engineering and design portion of the work then it will be assumed that 30 days is the reasonable time frame that it would have been completed within for the purposes of comparing material/labor escalation CPI's.

3 Conditional Offering and Client's Warranty

The Client understands that this proposal has been issued based upon the information provided by the Client, and made available to Cloacina, as of the date on the cover sheet of this document. Any changes or discrepancies in site conditions (Including but not limited to system influent characteristics, changes in Environmental Health and Safety (EH&S) conditions and/or newly discovered EH&S concerns, the Client's financial standing, Client's requirements and/or any other relevant change or discrepancy in the factual basis upon which this proposal was created, may lead to changes in the offering, including but not limited to changes in pricing, warranties, quoted specifications and/or terms and conditions.

Client warrants the accuracy of any and all information relating to the details of its operating conditions and project understanding and that Cloacina can justifiably rely upon the accuracy of the Client's information in its performance. Should the Client's information prove inaccurate, the Client agrees to reimburse Cloacina for any losses, liabilities, damages and expenses that Cloacina may have incurred as a result of any inaccurate information provided by the Client to Cloacina.

4 Loading, Packing, Shipping, Delivery, and Inspection

4.1 Loading

4.1.1 Factory Pick-Up

Equipment craning and loading onto the trailer of the shipping agent at the Cloacina factory is included in the above pricing. Cloacina will only lift and set the equipment on the trailer – no assistance will be provided with strapping, securing and/or tarping the load. Any damage as a result of improper strapping, securing and/or tarping will be the responsibility of the shipping agent and Cloacina shall not be liable. Title and ownership transfers to the Client immediately upon Cloacina setting the equipment on the trailer of the third party shipping agent and Cloacina is not liable for any damage to the equipment or caused by the equipment from that time forward.

4.1.2 Cloacina as the Shipping Agent

Should Cloacina act as the shipping agent, title, ownership, liability for damage to the equipment or caused by the equipment, the risk of loss of the material and repair/replacement costs shall pass to the Client upon commencement of third-party rigging or removal/lifting of the equipment from Cloacina's trailer by the crane/forklift operator. Cloacina or agent will unstrap and/or un-tarp the load upon arrival but will not provide the crane/forklift operator with assistance and/or direction in removal of the unit from the trailer. Cloacina is not liable for any damage sustained during rigging, forklift positioning and/or removal/lifting. Damage to the unit during rigging, removal and/or lifting may void the Equipment Warranty and/or Process Guarantee, and the client will be responsible for making repairs according to written instruction by Cloacina.

4.2 Packing

The above price includes standard packing and preparation for shipping according to Cloacina's specifications. Standard packing does not include provisions for inclement weather. Should the Client require weather-resistant packing, Cloacina can provide it for an additional cost at the explicit request by the Client. It is the Clients responsibility to notify Cloacina of any special shipping requirements for transit to the jobsite. All costs and taxes associated with special packing requested by the Client, including packing for international exports, shall be paid by the Client as an additional charge. Shipping and packing prices are subject to change without notice.

4.3 Shipping

4.4 Freight on Board (FOB)

Unless otherwise noted in the contract, all projects are FOB Cloacina's factory located at:
2385 Precision Drive
Arroyo Grande, CA 93420

4.5 Schedule

Shipping is estimated at 24-28 weeks after order acceptance. Cloacina and the Client will arrange a kick-off meeting after contract acceptance to develop a project schedule. Expedited project completion and shipping are available for an additional cost to the Client.

4.6 Delays for Shipping

In the event that Cloacina completes production of the equipment prior to the Client being ready on the site and the Client cannot yet receive the equipment, Cloacina may at its option choose to move the equipment into long-term/short-term storage. The minimum charge for this service is $1,000.00 for single tank systems. Multiple tank systems will be billed at a rate of $1,000.00 per tank. Long-term and short-term storage fees will be billed at $250/month per equivalent 400 square foot tank.

5 Delivery

5.1 Production Schedule

The delivery schedule presented is based on current workload backlogs and production capacity. This estimated delivery schedule assumes no more than two weeks for Client review of the Equipment Submittal Package. Any delays in Client approval or requested changes may result in additional charges to the Client and/or a delay to the production schedule and delivery date.

5.2 Client Acceptance

Cloacina's price and delivery schedule are based on the assumption that the Client will take delivery as and when foreseen by the schedule. When this is not the case, Cloacina and the Client must agree in advance on an alternative place of delivery, failing which Cloacina will be entitled to move the equipment to storage. In such cases, the Client shall be liable for all moving, storage and relocation fees.

5.3 Delivery Date

Delivery dates are estimates, and time is not of the essence. Cloacina shall not be responsible to the Client for any loss, whether direct, indirect, incidental or consequential in nature, including without limitation loss of profits arising out of or relating to any failure of the goods to be delivered by the specified delivery date. In the absence of specific instructions, Cloacina has the option to select the shipping agent, the equipment will be shipped COD and the shipping charges will be due and payable by the Client upon delivery.

5.4 Additional Costs

The Client shall be responsible for any additional costs resulting from inaccurate delivery information, lack of delivery or equipment placement instructions and/or omission of special or unique delivery details such as dirt roads, steep grades, etc. Additional costs may include, but are not limited to, storage, insurance, protection, re-inspection and redelivery expenses. Client further agrees that any payment due on delivery shall be made on delivery into storage as though the equipment had been delivered in accordance with the order. Claims for loss of or damage to equipment in transit must be made to the shipping agent, not to Cloacina. Cloacina requires that the Client and/or the Client's agent, contractor or engineer meets the shipping agent at the time of delivery to inspect the condition of all Cloacina-provided equipment.

5.5 American Iron and Steel Requirements

If a project manager/engineer provides a subjective opinion that Stainless Steel is subject to AIS requirements either an adder for this will be applied to the project costs or a justification letter for exemption based on costing and/or availability of American Stainless steel will be provided to the Client/Contractor. Cloacina does not as a standard provide AIS stainless steel due to the limited domestically available SS sources.

5.6 Damage

Any visible damage to equipment or components during shipping must be declared to Cloacina and the shipping company prior to unloading. In the event of damage to equipment, authorization to unload must be received by Cloacina in writing only. Unloading equipment that may have been damaged during shipment, without express written permission from Cloacina may void the Equipment Warranty and Process Guarantee, and the Client takes responsibility for remedying any necessary repairs. The Client shall have the right to inspect all Cloacina-provided equipment upon their receipt and shall notify Cloacina in writing of any nonconformity of the equipment with this agreement within seventy-two hours of delivery by the shipping agent at the client's job-site, other agreed upon location or to storage, regardless of whether the Client and/or their agent, contractor or engineer is there to receive the equipment in person. Failure to give such notice shall constitute a waiver of the Client's right to inspect and/or reject the equipment for nonconformity and shall be equivalent to an irrevocable acceptance of the equipment by the Client.

6 Installation, Start-up and Commissioning

6.1 Installation

6.1.1 Responsibility

Installation is the sole responsibility of the Client and costs to install the Cloacina-provided equipment are not included in the above pricing. The Client may have installation performed by a contractor, engineer or their own mechanical staff. Cloacina can provide contact information for factory-authorized installers, upon request. Cloacina assumes no liability for the quality of workmanship in any installation, regardless of who installs the equipment.

6.1.2 Guidelines

Should the Client and/or their agent, contractor, engineer or staff install the equipment contrary to Cloacina's installation guidelines or direct a factory-authorized representative to do so, the Equipment Warranty and Process Guarantee may become void.

6.2 Start-up and Commissioning

6.2.1 General Provisions

Equipment start-up and commissioning may be included in the above pricing. Additional eight-hour days are available for $1,600.00 per day plus travel costs and per diem.

6.2.2 Procedures

Cloacina requires that all factory-supplied equipment be installed and started-up in strict accordance with Cloacina's installation and start-up procedures and/or in accordance with local/state/federal building codes (Whichever is more stringent) in order to maintain the validity of Cloacina's Equipment Warranty. Start-up must be performed by an authorized Cloacina representative. Should start-up occur outside the presence of an authorized Cloacina representative and without the prior written consent of Cloacina, Cloacina's Equipment Warranty and Process Guarantee are void.

6.2.3 Engineering Oversight

In the event that the Client hires an engineer for start-up supervision, such engineer will function in a supervisory capacity only. Cloacina's start-up technician shall not follow start-up directions from engineers that are contrary to Cloacina's Standard Start-Up Procedures. Cloacina requires the Client to have a licensed electrician on-site at all times during start-up, the cost of which will be paid by the Client.

6.2.4 Start-up and Commissioning Scheduling

In order to schedule a start-up/commissioning date, the Client must notify Cloacina at least four weeks prior to the date they desire start-up/commissioning services. Should the Client need to cancel and/or reschedule a start-up date once a date has been scheduled, the Client must notify Cloacina in writing and will be responsible for any costs Cloacina incurs to cancel and/or reschedule, including, but not limited to: airline ticket cancelation/change fees, rental car cancelation/change fees, hotel cancelation/change fees, etc.

6.3 Delays

Should a Cloacina start-up technician arrive at the Client's job-site on the agreed upon start-up date and find the site, Cloacina-provided equipment, equipment provided by others and/or the Client not ready to start-up the equipment, upon arrival, for any reason, Cloacina will count that day as day 1 of the included start-up days, regardless of whether Cloacina directs the start-up technician to remain on-site or return to the Cloacina office, which shall be at Cloacina's discretion. Cloacina will count every day until the start-up technician arrives at the office as a day of commissioning. Should the Client then require more start-up days than the balance remaining, it will be at the additional per day/travel/per Diem costs outlined above.

7 Equipment Warranty

7.1 Overview

Cloacina expects and plans for a successful project with each client. Each system is designed and built using only the highest quality components that have a proven track record in the wastewater industry. As a result, each treatment plant comes standard with one year warranty on all Cloacina-provided equipment.

7.2 Warranty Period

Cloacina warrants its materials and workmanship for a period of twelve (12) months from the date of start-up, or fifteen (15) months from the date of equipment shipment, or fifteen months from the date of notice of production completion, whichever occurs first. Extended warranties are available for an additional cost to the Client. Extended warranties must be purchased 1 month prior to the unit leaving the Cloacina facility.

7.3 Warranty Changes

No additional warranty, either expressed or implied, is to be construed as binding. Any changes to this warranty must be issued in writing by Cloacina and will be issued as an addendum to this document.

7.4 Damage

Cloacina's Equipment Warranty expressly excludes any liability for damage to equipment caused during shipping or under any other circumstances once title for the equipment has passed to the Client.

7.5 Equipment Storage

All materials, once delivered to the job-site, are required to be stored in a protected area and tarped during times of inclement weather. In severe weather, climate control may be necessary.

7.6 Consumables

Cloacina does not warranty consumables.

7.7 Communication of Warranty Related Issues

Client will be required to communicate any warranty related issues by submitting a ticket through the Cloacina portal. Instructions will be given to the Client during the commissioning/training period. A warranty related ticket will be assigned to the issue, and tracked for the life of the problem. Verbal expressions and/or letters/email will not be accepted nor addressed.

7.8 Equipment Repair or Replacement

Cloacina shall, at its option and at no cost to the Client, either repair or replace any product which fails to conform to the Equipment Warranty; provided, however, that under either option, Cloacina shall not be obligated to remove the defective product or install the replaced or repaired product. The Client shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Cloacina shall have complete discretion as to the method or means of repair or replacement. Client's failure to comply with Cloacina's repair or replacement directions shall constitute a waiver of its rights and render the Equipment Warranty void. Any parts repaired or replaced under the Equipment Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. The Equipment Warranty is conditioned on the Client giving written notice to Cloacina of any defects in material or workmanship of warranted equipment immediately after any defects are first manifest.

7.9 Change of Ownership

The Equipment Warranty is extended to the original Client/end-user only and is not transferrable to new owners and/or other third parties.

8 Exclusions:

Cloacina shall have no warranty obligations to the Client with respect to any product or parts of a product where one or more of the following applies:

8.1 De-rating of Equipment

In the event that one of the following conditions exist, there will be a commensurate de-rating of all effected downstream equipment;

8.1.1 Influent Screening

-In the event the TSS exceeds the stated influent assumptions, then a commensurate de-rating of the screens stated flows will occur.
-In the event that the influent is ground, chopped, macerated, cut, or materially changed beyond that of raw influent, then a de-rating of the screen will occur and the Client will be responsible for putting in a finer screen to increase the removal rate due to finer material having a propensity to pass through at a higher rate, otherwise an increased burden associated with more frequent membrane cleaning will be required.

8.2 Strength of Influent

If the influent materially differs from the assumed influent characteristics using composited samples as the basis for the differentiation then a re-rating of the plant may be necessary for the purposes of determining total loading of the plant. Contaminant variances may have one or all of the following unintended consequences which will be part of the re-rating in order to meet effluent targets;

- Process setpoints
- Re-rating of flows as a function of the loading
- Chemical addition for alkalinity and/or load balancing/supplementation for proper BNR
- Programming changes to effect the above
- Expansion of the plant to meet build-out goals
- Re-screening
- More frequent cleaning of membranes/sensory/equipment

8.3 Standards Compliance

If an inspector requests changes due to their interpretation of State, Federal, internal, trade standards or 3rd Party regulations which are different than how Cloacina builds as a standard, the Client will be responsible for any delta costs to comply with this requirement/request. Cloacina reserves the right to consult with a trade specific Engineer/Expert regarding the request. The direction received from that Engineer/Expert will determine any course of action, if required. If a 3rd party or the Client requires changes which deviate from that Engineers direction to be made due to subjective interpretation on the part of the 3rd party or Client, these costs will be borne solely by the Client and not Cloacina.

8.4 Third Party Repairs

The equipment has been repaired by third parties other than Cloacina and/or without Cloacina's written approval.

8.5 Misuse or Damage

The equipment has been subject to intentional or unintentional misuse, misapplication, neglect, alteration, accident or physical damage.

8.6 Use Contrary to Instructions

The equipment has been used in a manner contrary to Cloacina's instructions for installation, operation and/or maintenance.

8.7 Wear, Tear and Corrosion

The equipment has been damaged from ordinary wear and tear, corrosion, biological or chemical attack.

8.8 Abnormal Conditions

The equipment has been damaged due to abnormal conditions, vibration, failure to properly prime or operation without flow.

8.9 Improper Electrical Conditions

The equipment has been damaged due to a defective power supply or improper electrical protection.

8.10 Non-Cloacina Ancillary Equipment

The equipment has been damaged from the use of ancillary equipment not sold by Cloacina or not approved by Cloacina in connection with products supplied by Cloacina. **Cloacina strongly recommends that, prior to installation of any ancillary equipment, the Client contacts their Cloacina representative to ensure that the desired ancillary equipment is compatible with the Cloacina-provided equipment and treatment process.**

8.11 Liability Limitations

The foregoing warranty is exclusive and in lieu of any and all other express or implied warranties, guarantees, conditions or terms of whatever nature relating to the equipment provided hereunder, including without limitation any implied warranties of merchantability and fitness for a particular purpose, which are hereby expressly disclaimed and excluded. Client's exclusive remedy and Cloacina's aggregate liability for breach of any of the foregoing warranties are limited to repairing or replacing the product and shall in all cases be limited to the amount paid by the client as outlined above. In no event is Cloacina liable for any other form of damages, whether direct, indirect, liquidated, incidental, consequential, punitive, exemplary or special damages, including but not limited to loss of profit, loss of anticipated savings or revenue, loss of income, loss of business, loss of production, loss of opportunity or loss of reputation.

9 Process Guarantee

Cloacina's treatment systems are guaranteed to function properly and to meet the Design Criteria specified in the contract documents for a period of twelve months from the date of initial start-up performed by an authorized Cloacina representative. For the Process Guarantee to remain in full effect, the Client must never exceed the Design Criteria and comply with all the following subcategories:

9.1 Reports

The Client and/or their agent must provide operational and lab reports as required in the warranty compliance sampling schedule or any other written documentation provided to the Client. These samples and their results are to be provided to Cloacina monthly during the first 12 months of operation for the Process Guarantee to remain in full effect. Emailed reports or raw files uploaded to the Cloacina portal/server are acceptable.

9.2 Operations

The Client and/or their agent must operate the treatment system in accordance with the Design Specifications outlined in the contract documents and within all Cloacina OMMs and equipment manuals.

9.3 Operations and Maintenance Manual

The Client and/or their agent must adhere to the operations and maintenance procedures as set forth in the OMM and/or provided with the treatment plant upon start-up.

9.4 Internet

The Client and/or their agent must provide and maintain a reliable high-speed Internet connection (Minimum speed of 400Kbps) to the Cloacina-supplied SCADA Controls Computer. It is the Client's responsibility to provide the necessary network security clearances for Cloacina to access the system remotely using GoToMyPC or Teamviewer or other third-party remote desktop software. In addition, the Client and/or their agent shall maintain Port 25 for SCADA's use for alarm text/email notification of alarm conditions.

9.5 Maintenance

The Client and/or their agent shall perform all routine equipment maintenance in accordance with the SCADA System Maintenance Module, the OMM, and/or the respective equipment manufacturers' recommendations, whichever is the most stringent.

9.6 Lab Work

The Client and/or their agent shall perform all process control lab work applicable and enter all data into SCADA History, portal or if those are unavailable emailing them to the Cloacina PM. The Client must also include lab results in the weekly/monthly reports. Cloacina will provide the required sampling constituents and schedule as part of the submittal package.

9.7 Non-Identified Constituents

If a constituent or combination of constituents that Cloacina did not explicitly identify as being managed in the influent compounds causes unintended consequences, the Client shall be solely responsible for mitigating these constituent(s) such that they are within acceptable range(s) for the process warranty to be in full force. Examples of such unintended constituent side effects may be;

- Precipitation
- Mineralization
- Deposition
- Scaling
- Fouling

9.8 Compliance

Should the client fail to comply with any of the above criteria, the Process Guarantee will be void from the date of the Client's non-compliance. From that date forward, Cloacina will not be responsible for any system upsets, effluent violations, the Client's inability to reuse effluent and/or any fines or other costs, including lost revenue or ancillary costs that may be incurred, including costs to repair or cure any damage to the system because of noncompliance.

9.9 Pretreatment Program

For domestic systems, the Client must implement a pretreatment program and submit it to Cloacina for approval. In the absence of a Client provided pretreatment program, the Client must implement the Cloacina standard pretreatment program to ensure compliance with influent criteria.

10 General Terms and Conditions

This document is an offer by Cloacina to sell the equipment and/or services set forth herein and is conditional on Client's assent to these terms and conditions. This document is to be included, in its entirety, in any issued POs or subcontracts. Acceptance by the Client is expressly limited to these terms and conditions. Any additional or different terms and conditions contained in Client's PO or other communication shall not be effective or binding upon Cloacina unless specifically agreed to in writing by Cloacina; Cloacina hereby objects to any such conditions. The failure of Cloacina to object to specific provisions contained in any PO or other communication from Cloacina shall not be construed as a waiver of these terms and conditions nor an acceptance of any such provisions. Neither Cloacina's commencement of performance nor delivery shall be deemed or construed as acceptance of Client's additional or different terms and conditions. Client acknowledges that this document is the complete and final agreement between the parties and this document supersedes all prior negotiations, representations, or agreements, either written or oral, between the parties and, further, can only be altered, modified or amended with the express written consent of Cloacina.

10.1 Release

The Client gives Cloacina permission to use project information, including but not limited to: project name, client name, location, design criteria, photographs, video, drawings, images, renderings, etc., for the purposes of marketing/promotional materials that may be printed, broadcast or used in digital formats on-line. The Client acknowledges that Cloacina may elect to hire/employ aerial photographers, photographers, artists, etc. for the purpose of documenting project progress and the final product. Cloacina shall, upon request, share any photographs or images of the project with the Client for their exclusive use. Photographs, images, likenesses and project information shall be used at the discretion of Cloacina and the Client is not entitled to editorial control or compensation.

10.2 Limited Liability

In no event shall Cloacina's liability under this agreement exceed the amount paid by the Client under this agreement. Cloacina shall have no liability for loss of profit, loss of anticipated savings or revenue, loss of income, loss of business, loss of production, loss of opportunity, loss of reputation, indirect, consequential, incidental, punitive or exemplary damages.

10.3 Cloacina Cancellation

Cloacina may cancel or suspend this agreement and Cloacina shall have no liability for any failure to deliver or perform, or for any delay in delivering or performing any obligations, due to acts or omissions of the Client and/or its agent, engineer, contractors or third party representatives or due to circumstances beyond its reasonable control, including but not limited to acts of God, fire, flood or other natural disasters, war and civil disturbance, riots, acts of governments, terrorism, disease, currency restrictions, labor shortages or disputes, unavailability of materials, fuel, power, energy or transportation facilities, failures of suppliers or subcontractors to effect deliveries, in which case the time for performance shall be extended in an amount equal to the excused period, provided that Cloacina shall have, as soon as reasonably practicable after it has actual knowledge of the beginning of any excusable delay, notified the Client of such delay, of the reason therefore and of the probable duration and consequence thereof. Cloacina shall use its best efforts to eliminate the cause of the delay, interruption or cessation and to resume performance of its obligations hereunder with the least possible delay.

10.4 Client Cancellation

Except as otherwise provided in this agreement, no order may be cancelled unless requested in writing by one party and accepted in writing by the other. In the event of a cancellation by the Client, the Client shall, within thirty days of such cancellation, pay Cloacina a cancellation fee, which shall include all costs and expenses incurred by Cloacina prior to the receipt of the request for cancellation including, but not limited to: Estimating costs, engineering (Process/mechanical/civil/electrical/controls), drawing costs, copies, lost profits, project management, all commitments to its suppliers, subcontractors and others, all labor and overhead expended by Cloacina, plus a reasonable charge for profit. Cloacina may charge a restocking fee and may reassign equipment initially assigned to the Client's project to another client.

10.5 Default

Notwithstanding anything to the contrary herein, in the event of the commencement by or against Client of any voluntary or involuntary proceedings in bankruptcy or insolvency or in the event Client shall be adjusted bankrupt, make a general assignment for the benefit of its creditors, or if a receiver shall be appointed on account of Client's insolvency, or if Client fails to make payment when due under this agreement, or in the event Client does not correct or, if immediate correction is not possible, commence and diligently continue action to correct any default of Client to comply with any of the provisions or requirements of this agreement within ten calendar days after being notified in writing of such default by Cloacina, Cloacina may, by written notice to Client, without prejudice to any other rights or remedies which Cloacina may have, terminate its further performance of this agreement. In the event of such termination, Cloacina shall be entitled to receive payment as if Client has cancelled the agreement as per the preceding paragraphs. Cloacina may nevertheless elect to complete its performance of this agreement by any means it chooses. Client agrees to be responsible for any additional costs incurred by Cloacina in so doing.

10.6 Termination

Upon termination of this agreement, the rights, obligations and liabilities of the parties which shall have arisen or been incurred under this agreement prior to its termination shall survive such termination.

10.7 Failure to Insist

Cloacina's failure to insist, in any one or more instances, upon Client's performance of any term of this proposal, or to exercise any rights conferred, shall not constitute a waiver or relinquishment of any such right or right to insist upon Client's performance in any other regard.

10.8 Severability

If any term, covenant, condition or provision of these Terms and Conditions is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions hereof shall remain in full force and effect and shall in no way be affected, impaired or invalidated.

10.9 Governing Laws and Venue

The terms of this agreement and all rights and obligations hereunder shall be governed by the laws of The State of California. Any petitions filed against Cloacina shall be filed, heard, tried and decided in The San Luis Obispo County Superior Court. In international transactions, the rights and obligations of the parties hereunder shall not be governed by the 1980 United Nations Convention on Contracts for the International Sale of Goods.

Should changes in laws, regulations, tariffs, taxes or any governing regulatory agency stipulations effecting the project occur after the time in which Cloacina was placed under contract, the entire costs for the compliance with the same will be borne by the Client, and not Cloacina.

10.10 Indemnification

To the fullest extent permitted by law, the Client agrees to indemnify, defend and hold harmless Cloacina and any of its respective officers, agents, employees, affiliates, parents and subsidiaries from and against any and all liability claims, loss, damage or costs (Including but not limited to attorney's fees, loss of profit, business interruption or other special or consequential damages, damages relating to property damage, bodily injury or damages relating to wrongful death) arising out of or relating to the installation, operation, maintenance, use or possession of any Cloacina-provided equipment. This indemnity provision also applies to any claims asserted against Cloacina based upon strict or product liability causes of action. The Client shall not be obligated to indemnify Cloacina for that part of any loss, damage or liability caused solely by the intentional misconduct or sole negligence of Cloacina. In furtherance of, but not in limitation to the indemnity provisions in this document, the Client expressly and specifically agrees that the foregoing obligation to indemnify shall not be in any way affected or diminished by any statutory or constitutional imitation of liability or immunity Client enjoys from suits by its own employees. The duty to indemnify will continue in full force indefinitely from the date of execution of this document and is not diminished by cancelation or early termination of the agreement if Cloacina provides any equipment to the Client.

Kane Creek Preservation & Development
MEMPAC™-M130 Wastewater Treatment Plant
Computer Modeling & Simulation Report

Prepared for Cloacina LLC

by

Fluid Resource Management
February 7, 2022

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Part 1 - Overview

The goal of this modeling and simulation report is to determine which of three candidate process configurations of the MEMPAC-M Package Treatment System proposed for Kane Creek Preservation & Development sufficiently and most feasibly meets the specified effluent criteria. Of particular interest is the ability of the System to remove phosphorus. The three configurations considered are Modified Ludzack-Ettinger (MLE, per the Proposal), 4-Stage Bardenpho, and Johannesburg.

Part 2 - Plant Design

The plant is an immersed membrane bioreactor (MBR) type that includes an activated sludge treatment process and immersed membranes for separation of clear effluent from wastewater process solids. The Plant shall treat domestic wastewater across the range of flows and influent concentrations shown in Tables 2.1 and 2.2 up to Peak Daily Flow (PDF). The System shall be able to meet effluent criteria at flows up to Maximum Daily Flow (MDF), and its hydraulic capacity shall be Peak Daily Flow (PDF). Influent flows above PDF will be equalized to PDF by an Equalization (EQ) reservoir external to the System.

Daily Flow (Q)	Average Annual (AAF)	Maximum Daily (MDF)	Peak Daily (PDF)	Peak Hour (PDF)
Peaking Factor		1.35	2.0	4.0
Gallons per Day	135,000	182,250	270,000	
Gallons per Minute	93.8	126.6	187.5	375

Table 2.1: Influent Wasterwater Flow

Organic Concentration	BOD5	TSS	TKN	NH3	P
Influent (mg/l)	225	219	38	23	10
Screen Removal %	4%	9%	0%	0%	2%
Screened Influent (mg/l)	216	199	37	23	10

Table 2.2: Influent Wasterwater Organic Concentration

The effluent criteria for the plant per Contract (1/6/22) are shown in Table 2.3 below.

Effluent Limitations	BOD5	TSS	TN	NH3	P
Effluent (mg/l)	<10	<10	<10	<5	<1*

**Engineering to verify once under contract.*

Table 2.3: Effluent Criteria

The effluent criteria, effective for this report, were revised per e-mail from William Anderson (2/4/22) as indicated in Table 2.4.

Effluent Limitations	BOD5	TSS	TN	NH3	P
Effluent (mg/l)	<10	<10	<5	<2.2*	<1**

**Monthly Average. Daily Max < 13.3 mg/L* ***Engineering to verify once under contract.*

Table 2.4: Revised, Effective Effluent Criteria

Detailed process models were developed using the Hydromantis GPS-X™ 7.0 process modeling platform. The GPS-X™ Mantis 2 model library that allows for comprehensive analysis of COD, N, P and pH was selected. The BOD based influent model was utilized since the organic carbon loading information in the influent data provided by the Client was stated in BOD terms. The influent was defined in the GPS-X Influent Advisor as shown in Figure 2.1. All three models considered for this report are of approximately equal total process volumes, and all are equipped with carbon "COD" and alkalinity supplementation feeds in case such are required for process optimization.

Influent Advisor - Library: mantis2lib - Influent Model: bodbased - Biological Model: mantis2

User Inputs

Influent Composition			
bod	total carbonaceous BOD5	gO2/m3	**225.0**
tkn	total TKN	gN/m3	**38.0**
tp	total phosphorus	gP/m3	10.0
Soluble Organic Compounds			
scol	colloidal substrate	gCOD/m3	**38.0**
sac	acetate	gCOD/m3	0.0
spro	propionate	gCOD/m3	0.0
smet	methanol	gCOD/m3	0.0
Particulate Organic Compounds			
xu	unbiodegradable cell products	gCOD/m3	0.0
xbt	poly-hydroxy alkanoates in PAO	gCOD/m3	0.0
Nitrogen Compounds			
snh	ammonia nitrogen	gN/m3	**23.0**
snoi	nitrite	gN/m3	0.0
snoa	nitrate	gN/m3	0.0
Phosphorus Compounds			
sp	ortho-phosphate	gP/m3	8.0
xpp	stored poly-phosphate in PAO	gP/m3	0.0
Influent Fractions			
ivsstotss	VSS/TSSratio	gVSS/gTSS	**0.731**
Organic Fractions			
isbodtobod	soluble BOD5 to total BOD5 ratio	gsBOD5/gtBOD5	**0.341**
isbodtoscod	soluble BOD5 to soluble COD ratio	gsBOD5/gsCOD	0.61
ibodtocod	total BOD5 to total COD ratio	gtBOD5/gtCOD	0.58
Nitrogen Fractions			
frsnh	ammonium fraction of soluble TKN	-	0.9
insi	N content of soluble inert material	gN/gCOD	0.05
inxi	N content of inert particulate material	gN/gCOD	0.05
Phosphorus Fractions			
ipsi	P content of soluble inert material	gP/gCOD	0.01
ipxi	P content of inert particulate material	gP/gCOD	0.01
Inorganic Compounds			
stic	total soluble inorganic carbon	gC/m3	84.0
sca	total calcium	gCa/m3	140.0
smg	total magnesium	gMg/m3	50.0
spot	total potassium	gK/m3	28.0
scat	other cation	eq/m3	3.0
sana	other anion	eq/m3	12.0
Active Bacterial Biomass			
xbh	heterotrophic biomass	gCOD/m3	0.0
xbai	ammonia oxidizer biomass	gCOD/m3	0.0
xbaa	nitrite oxidixer biomass	gCOD/m3	0.0
xbp	phosphate accumulating biomass	gCOD/m3	0.0
xbpro	acetogenic biomass	gCOD/m3	0.0
xbacm	acetoclastic methanogenic biomass	gCOD/m3	0.0
xbh2m	hydrogenotrophic methanogenic biomass	gCOD/m3	0.0
xbmet	methylotrophic biomass	gCOD/m3	0.0
xbf	fermenting biomass	gCOD/m3	0.0
xbax	anammox biomass	gCOD/m3	0.0
Inorganic Precipitates			
xaloh	aluminum hydroxide	gAl(OH)3/m3	0.0
xalpo4	aluminum phosphate	gAlPO4/m3	0.0
xfeoh	iron hydroxide	gFe(OH)3/m3	0.0
xfepo4	iron phosphate	gFePO4/m3	0.0
xcaco3	calcium carbonate	gCaCO3/m3	0.0
xcapo4	calcium phosphate	gCaPO4/m3	0.0
xmgco3	magnesium carbonate	gMgCO3/m3	0.0
xmghpo4	magnesium hydrogen phosphate (newberyi...	gMgHPO4/m3	0.0
xmgnh4po4	magnesium ammonium phosphate (struvite)	gMgNH4PO4/m3	0.0
Soluble Gases			
so	dissolved oxygen	gO2/m3	0.0
Soluble Gases			
sh2	dissolved hydrogen gas	gCOD/m3	0.0
sn2	dissolved dinitrogen gas	gN/m3	18.0
sch4	dissolved methane	gCOD/m3	0.0

State Variables

Soluble Gases			
so	dissolved oxygen	gO2/m3	0.0
Soluble Gases			
sh2	dissolved hydrogen gas	gCOD/m3	0.0
sn2	dissolved dinitrogen gas	gN/m3	18.0
sch4	dissolved methane	gCOD/m3	0.0
Soluble Organic Compounds			
si	soluble inert material	gCOD/m3	18.8
scol	colloidal substrate	gCOD/m3	38.0
ss	readily degradable soluble substrate	gCOD/m3	69.0
Other Soluble Organic Substrates			
sac	acetate	gCOD/m3	0.0
spro	propionate	gCOD/m3	0.0
smet	methanol	gCOD/m3	0.0
Particulate Organic Compounds			
xi	particulate inert material	gCOD/m3	6.51
xu	unbiodegradable cell products	gCOD/m3	0.0
xs	slowly biodegradable substrate	gCOD/m3	255.6
xbt	poly-hydroxy alkanoates in PAO	gCOD/m3	0.0
Nitrogen Compounds			
snh	ammonia nitrogen	gN/m3	23.0
snd	soluble organic nitrogen	gN/m3	1.62
snoi	nitrite	gN/m3	0.0
snoa	nitrate	gN/m3	0.0
xns	nitrogen in slowly biodegradable substrate	gN/m3	12.1
Phosphorus Compounds			
sp	ortho-phosphate	gP/m3	8.0
xps	phosphorus in slowly biodegradable substr...	gP/m3	1.75
xpp	poly-phosphate in PAO	gP/m3	0.0
Active Bacterial Biomass			
xbh	heterotrophic biomass	gCOD/m3	0.0
xbf	fermenting biomass	gCOD/m3	0.0
xbai	ammonia oxidizer biomass	gCOD/m3	0.0
xbaa	nitrite oxidixer biomass	gCOD/m3	0.0
xbp	phosphate accumulating biomass	gCOD/m3	0.0
Active Bacterial Biomass			
xbpro	acetogenic biomass	gCOD/m3	0.0
xbacm	acetoclastic methanogenic biomass	gCOD/m3	0.0
xbh2m	hydrogenotrophic methanogenic biomass	gCOD/m3	0.0
xbmet	methylotrophic biomass	gCOD/m3	0.0
xbax	anammox biomass	gCOD/m3	0.0
Soluble Inorganic Compounds			
stic	total soluble inorganic carbon	gC/m3	84.0
Soluble Inorganic Compounds			
sca	total calcium	gCa/m3	140.0
smg	total magnesium	gMg/m3	50.0
spot	total potassium	gK/m3	28.0
scat	other cation	eq/m3	3.0
sana	other anion	eq/m3	12.0
Particulate Inorganic Compounds			
xii	inorganic inert particulate	gSS/m3	53.7
Particulate Inorganic Compounds			
xaloh	aluminum hydroxide	gAl(OH)3/m3	0.0
xalpo4	aluminum phosphate	gAlPO4/m3	0.0
xfeoh	iron hydroxide	gFe(OH)3/m3	0.0
xfepo4	iron phosphate	gFePO4/m3	0.0
xcaco3	calcium carbonate	gCaCO3/m3	0.0
xcapo4	calcium phosphate	gCaPO4/m3	0.0
xmgco3	magnesium carbonate	gMgCO3/m3	0.0
xmghpo4	magnesium hydrogen phosphate (newberyi...	gMgHPO4.3H2O/m3	0.0
xmgnh4po4	magnesium ammonium phosphate (struvite)	gMgNH4PO4.6H2O/m3	0.0

CompositeVariables

Volatile Fraction			
ivt	VSS/TSSratio	gVSS/gTSS	0.731
Composite Variables			
x	total suspended solids	g/m3	219.4
vss	volatile suspended solids	g/m3	160.4
xiss	total inorganic suspended solids	g/m3	59.0
bod	total carbonaceous BOD5	gO2/m3	225.0
cod	total COD	gCOD/m3	387.9
tkn	total TKN	gN/m3	38.0
tn	total nitrogen	gN/m3	38.0
tp	total phosphorus	gP/m3	10.0
totc	total carbon	gC/m3	208.1
Additional Composite Variables			
sbod	filtered carbonaceous BOD5	gO2/m3	76.7
xbod	particulate carbonaceous BOD5	gO2/m3	148.3
sbodu	filtered ultimate carbonaceous BOD	gO2/m3	92.3
xbodu	particulate ultimate carbonaceous B...	gO2/m3	220.6
bodu	total ultimate carbonaceous BOD	gO2/m3	312.9
substbod	total substrate BOD5	gO2/m3	225.0
substscod	soluble substrate COD	gCOD/m3	107.0
substcod	total substrate COD	gCOD/m3	362.7
scod	filtered COD	gCOD/m3	125.8
xcod	particulate COD	gCOD/m3	262.2
mnscod	filtered CODmn	gCOD/m3	96.3
mnxcod	particulate CODmn	gCOD/m3	153.4
mncod	total CODmn	gCOD/m3	249.7
Biomass Composite Variables			
xbcod	biomass COD	gCOD/m3	0.0
xbiss	biomass inert material	gCOD/m3	0.0
bvss	biomass VSS	g/m3	0.0
percactivesolid	percent active solids	%	0.0
percinactivesolid	percent inactive solids	%	100.0
Additional Nitrogen Composite Variables			
stkn	filtered TKN	gN/m3	25.6
xtkn	particulate TKN	gN/m3	12.4
tnplusgas	total nitrogen including dinitrogen g...	gN/m3	56.0
snox	nitrite and nitrate	gN/m3	0.0
Additional Phosphorus Composite Variables			
xtop	particulate organic phosphorus	gP/m3	1.81
xtip	particulate inorganic phosphorus	gP/m3	0.0
xtp	total particulate phosphorus	gP/m3	1.81
stp	total soluble phosphorus	gP/m3	8.19
Additional Carbon Composite Variables			
xtoc	particulate organic carbon	gC/m3	83.9
stoc	soluble organic carbon	gC/m3	40.2
toc	total organic carbon	gC/m3	124.1
xtic	particulate inorganic carbon	gC/m3	0.0
tic	total inorganic carbon	gC/m3	84.0

Stoichiometric Ratios

⇵	COD / TKN	gCOD/gN	10.2
⇵	CODbiodeg / TKN	gCOD/gN	9.54
⇵	NH4 / TKN	-	0.605
⇵	COD / TP	gCOD/gP	38.8
⇵	CODbiodeg / TP	gCOD/gP	36.3
⇵	VSS / TSS	gVSS/gTSS	0.731
⇵	XCOD / VSS	gCOD/gVSS	1.63
⇵	BOD / COD	gO2/gCOD	0.58

Equation for : No Selection

NO SELECTION

Change selection by :
- (•) clicking on variable
- ( ) moving over variable

Figure 2.1
GPS-X Influent Advisor
Kane Creek MEMPAC-M130

Part 3 – Modified Ludzack-Ettinger (MLE) Process

3.1 Model Layout and Configuration

The model process train consists of sequential chambers that comprise a Modified Ludzack-Ettinger (MLE) process utilizing the MBR membrane basins as integral to the aerobic process in the configuration. This configuration is represented in Figure 3.1. The process tank volumes are shown in Table 3.1. The MLSS setpoint of this model is 5,500 mg/L to effect F/M = 0.10 1/d and SRT = 25 days at Average Annual Flows (AAF), and the standard Return Activated Sludge (RAS) flow rate (WASRAS) is four times the influent flow rate (4Q). The standard dissolved Oxygen (DO) setpoint for the aeration chamber is 2 mg/L. The membranes sparging air in the membranes chamber that serves also as the second aeration chamber yields a DO concentration there between 6 and 8 mg/L.

Process Chamber	Volume (gal)
Anoxic	21,140
Aeration 1	21,140
Aeration 2	21,140
FAS	2,100
Membrane	7,280
Pre-Anoxic	1,360

Table 3.1: MLE Process Chambers Volumes

3.2 Simulation Results

Figures 3.2 to 3.6 indicate five attempts (scenarios) at Average Annual Flow (AAF) to lower effluent contaminants concentrations to meet effluent criteria by adjusting the Return Activated Sludge (RAS) flow rate and DO setpoint from their standard values. The first four of these attempts (Figures 3.2 to 3.5) fail to meet effluent criteria either in terms of Total Nitrogen (TN) or Total Phosphorus (P). Scenario number five (Figure 3.6) is successful in theory, but maintaining a process aeration set point tightly about DO = 0.5 mg/L is not operationally feasible. Similarly to Figure 3.6, Figure 3.7 indicates success at Max Day Flows (MDF) in theory, but strict control of the requisite process aeration DO = 0.5 mg/L is not operationally feasible.

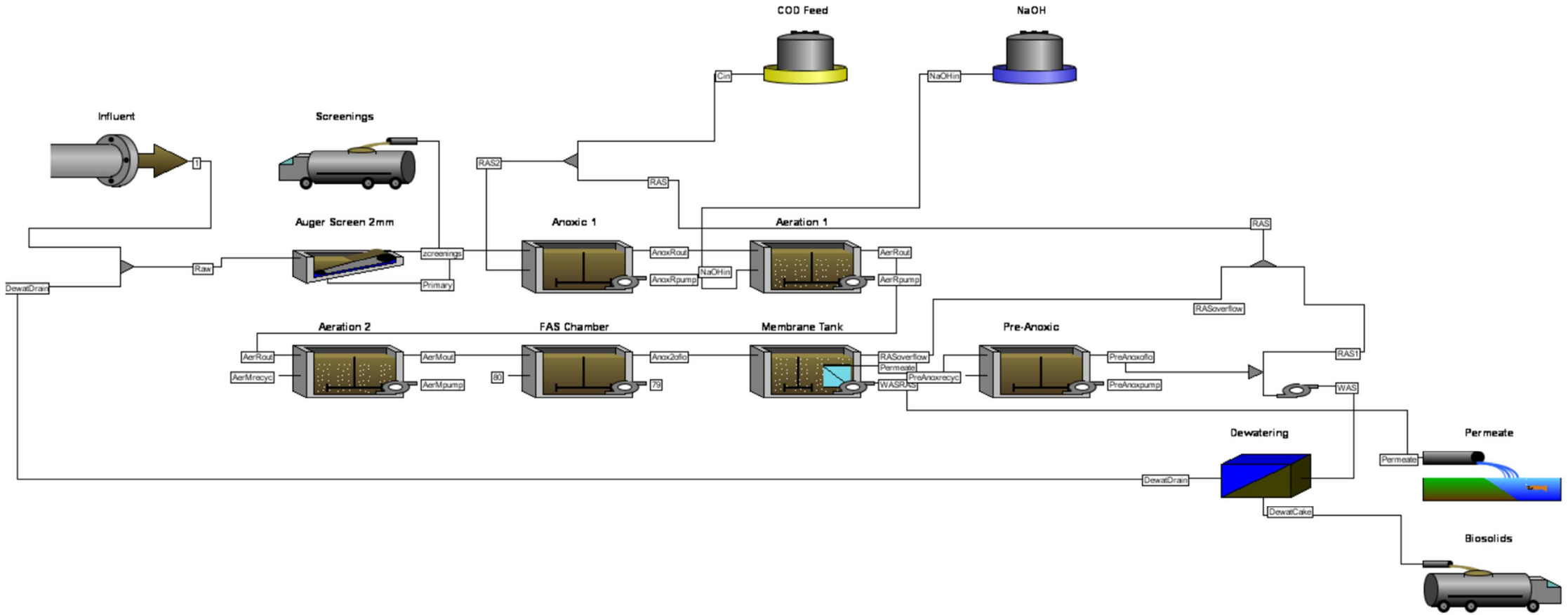

Figure 3.1
Process Flow Diagram in GPS-X
Kane Creek MEMPAC-M130
MLE Process

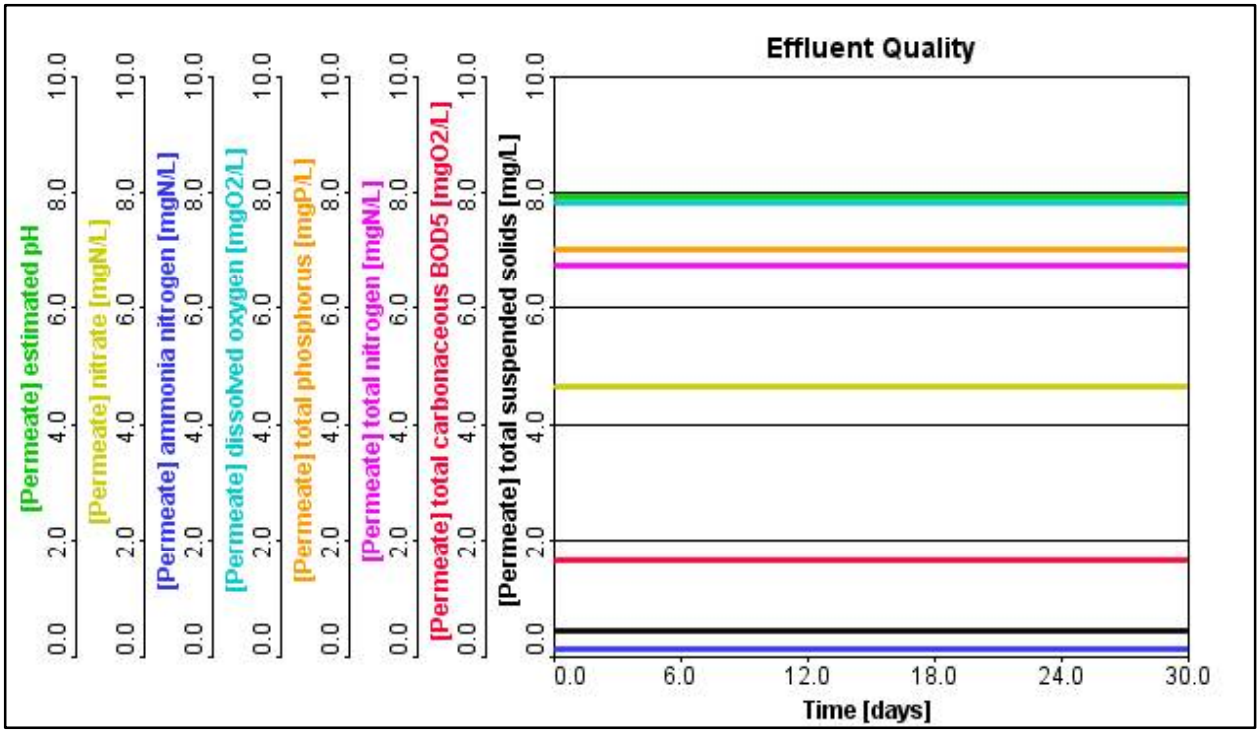

Figure 3.2: MLE AAF Effluent Quality at RAS = 4Q and DO = 2 mg/L

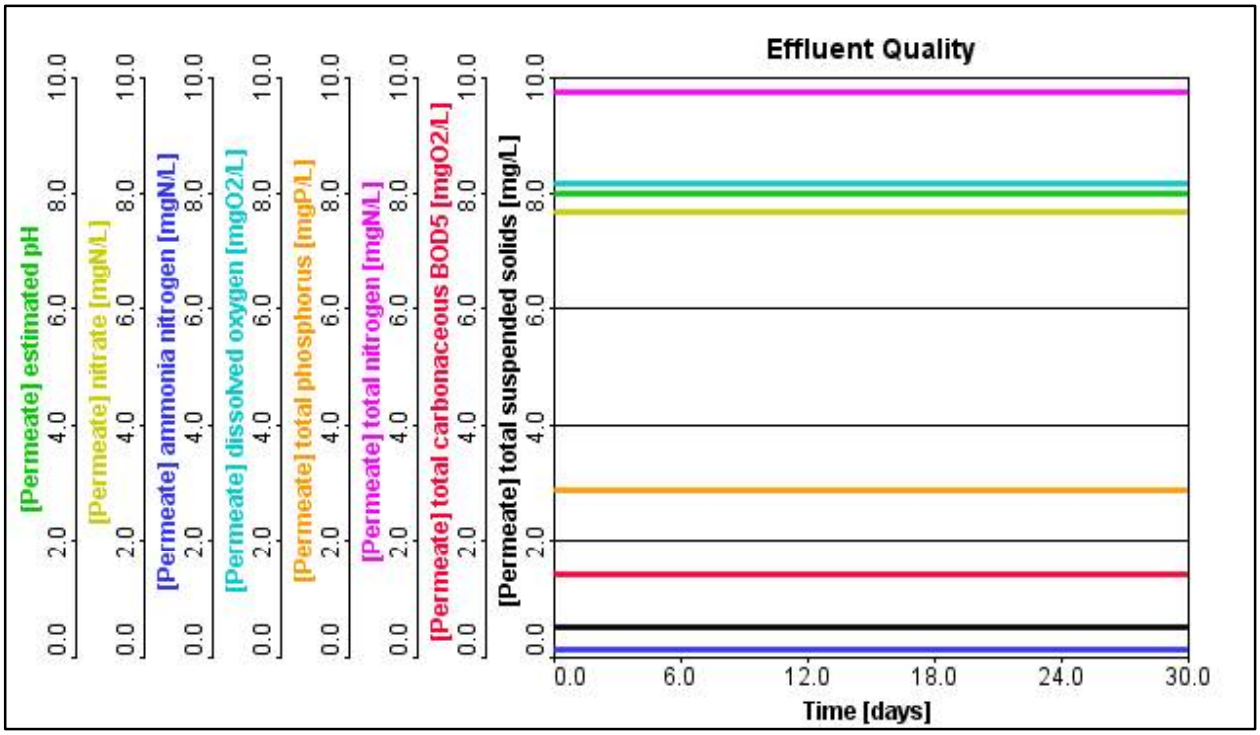

Figure 3.3: MLE AAF Effluent Quality at RAS = 2Q and DO = 2 mg/L

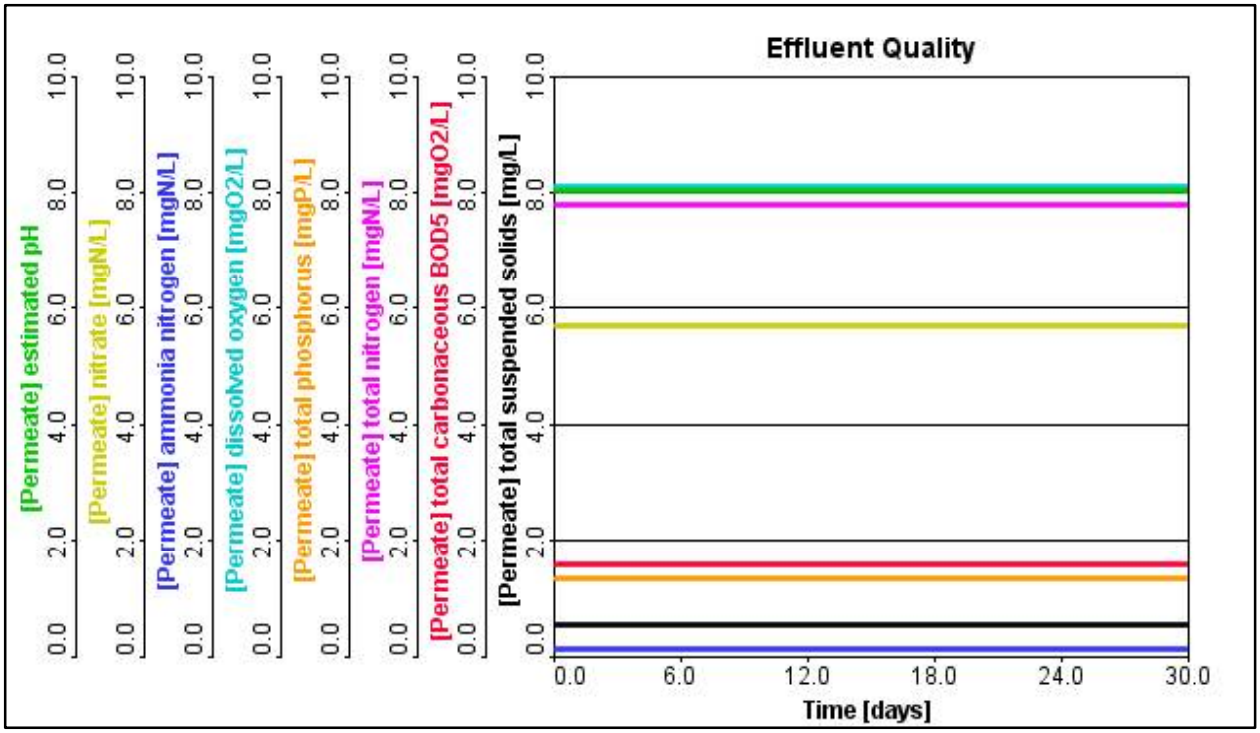

Figure 3.4: MLE AAF Effluent Quality at RAS = 2Q and DO = 1 mg/L

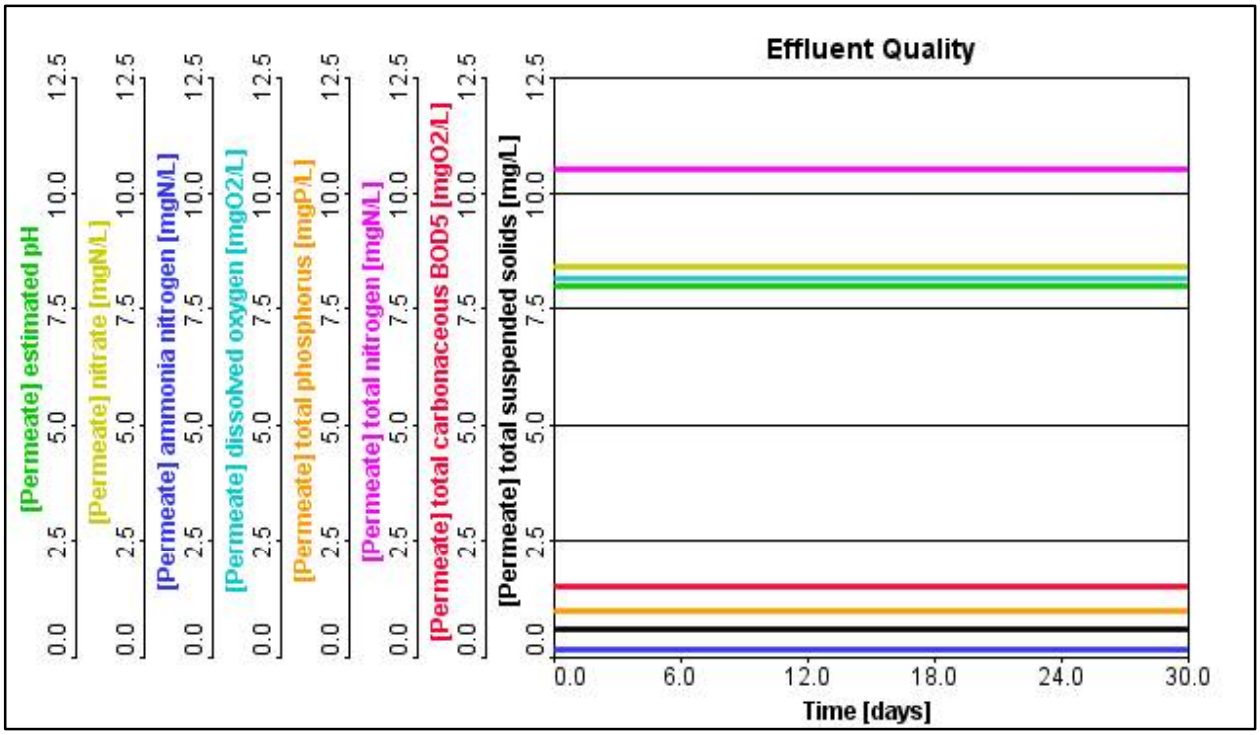

Figure 3.5: MLE AAF Effluent Quality at RAS = 1Q and DO = 1 mg/L

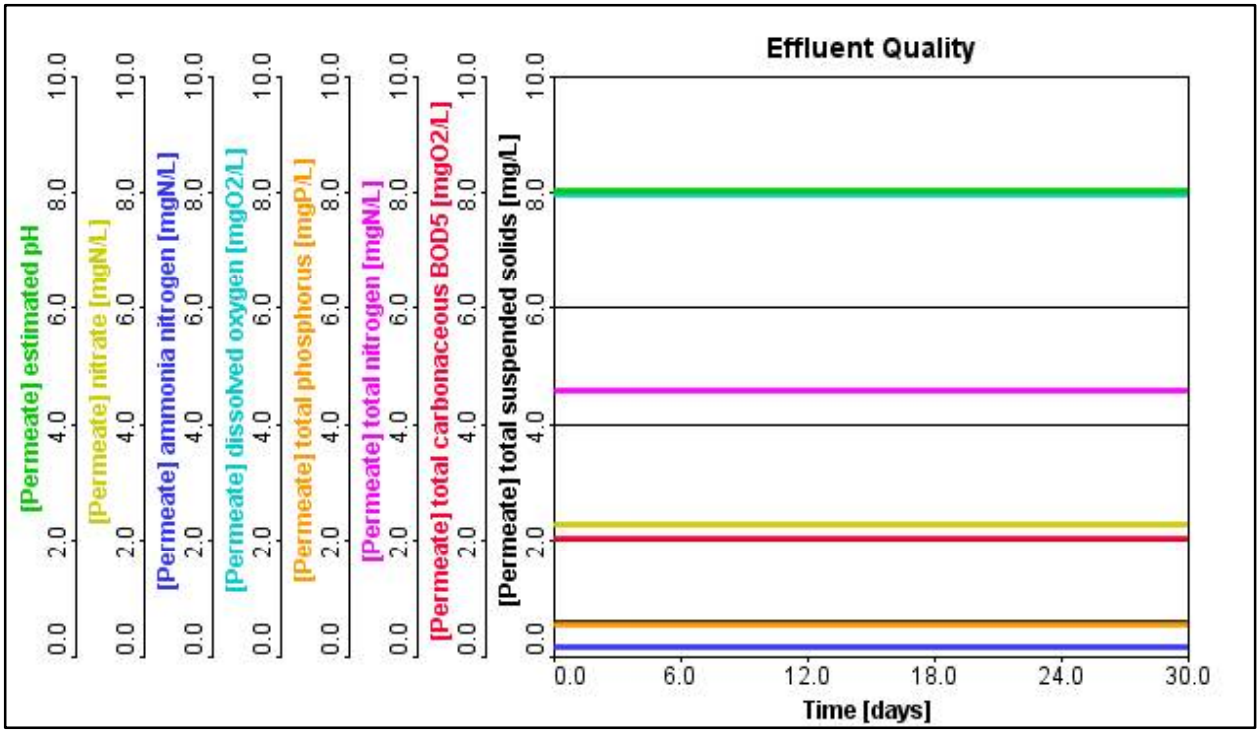

Figure 3.6: MLE AAF Effluent Quality at RAS=2Q and DO=0.5 mg/L

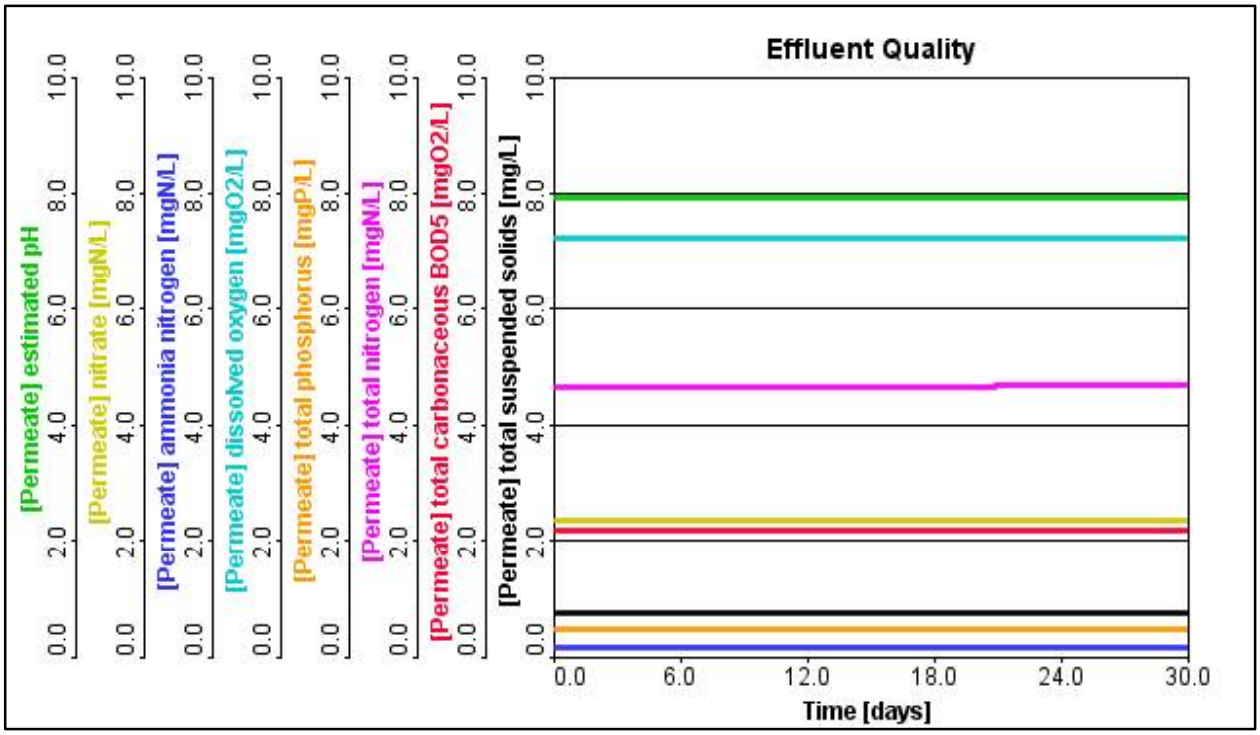

Figure 3.7: MLE MDF Effluent Quality at RAS = 2Q and DO = 0.5 mg/L

MLE Scenario				Effluent Quality (mg/L)				
Figure	Flow	RAS	DO (mg/L)	BOD	TSS	TN	NH3	P
3.2	AAF	4Q	2.0	1.7	0.4	6.7	0.1	7.0
3.3	AAF	2Q	2.0	1.4	0.5	9.8	0.1	2.9
3.4	AAF	2Q	1.0	1.6	0.5	7.8	0.1	1.3
3.5	AAF	1Q	1.0	1.5	0.6	10.5	0.1	1.0
3.6	AAF	2Q	0.5	2.0	0.6	4.6	0.1	0.5
3.7	MDF	2Q	0.5	2.2	0.8	4.7	0.1	0.5

Table 3.2: Comparison of Effluent Quality per MLE Scenario

Part 4 – 4-Stage Bardenpho Process

4.1 Model Layout and Configuration

The model process train consists of sequential chambers that comprise a 4-stage Bardenpho process featuring an internal recirculation from the end of the first aeration chamber to the beginning of the first anoxic chamber. This configuration is represented in Figure 4.1. The process tank volumes are shown in Table 4.1. Similarly to the MLE process, the MLSS setpoint of this model is set to 5,500 mg/L. RAS flow rate (WASRAS) and the internal recycle flow rate (AerMpump) are each initially four times the influent flow rate (4Q). The dissolved Oxygen (DO) setpoint for the aeration chambers is initially set to 2 mg/L. The membranes sparging air in the membranes chamber that serves also as the second aeration chamber yields a DO concentration there between 6 and 8 mg/L.

Process Chamber	Volume (gal)
Anoxic 1	23,170
Aeration 1	14,480
Aeration 2	14,480
Anoxic 2 + FAS	14,480
Membrane	7,280
Pre-Anoxic	1,360

Table 4.1: 4-Stage bardenpho Process Chambers Volumes

4.2 Simulation Results

Figures 4.2, 4.3 and 4.4 indicate the effluent quality of three scenarios at AAF that are equal in operation except that their internal recyle rates vary from 4Q to 2Q to 1Q, respectively. A lower possible internal recycle rate corresponds to lower capital expenditure (smaller pump, smaller pipe) and lower operating expenditure (less energy). The effluent of all three AAF scenarios meets criteria with P comfortably below the limit at between 0.5 and 0.6 mg/L. Figures 4.5 and 4.6 indicate the effluent quality of scenarios at MDF in which the internal recycle rates vary from 2Q to 1Q, respectively. These two MDF scenarios also meet all effluent criteria.

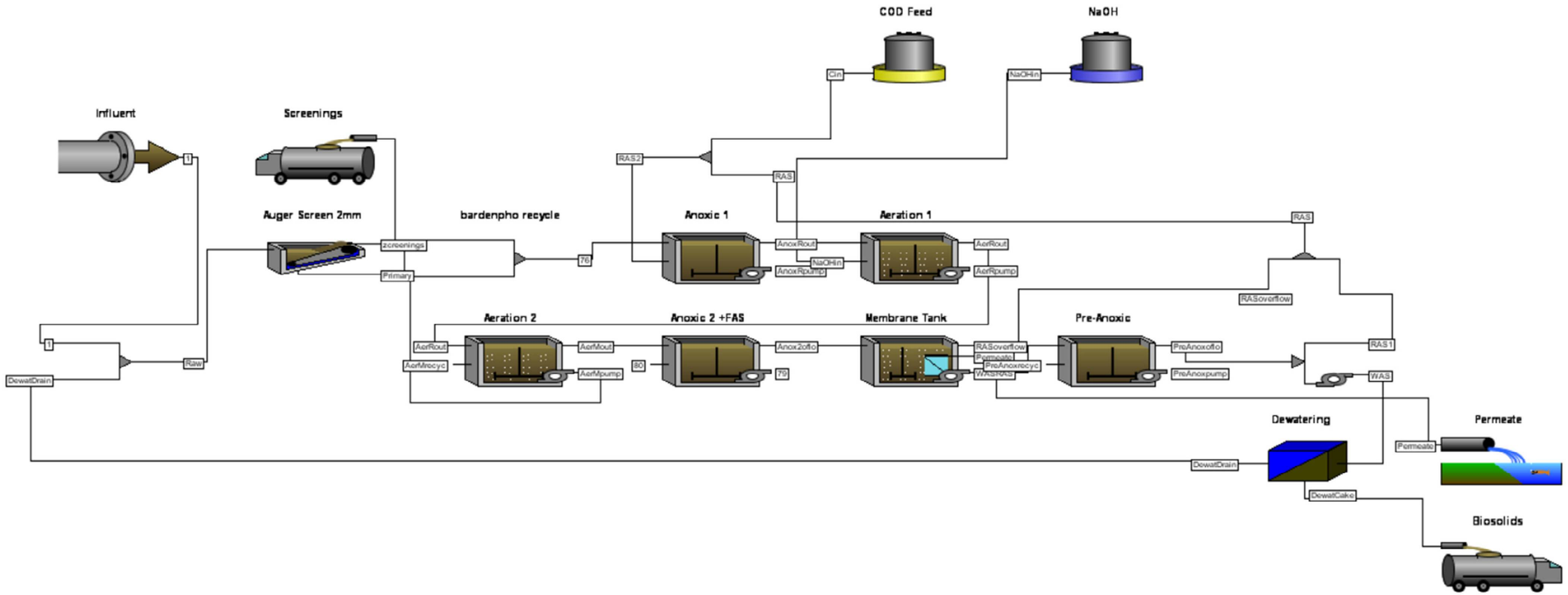

Figure 4.1
Process Flow Diagram in GPS-X
Kane Creek MEMPAC-M130
4-Stage Bardenpho Process

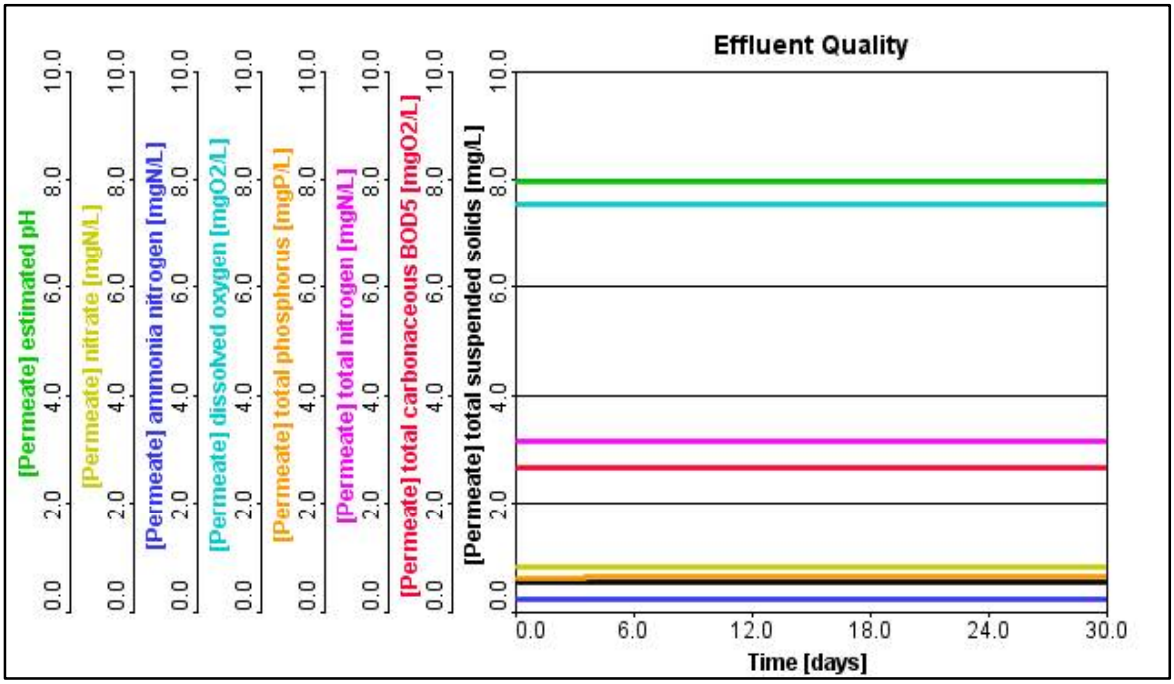

Figure 4.2: Bardenpho AAF Effluent Quality at internal recycle rate = 4Q

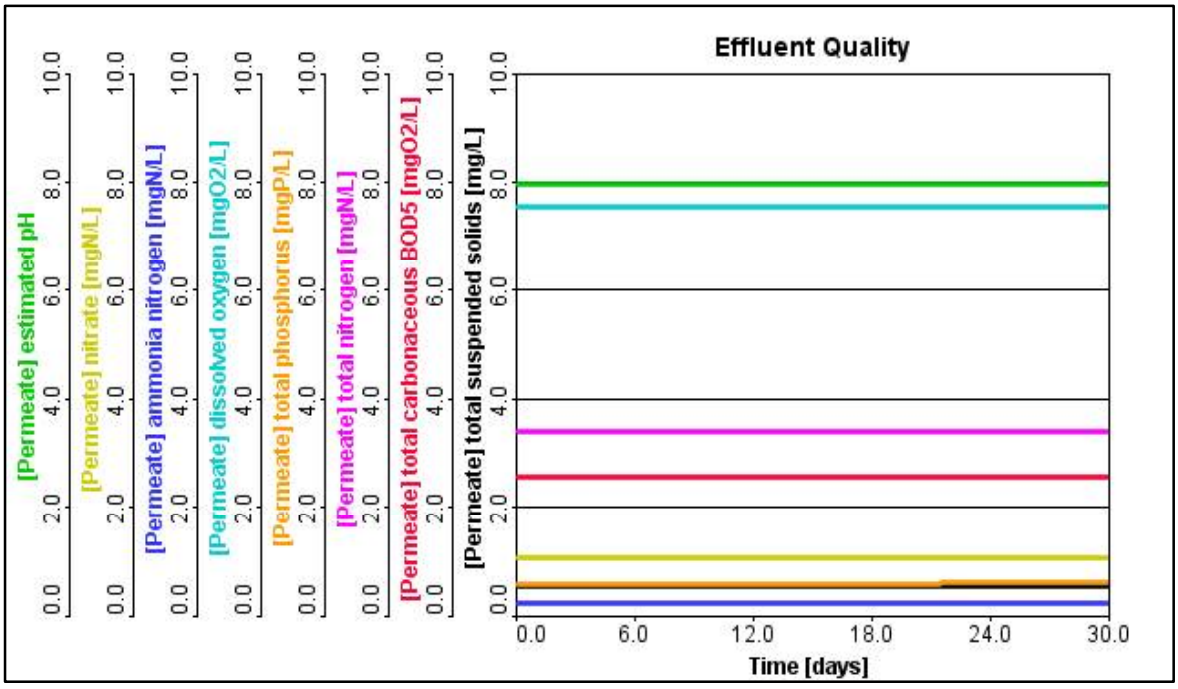

Figure 4.3: Bardenpho AAF Effluent Quality at internal recycle rate = 2Q

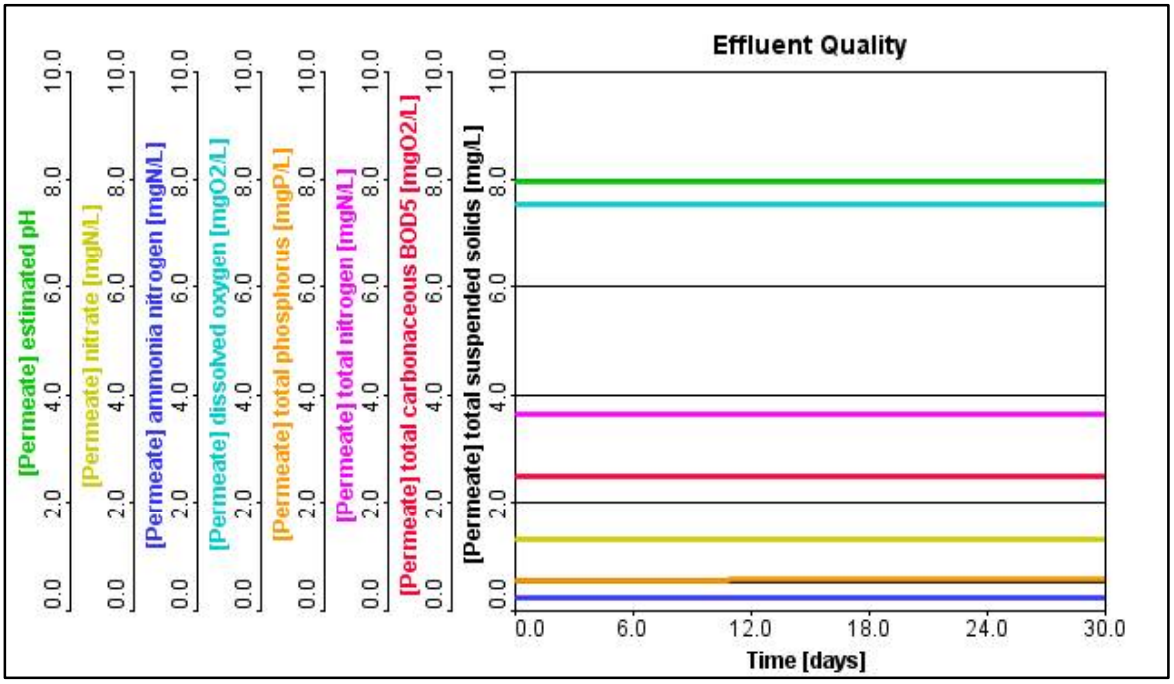

Figure 4.4: Bardenpho AAF Effluent Quality at internal recycle rate = 1Q

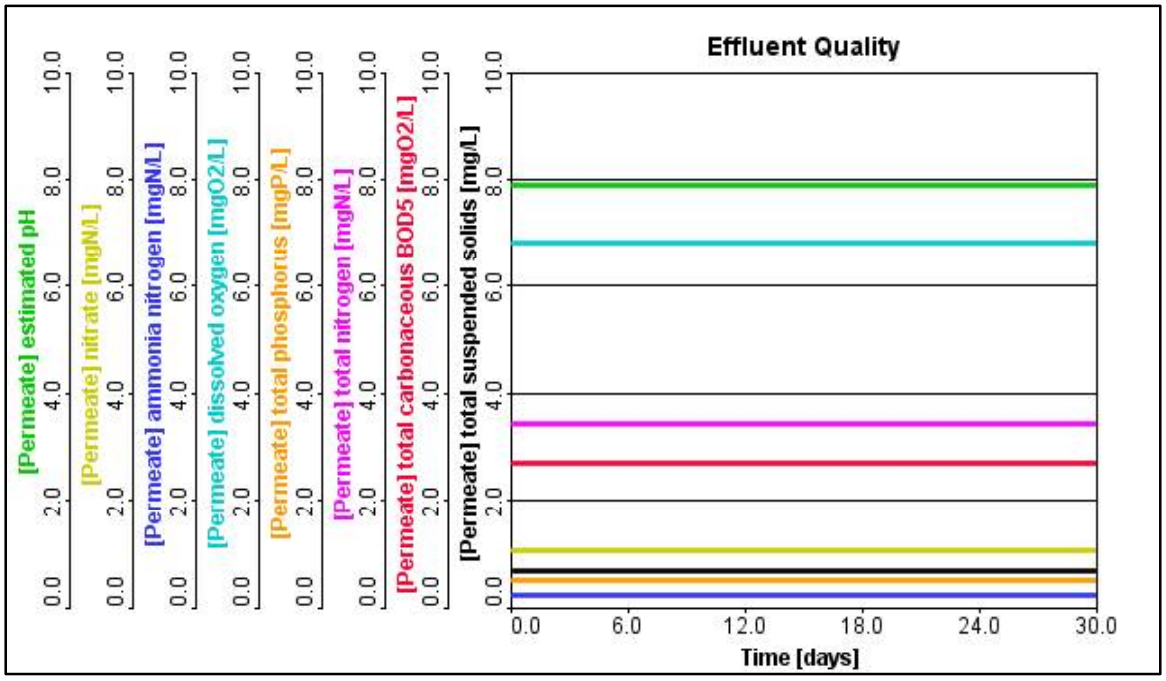

Figure 4.5: Bardenpho MDF Effluent Quality at internal recycle rate = 2Q

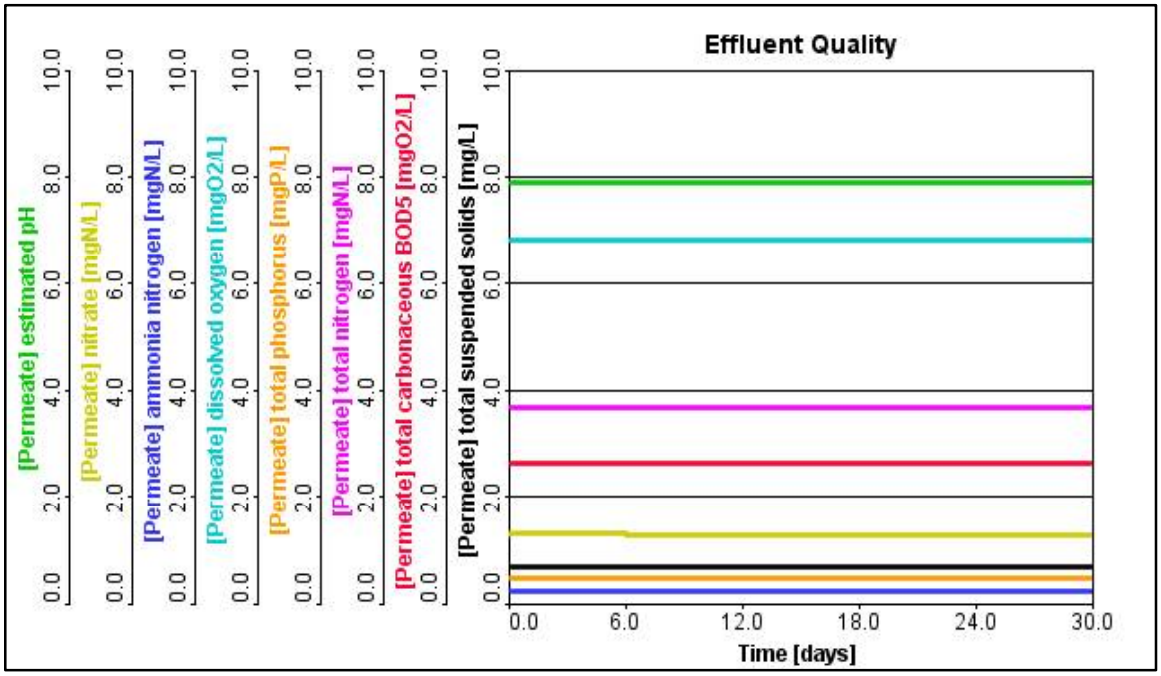

Figure 4.6: Bardenpho MDF Effluent Quality at internal recycle rate = 1Q

Bardenpho Scenario			Effluent Quality (mg/L)				
Figure	Flow	Internal Recycle Rate	BOD	TSS	TN	NH3	P
4.2	AAF	4Q	2.7	0.5	3.2	0.2	0.6
4.3	AAF	2Q	2.6	0.5	3.4	0.2	0.6
4.4	AAF	1Q	2.5	0.5	3.6	0.2	0.6
4.5	MDF	2Q	2.7	0.7	3.4	0.2	0.5
4.6	MDF	1Q	2.6	0.7	3.7	0.2	0.5

Table 4.2: Comparison of Effluent Quality per Bardenpho Scenario

Part 5 – Johannesburg Process

5.1 Model Layout and Configuration

The model process train consists of sequential process chambers featuring an Anaerobic Chamber between the two Anoxic Chambers into which influent is fed. RAS flow is proportioned 20% to Anoxic Chamber 1 and 80% to Anoxic Chamber 2 as depicted in Figure 5.1. The process chambers volumes are shown in Table 5.1. The MLSS setpoint of this model is set to 5,500 mg/L, and the RAS flow rate (WASRAS) is set to four times the influent flow rate (4Q). The dissolved Oxygen (DO) setpoint for aeration chambers is 2 mg/L. The membranes sparging air in the membranes chamber that serves also as the second aeration chamber yields a DO concentration there between 6 and 8 mg/L.

Process Chamber	Volume (gal)
Anoxic 1	5,860
Anaerobic	11,710
Anoxic 2	16,200
Aeration 1	8,800
Aeration 2	22,960
Membrane	7,280
RAS Collection	1,360

Table 5.1: Johannesburg Process Chambers Volumes

5.2 Simulation Results

The Johannesburg process has the potential to yield greater P removal than the other processes considered in this report if there is sufficient carbon supplied in the influent (e.g. BOD5:P >= 30:1). However, Figure 5.2 indicates that the process fails in terms of effluent TN and P since the process is carbon limited. That is, influent BOD5:P ~= 20:1. Figure 5.3 indicates an effluent P result similar to those yielded by the 4-Stage Bardenpho process considered in this report (~0.5 mg/L) when the influent is supplemented with a carbon feed which is 100% methanol at 0.25 gph. However, this scenario fails in terms of TN. Figure 5.4 indicates that effluent P may be lowered to 0.25 mg/L (a 40:1 turndown), and TN comes in under the limit, when the methanol feed rate to influent is increased to 1.25 gph. Figure 5.5 indicates the methane generation corresponding to the scenario indicated by Figure 5.4 from the various process chambers.

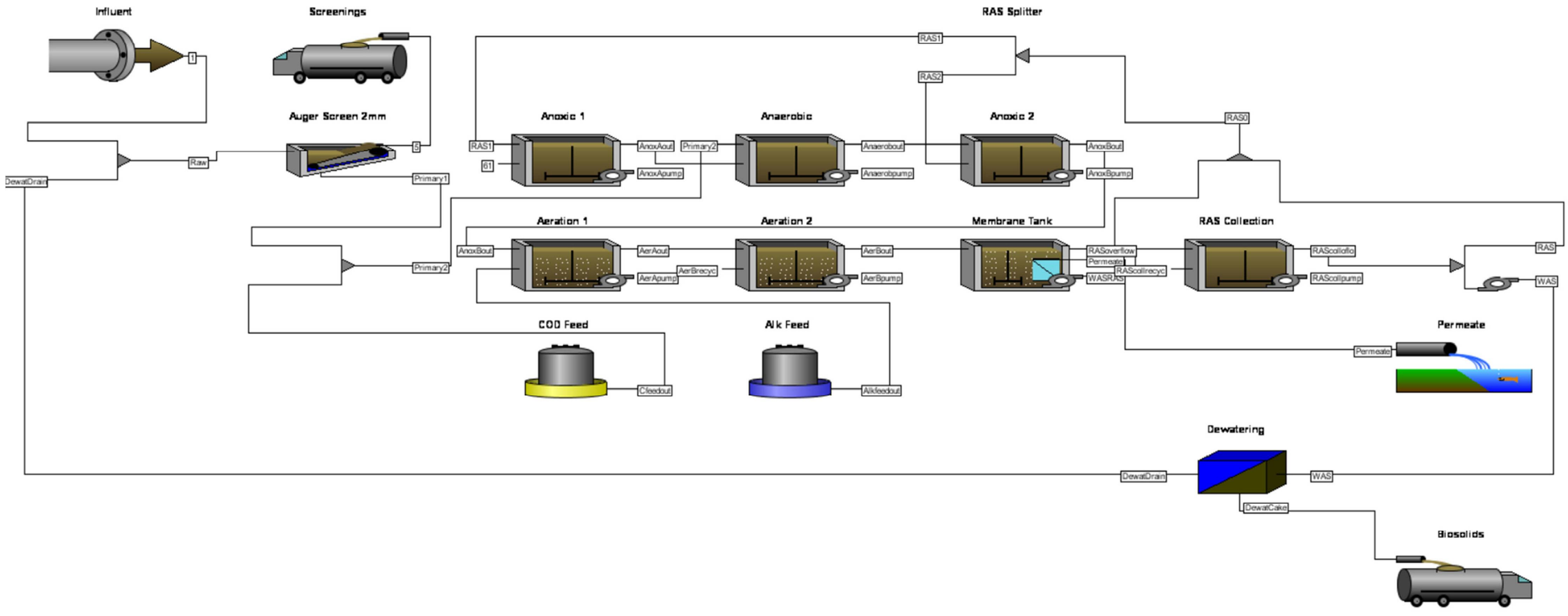

Figure 5.1
Process Flow Diagram in GPS-X
Kane Creek MEMPAC-M130
Johannesburg Process

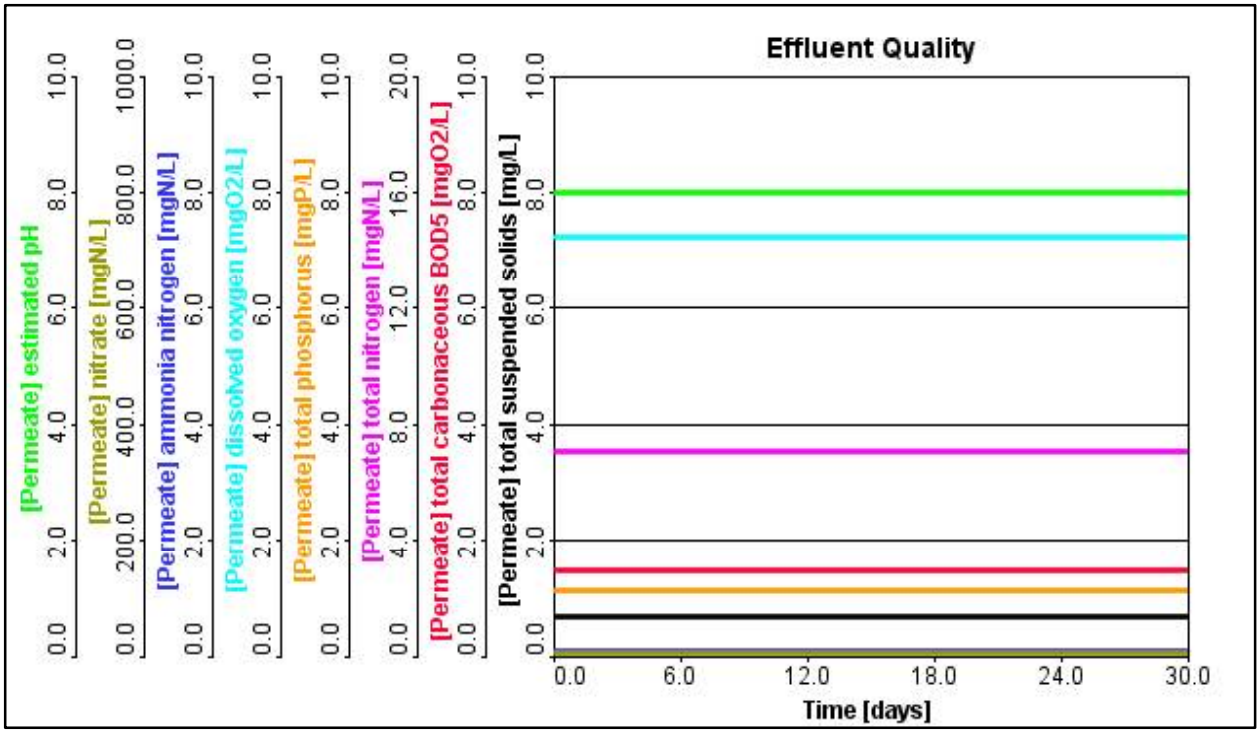

Figure 5.2: Johannesburg AAF Effluent Quality at DO = 2 mg/L

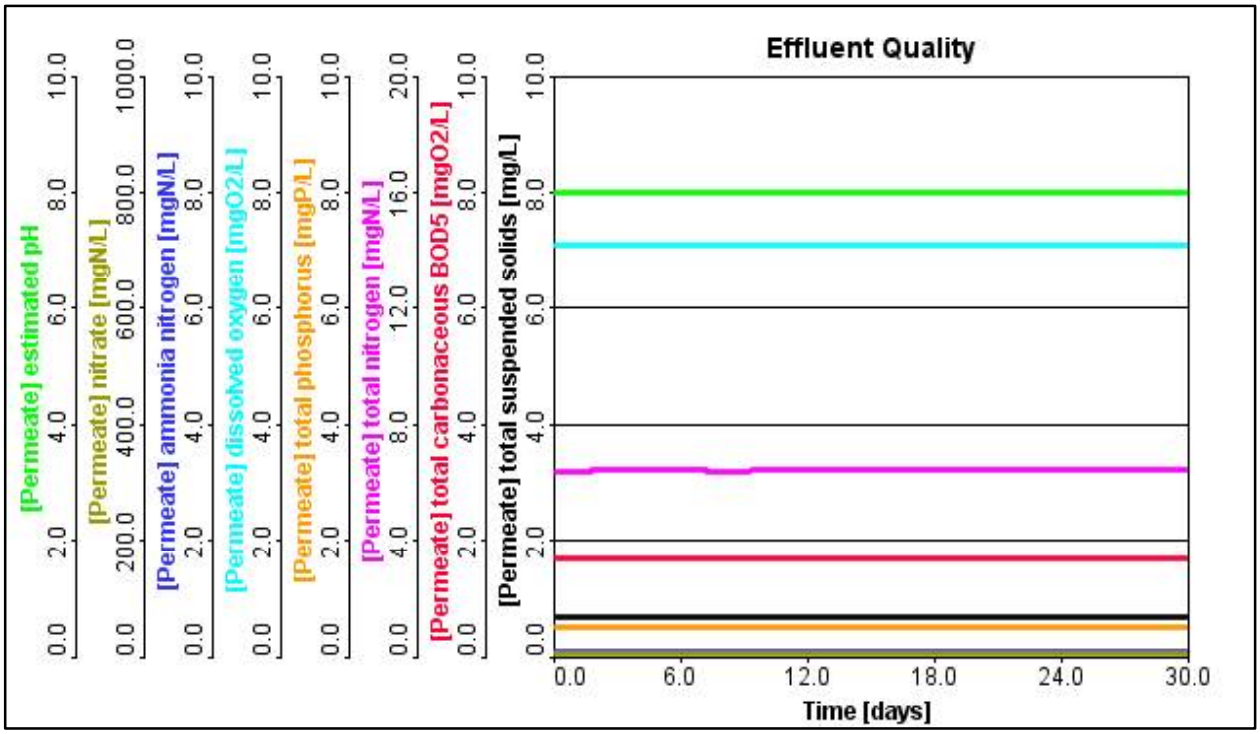

Figure 5.3: Johannesburg AAF Effluent Quality at DO = 2 mg/L, Methanol Feed = 0.25 gph

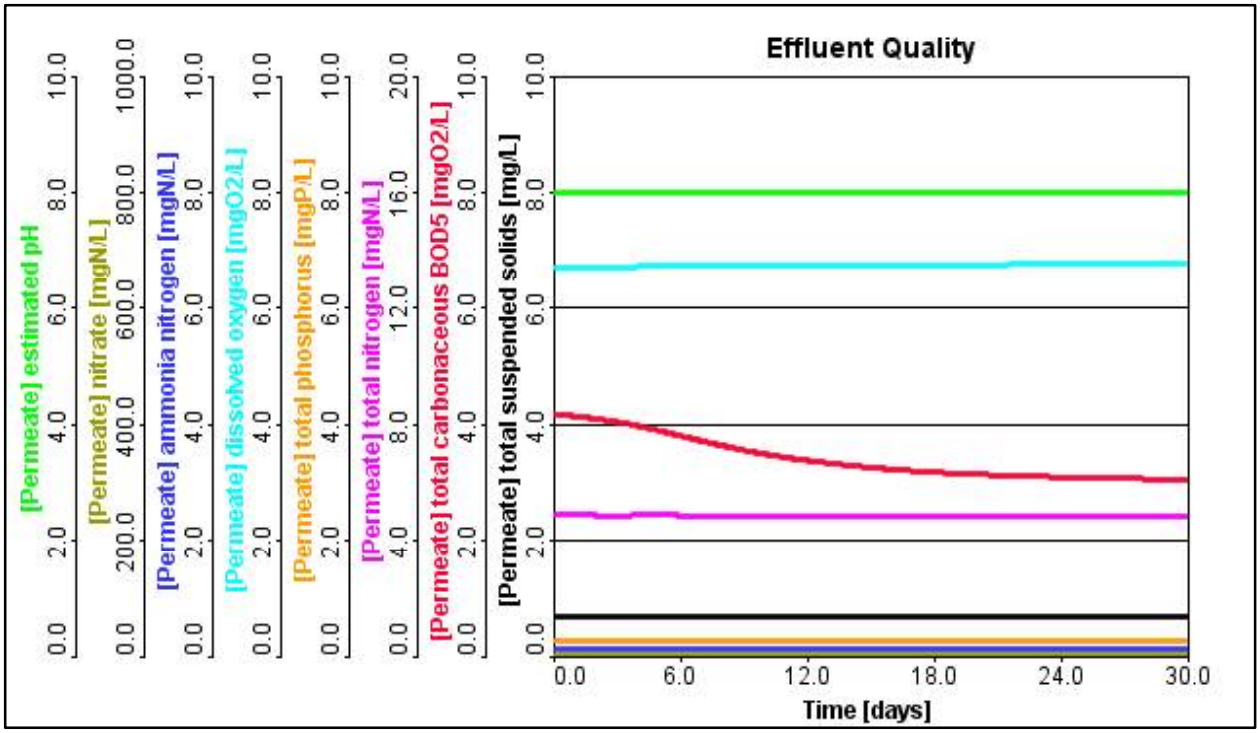

Figure 5.4: Johannesburg AAF Effluent Quality at DO = 2 mg/L, Methanol Feed = 1.25 gph

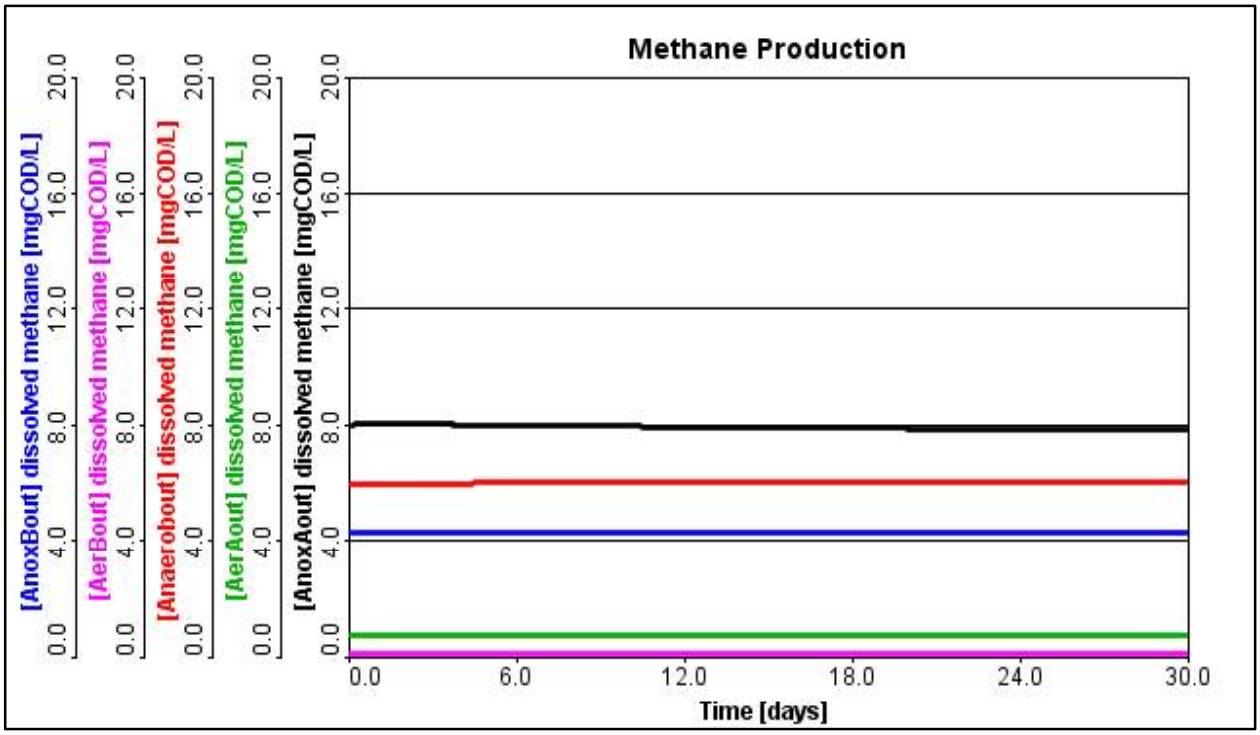

Figure 5.5: Johannesburg AAF Methane Production at DO = 2 mg/L, Methanol Feed = 1.25 gph

Johannesburg Scenario		Effluent Quality (mg/L)				
Figure	Methanol Feed (gph)	BOD	TSS	TN	NH3	P
5.2	0.00	1.5	0.7	7.1	0.1	1.1
5.3	0.25	1.7	0.7	6.4	0.1	0.5
5.4	1.25	4.2	0.7	4.9	0.1	0.2

Table 5.2: Comparison of Effluent Quality per Johannesburg Scenario

Part 6 – Conclusion

The 4-Stage Bardenpho process is the most feasible of the three considered in this modeling study for treatment of this particular influent in terms of CapEx, OpEx, and operation.

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

APRIL 2022

SHEET INDEX		
SHEET NUMBER	**REV**	**DRAWING TITLE**
G-001	A	COVER SHEET & SHEET INDEX
G-002	A	SYMBOLS & LEGENDS
G-003	A	SYMBOLS & LEGENDS
G-004	A	DESIGN DATA & GENERAL NOTES
G-005	B	GENERAL ARRANGEMENT PLAN
G-006	A	GENERAL ARRANGEMENT PLAN
G-007	A	TIE-IN LIST
P-001	B	PROCESS FLOW DIAGRAM
P-002	A	HYDRAULIC PROFILE
P-101	A	PIPING AND INSTRUMENTATION DIAGRAM
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P-107	A	PIPING AND INSTRUMENTATION DIAGRAM
P-108	A	PIPING AND INSTRUMENTATION DIAGRAM
P-109	A	PIPING AND INSTRUMENTATION DIAGRAM
P-110	A	PIPING AND INSTRUMENTATION DIAGRAM
P-111	A	PIPING AND INSTRUMENTATION DIAGRAM
P-112	A	PIPING AND INSTRUMENTATION DIAGRAM
P-301	A	PIPING AND INSTRUMENTATION DIAGRAM
P-401	A	PIPING AND INSTRUMENTATION DIAGRAM

Brian Snow 5/9/22

BRIAN D. SNOW, PE DATE

C.E. 80472 EXP. 3/31/23

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REFERENCE DRAWINGS	REVISIONS
	A ISSUED FOR 70% COMPLETE — JWL SEA BDS — 2022-05-09

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

COVER SHEET & DRAWING INDEX

REV NO. A | SHEET: G-001 | 01 OF 01 SHEETS

EQUIPMENT TAG CONFIGURATION

Prefix - **S1** **S2** **S3** **S4** **S5**

MULTIPLE OF ANCILLARY ASSIGNED TO ONE EQUIPMENT
WHICH OF RIGHT-MOST NON-ZERO CHARACTER
A, B, C, ETC.; OTHERWISE NULL

ORDER OF SAME TYPE OF EQUIPMENT WITHIN THE CHAMBER
1, 2, ETC.

CHAMBER #
1, 2, ETC.; 0 IF COMMON
PUMPS ASSIGNED TO WHERE PULLING FROM

SYSTEM

0	-	(COMMON)	6	-	CLARIFICATION
1	-	INFLUENT LIFT	7	-	DISINFECTION
2	-	HEADWORKS & STORAGE	8	-	EFFLUENT (INCL. RECLAIM)
3	-	ATTACHED GROWTH PROCESSES, E.G. ROUGHING/TRICKLING FILTERS, IFAS	9	-	SLUDGE HANDLING
4	-	SUSPENDED GROWTH PROCESSES, E.G. ANAEROBIC/ANOXIC/AEROBIC ACTIVATED SLUDGE	A-F	-	[UNASSIGNED]
5	-	[UNASSIGNED]			

TRAIN # (PARALLEL PROCESS)
1, 2, ETC.; 0 IF COMMON

AIR
- B - BLOWER
- CO - COMPRESSOR

ANALYTICAL
- CLA - CHLORINE ANALYZER
- DO - DISSOLVED OXYGEN
- NH - AMMONIUM
- NHO - AMMONIUM & NITRATE
- NO - NITRATE
- NTU - TURBIDITY
- ORP - OXIDATION-REDUCTION POTENTIAL
- PH - PH
- SSS - MIXED LIQUOR SUSPENDED SOLIDS
- TOC - TOTAL ORGANIC CARBON
- UVT - UV TRANSMITTANCE

CONTROLS
- BK - BEACON
- CP - CONTROL PANEL
- ES - EMERGENCY STOP
- H - HORN
- HOA - HAND-OFF-AUTO SWITCH
- MCC - MOTOR CONTROL CENTER
- OA - OFF-AUTO SWITCH
- VFD - VARIABLE FREQUENCY DRIVE

INSTRUMENTATION
- FM - FLOW METER
- IT - INSTRUMENTATION TRANSMITTER
- LF - LEVEL FLOAT
- LS - LEVEL SWITCH
- LT - LEVEL TRANSDUCER
- MAF - MASS AIR FLOW
- PI - PRESSURE INDICATOR
- PS - PRESSURE SWITCH
- PT - PRESSURE TRANSDUCER
- TS - TEMPERATURE SENSOR
- US - ULTRASONIC LEVEL SENSOR

MECHANICAL
- A - ACTUATOR
- DWP - DEWATERING PRESS
- MEM - MEMBRANE CASSETTE
- MX - MIXER
- SA - SAMPLER
- SC - SCREEN
- TK - TANK
- UV - ULTRA-VIOLET DISINFECTION

PUMPS
- EJ - EJECTOR
- P - PUMP

VALVES
- ARV - AIR RELEASE VALVE
- AVRV - AIR VACUUM RELEASE VALVE
- BF - BUTTERFLY VALVE
- BV - BALL VALVE
- CK - CHECK VALVE
- CMBV - COMBINATION VALVE
- DV - DIAPHRAGM VALVE
- FCV - FLOW CONTROL VALVE
- GV - GATE VALVE
- LCV - LEVEL CONTROL VALVE
- NV - NEEDLE VALVE
- PCV - PRESSURE CONTROL VALVE
- PRV - PRESSURE RELIEF VALVE
- SP - SAMPLE PORT
- SPG - SPIGOT
- SV - SOLENOID VALVE

CONTROLS ABBREVIATIONS

- A - AUTO
- AV - AUTOMATED VALVE
- CTC - CALL TO CLOSE
- CTO - CALL TO OPEN
- CTR - CALL TO RUN
- CTRF - CALL TO RUN FORWARD
- CTRR - CALL TO RUN REVERSE
- CV - CONTROL VALVE
- DO - DISSOLVED OXYGEN
- F - FAIL SIGNAL
- FM - FLOW METER
- H - HAND
- HOA - HAND/OFF/AUTO
- HS - HAND SWITCH
- HMI - HUMAN MACHINE INTERFACE
- KS - KILOWATT SENSOR
- LFH - LEVEL FLOAT HIGH
- LSL - LEVEL SWITCH LOW
- LSLL - LEVEL SWITCH LOW LOW
- LSH - LEVEL SWITCH HIGH
- LSHH - LEVEL SWITCH HIGH HIGH
- LT - LEVEL TRANSDUCER
- NF - NO FLOW
- NO3 - NITRATE
- OA - OFF/AUTO
- PH - POWER OF HYDROGEN
- PI - PRESSURE INDICATOR
- PT - PRESSURE TRANSMITTER
- PRV - PRESSURE REGULATING VALVE
- PSV - PRESSURE SAFETY VALVE
- R - RUNNING SIGNAL
- SC - SPEED CONTROL
- SCADA - SUPERVISORY CONTROL & DATA ACQUISITION
- SF - SEAL FAIL
- SSS - MLSS/TURBIDITY
- SV - SOLENOID VALVE
- TF - TUBE FAIL
- TO - THERMAL OVERLOAD
- VC - VALVE CLOSED
- VO - VALVE OPEN

INSTRUMENT SYMBOLS

GENERAL INSTRUMENT OR FUNCTION SYMBOLS	PRIMARY LOCATION (NORMALLY ACCESSIBLE TO OPERATOR)	FIELD MOUNTED
INSTRUMENTS		
SHARED DISPLAY OR SHARED CONTROL		
PROGRAMMABLE LOGIC CONTROL OR LOGIC FUNCTION	PLC	PLC

XXX
XXX–XX
INSTRUMENT WITH LONG TAG NUMBER

NORMALLY INACCESSIBLE OR BEHIND-THE-PANEL DEVICES OR FUNCTIONS MAY BE DEPICTED BY USING THE SAME SYMBOLS BUT WITH DASHED HORIZONTAL BARS, I.E..

FOR PROGRAMMABLE LOGIC CONTROLLER (PLC)
IDENTIFY PLC LOCATION FOR -
IDENTIFY SIGNAL TYPE FOR ## — — ## PLC

##: AI = ANALOG INPUT
AO = ANALOG OUTPUT
DI = DISCRETE INPUT
DO = DISCRETE OUTPUT

*ANALOG INPUT/OUTPUT MUST BE 420 MILLIAMPERE.

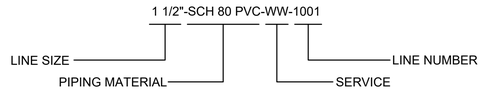
*DIGITAL INPUT/OUTPUT MUST BE 24 VOLT DIRECT CURRENT.

INTERLOCK (SOFTWARE OR HARDWARE)

LAMP INDICATION (STATUS OR ALARM)

PILOT LIGHT

PIPING LINE NUMBERING SYSTEM



LINE TYPES

- PRIMARY PROCESS
- SECONDARY PROCESS
- EXISTING PROCESS
- ELECTRICAL SIGNAL
- PNEUMATIC SIGNAL
- SOFTWARE SIGNAL
- CAPILLARY SIGNAL

SERVICE LINES

- BW - BACKWASH
- CI - CHEMICAL INJECTION
- CIT - CITRIC ACID
- COD - CHEMICAL OXYGEN DEMAND
- DR - DRAIN
- EFF - EFFLUENT
- EQ - EQUALIZATION
- FAS - FORWARD ACTIVATED SLUDGE
- OF - OVERFLOW
- MA - MEMBRANE AIR
- NaOCl - SODIUM HYPROCHLORITE
- NaOH - SODIUM HYDROXIDE
- PA - PROCESS AIR
- PF - PERMEATE FLOW
- PW - POTABLE WATER
- RAS - RETURN ACTIVATED SLUDGE
- RV - RELIEF VENT
- RW - RECLAIMED WATER
- TE - TREATED EFFLUENT
- UA - UTILITY AIR
- UW - UTILITY WATER
- WAS - WASTEWATER ACTIVATED SLUDGE
- WW - WASTE WATER

LEGEND

- PRESENT
- FUTURE-OPTIONAL

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REFERENCE DRAWINGS		REVISIONS					
COVER SHEET - DRAWING INDEX	SHT. - G-001	A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS	2022-05-09

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SYMBOLS & LEGENDS

REV NO. A
SHEET: G-002
01 OF 01 SHEETS

SYMBOL LEGEND

- AIR RELEASE VALVE
- BACK PRESSURE REGULATOR
- BALL VALVE
- BASKET STRAINER
- BUTTERFLY VALVE
- CAP
- CHECK VALVE
- CLEAN-OUT
- CONCENTRIC REDUCER
- DIAPHRAGM VALVE
- DIFFUSER NOZZLE
- ECCENTRIC REDUCER
- EDUCTOR/EJECTOR
- EXPANSION JOINT
- GATE VALVE
- GLOBE VALVE
- HOSE COUPLING
- HOSE/TUBING
- INJECTION QUILL
- LEVEL FLOATS
- NEEDLE VALVE
- ORIFICE PLATE
- PLUG VALVE
- PRESSURE REDUCING REGULATOR
- PRESSURE RELIEF VALVE
- ROTAMETER
- ROTARY VALVE
- SPIGOT
- SLOPE
- TIE-IN
- VACUUM BREAKER
- Y-STRAINER
- 3-WAY VALVE
- CAMLOCK CONNECTOR

CONNECTION TYPES

- FLANGE
- THREADED

FLOW METERS

- MAGNETIC
- ULTRASONIC

AUTO VALVE ACTUATOR SYMBOLS

- DIAPHRAGM
- CYLINDER/ PISTON
- SOLENOID
- ELECTRO-HYDRAULIC
- MOTORIZED

ABBREVIATIONS LIST

EQUIPMENT TYPE
B - BLOWER
CO - COMPRESSOR
MEM - MEMBRANE
SC - SCREEN
P - PUMP
SHT - SLUDGE HOLDING TANK
TK - TANK
UV - ULTRAVIOLET DISINFECTION

MISCELLANEOUS
AB - ABOVE GROUND
ALM - ALARM
E - EXISTING
FEB - FLOW EQUALIZATION BASIN
IE - INVERT ELEVATION
M - MOTOR
MW - MAN WAY
OIM - OPERATOR INTERFACE MODULE
P&ID - PROCESS & INSTRUMENTATION DIAGRAM
PLC - PROGRAMMABLE LOGIC CONTROLLER
RS - REMOVABLE SPOOL
SA - SAMPLER
SANI - SANITARY 304 SS TUBING
SC - SCREEN
SP - SAMPLE PORT
TF - TOP FLAT
UG - UNDER GROUND
US - ULTRASONIC LEVEL SENSOR
VFD - VARIABLE FREQUENCY DRIVE
XMTR - TRANSMITTER

SERVICE LINE
BW - BACKWASH
CI - CHEMICAL INJECTION
CIT - CITRIC ACID
COD - CHEMICAL OXYGEN DEMAND
DR - DRAIN
EFF - EFFLUENT
EQ - EQUALIZATION
FAS - FORWARD ACTIVATED SLUDGE
O/F - OVERFLOW
IA - INSTRUMENT AIR
MA - MEMBRANE AIR
NaOCl - SODIUM HYPOCHLORITE
NaOH - SODIUM HYDROXIDE
PA - PROCESS AIR
PF - PERMEATE FLOW
PW - POTABLE WATER
RAS - RETURN ACTIVATED SLUDGE
RV - RELIEF VENT
RW - RECLAIMED WATER
TE - TREATED EFFLUENT
UA - UTILITY AIR
UW - UTILITY WATER
WAS - WASTE ACTIVATED SLUDGE
WW - WASTE WATER

SIGNAL TYPE
AO - ANALOG OUTPUT
AI - ANALOG INPUT
DO - DIGITAL OUTPUT
DI - DIGITAL INPUT
RO - RELAY OUTPUT

VALVES
BV - BALL VALVE
BFV - BUTTERFLY VALVE
CK - CHECK VALVE
DV - DIAPHRAGM VALVE
GV - GATE VALVE

VALVE ANNOTATIONS
FO - FAIL OPEN
FC - FAIL CLOSED
FL - FAIL LOCKED (POSITION DOES NOT CHANGE)
FI - FAIL INDETERMINATE
FAI - FAIL AS IS
NO - NORMALLY OPEN
NC - NORMALLY CLOSED
LO - LOCKED OPEN
LC - LOCKED CLOSED

EQUIPMENT SYMBOLS

AERATION MANIFOLDS
- TUBULAR
- DISC

BLOWERS
- DIAPHRAGM
- POSITIVE DISPLACEMENT
- REGENERATIVE
- ROTARY VANE
- POSITIVE DISPLACEMENT W/O ENCLOSURE
- REGENERATIVE W/O ENCLOSURE
- IN-LINE FAN

DISINFECTION
- UV

FILTRATION
- MEMBRANE
- MEMBRANE

GRINDER

MIXER

PUMPS
- CENTRIFUGAL
- GEAR
- FLEXIBLE IMPELLER
- DIAPHRAGM
- ROTARY LOBE
- VERTICAL MULTI-STAGE
- PROGRESSING CAVITY
- SUBMERSIBLE
- PERISTALTIC

SCREEN
- FINE SCREEN
- ROTARY BRUSH (A)
- BAR SCREEN

TANKS
- OPEN TOP TANK
- DOME ROOF TANK

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2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

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FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

SYMBOLS & LEGENDS

REV NO. A

SHEET: G-003
01 OF 01 SHEETS

GENERAL NOTES

1. SPECIFICATIONS
   THE PACKAGE WASTEWATER TREATMENT PLANT REPRESENTED WITHIN THIS CONTRACT DRAWINGS SET CONFORMS TO CLOACINA TECHNICAL SPECIFICATION SECTION 46 07 53.49 PACKAGE MBR PLANTS.

2. SLUDGE PRESS GROSS PRODUCTION INCLUDES POLYMER MAKEUP WATER.

DESIGN DATA

FLOW	PHASE 1
AVERAGE ANNUAL, MGD	.135
AVERAGE DAY MAX MONTH, MGD	.183
PEAK DAY, MGD	.270

AVERAGE ANNUAL INFLUENT MASS CONCENTRATION	
BOD5, MG/L	225
TSS, MG/L	219
TOTAL KJELDAHL NITROGEN, MG/L	38
AMMONIA, MG/L	23
PHOSPHORUS, Mg/L	10

EFFLUENT CONCENTRATION LIMITS	
BOD5, MG/L	10
TSS, MG/L	10
TOTAL NITROGEN, MG/L	5
AMMONIA-N, MG/L	2.3
PHOSPHORUS, Mg/L	1

PROCESS TRAINS	
NUMBER OF TRAINS	1
ANOXIC VOLUME PER TRAIN, GAL	39,010
AERATION VOLUME PER TRAIN, GAL	36,240
PROCESS MLSS, MG/L	5,500

INFLUENT SCREEN	
TYPE	MICRO BAR
NUMBER	1
OPENING SIZE, MM	2
CAPACITY EA, GPM	TBD

AERATION BLOWERS	
TYPE	REGENERATIVE
NUMBER	2
CAPACITY/EA, SCFM	150

FAS PUMPS	
TYPE	SUBMERSIBLE
NUMBER	2
CAPACITY, GPM	1,120

INTERNAL RECYCLE PUMP	
TYPE	SUBMERSIBLE
NUMBER	1
CAPACITY, GPM	671

MEMBRANES	
NUMBER OF CASSETTES	2
MODEL	SUEZ 500D-38M
TOTAL MEMBRANE AREA, SQ FT	32,680

MEMBRANE BLOWERS	
TYPE	REGENERATIVE
NUMBER	2
CAPACITY/EA, SCFM	147

PERMEATE PUMPS	
TYPE	ROTARY LOBE
NUMBER	2
CAPACITY/EA, GPM	224

WAS PUMP	
TYPE	PROGRESSING CAVITY
NUMBER	1
CAPACITY, GPM	5

SLUDGE STORAGE	
VOLUME, GAL	20,000

SLUDGE BLOWER	
TYPE	REGENERATIVE
NUMBER	TBD
CAPACITY/EA, SCFM	TBD

SLUDGE PRESS (NOTE 2)	
TYPE	TBD
NUMBER	TBD
CAPACITY/EA GPM	TBD

ISSUED FOR 70% COMPLETE
2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS					
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS	
		2022-05-09			

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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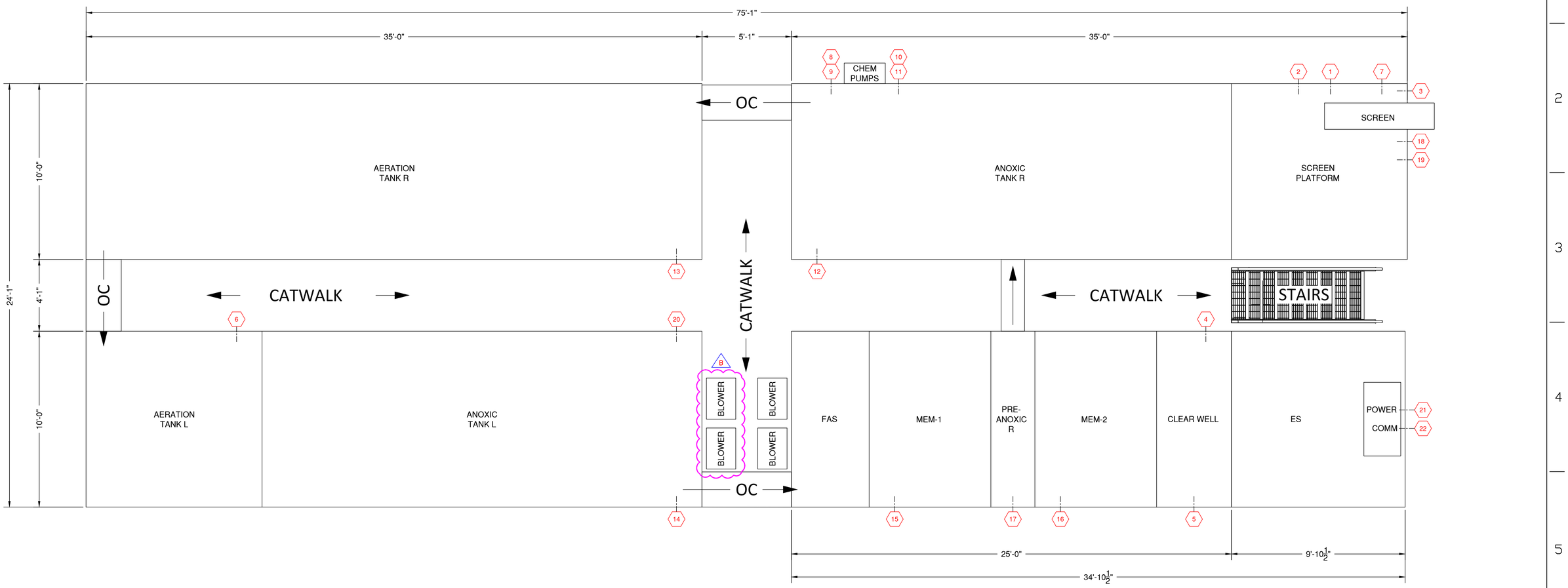
CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

DESIGN DATA & GENERAL NOTES

REV NO. A
SHEET: G-004
01 OF 01 SHEETS



PLAN VIEW
MEMPAC-M
3/8"=1'-0"

LEGEND

OC = OPEN CHANNEL

PRESENT-M130

FUTURE-OPTIONAL

NOT FOR CONSTRUCTION

ISSUED FOR 70% COMPLETE

2022-05-09

NOTES:

1. TIE-IN LOCATIONS REPRESENTED IN THIS DRAWING ARE APPROXIMATE AND ARE SUBJECT TO CHANGE.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
	2022-04-04			
B	RE-ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
	2022-05-09			

SCALE: AS NOTED
DATE: 2022-04-04
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA
FLUID RESOURCE MANAGEMENT

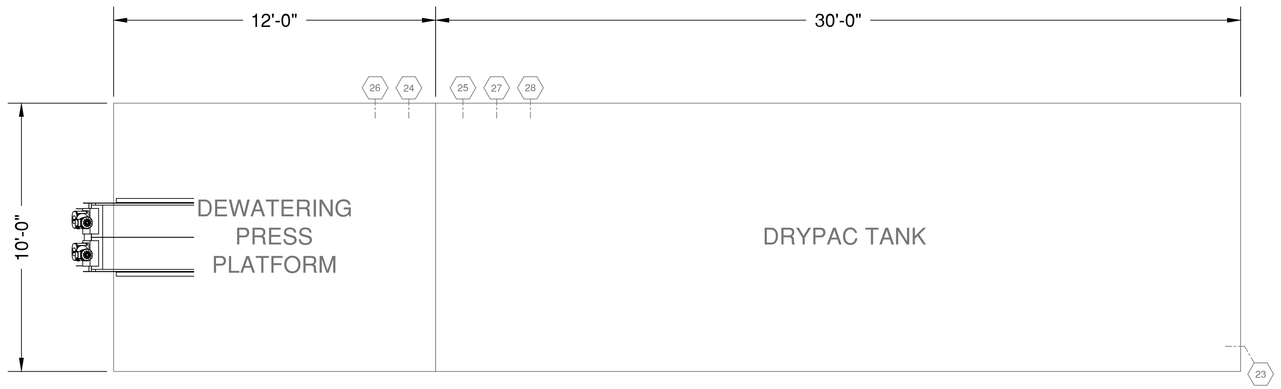
KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

GENERAL ARRANGEMENT

REV NO. B

SHEET: G-005
01 OF 01 SHEETS

C:\Users\JohnL\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek – CL21-022 MPAC MBR M-130\PID DWG\G-005.dwg – johnl – May 09, 2022 – 12:21pm



PLAN VIEW
MEMPAC-M
3/8"=1'-0"

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

NOTES:

1. TIE-IN LOCATIONS REPRESENTED IN THIS DRAWING ARE APPROXIMATE AND ARE SUBJECT TO CHANGE.

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: **AS NOTED**
DATE: **2022-04-26**
DRAWN BY: **JWL**
JOB #: **CL21-022**

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CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

GENERAL ARRANGEMENT PLAN

REV NO. **A**
SHEET: **G-006**
01 OF 01 SHEETS

C:\Users\JohnL\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek – CL21-022 MPAC MBR M-130\PID DWG\G-006.dwg – johnl – May 09, 2022 – 12:24pm

TIE-IN LIST		
TIE PT.	LINE SIZE/SPEC	PROCESS
1	XX	WW INLET
2	8"	OVERFLOW
3	1 1/2"	UW INLET
4	1"	WAS OUTLET
5	XX	PF OUTLET
6	6"	RECIRC- AERATION L
7	6"	RECIRC- ANOXIC R
8	3/8"	CITRIC ACID
9	3/8"	NaOCl
10	3/8"	NaOH
11	3/8"	COD
12	3"	DR ANOXIC R
13	3"	DR AERATION R
14	3"	DR ANOXIC L
15	3"	DR MEM 1
16	3"	DR MEM 2
17	3"	DR PRE ANOXIC R
18	2"	FOUL AIR- HEADWORKS
19	2"	FOUL AIR- ANOXIC R
20	2"	FOUL AIR- ANOXIC L
21	2"	POWER IN
22	2"	COMM IN
23	1"	WAS INLET
24	XX	DECANT
25	3"	DR SLUDGE
26	1 1/2"	UW INLET
27	2"	POWER INLET
28	2"	COMM INLET

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

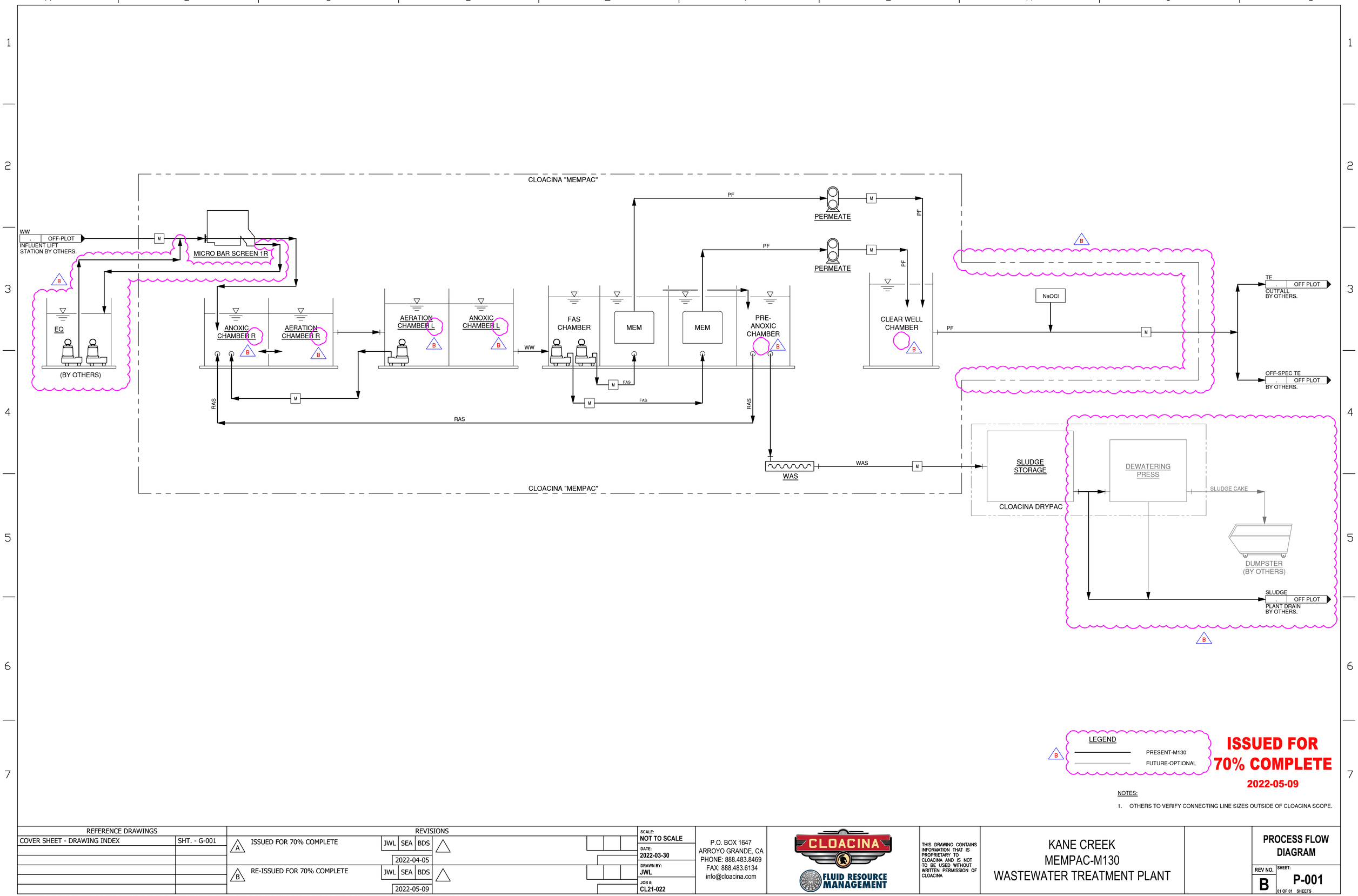
KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

TIE-IN LIST

REV NO. A

SHEET: G-007
01 OF 01 SHEETS

C:\Users\JohnL\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek - CL21-022 MPAC MBR M-130\PID DWG\G-007 - TIE-IN LIST.dwg - johnl - May 09, 2022 - 12:26pm



REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
	2022-04-05			
B	RE-ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
	2022-05-09			

SCALE: NOT TO SCALE
DATE: 2022-03-30
DRAWN BY: JWL
JOB #: CL21-022

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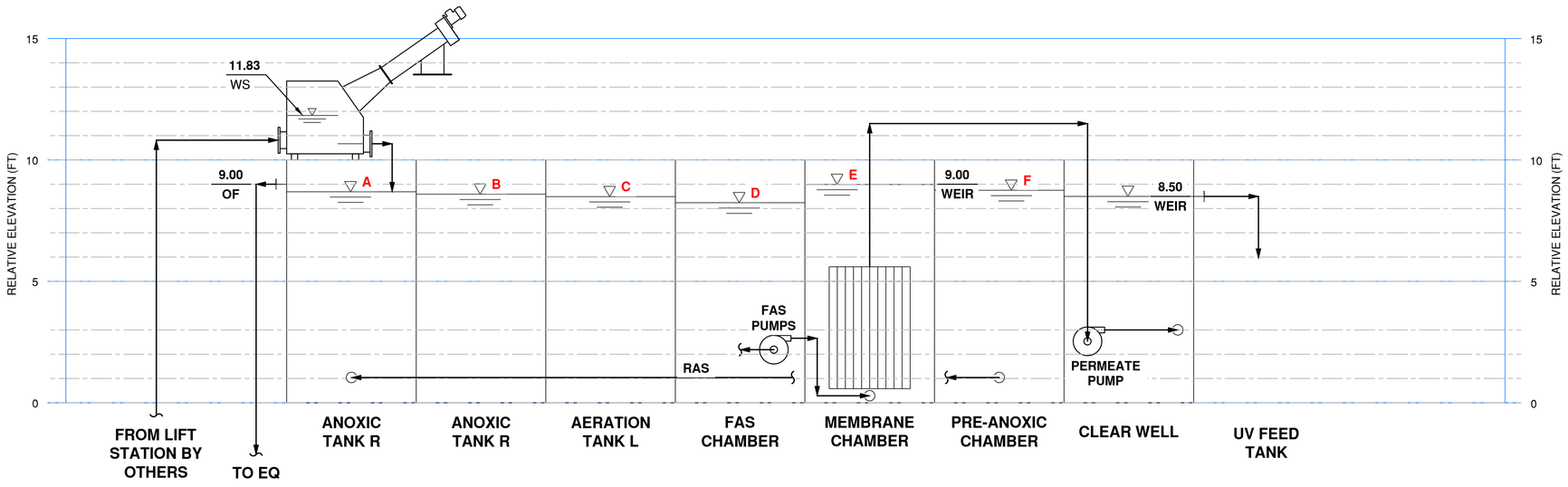
CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PROCESS FLOW DIAGRAM

REV NO. B
SHEET: P-001
01 OF 01 SHEETS

INFLUENT	WATER SURFACE ELEVATION (FT)					
FLOW	A	B	C	D	E	F
AA 0.135 MGD						
PD 0.270 MGD						
0.010 MGD						



NOTES:

1. **ALL ELEVATIONS IN THIS DRAWING ARE RELATIVE TO TREATMENT SYSTEM FOUNDATION TOP OF CONCRETE (T.O.C.).**
2. **SOME PUMPS INTERNAL TO TREATMENT SYSTEM NOT SHOWN.**

ISSUED FOR 70% COMPLETE

2022-05-09

ABBREVIATIONS:

IE	INVERT ELEVATION
T.O.C.	TOP OF CONCRETE
WS	WATER SURFACE

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

HYDRAULIC PROFILE

REV NO. A | SHEET: P-002 | 01 OF 01 SHEETS

OPERATOR INTERFACE

SCADA

LIFT STATION CONTROL PANEL (BY CLOACINA)

LIFT STATION (MCC) MOTOR CONTROL CENTER (BY CLOACINA)

FIELD

HMI
SCADA
LT 0100 AI
LSLL 0101 DI
LSL 0102 DI
LSH 0103 DI
LSHH 0104 DI
R 0111 / CTR 0111 / F 0111 / SC 0111 DI DO DI AO
R 0112 / CTR 0112 / F 0112 / SC 0112 DI DO DI AO
LIFT STATION HIGH LEVEL — LS 0101 DI
LIFT STATION LOCKOUT — LS 0102 DO

VFD
HOA
HS 0111
HS 0112

LIFT STATION CONTROL PANEL (BY OTHERS)

WW . OFF-PLOT
FROM COLLECTION SYSTEM

LF-LOW-LOW
LF-LOW
LF-HIGH
LF-HIGH-HIGH
LT 0100
LE 0100
M
P-0111 (SUBMERSIBLE)
P-0112 (SUBMERSIBLE)

INFLUENT LIFT STATION (BY OTHERS)

VALVE VAULT (BY OTHERS)

DR

WW . P-102
FINE SCREEN
SC-1211

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

NOTES:

1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A | SHEET: P-101 | 01 OF 01 SHEETS

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OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD

HMI
SCADA
FM 1211 — AI
CTO 1211A — DO
CTO 1211B — DO
LSHH 1211 — DI
LSL 1211 — DI
LSH 1211 — DI
R 1211A, F 1211A, CTR 1211A — DI, DI, DO
R 1211B, F 1211B, CTR 1211B — DI, DI, DO
HS 1211A — HOA
HS 1231B — HOA
PT 1010 — DI
CTO 1010 — DO
KS 1000 — DI

ORP-1411 P-103 ANOXIC R ORP
DO-1421 P-103 AERATION R DO
pH-1452 P-104 AERATION L pH
MLSS-1601 P-106 FAS MLSS
AIT 1001
ORP-1411 P-102 MEMPAC CONTROL PANEL 1000
DO-1421 P-102 MEMPAC CONTROL PANEL 1000
pH-1452 P-104 MEMPAC CONTROL PANEL 1000
MLSS-1601 P-106 MEMPAC CONTROL PANEL 1000

OTHERS CLOACINA T 3
UW . OFF-PLOT
2"-Sch 80 PVC-UA-5001
2"
1 1/2"
3/4"

120V
M CO-1010
PI 1010
? PSIG MAX
PRV 1010
PI 1020
PT 1010
SV 1010
1/2" BV
S

3/8"-SST-UA-? → UA . P-103 INSTRUMENTS pH-1452, DO-1451, DO-1530, NO3-1453
3/8"-SST-UA-5004 → UA . P-107 INSTRUMENT NTU-1601
3/8"-SST-UA-5005 → UA . P-105 INSTRUMENT MLSS-1601

SV 1211B — 1/2"-Sch 80 PVC-UW-5007
SV 1211A — 2"x1/2" — 1/2"-Sch 80 PVC-UW-5008 — 1/2"
HS 1211A — OA, M
HS 1211B — OA, M
T 2" FOUL AIR
SC-1211
MICRO BAR SCREEN
SOLIDS BIN
6"-OF

OTHERS CLOACINA T 1
24VDC FM 1211 5Ø 2Ø M
WW . P-101 INFLUENT LIFT STATION (BY OTHERS)
WW Sch 80 PVC-WW-1008
X-Sch 80 PVC-WW-1008
1/2" BV SP
X X
OTHERS CLOACINA T
WW . P-112 FROM EQ
X-Sch 80 PVC-WW-1090

X-Sch 80 PVC-WW-? → WW . P-103 ANOXIC TANK 1R
X-Sch 80 PVC-WW-1009 → WW . P-103

LEGEND
PRESENT-M130
FUTURE-OPTIONAL

ISSUED FOR 70% COMPLETE
2022-05-09

NOTES:
1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A
SHEET: P-102
01 OF 01 SHEETS

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OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD

HMI
SCADA
LT 1411 AI
F 1411 R 1411 TO 1411 SF 1411 CTR 1411 DI DI DI DI DO
F 1412 R 1412 TO 1412 SF 1412 CTR 1412 DI DI DI DI DO
ORP 1411 AI
DO 1421 AI
HS 1411 HOA
HS 1412 HOA
AIT-1001 P-102 TRANSMITTER

UA . P-102 3/8"-SST-UA-5001 . → 3/8"-SST-UA-5001 UA . P-104
INSTRUMENTS DO-1530, SSS-1532 pH-1533

WW . P-102 X-Sch 80 PVC-WW-5022
SC-1211 FROM SCREEN OF

WW . P-102 X-Sch 80 PVC-WW-?
SC-1211 INLET FINE SCREEN

RAS . P-105 16"-SS150-RAS-4001
PRE-ANOXIC CHAMBER R

WW . P-104 6"-PVC-WW-43
AERATION TANK L

6" PV-102

T 7 OTHERS CLOACINA

T 2 CLOACINA OTHERS

1/4"x3/8" 1/4" BV 1/4" CK

HS 1411 OA HS 1412 OA

LT 1411 MX-1411 MX-1412 ORP 1411

FOUL AIR T .

2" OPEN CHANNEL 12"-SS 12" GA-1401 3" D T 14

ANOXIC TANK R

3/8" BV NaOH

1/4"x3/8" 1/4" BV 1/4" CK

4"x6" 6"x4"

DO 1421 3"D T 15

AERATION TANK R

CLOACINA OTHERS T 12R

3/8"-TUBING-NaOH-6009 → NaOH . P-108 .

6"-SS TUBING-PA-7005 → PA . P-111 . AERATION BLOWERS B-1421, B-1422

OPEN CHANNEL OPEN CHANNEL → WW . P-104 AERATION TANK L

12"-SS → WW . P-104 .

OF . P-112 EQ TANK

LEGEND
PRESENT-M130
FUTURE-OPTIONAL

ISSUED FOR 70% COMPLETE
2022-05-09

NOTES:

1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A
SHEET: P-103
01 OF 01 SHEETS

OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD

HMI
SCADA
FM 1451 AI

HMI
SCADA
DO 1451 AI

HMI
SCADA
pH 1452 AI

HMI
SCADA
NO3 1453 AI

HMI
SCADA
ORP 1454 AI

HMI
SCADA
LT 1451 AI

HMI
SCADA
F 1451 DI
CTR 1451 DI
CTR 1451 DO
SF 1451 DI
TO 1451 DI
SC 1451 AO

HMI
SCADA
F 1452 DI
R 1452 DI
TO 1452 DI
ST 1452 DI
CTR 1452 DO

AIT 1020

NTU-1601 P-108 CLEAR WELL NTU

NTU-1601 P-108 MEMPAC CONTROL PANEL 1000

HS 1451 OA

VFD

UA . P-103

3/8"-SST-UA-5001

3/8"-SST-UA-5001

1/4"x3/8"

1/4" BV

1/4" CK

3/8"x1/4"

OTHERS CLOACINA T 6

WW P-103 ANOXIC TANK R

6"

1/4" CK

FM 1451

2Ø 5Ø

M

1/4" BV

6"

ORIFICE PLATE (NOTE 2)

CLOACINA OTHERS T .

COD P-108 . P-1451

6"-SS TUBING-PA-7006

PA P-111 . AERATION BLOWERS B-1421, B-1422

T . FA

2"

WW . P-103 AERATION TANK R

OPEN CHANNEL

OPEN CHANNEL

OPEN CHANNEL

WW . P-105 FAS PUMPS: P-1611, P-1621

WW . P-103

12"

12"

12"

WW . P-105 FAS PUMPS

3"

T 16

DO 1451

pH 1452

M P-1451

LT 1451

M MX-1452

NO3 1453

ORP 1454

AERATION TANK L

ANOXIC TANK L

ISSUED FOR 70% COMPLETE

2022-05-09

NOTES:

1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.
2. ORIFICE HOLE SIZE 3.5625".

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-104

01 OF 01 SHEETS

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OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD

HMI | SCADA | LT 1601 AI | SSS 1601 AI | F R CTR SF TO SC 1611 DI DI DO DI DI AO | F R CTR SF TO SC 1621 DI DI DO DI DI AO | FM 1621 AI | FM 1611 AI | LSL 1611 DI | PT 1611 AI | R CTR 1614 DI DO | LSL 1621 DI | PT 1621 AI | R CTR 1624 DI DO | F R CTR TO SC 1911 DI DI DO DI AO | FM 1911 AI

VFD | HOA HS 1611 | HOA HS 1621 | HOA HS 1614 | HOA HS 1624 | HOA HS 1911

AIT-1001 P-101 TRANSMITTER

UA . P-102 — 3/8"-SST-UA-5005

WW . P-104 AERATION TANK 1M — OPEN CHANNEL

WW . P-104 ANOXIC TANK L — 12" — 12" GV

LT 1601 | SSS 1601 | HS 1611 OA | HS 1621 OA | VFD | VFD

1/4"x3/8" | 1/4" BV | 1/4" CK

P-1611 | P-1621

FAS CHAMBER (NOTE 2)

VENT 1" 1"x6" BV

FAS

FM 1611 | FM 1621 | 5Ø | 2Ø | M

6" | 6"x8" | 8"x6" | CK-1611 | CK-1621

T 19 | T 20 | T 21 | 3" DR

8" PV-1611 | 8" PV-1621

ORIFICE PLATE (NOTE 1)

6"-Sch 80 PVC-WW-1003

8"-Sch 80 PVC-WW-1004

MEMBRANE CHAMBERS

LF-FLOW | WEIR

MEM-1611 6"x4" | MEM-1621 4"x4"

PRE-ANOXIC CHAMBER

PVC | HOSE | HOSE | PVC

3/4"-Sch 80 PVC-PF-2007 | P-1614 | 3/4"-Sch 80 PVC-PF-2008

PT 1611 | 1/2" BV-1640 | 6"x3/4"

PVC | HOSE | HOSE | PVC

3/4"-Sch 80 PVC-PF-2009 | P-1624 | 3/4"-Sch 80 PVC-PF-2010

PT 1621 | 1/2" BV-1690 | 6"x3/4"

4"-Sch 80 PVC-PF-2001 — PF . P-106 PERMEATE PUMP P-1612

4"-Sch 80 PVC-PF-2003 — PF . P-106 PERMEATE PUMP P-1622

3"-SS-TUBING-PA-7001 — PA P-110 . MEMBRANE BLOWER B-1613

3"-SS-TUBING-PA-7002 — PA P-110 MEMBRANE BLOWER B-1623

3" CK-1631 | 3" CK-1651

16"-SS150-RAS-4001 — RAS . P-103 ANOXIC TANK R

1 1/2" BV-1911A | 1 1/2"-Sch 80 PVC-WAS-3001 | 2"x1 1/2" | M | P-1911 (WAS) | 2 1/2"x1" | 1" BV-1911B | 1" BV-1911C | 1"-Sch 80 PVC-WAS-3002

CLOACINA | OTHERS | T 4 | WAS P-401 SLUDGE TANK

ISSUED FOR 70% COMPLETE

2022-05-09

NOTES:

1. ORIFICE HOLE SIZES ARE AS FOLLOWS:

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE

DATE: 2022-04-26

DRAWN BY: JWL

JOB #: CL21-022

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ARROYO GRANDE, CA
PHONE: 888.483.8469
FAX: 888.483.6134
info@cloacina.com

CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-105

01 OF 01 SHEETS

C:\Users\JohnL\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek – CL21-022 MPAC MBR M-130\PID DWG\P-105.dwg – johnl – May 09, 2022 – 3:05pm

OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD

HMI
SCADA
CTO 1612 [DO]
VC 1612 [DI]
VO 1612 [DI]
HS 1612 HOA

HMI
SCADA
F 1612 [DI]
R 1612 [DI]
CTRF 1612 [DO]
CTRR 1612 [DO]
SC 1612 [AO]
VFD
HS 1612 HOA

HMI
SCADA
FM 1612 [AI]

HMI
SCADA
CTO 1622 [DO]
VC 1622 [DI]
VO 1622 [DI]
HS 1622 HOA

HMI
SCADA
F 1622 [DI]
R 1622 [DI]
CTRF 1622 [DO]
CTRR 1622 [DO]
SC 1622 [AO]
VFD
HS 1622 HOA

HMI
SCADA
FM 1622 [AI]

PF . P-105 — 4"-Sch 80 PVC-PF-2003 — MEMBRANE MEM-1621

CIT . P-109 — 3/8"-TUBING-CIT-6003 — CHEMICAL PUMP P-1601 — 1/2" BV — CIT

NaOCl . P-109 — 3/8"-TUBING-NaOCl-6007 — CHEMICAL PUMP P-1602 — 1/2" BV — NaOCl

PRV 1622 3" NOTE 1 2" TO DRAIN

PF . P-105 — 4"-Sch 80 PVC-PF-2001 — MEMBRANE MEM-1611

CIT . P-109 — 3/8"-TUBING-CIT-6002 — CHEMICAL PUMP P-1601 — 1/2" BV — CIT

NaOCl . P-109 — 3/8"-TUBING-NaOCl-6006 — CHEMICAL PUMP P-1602 — 1/2" BV — NaOCl

PRV 1612 3" NOTE 1 2" TO DRAIN

M — AV 1622 — 4" — 4"x6" — 6"x4" — 4" — BF-1622A — BF-1622B — 1/4" BV SP

FM 1622 — 24VDC — 5Ø — 5Ø — M

P-1622 (PERMEATE)

MEMBRANES SKID

4"-Sch 80 PVC-PF-2004 — PF . P-107 — CLEARWELL CHAMBER

M — AV 1612 — 4" — 4"x6" — 6"x4" — 4" — BF-1612-A — BF-1612-B — 1/4" BV SP

FM 1612 — 24VDC — 5Ø — 5Ø — M

P-1612 (PERMEATE)

MEMBRANES SKID

4"-Sch 80 PVC-PF-2002 — PF . P-107 — CLEARWELL CHAMBER

ISSUED FOR 70% COMPLETE

2022-05-09

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

NOTES:

1. RELIEF VALVE SHALL BE INSTALLED 4'-5" FROM GRADE ELEVATION TO CENTER LINE OF RELIEF VALVE OUTLET.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-106
01 OF 01 SHEETS

OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD

HMI

SCADA

NTU 1601 — AI

AIT-1002 P-104 TRANSMITTER

AIT-1002 P-104 TRANSMITTER

HMI

SCADA

LT 1604 — AI

HMI

SCADA

FM 1811 — AI

HMI

SCADA

VC 1802 — DI

AV 1802 — DI

CTO 1802 — DO

HS 1802 — HOA

HMI

SCADA

VC 1801 — DI

AV 1801 — DI

CTO 1801 — DO

HS 1801 — HOA

UA . P-102 — OFF PLOT

3/8"-SST-UA-5004

1/4"X3/8"

1/4" BV

1/4" CK

CLEAR WELL

1/4" SP

NTU 1601

1/2" BV-113

LT 1604

FM 1811 — 24VDC

5Ø 2Ø

XXX

M

X-Sch 80 PVC-PF-2007

OTHERS | CLOACINA

AV 1801 — M — .8"

T .

CLOACINA | OTHERS

WW . . — OFF-SPEC

AV 1802 — M — .8"

T 5

PF

PF . P-301 — EFFLUENT SYSTEM

PF . P-106 — PERMEATE PUMP P-1613

4"-Sch 80 PVC-PF-2002

4"-Sch 80 PVC-PF-2002

PF . P-106 — PERMEATE PUMP P-1623

4"-Sch 80 PVC-PF-2004

4"-Sch 80 PVC-PF-2004

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

NOTES:

1. RELIEF VALVE SHALL BE INSTALLLED 4'-5" FROM GRADE ELEVATION TO CENTER LINE OF RELIEF VALVE OUTLET.

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-107

01 OF 01 SHEETS

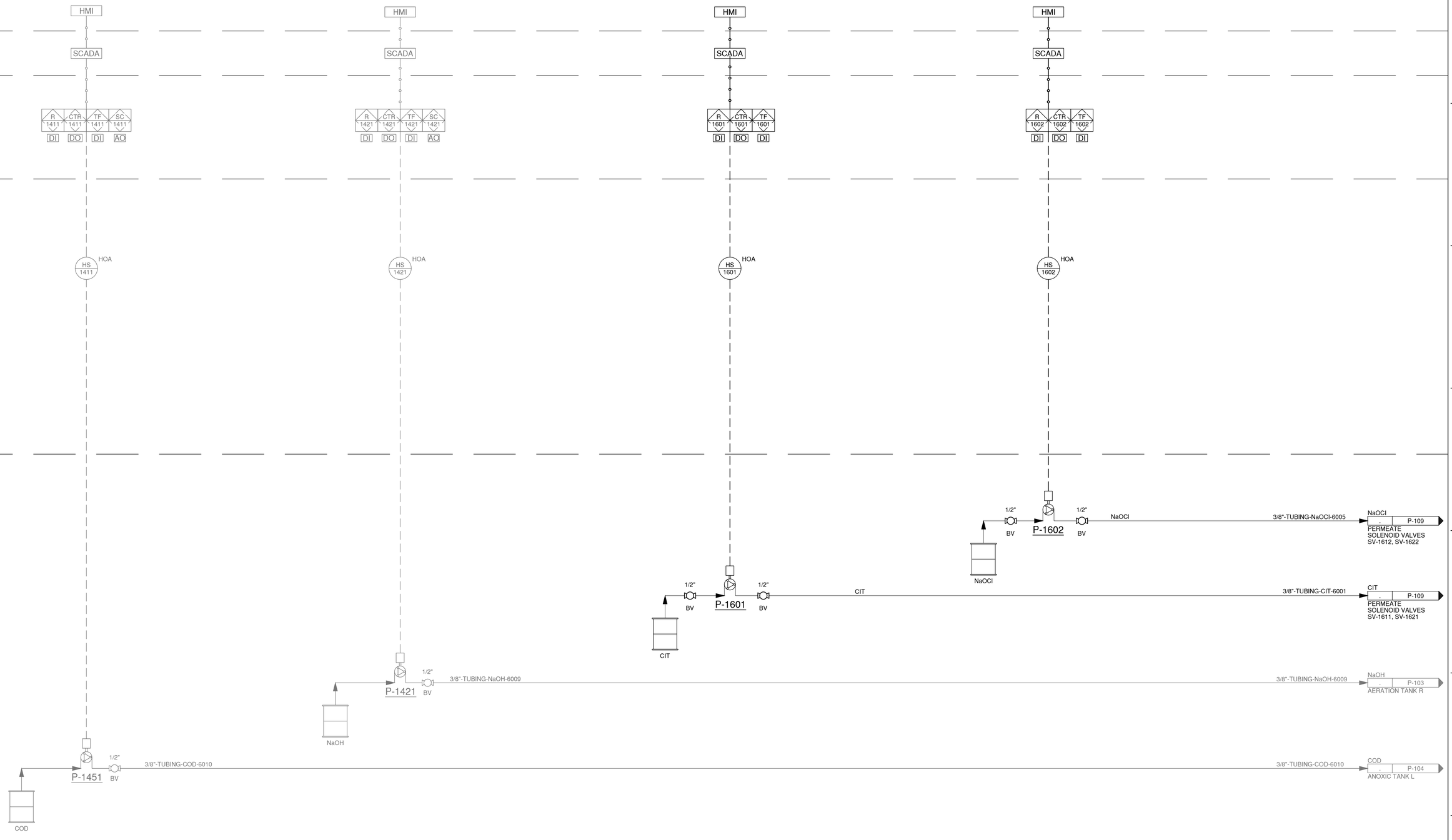
OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD



LEGEND

PRESENT-M130

FUTURE-OPTIONAL

NOTES:

1. CHEMICAL STORAGE AND CONVEYANCE TO MEMPAC BY OTHERS UNLESS OTHERWISE NOTED.
2. CHEMICAL PUMPS BY CLOACINA UNLESS OTHERWISE NOTED.

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-108
01 OF 01 SHEETS

C:\Users\JohnL\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek - CL21-022 MPAC MBR M-130\PID DWG\P-108.dwg - johnl - May 09, 2022 - 12:47pm

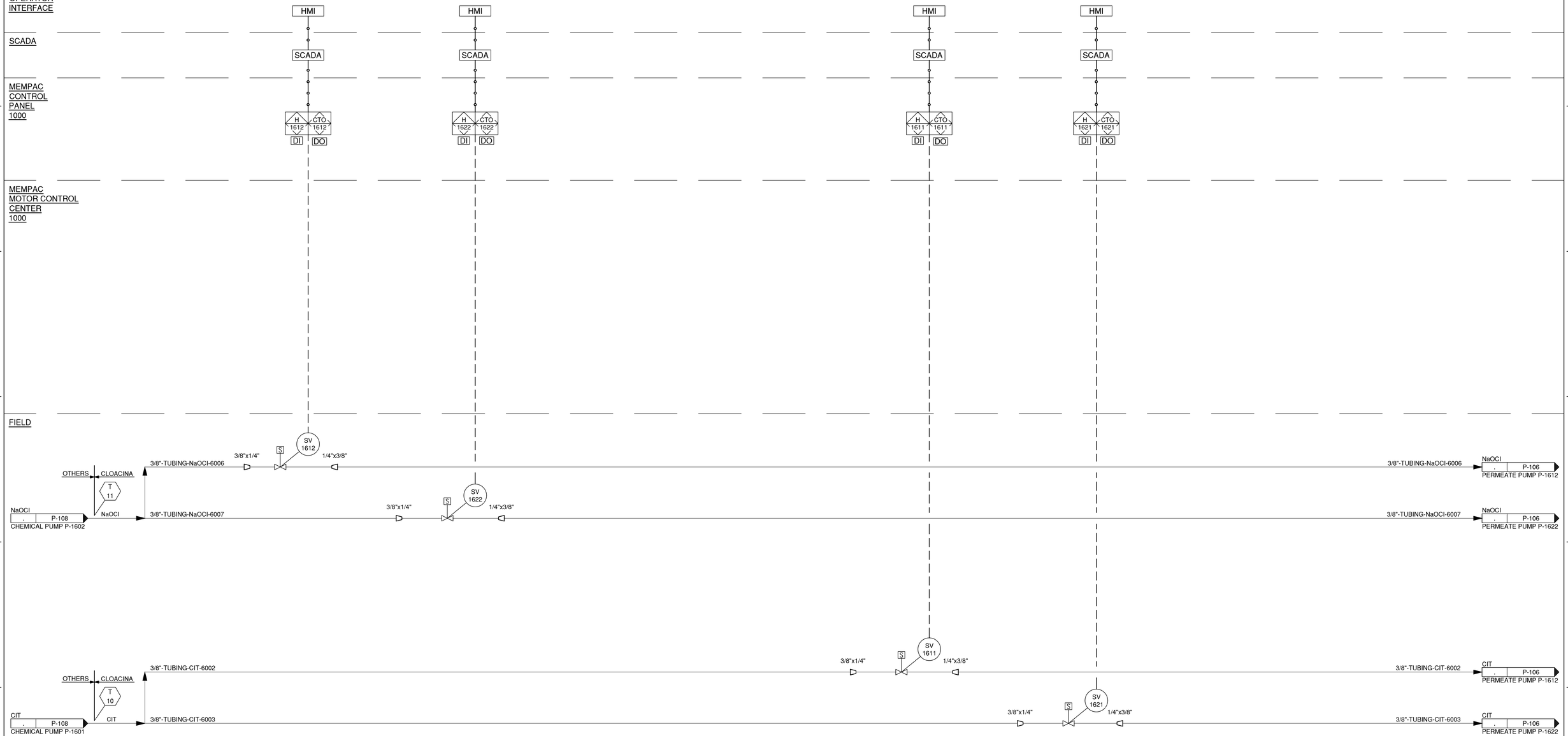
OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD



LEGEND

PRESENT-M130

FUTURE-OPTIONAL

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS					
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS	
		2022-05-09			

SCALE: NOT TO SCALE

DATE: 2022-04-26

DRAWN BY: JWL

JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-109

01 OF 01 SHEETS

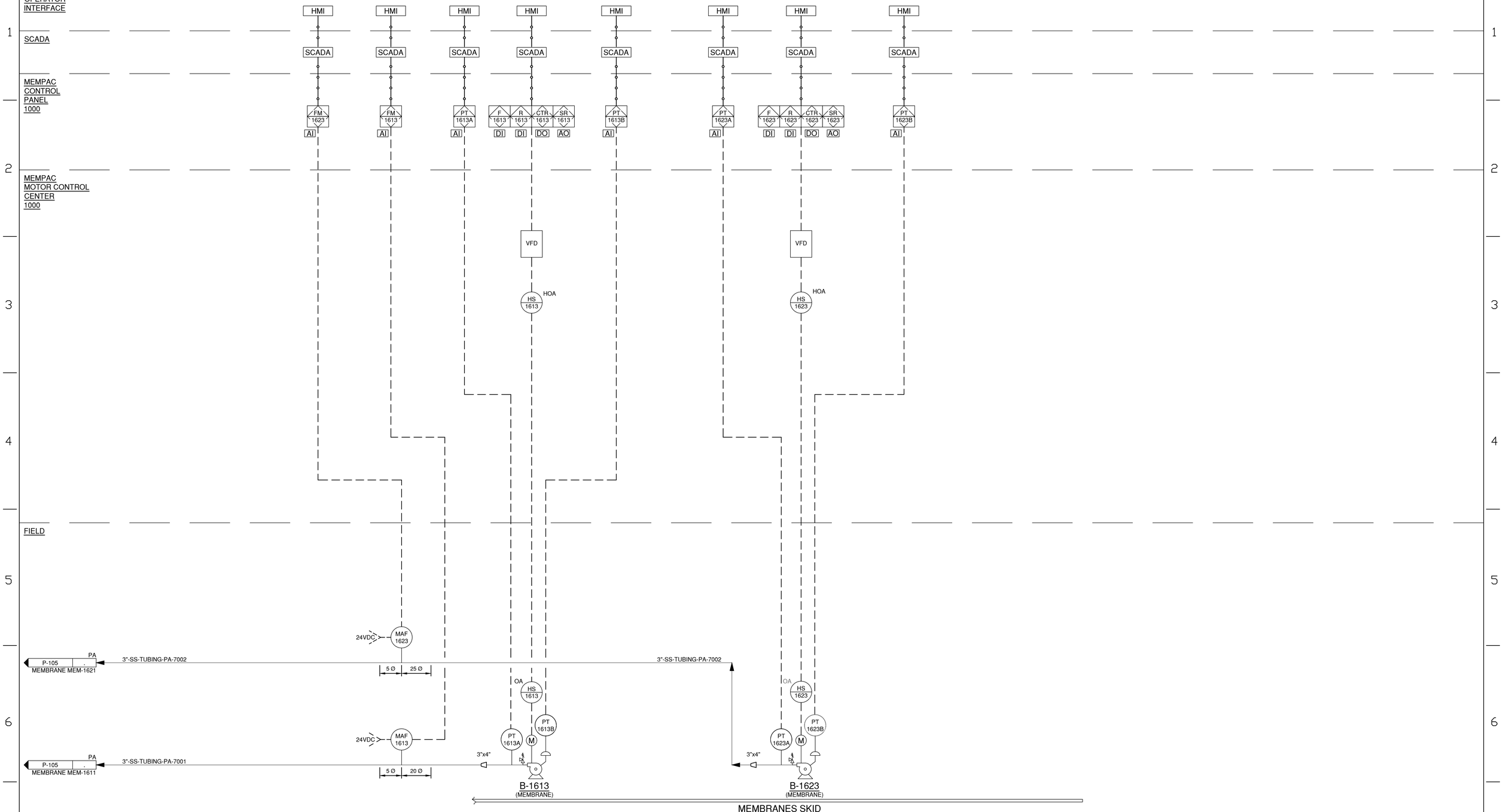
OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD



LEGEND

PRESENT-M130

FUTURE-OPTIONAL

ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE

DATE: 2022-04-26

DRAWN BY: JWL

JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-110

01 OF 01 SHEETS

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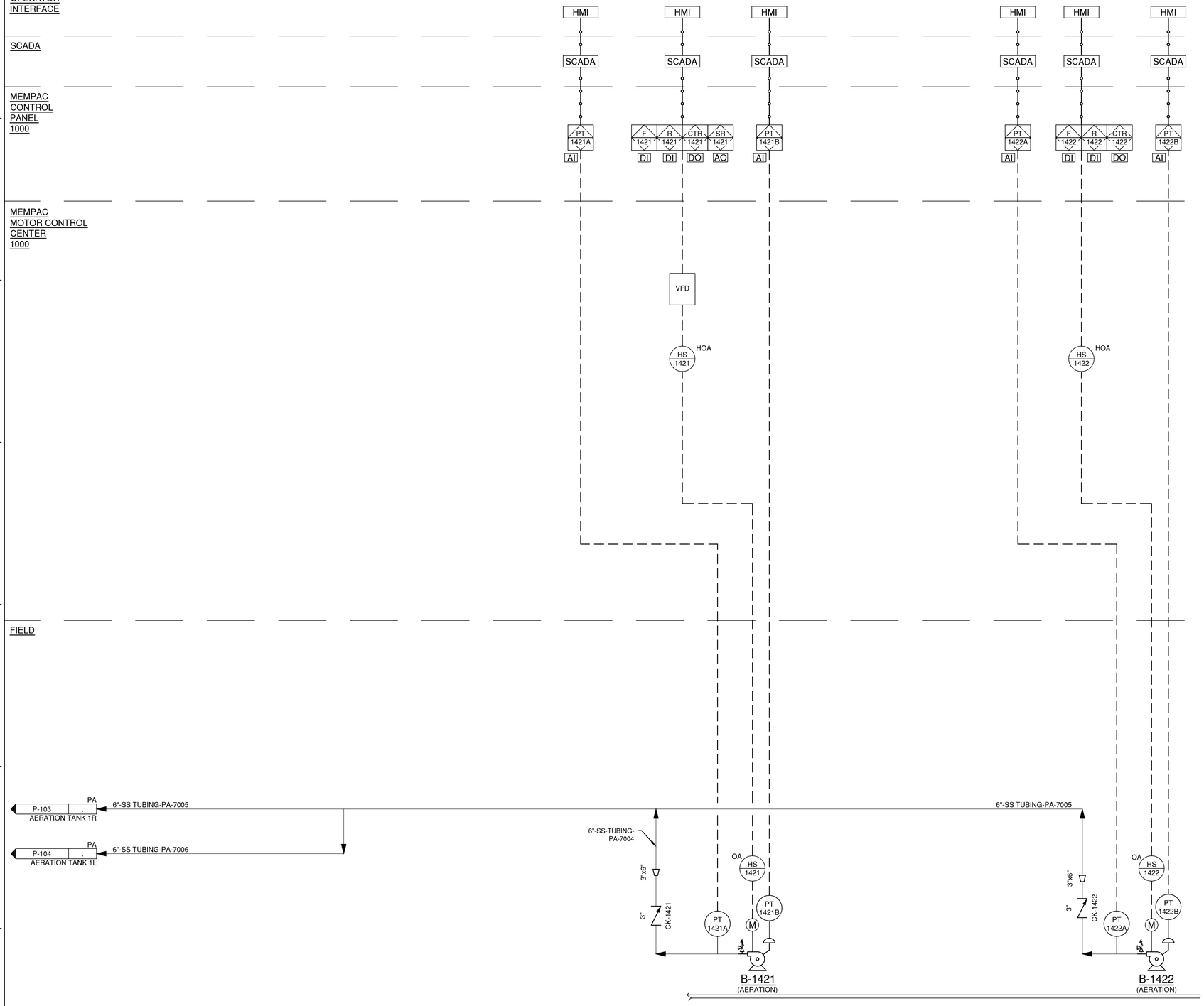
OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

MEMPAC MOTOR CONTROL CENTER 1000

FIELD



ISSUED FOR 70% COMPLETE

2022-05-09

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-111
01 OF 01 SHEETS

OPERATOR INTERFACE

SCADA

LIFT STATION CONTROL PANEL (BY CLOACINA)

LIFT STATION (MCC) MOTOR CONTROL CENTER (BY CLOACINA)

FIELD

HMI
SCADA
PT 0213A — AI
F 0213 — DI
R 0213 — DI
CTR 0213 — DO
PT 0213B — AI
LT 0200 — AI
LSHH 0104 — DI
R 0211 — DI
CTR 0211 — DO
F 0211 — DI
R 0212 — DI
CTR 0212 — DO
F 0212 — DI

HS 0213 HOA

OF - P-103
FROM ANOXIC TANK R

HS 0212 OA
PT 0213A
PT 0213B
M
B-0213

LT 0200
LE 0200
LF-HIGH-HIGH
P-0211 (SUBMERSIBLE) (NOTE 2)
P-0212 (SUBMERSIBLE) (NOTE 2)
EQ TANK (BY OTHERS)

VALVE VAULT (BY OTHERS)
DR

WW P-102
FINE SCREEN
SC-1211

LEGEND

PRESENT-M130
FUTURE-OPTIONAL

NOTES:

1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.
2. OTHERS TO PROVIDE PUMPS.

ISSUED FOR 70% COMPLETE
2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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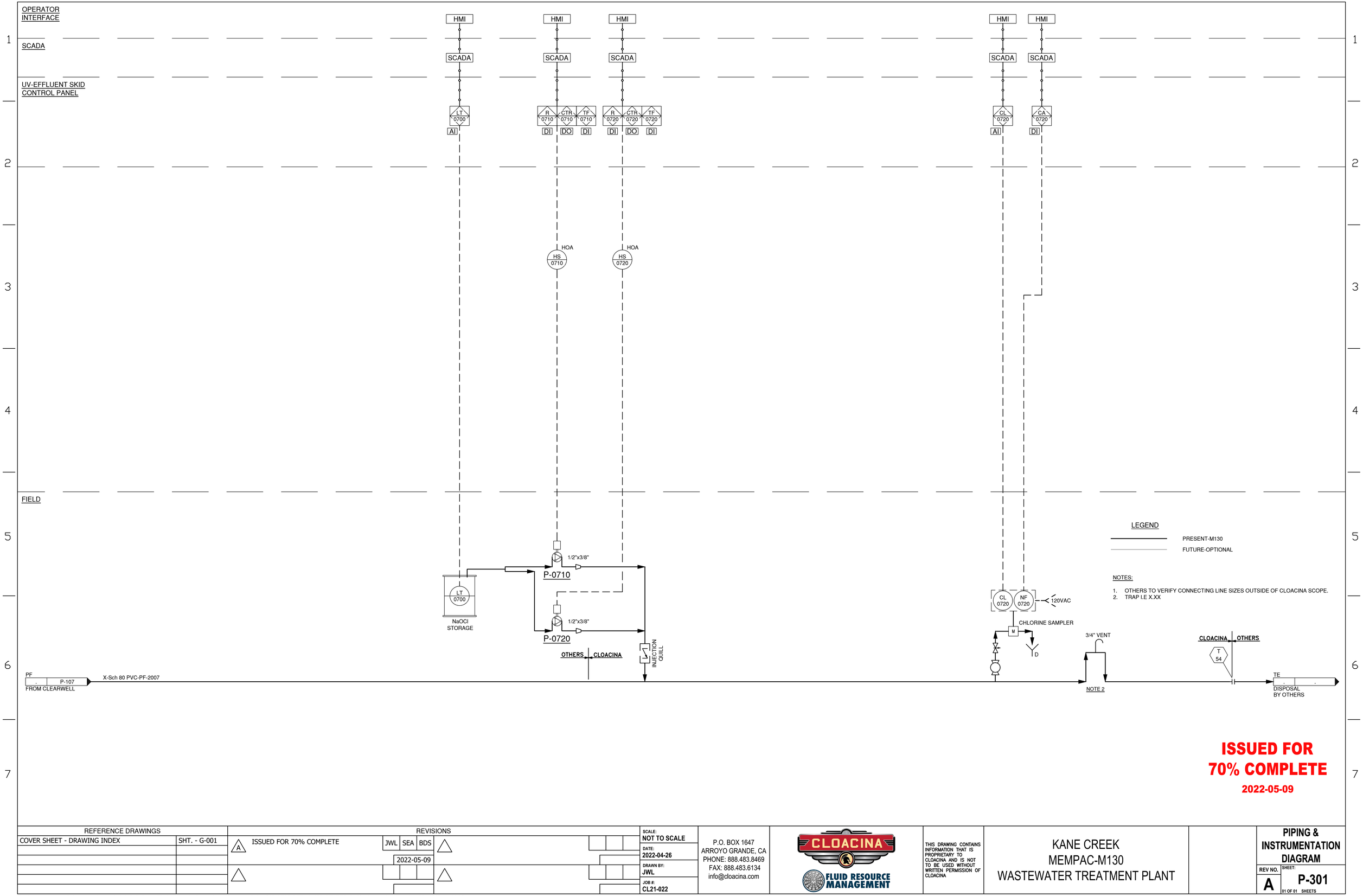
CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A
SHEET: P-112
01 OF 01 SHEETS

C:\Users\JohnL\AppData\Local\Autodesk\AutoCAD Plant 3D\CollaborationCache\Kane Creek – CL21-022 MPAC MBR M-130\PID DWG\P-112.dwg – johnl – May 09, 2022 – 3:08pm



ISSUED FOR 70% COMPLETE

2022-05-09

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS				
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS
		2022-05-09		

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA FLUID RESOURCE MANAGEMENT

KANE CREEK
MEMPAC-M130
WASTEWATER TREATMENT PLANT

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-301
01 OF 01 SHEETS

OPERATOR INTERFACE

SCADA

MEMPAC CONTROL PANEL 1000

FIELD

HMI
SCADA
LT 0910 AI

HMI
SCADA
PT 0910A AI

HMI
SCADA
F 0910 DI
R 0910 DI
CTR 0910 DO

HMI
SCADA
PT 0910B AI

HMI
SCADA
F 0910 DI
R 0910 DI
CTR 0910 DO

HS 0910 HOA

HS 0910 OA

PT 0910A

PT 0910B

M

B-0910

2"x1 1/2"

2"-SS-TUBING-PA-6013

OTHERS CLOACINA

T 26

UTILITY WATER
OFF-PLOT

1"-Sch 80 PVC-PW-6007

T 23

WAS
P-105
WAS PUMP P-1911

1"-Sch 80 PVC-WAS-3002
NOTE 4

2"
BV-105
(NOTE 5)

LT 0910

SLUDGE STORAGE

2 1/2"-Sch 80 PVC-WAS-5005

12"
3"x2 1/2"
BV-1910A

M

T 25

3" DR

P-0910

2 1/2"
CK-1910

2 1/2"
BV-1910B

2 1/2"-Sch 80 PVC-WAS-5006

OTHERS CLOACINA

2"-Sch 80 PVC-DR-9003

FM 0910
120VDC
5ø
2ø

DRUM
NEAT POLYMER
NOTE 2

T 63

T 64

1"x3/4"
3/4"
3/4"-Sch 80 PVC-UW-6008
3/4"x1"
3/4"
BV-1910C

NOTE 3

ITEMS ON PILOT SKID

DEWATERING SYSTEM CONTROL PANEL CP-DWS

ITEMS INCLUDED ON POLY SKID

JUNCTION BOX

DILN WATER SOLENOID VALVE

FLOWMETER

THERMAL FLOW SENSOR

DILN FLOW ADJUSTING VALVE

M

NEAT POLYMER PUMP

NEAT POLYMER CALIBRATION COLUMN

VELO-CHECK VALVE

MIXING CHAMBER

M

MIXER MOTOR

1"

1"-Sch 80 PVC-CI-7001

2 1/2"-Sch 80 PVC-WAS-5006

3/4"-Sch 80 PVC-PW-6007

SPRAY WASH VALVE

M

LSAH 02

SPRAY HEADS

M

DEWATERING PRESS

FLOW CONTROL TANK

FLOCCULATION TANK

2"
BV-1910D

2"-Sch 80 PVC-DR-9001

2"x4"

3"x4"

3"-Sch 80 PVC-DR-9002

SOLIDS BIN

DRAIN

T 24

DRAIN

CLOACINA OTHERS

2"-Sch 80 PVC-DR-9003

CLOACINA OTHERS

DRAINS TO
PLANT DRAINS
BY OTHERS

LEGEND

PRESENT-M130

FUTURE-OPTIONAL

ISSUED FOR 70% COMPLETE

2022-05-09

NOTES:

1. OTHERS TO VERIFY CONNECTING LINE SIZES OUTSIDE OF CLOACINA SCOPE.
2. NEAT POLYMER DRUM SUPPLIED BY OTHERS.
3. DEWATERING PRESS SCHEMATIC BY PWTECH.
4. WASTE ACTIVATED SLUDGE LINE TO BE INSTALLED WITH ELBOW SWEEPS AND CLEAN OUTS.
5. DRAIN MANIFOLD. TBD BY CLOACINA.

REFERENCE DRAWINGS	
COVER SHEET - DRAWING INDEX	SHT. - G-001

REVISIONS					
A	ISSUED FOR 70% COMPLETE	JWL	SEA	BDS	
		2022-05-09			

SCALE: NOT TO SCALE
DATE: 2022-04-26
DRAWN BY: JWL
JOB #: CL21-022

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CLOACINA
FLUID RESOURCE MANAGEMENT

KANE CREEK
DRYPAC - 25,000 GPD
SLUDGE HOLD & PRESS SYSTEM

PIPING & INSTRUMENTATION DIAGRAM

REV NO. A

SHEET: P-401
01 OF 01 SHEETS

Colorado River

Sample Location: 38.57526 -109.5787286

Activity Date	Time	CharacteristicName	Result Text	Result		DWQ
1981-01-29	14:00:00	Temperature, water	None	3	deg C	
1981-01-29	14:00:00	Temperature, air, deg C	None	7	deg C	
1981-01-29	14:00:00	Stream flow, instantaneous	None	3590	ft3/s	****
1981-01-29	14:00:00	Specific conductance	Total	1170	uS/cm @25C	
1981-01-29	14:00:00	Oxygen	Dissolved	12.4	mg/l	****
1981-01-29	14:00:00	pH	Total	8.2	std units	****
1981-01-29	14:00:00	pH	Total	8.1	std units	
1981-01-29	14:00:00	Total suspended solids	Non-filterable	16	mg/l	
1981-01-29	14:00:00	Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3)	Total	1.3	mg/l	****
1981-01-29	14:00:00	Organic Nitrogen	Total	0	mg/l	
1981-01-29	14:00:00	Ammonia and ammonium	Total	0.51	mg/l as N	****
1981-01-29	14:00:00	Kjeldahl nitrogen	Total	0.34	mg/l as N	
1981-01-29	14:00:00	Inorganic nitrogen (nitrate and nitrite)	Total	0.98	mg/l as N	****
1981-01-29	14:00:00	Phosphorus	Total	0.04	mg/l as P	
1981-01-29	14:00:00	Hardness, Ca, Mg	None	340	mg/l CaCO3	
1981-01-29	14:00:00	Calcium	Dissolved	84	mg/l	
1981-01-29	14:00:00	Magnesium	Dissolved	31	mg/l	
1981-01-29	14:00:00	Potassium	Dissolved	4.5	mg/l	
1981-01-29	14:00:00	Chloride	Dissolved	150	mg/l	
1981-01-29	14:00:00	Sulfate	Dissolved	270	mg/l	
1981-01-29	14:00:00	Total dissolved solids	Dissolved	763	mg/l	****
1981-01-29	14:00:00	Ammonia and ammonium	Total	0.17	mg/l NH4	****
1981-01-29	14:00:00	Phosphorus	Total	0.12	mg/l PO4	****
1981-01-29	14:00:00	Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3)	Total	5.8	mg/l NO3	****
1981-06-25	15:00:00	Temperature, water	None	27	deg C	
1981-06-25	15:00:00	Temperature, air, deg C	None	39.5	deg C	
1981-06-25	15:00:00	Stream flow, instantaneous	None	3550	ft3/s	****
1981-06-25	15:00:00	Specific conductance	Total	1120	uS/cm @25C	
1981-06-25	15:00:00	Oxygen	Dissolved	7.2	mg/l	****
1981-06-25	15:00:00	pH	Total	8.1	std units	****
1981-06-25	15:00:00	pH	Total	8.3	std units	
1981-06-25	15:00:00	Total suspended solids	Non-filterable	43	mg/l	
1981-06-25	15:00:00	Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3)	Total	1.2	mg/l	****
1981-06-25	15:00:00	Organic Nitrogen	Total	0.82	mg/l	
1981-06-25	15:00:00	Ammonia and ammonium	Total	0.09	mg/l as N	
1981-06-25	15:00:00	Kjeldahl nitrogen	Total	0.91	mg/l as N	
1981-06-25	15:00:00	Inorganic nitrogen (nitrate and nitrite)	Total	0.33	mg/l as N	****
1981-06-25	15:00:00	Phosphorus	Total	0.05	mg/l as P	****
1981-06-25	15:00:00	Hardness, Ca, Mg	None	350	mg/l CaCO3	
1981-06-25	15:00:00	Calcium	Dissolved	89	mg/l	
1981-06-25	15:00:00	Magnesium	Dissolved	30	mg/l	
1981-06-25	15:00:00	Potassium	Dissolved	3.8	mg/l	
1981-06-25	15:00:00	Chloride	Dissolved	120	mg/l	
1981-06-25	15:00:00	Sulfate	Dissolved	330	mg/l	
1981-06-25	15:00:00	Total dissolved solids	Dissolved	743	mg/l	****
1981-06-25	15:00:00	Ammonia and ammonium	Total	0.116	mg/l NH4	****
1981-06-25	15:00:00	Phosphorus	Total	0.15	mg/l PO4	****
1981-06-25	15:00:00	Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3)	Total	5.5	mg/l NO3	****