REQUEST FOR QUALIFICATIONS

FOR ENGINEERING SERVICES

FOR

FOR THE DESIGN

AND CONSTRUCTION OF THE

VISTA WWTP UPGRADES

DUE DATE AND TIME – April 28, 2023, 10:00 AM

Pagosa Area Water & Sanitation District. • 100 Lyn Ave • Pagosa Springs CO 81147 • 970 731-7641

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1. BOARD OF DIRECTORS

• Jim Smith	President/Chairman
• Glenn Walsh	Vice President
• Bill Hudson	Secretary
• Peter Hurley	Treasurer
• Gene Tautges	Director

2. KEY STAFF

• Aaron Burns	Director of Business Services
• Craig Swick	Electric/Instrumentation Manager
• Harry Lynk	Collections ORC
• Joe Hewett	Wastewater Treatment ORC
• Justin Ramsey	District Manager/Engineer
• Kyle Tjelmeland	GIS/City Works Coordinator

3. PROJECT BACKGROUND INFORMATION

3.1. SERVICE AREA

The Pagosa Area Water and Sanitation District (PAWSD) is a quasi-municipal corporation and political subdivision of the State of Colorado and is organized and operated pursuant to Title 32, Colorado Revised Statutes. PAWSD provides water supply and distribution services within its jurisdictional boundaries.

PAWSD encompasses approximately 70 square miles within Archuleta County in southwestern Colorado. It includes within its boundaries the Town of Pagosa Springs and unincorporated portions of Archuleta County, including the Pagosa Lakes resort community.

The PAWSD service area is broken into two districts. District 1 is the Pagosa Lakes area that can be generally described as running along Piedra Road and west to the Elk Park Ranch subdivision and runs north to the Eagle Peak subdivision and south to the southern end of the Meadows subdivision. District 2 is the area west of Piedra Road which includes the Town of Pagosa Springs and the Highway 84 corridor to the Loma Linda Subdivision and west along Highway 160 to the Log Park subdivision.

A map outlining the service area is included in Figure 1.

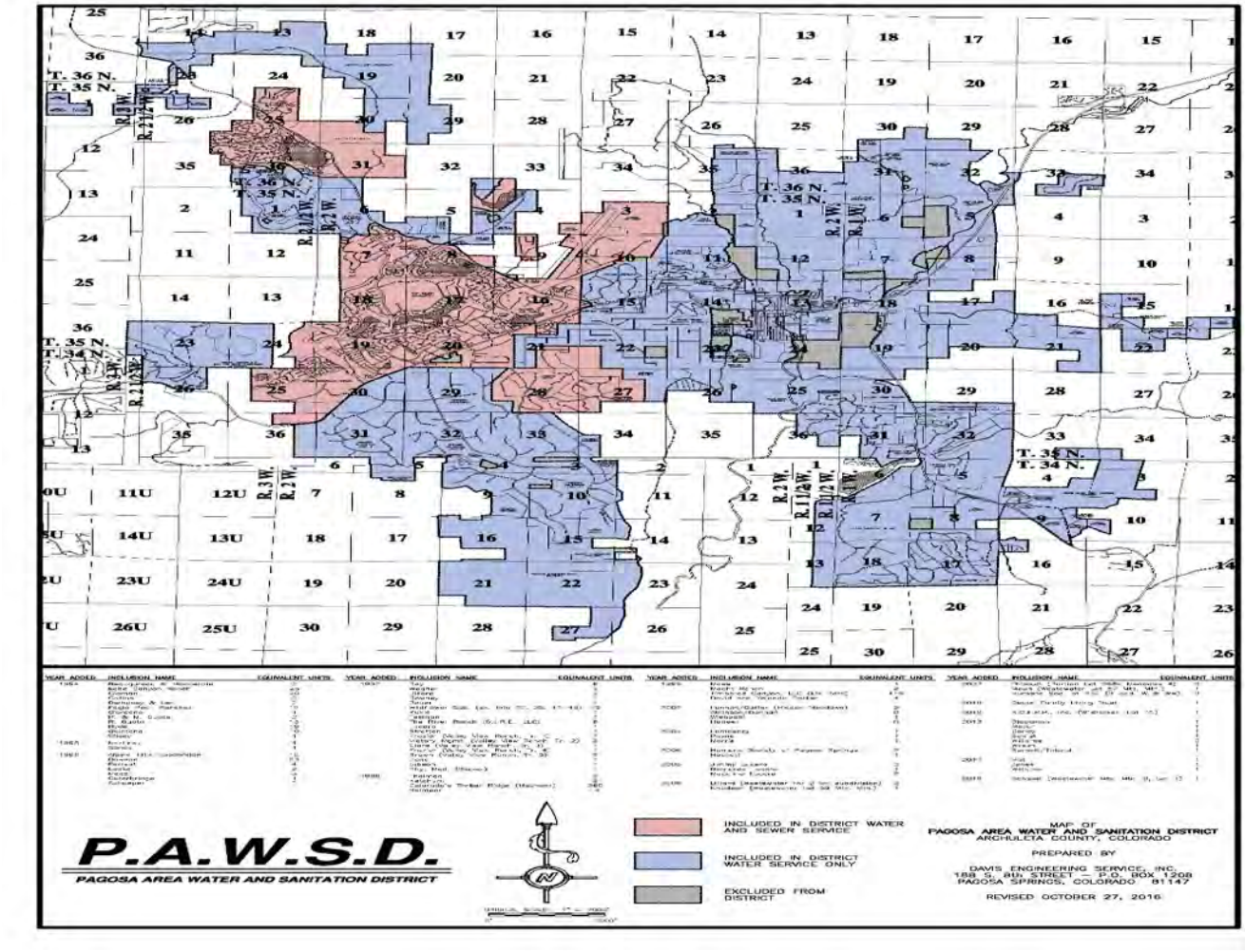

Figure 1 – Service Area

3.2. VISTA WASTEWATER TREATMENT PLANT

The existing Vista WWTP is rated by CDPHE for a maximum month (30-day average) flow and biochemical oxygen demand (BOD) organic load based on the time of year. For January through March, the capacity is 3.7 million gallons per day (MGD) for flow and 3,765 pounds per day (ppd) for BOD organic load. For April through December, the capacity is 3.9 MGD for flow and 3,906 ppd for BOD organic load.

The Vista WWTP's receiving streams are Stevens Draw, Martinez Creek, and Stollsteimer Creek (consecutively in that order). These streams are located in the San Juan River Basin and Piedra River Sub-Basin (Figure 2). Released effluent runs via an ephemeral stream to Stevens Draw, which is designated as Use Protected. Stevens Draw and its confluent rivers, Martinez Creek and Stollsteimer Creek, are classified as Aquatic Life Warm 2, Recreation Class P (potential primary contact use), Agriculture. Martinez Creek and

Stollsteimer Creek are designated as Reviewable for Anti-Degradation purposes and are also considered drinking water supply sources.

The Vista WWTP is currently operating under Discharge Permit Number CO0031755 with an effective date of July 31, 2019.

The Vista WWTP was originally put into operation in 2002 and upgraded and expanded in 2010. The plant is a typical activated sludge system consisting of:

- Headworks with automatic bar screen and grit removal
- 2 oxydation ditches
- 3 clarifies
- RAS/WAS pumping facilities
- Aerobic sludge digestion
- Sludge drying facility.

Figure 2 – Vista Wastewater Treatment Plant

4. STATEMENT OF QUALIFICATIONS

4.1. PURPOSE OF THE STATEMENT OF QUALIFICATIONS

The Pagosa Area Water and Sanitation District (PAWSD or District) is seeking Statements of Qualifications (SOQ's) from qualified engineering firms to prepare construction plans and supporting documents to upgrade the Vista WWTP to meet new discharge limitations as required by the current Discharge Permit (see Appendix A) specifically related to Regulation 85 and modifications or replacement to various treatment components. The design should allow for future modifications to meet Regulation 31 which will go into effect as early as 2027. The design will outline the most practical approach to meet current and future regulatory requirements. The design must take into account the requirement that the existing system must remain fully functional during construction of the plant upgrades. The selected engineer will also be responsible for CDPHE approval of the design documents.

It is the intent of PAWSD to use the selected firm to continue with the project after design has been completed and extend the contract for bidding assistance, construction oversight services and record drawing preparation. It is the intent of the District to move directly from a ranking of interested firms based on their SOQ's and subsequent interviews, to the development of a negotiated Scope of Work, Budget and a contract for services.

The District anticipates two phases of engineering work, each to be negotiated and awarded separately and sequentially. These phases are:

1. Preliminary design, final design and bid documents;
2. Bidding assistance, construction management and inspections.

Below are the anticipated services for all phases of the project.

- Civil Engineering;
- Electrical Engineering;
- Instrumentation and Control Engineering;
- Mechanical Engineering;
- Structural Engineering;
- Architectural Design;
- Geotechnical Engineering and Soils Laboratory Services;
- Water Chemistry Analysis
- Survey Services;
- Construction Cost Estimating;
- Construction Management/Oversight;
- Permitting Services.

4.2. ANTICIPATED SERVICES REQUIRED

The SOQ of interested engineering firms or teams shall state their qualifications to provide the above mentioned services:

4.3. COMPONENTS OF SOQ

The SOQ of interested engineering firms or teams shall state their qualifications to provide the following services:

A. Design of waste water treatment plants in compliance with all rules, regulations and requirements of the Colorado Department of Public Health and the Environment (CDPHE).
B. Design of waste water treatment plants in mountain communities with similar source water, weather and flow conditions.
C. Familiarly with Regulation 85 and 31.
D. Ability to complete design and bid process professionally and in a timely manner.
E. Ability to perform construction management and inspection during the project.
F. Ability to communicate to the District during design and construction phases.
G. Ability to aid the District in acquiring funding sources.
H. Understanding of construction practices related to the construction of a municipal WWTP.

4.4. COMPONENTS OF SELECTION

The following conditions will be outlined in the contract of the project:

A. The District will rate the top firms based on their Statement of Qualifications provided in the RFQ response and will interview, at a minimum, the top three firms.
B. The district will begin negotiating a Scope of Work for the project with the top ranked firm amongst the firms interviewed. Should the District be unable to reach agreement on the Scope of Work and cost for the project with the top-ranked firm it will proceed to negotiations with the second ranked firm, and so on.
C. The District expects that professionals identified in a firm's response to the RFQ will be the same professionals who will do the majority of the work during the creation of the scope of work, planning, and review phases of the project. Changes to any key members of this proposal will require District approval. Award of a contract is based on the qualifications of the team members provided in the response to this RFQ; therefore, failure of the firm or any subcontractor to commit these individuals, or District approved substitutes with comparable or higher skills without additional cost to the District, may be considered cause for termination of the contract.
D. The District expects that the engineering firms will show substantial experience with waste water treatment plant design and construction.
E. The District will maintain oversight of the project through all phases.

4.5. CRITERIA OF THE SOQ

The following criteria shall be fully addressed in the SOQ:

A. Firm's history and capability to perform the services identified;
B. Firm's financial stability and accountability;
C. Relevant project experience;
D. Qualifications of the Project Manager;
E. Qualifications of project team members;
F. Familiarity with waste water treatment plants similar in size and under the jurisdiction of the CDPHE;
G. Proximity of the Project Manager and team to Pagosa Springs CO and responsiveness of the Project Manager and team on project issues;
H. Project approach and schedule;
I. References;
J. Quality, clarity and briefness of the SOQ.

4.6. EVALUATION PROCESS

The evaluation will be based on information provided related to the selection criteria as follows:

		Points
A.	Firm's history and capability to perform the services identified;	10
B.	Firm's financial stability and accountability;	5
C.	Relevant project experience;	15
D.	Qualifications of the Project Manager;	10
E.	Qualifications of project team members;	10
F.	Familiarity with water treatment plants similar in size and under the jurisdiction of the CDPHE;	15
G.	Proximity of the Project Manager and team to Pagosa Springs CO and responsiveness of the Project Manager and team on project issues;	5
H.	Understanding of construction practices related to the construction of a municipal WWTP;	10
I.	References;	5
J.	Quality, clarity and briefness of the SOQ.	10
K.	Timeline of design and approval and estimated engineering fees and rates.	5

Scoring will be completed by a hiring committee consisting of District staff. The evaluations are at the sole discretion of the District and the Districts decisions in the evaluation process and moving forward with the development of a contract are final and not open to appeal.

4.7. PRIME ENGINEERING FIRM

It is recognized that several engineering firms may wish to combine their resources in responding to this RFQ. An SOQ with such a combination is acceptable and encouraged provided that the complete SOQ contains all the required information, and indicates which engineering firms shall be responsible for each of the components that make up the complete set of services. In addition, there must be a prime engineering firm designated to perform all implementation and project management activities such as project scheduling and coordination, communication, issue tracking, service delivery, integration, and implementation. All ongoing support, maintenance, changes and support contracts for the implemented services must be coordinated through the prime engineering firm.

The District will enter into a single contract with the prime engineering firm for the entire proposed services. The prime engineering firm is unilaterally liable for the success and ongoing support of the proposed services, regardless of other engineering firm dependencies. The prime engineer shall ensure all subcontractors abide by the rules of any funding agencies.

4.8. NON-OBLIGATION

Receipt of SOQs in response to this RFQ does not obligate the District in any way. The right to accept or reject any engineering firm shall be exercised solely by the District. PAWSD shall have the right to waive any defects in the SOQ at its sole option. PAWSD shall retain the right to abandon the RFQ/SOQ process at any time prior to the actual execution of a contract with an engineering firm, and the District shall bear no financial or other responsibility in the event of such abandonment.

4.9. BUSINESS AND PROFESSIONAL LICENSES

The successful engineering firm and all subcontractors are required to hold valid business and professional licenses and registrations required by the State of Colorado prior to submittal of the SOQ and such licenses and registrations must be maintained in current status throughout the term of the agreement for services.

4.10. INSURANCE

The engineering firm will hold harmless, indemnify and defend the PAWSD and its employees, agents, officers and servants from any and all lawsuits, claims, demands and causes of action of any kin arising from the negligent or intentional acts, errors or omissions of the engineering firm, its officers, employees or agents. This will include, but not be limited to, the amounts of judgments, penalties, interest, court costs, reasonable legal fees, and all other expenses incurred by PAWSD arising in favor of any party, including the amounts of any damages or awards resulting from claims, demands and causes of action for breach of fiduciary duty or malfeasance, personal injuries, death or damages to property.

During the term of this Agreement, the engineering firm shall: (i) maintain all insurance required by the State Workmen's Compensation Act or any other employee benefit law; (ii) provide broad form general liability and

property damage insurance in the minimum amount of $1,000,000 for bodily injury, death or damage to property of any person, and $2,000,000 for bodily injury, death or damage to property of more than one person, or such other greater amounts as may be specified in the Contract Documents for injuries, death, or damages which may arise out of or result from engineering firm's acts or omissions in performing the Project, designating District and as "additional insured" thereunder; Such certificates shall provide that coverages afforded thereunder shall not be cancelled until at least thirty (30) days' prior written notice has been given to District. (iii) Automobile insurance policies for bodily injury, including death, and property damage, including coverage for owned, hired or non-owned vehicles as applicable for the protection of the engineering firm and PAWSD in the coverage amount of $1,000,000. (iv) Maintain errors and omissions insurance in the amount not less than $2,000,000.

Successful engineering firm will be required to supply proof of insurance prior to commencing work on the project.

All policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds.

4.11. Taxes and Fees

PAWSD is exempt from federal and state taxes and will provide proof upon written request. If an engineering firm is required to pay any taxes or fees incurred as a result of doing business with the District, the engineering firm shall be solely responsible for payment of those taxes or fees.

4.12. Proprietary Information

PAWSD will attempt to protect legitimate trade secrets of the engineering firm. Any proprietary information contained in the engineering firm's SOQ must be clearly designated and shall be labeled with the words "Proprietary Information". Marking the entire SOQ or any one or more of the major sections as proprietary will not be permissible.

The engineering firm should be aware that the District is required by the Colorado Open Records Act to make certain records available for public inspection with certain exceptions. The engineering firm, by submission of materials marked proprietary, acknowledges and agrees that the District will have no obligation or liability to the engineering firm in the event that the District must disclose these materials. All pricing related materials will be a public record upon completion of this competitive process and the Notice of Award has been issued.

4.13. Contract Negotiations

Upon ranking of the interviewed engineering firms, contract negotiations shall commence. Contract negotiations will require the selected engineering firm to proceed with the development of a Scope of Work and cost for all the components of the project identified. If any engineering firm fails to provide the necessary Scope of Work and cost information for negotiations in a timely manner, does not negotiate in good faith,

cannot perform the contract for the project, or cannot reach an agreement on costs and/or scope of work with the District, the District may cancel negotiations with that engineering firm and commence negotiations with the next ranked engineering firm. If the District deems there is no engineering firm that is viable, it will re-bid the project.

All aspects of the scope of work, pricing and contract provisions may be subject to negotiation, except for contract provisions required by PAWSD or state statutes.

5. SOQ REQUIREMENTS

5.1. Submission Requirements

Provide six (6) complete proposals, and an electronic version to:

Pagosa Area Water and Sanitation District
CO Justin Ramsey
100 Lyn Avenue
Pagosa Springs, CO 81147

SOQ's must be received no later than April 28, 2023 at 10:00 a.m.

SOQ envelopes shall be marked with "RFQ-23-01 Vista WWTP" the name of the engineering firm and the date. If shipped UPS, FedEx or other courier service the project name must be clearly marked on the outside shipping label. Be aware 24 hour delivery guarantee for both UPS and FedEx is questionable to Pagosa Springs, PAWSD recommends sending via UPS or FedEx a minimum of 48 hours in advance.

5.2. Delivery of SOQ

Each SOQ must be received by the date and time as stated above. Please note that PAWSD does not always receive overnight delivery even when the courier guarantees delivery so plan accordingly.

5.3. SOQ Costs

Those submitting SOQ's do so entirely at their own expense. There is no expressed or implied obligation by the District to reimburse any individual or firm for any costs incurred in preparing or submitting a response to this RFQ, providing additional requested information or for participating in any selection interviews.

5.4. Acceptance

Submission of any SOQ indicates acceptance of the conditions contained in the RFQ unless clearly and specifically noted otherwise in the SOQ. Exceptions that were not first submitted requesting clarifications or changes will be considered to be without merit.

5.5. CLARIFICATIONS

All questions regarding the RFQ must be submitted in writing (emails acceptable) to Justin Ramsey (justin@pawsd.org). All questions must be submitted prior to April 24, 2023, questions submitted after that date will not be answered.

All questions received will be posted along with answers on the PAWSD website (www.pawsd.org). Final posting to the website will be on April 24, 2023.

5.6. MANDATORY PRE-SOQ CONFERENCE/TOUR

There will be no mandatory Pre-SOQ Conference/Tour however PAWSD recommends interested firms meet with PAWSD staff on-site prior to RFQ submittal to discuss local complexities of the facility.

5.7. SOQ REJECTIONS

PAWSD reserves the right to reject any and all SOQ's, to waive any and all informalities and to disregard all non-conforming, non-responsive or conditional SOQ's. SOQ's, whether accepted or rejected, will not be returned to the engineering firm.

6. SOQ FORMAT

6.1. SUBMISSION INSTRUCTIONS

Each engineering firm is required to submit, in a sealed package or box, six (6) complete proposals to their SOQ and one electronic version in .DOC or .PDF format.

In order to facilitate the analysis of responses to this RFQ, engineering firms are required to prepare their SOQ's in accordance with the instruction outlined in this section.

Engineering firms whose SOQ's deviate from these instructions may be considered non-responsive and may be disqualified.

SOQ's should be prepared as simply as possible and provide a straightforward, concise description of the engineering firm's capabilities to satisfy the requirements of the RFQ. Excessive length will be reflected in evaluation of the SOQs.

Expensive bindings, color displays, promotional material, etc., are not necessary, nor desired. Emphasis should be concentrated on accuracy, completeness, and clarity of content. All parts, pages, figures and tables should be numbered and clearly labeled.

6.2. SOQ FORMAT

6.2.1. Letter of Transmittal and Certification of Statement of Qualifications

Provide a letter which includes the complete name of the firm or firms submitting the SOQ, the main office address or addresses, primary and secondary contact persons and their respective telephone numbers and email addresses. The letter should have attached the Certification of Statement of Qualifications (Appendix A).

6.2.2. Executive Summary

The Executive Summary should be a brief narrative highlighting the engineering firms SOQ. The summary should contain as little technical jargon as possible and should be oriented toward non-technical personnel. The Executive Summary should not exceed two single sided pages.

6.2.3. Company Profile

Engineering firms and their subcontractors (if any) must provide information about their company so the District can evaluate the engineering firm's stability and ability to support the commitments of the contract. PAWSD, at its option, may require an engineering firm to provide additional support and/or clarify requested information. Provide the business name, address, principal place of business, and telephone number of the legal entity or individual with which a contract would be written. Provide an overview of the firm, including the main features and benefits of your services and how they address this project.

6.2.4. Engineering Firm Team Qualifications

The prime engineering firm must identify its, and its subcontractors (if any), professional staff members who would be personally involved in the project, including each person's prior relevant experience in designing, implementing, and supporting similar projects. Indicate the location of the office where each normally works. Engineering firms must provide resumes of key team members and describe their proposed project organization and staffing.

PAWSD expects that the key individuals identified in the SOQ will be assigned to the project. SOQ's must commit these individuals to the project and the District reserves the right to approve any substitutions for these individuals.

Engineering firms selected for onsite interviews must include a Project Manager as part of the interview team. This Project Manager will be identified in the RFQ response and it is the expectation of the District that this manager will lead actual implementation if a contract is awarded.

6.2.5. References

Engineering firms should provide at least three (3) client references from similar sized entities within Colorado.

6.2.6. Addenda Acknowledgements

If revisions become necessary, the District will provide written addenda to this RFQ.

APPENDIX A

CERTIFICATION OF STATEMENT OF QUALIFICATIONS

RFQ Title: RFQ-23-01 Vista Waste Water Treatment Plant
Due Date: April 28, 2023 10:00 a.m.

I, the undersigned, having carefully examined the above referenced RFQ document, and all other related materials and information, including addenda number _____ to _____, agree to furnish services to the Pagosa Area Water and Sanitation District (District) as per this Request for Qualifications and my Statement of Qualifications. This Statement of Qualifications (SOQ) to provide services related to RFQ-20-01 will remain in effect for a period of not less than ninety (90) days from the date that SOQ's are due.

I further agree that I will at all times protect the Districts information and not make it available to any other source than the District, unless so directed by the District in writing.

Is this SOQ, or a portion thereof, is accepted by the District, I agree to enter into negotiations with the District to develop a Scope of Work and Budge for the services being requested in this RFQ.

I hereby certify that this SOQ is genuine and that I have not entered into collusion with any other proposer(s0, engineering firm(s) or any other person(s).

_____	_____
Authorized Signer	Date
_____	_____
Printed Name	Phone Number
_____	_____
Title	Tax Identification/SS
_____	_____
Company Name	Address
	_____
	City, State, Zip Code

APPENDIX B

DISCHARGE PERMIT

STATE OF COLORADO

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
Water Quality Control Division

AUTHORIZATION TO DISCHARGE UNDER THE
COLORADO DISCHARGE PERMIT SYSTEM
PERMIT NUMBER CO0031755

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended), for both discharges to surface and ground waters, and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act"), for discharges to surface waters only, the

Pagosa Area Water and Sanitation District

is authorized to discharge from the facility's wastewater treatment plant located at SE 1/4 of the NW 1/4 of S19, T35N, R2W 1/2 W, N.M.P.M.; 100 Lyn Ave in Pagosa Springs, CO; at 37.25525° latitude N and 107.10243° longitude W

to Stevens Draw, Martinez Creek, and Stollsteimer Creek

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I and II hereof. All discharges authorized herein shall be consistent with the terms and conditions of this permit.

The applicant may demand an adjudicatory hearing within thirty (30) calendar days of the date of issuance of the final permit determination, per the Colorado State Discharge Permit System Regulation 61.7(1). Should the applicant choose to contest any of the effluent limitations, monitoring requirements or other conditions contained herein, the applicant must comply with Section 24-4-104 CRS 1973 and the Colorado State Discharge Permit System Regulations. Failure to contest any such effluent limitation, monitoring requirement, or other condition, constitutes consent to the condition by the applicant.

This permit and the authorization to discharge shall expire at midnight, July 31, 2024.

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Meg Parish

Meg Parish, Permits Section Manager
Water Quality Control Division

PERMIT ACTION SUMMARY:

MODIFICATION 1: Issued July 31, 2019 Effective July 31, 2019 (Part I.A.2)
ORIGINALLY ISSUED: June 28th, 2019 Effective Date: August 1, 2019

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PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Permitted Feature(s)

Beginning no later than the effective date of this permit and lasting through the expiration date, the permittee is authorized to discharge from, and self-monitoring samples taken in accordance with the monitoring requirements shall be obtained from permitted feature(s):

001A, following UV disinfection and prior to mixing with Stevens Draw 37.25575 latitude N, 107.10371 longitude W

The location(s) provided above will serve as the point(s) of compliance for this permit and are appropriate as they are located after all treatment and prior to discharge to the receiving water. Any discharge to the waters of the State from a point source other than specifically authorized by this permit is prohibited.

In accordance with the Water Quality Control Commission Regulations for Effluent Limitations, Section 62.4, and the Colorado Discharge Permit System Regulations, Section 61.8(2), 5 C.C.R. 1002-61, the permitted discharge shall not contain effluent parameter concentrations which exceed the limitations specified below or exceed the specified flow limitation.

2. Limitations, Monitoring Frequencies and Sample Types for Effluent Parameters

In order to obtain an indication of the probable compliance or noncompliance with the effluent limitations specified in Part I.A, the permittee shall monitor all effluent parameters at the frequencies and sample types specified below. Such monitoring will begin immediately and last for the life of the permit unless otherwise noted. The results of such monitoring shall be reported on the Discharge Monitoring Report form (See Part I.D.)

Self-monitoring sampling by the permittee for compliance with the effluent monitoring requirements specified in this permit, shall be performed at the location(s) noted in Part I.A.1 above. If the permittee, using an approved analytical method, monitors any parameter more frequently than required by this permit, then the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (DMRs) or other forms as required by the Division. Such increased frequency shall also be indicated.

Percentage Removal Requirements- If noted in the limits table(s), the arithmetic mean of the BOD5 and TSS concentrations for effluent samples collected during the DMR reporting period shall demonstrate a minimum of eighty-five percent (85%) removal of both BOD5 and TSS, as measured by dividing the respective difference between the mean influent and effluent concentrations for the DMR monitoring period by the respective mean influent concentration for the DMR monitoring period, and multiplying the quotient by 100.

Oil and Grease Monitoring: For every outfall with oil and grease monitoring, in the event an oil sheen or floating oil is observed, a grab sample shall be collected and analyzed for oil and grease, and reported on the appropriate DMR under parameter 03582. In addition, corrective action shall be taken immediately to mitigate the discharge of oil and grease. A description of the corrective action taken should be included with the DMR.

Total Residual Chlorine: Monitoring for TRC is required only when chlorine is in use.

Flow Recording Device: For this facility, flow recording devices are provided and located at the point of inflow and discharge from the treatment plant.

Metals: Metals concentrations measured in compliance with the effluent monitoring requirements listed in Part I.A of this permit may be used to satisfy any pretreatment or industrial waste management metals monitoring requirements listed in Part I.B.7, if the metals are in the same form (i.e. total). Sampling must be conducted in accordance with Part I.B.7.

Permitted Feature/Limit Set 001A

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations				Monitoring Requirements	
		30-Day Average	7-Day Average	Daily Maximum	2-Year Average	Frequency	Sample Type
50050	Effluent Flow (MGD) (Jan-Mar)	3.7		Report		Continuous	Recorder
50050	Effluent Flow (MGD) (Apr-Dec)	3.9		Report		Continuous	Recorder
00400	pH (su)			6.5-9.0		Daily	Grab
51040	*E. coli* (#/100 ml)	205	410			2 Days/Month	Grab
50060	TRC (mg/l)	0.011		0.019		Daily	Grab
00640	Total Inorganic Nitrogen as N (mg/l) until 12/31/2024			Report		3 Days/Week	Composite
	Total Inorganic Nitrogen as N (mg/l) beginning 1/1/2025			10		3 Days/Week	Composite
00610	Total Ammonia as N (mg/l)						
	January	6.4		22		3 Days/Week	Composite
	February	6.1		23		3 Days/Week	Composite
	March	4.7		23		3 Days/Week	Composite
	April	4.7		26		3 Days/Week	Composite
	May	4.1		26		3 Days/Week	Composite
	June	3.6		26		3 Days/Week	Composite
	July	3.0		29		3 Days/Week	Composite
	August	3.2		29		3 Days/Week	Composite
	September	3.5		29		3 Days/Week	Composite
	October	3.4		29		3 Days/Week	Composite
	November	4.9		26		3 Days/Week	Composite
	December	6.3		22		3 Days/Week	Composite
00310	BOD5, effluent (mg/l)	30	45			2 Days/Month	Composite
81010	BOD5 (% removal)	85 (min)				Monthly	Calculated
00530	TSS, effluent (mg/l)	30	45			2 Days/Month	Composite
81011	TSS (% removal)	85 (min)				2 Days/Month	Calculated
84066	Oil and Grease (visual)			Report		Daily	Visual
03582	Oil and Grease (mg/l)			10		Contingent	Grab
70295	TDS (mg/l)[1]						
70295 3	PWS intake (mg/l)	Report		Report		2 Days/Month	Composite
70295	WWTF effluent (mg/l)	Report		Report		2 Days/Month	Composite

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations				Monitoring Requirements	
		30-Day Average	7-Day Average	Daily Maximum	2-Year Average	Frequency	Sample Type
00978	As, TR (µg/l)	Report				2 Days/Month	Composite
01309	As, PD (µg/l)			Report		2 Days/Month	Composite
01113	Cd, TR (µg/l) until 7/31/2021			Report		2 Days/Month	Composite
01113	Cd, TR (µg/l) beginning 8/1/2021			Report	Report	2 Days/Month	Composite
01313	Cd, PD (µg/l)	Report		Report		2 Days/Month	Composite
04262	Cr+3, TR (µg/l) until 7/31/2021			Report		2 Days/Month	Grab
04262	Cr+3, TR (µg/l) beginning 8/1/2021			Report		2 Days/Month	Grab
01314	Cr+3, PD (µg/l)	Report				2 Days/Month	Grab
01220	Cr+6, Dis (µg/l)	Report		Report		2 Days/Month	Grab
01306	Cu, PD (µg/l)	26		44		Quarterly	Composite
00718	CN, WAD (µg/l)			Report		2 Days/Month	Grab
01046	Fe, Dis (µg/l)	Report				2 Days/Month	Composite
00980	Fe, TR (µg/l)	169				Monthly	Composite
01114	Pb, TR (µg/l) until 7/31/2022			Report		2 Days/Month	Composite
01114	Pb, TR (µg/l) beginning 8/1/2022			Report	Report	2 Days/Month	Composite
01114	Pb, TR (µg/l) beginning 8/1/2024			Report	7.5	2 Days/Month	Composite
01318	Pb, PD (µg/l) until 7/31/2022	Report		Report		2 Days/Month	Composite
01318	Pb, PD (µg/l) beginning 8/1/2022	4.6		248		2 Days/Month	Composite
01319	Mn, PD (µg/l), AQ until 7/31/2021	Report		Report		2 Days/Month	Composite
01319	Mn, PD (µg/l), AQ beginning 8/1/2021	Report		Report	Report	2 Days/Month	Composite
01056	Mn, Dis (µg/l), WS until 7/31/2022	Report				2 Days/Month	Composite
01056	Mn, Dis (µg/l), WS beginning 8/1/2022	50				2 Days/Month	Composite
01129	Mo, TR (µg/l) until 7/31/2021	Report				2 Days/Month	Composite
01129	Mo, TR (µg/l) beginning 8/1/2021	Report			Report	2 Days/Month	Composite
50092	Hg, Tot (µg/l)	0.01				2 Days/Month	Composite
01074	Ni, TR (µg/l) until 7/31/2021	Report				2 Days/Month	Composite
01074	Ni, TR (µg/l) beginning 8/1/2021	Report			Report	2 Days/Month	Composite

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations				Monitoring Requirements	
		30-Day Average	7-Day Average	Daily Maximum	2-Year Average	Frequency	Sample Type
01322	Ni, PD (µg/l) until 7/31/2021	Report		Report		2 Days/Month	Composite
01322	Ni, PD (µg/l) beginning 8/1/2021	Report		Report	Report	2 Days/Month	Composite
01323	Se, PD (µg/l) until 7/31/2022	Report		Report		2 Days/Month	Composite
01323	Se, PD (µg/l) beginning 8/1/2022	2.1		18		2 Days/Month	Composite
01304	Ag, PD (µg/l) until 7/31/2021	Report		Report		2 Days/Month	Composite
01304	Ag, PD (µg/l) beginning 8/1/2021	Report		Report	Report	2 Days/Month	Composite
01303	Zn, PD (µg/l)	Report		Report	Report	Quarterly	Composite
00940	Chloride (mg/l)	Report				2 Days/Month	Composite
81020	Sulfate (mg/l)	Report				2 Days/Month	Composite
51202	Sulfide as H2S (mg/l)	Report				2 Days/Month	Composite
51568	Nonylphenol (µg/l) until 7/31/2022	Report		Report		2 Days/Month	Grab
51568	Nonylphenol (µg/l) beginning 8/1/2022	5.0		28		2 Days/Month	Grab
	WET, chronic						
TKP6C	Static Renewal 7 Day Chronic *Pimephales promelas*			NOEC or IC25 ≥ IWC*		Quarterly	3 Composites/Test
TKP3B	Static Renewal 7 Day Chronic *Ceriodaphnia dubia*			NOEC or IC25 ≥ IWC*		Quarterly	3 Composites/Test

* IWC = 100%
1 TDS measurements only required when the discharge is in the Colorado River Basin. Samples are to be of the raw water supply. If more than one source is being utilized, a composite sample proportioned to flow shall be prepared from individual grab samples.

Permitted Feature/Limit Set 001A, continued

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations[1]		Monitoring Requirements	
		Running Annual Median*	95th percentile**	Frequency	Sample Type
00640	Total Inorganic Nitrogen (mg/l) until 12/31/2025**	Report	Report	Monthly	Composite
00640	Total Inorganic Nitrogen (mg/l) beginning 1/1/2026	15	20	Monthly	Composite
00665	Total Phosphorus (mg/l), until 12/31/2025	Report	Report	Monthly	Composite
00665	Total Phosphorus (mg/l), beginning 1/1/2026	1.0	2.5	Monthly	Composite

[1] Note that 12 months of data collection after the effective date is needed prior to reporting.
* Reported as a running annual median, which is a median of all samples collected in the most recent 12 calendar months including samples collected in accordance with Regulation 85.
** Reported as the 95th percentile of all samples taken in the most recent 12 calendar months including samples collected in accordance with Regulation 85.

Permitted Feature 001 Limit Set P

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations, Daily Max	Frequency	Sample Type
01002	Total Arsenic, µg/l	Report	Annually	Composite
01027	Total Cadmium, µg/l	Report	Annually	Composite
01034	Total Chromium, µg/l	Report	Annually	Composite
01042	Total Copper, µg/l	Report	Annually	Composite
01051	Total Lead, µg/l	Report	Annually	Composite
71900	Total Mercury, µg/l	Report	Annually	Composite
01062	Total Molybdenum, µg/l	Report	Annually	Composite
01067	Total Nickel, µg/l	Report	Annually	Composite
01147	Total Selenium, µg/l	Report	Annually	Composite
01077	Total Silver, µg/l	Report	Annually	Composite
01092	Total Zinc, µg/l	Report	Annually	Composite
00720	Total Cyanide, µg/l	Report	Annually	Grab
03604	Total Phenols, µg/l	Report	Annually	Composite

3. Monitoring Frequency and Sample Type Influent Parameters

Regardless of whether or not an effluent discharge occurs and in order to obtain an indication of the current influent loading as compared to the approved capacity specified in Part I.A.3 and Part I.B.2; the permittee shall monitor influent parameters at the following required frequencies, the results to be reported on the Discharge Monitoring Report (See Part I.D):

If the permittee monitors any parameter more frequently than required by the permit, using an approved test procedure or as specified in the permit, the result of this monitoring shall be included in the calculation and reporting of data to the Division.

Self-monitoring samples taken in compliance with the monitoring requirements specified below shall be taken at the following location(s): Outfall 3001, at a representative point prior to biological treatment.

Permitted Feature 300I

ICIS Code	Parameter	Discharge Limitations Maximum Concentrations			Monitoring Frequency	Sample Type
		30-Day Average	7-Day Average	Daily Max.		
50050 G	Flow, mgd	Report		Report	Continuous	Recorder
00180 G	Plant Capacity (% of Capacity - Hydraulic) [1]	Report			Monthly	Calculated [1]
00310 G	BOD_5, mg/l	Report	Report		Monthly	Composite
00310 G	BOD_5, lbs/day	Report	Report		Monthly	Calculated
00180 G	Plant Capacity (% of Capacity - Organic) [1]	Report			Monthly	Calculated [1]
00530G	Total Suspended Solids, mg/l	Report	Report		Monthly	Composite

[1] The % capacity is to be reported against the listed capacities of 3.9 MGD for the hydraulic capacity and 3906 lbs. BOD_5/day for the organic capacities as noted in Site Approval 4614. The percentage should be calculated using the 30-day average values divided by the corresponding capacity, times 100.

4. Salinity Parameters

In order to obtain an indication of the increase in salinity due to the treatment and use of water within this service area, the permittee shall monitor the raw water source and the wastewater effluent at the following required frequencies, the results to be reported on the Discharge Monitoring Report (See Part I, Section D.1.):

Self-monitoring samples taken in compliance with the monitoring requirements specified above shall be taken prior to treatment of the raw drinking water source (with a composite sample proportioned to flow prepared from individual grab samples if more than one source is being utilized), and at the established wastewater treatment facility effluent sampling point identified above in Part I, Section B.2.

5. Special Studies and Additional Monitoring

a. Inflow/Infiltration Study – The permittee shall identify areas where significant I/I exists and begin reducing I/I in accordance with the following schedule.

Code	Event	Description	Due Date
04399	Inflow/Infiltration Report	Submit a plan that identifies sources of I/I and prioritizes repairs and rehabilitation to the collection system to reduce I/I below 120 gallons per day per capita, monthly average influent flow. The plan must be based on a study of the collection system that identifies the areas of the collection system that are contributing significant I/I. A report, summarizing the findings of the study, must be prepared by a professional engineer registered in Colorado, and must accompany the plan. The plan must include annual milestones that should correct I/I at 25% each year over the next four years beginning July 31, 2020, with elimination of the most significant contributions of I/I beginning first.	06/30/2020
04399	Inflow/Infiltration Report	Submit a progress report summarizing the progress in implementing the I/I control program, including notification that the first 25% of I/I targeted repairs have been completed.	06/30/2021
04399	Inflow/Infiltration Report	Submit a progress report summarizing the progress in implementing the I/I control program, including notification that 50% of I/I targeted repairs have been completed.	06/30/2022
04399	Inflow/Infiltration Report	Submit a progress report summarizing the progress in implementing the I/I control program, including notification that 75% of I/I targeted repairs have been completed.	06/30/2023
04399	Inflow/Infiltration Report	Submit final study results that indicate that 100% of I/I targeted repairs have been completed and that the 120 gallons per day per capita maximum monthly average influent flow goal is met.	06/30/2024

B. TERMS AND CONDITIONS

1. Service Area

All wastewater flows contributed in the service area may be accepted by the Vista WWTP for treatment at the permittee's wastewater treatment plant provided that such acceptance does not cause or contribute to an exceedance of the throughput or design capacity of the treatment works or the effluent limitations in Part I.A, or constitute a substantial impact to the functioning of the treatment works, degrade the quality of the receiving waters, or harm human health, or the environment.

In addition, the permittee shall enter into and maintain service agreements with any municipalities that discharge into the wastewater treatment facility. The service agreements shall contain all provisions necessary to protect the financial, physical, and operational integrity of the wastewater treatment works.

2. Design Capacity

Based on Site Approval 4614, the design capacity of this domestic wastewater treatment works is 3.7 million gallons per day (MGD) January through March and 3.9 million gallons per day (MGD) April through December for hydraulic flow (30-day average) and 3765 lbs. BOD_5 per day (January through March) and 3906 lbs. BOD_5 per day (April through December) for organic loading (30-day average).

3. Expansion Requirements

Pursuant to Colorado Law, C.R.S. 25-8-501 (5 d & e), the permittee is required to initiate engineering and financial planning for expansion of the domestic wastewater treatment works whenever throughput reaches eighty (80) percent of the treatment capacity. Such planning may be deemed unnecessary upon a showing that the area served by the domestic wastewater treatment works has a stable or declining population; but this provision shall not be construed as preventing periodic review by the Division should it be felt that growth is occurring or will occur in the area.

The permittee shall commence construction of such domestic wastewater treatment works expansion whenever throughput reaches ninety-five (95) percent of the treatment capacity or, in the case of a municipality, either commence construction or cease issuance of building permits within such municipality until such construction is commenced; except that building permits may continue to be issued for any construction which would not have the effect of increasing the input of wastewater to the sewage treatment works of the municipality involved.

Where unusual circumstances result in throughput exceeding 80% of treatment capacity, the permittee may, in lieu of initiating planning for expansion, submit a report to the Division that demonstrates that it is unlikely that the event will reoccur, or even if it were to reoccur, that 95% of the treatment capacity would not be exceeded.

Where unusual circumstances result in throughput exceeding 95% of the treatment capacity, the permittee may, in lieu of initiating construction of the expansion, submit a report to the Division that demonstrates that the domestic wastewater treatment works was in compliance at all times during the events and that it is extremely unlikely that the event will reoccur.

Where the permittee submits a report pursuant to unusual circumstances, and the Division, upon review of such report, determines in writing to the permittee that the report does not support the required findings, the permittee shall initiate planning and/or construction of the domestic wastewater treatment works as appropriate.

4. Facilities Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control including all portions of the collection system and lift stations owned by the permittee (and related appurtenances) which are installed or used by the permittee as necessary to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective performance, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems when installed by the permittee only when necessary to achieve compliance with the conditions of the permit.

Any sludge produced at the wastewater treatment facility shall be disposed of in accordance with State and Federal regulations. The permittee shall take all reasonable steps to minimize or prevent any discharge of sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. As necessary, accelerated or additional monitoring to determine the nature and impact of the noncomplying discharge is required.

5. Acute WET Testing - Outfall: 001A

a. General Chronic WET Testing and Reporting Requirements

The permittee shall conduct the chronic WET test using *Ceriodaphnia dubia and Pimephales promelas*, as a static renewal 7-day test using three separate composite samples. The permittee shall conduct each chronic WET test in accordance with the 40 CFR Part 136 methods described in Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition, October 2002 (EPA-821-R-02-013) or the most current edition.

The following minimum dilution series should be used: 0% effluent (control), 20%, 40%, 60%, 80%, and 100% effluent. If the permittee uses more dilutions than prescribed, and accelerated testing is to be performed, the same dilution series shall be used in the accelerated testing (if applicable) as was initially used in the failed test.

Tests shall be done at the frequency listed in Part I.A.2. Test results shall be reported along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting period when the sample was taken. (i.e., WET testing results for the calendar quarter ending March 31 shall be reported with the DMR due April 28, etc.) The permittee shall submit all laboratory statistical summary sheets, summaries of the determination of a valid, invalid or inconclusive test, and copies of the chain of custody forms, along with the DMR for the reporting period.

If a test is considered invalid, the permittee is required to perform additional testing during the monitoring period to obtain a valid test result. Failure to obtain a valid test result during the monitoring period shall result in a violation of the permit for failure to monitor.

b. Violations of the Permit Limit, Failure of One Test Statistical Endpoint and Division Notification

A chronic WET test is considered a violation of a permit limitation when both the NOEC and the IC25, for the same sub-lethal endpoint are at any effluent concentration less than the IWC. This determination is made independently for each test species. The IWC for this permit has been determined to be 100% effluent.

A chronic WET test is considered to have failed one of the two statistical endpoints when either the NOEC or the IC_{25} are at any effluent concentration less than the IWC. Simultaneous failure of both the NOEC and IC25 for both sub-lethal endpoints, when tests are performed on identical split samples, constitutes only a single violation of the Daily Maximum Effluent Limitation for Chronic WET specified in Part I, §A-2 of this permit. The IWC for this permit has been determined to be 100% effluent.

In the event of a permit violation, or during a report only period when both the NOEC and the IC25 are at any effluent concentration less than the IWC, or when two consecutive reporting periods have resulted in failure of one of the two statistical endpoints (regardless of which statistical endpoints are failed), the permittee must provide written notification to the Division. Such notification should explain whether it was a violation or two consecutive failures of a single endpoint, and must indicate whether accelerated testing or a Toxicity Identification Evaluation or Toxicity Reduction Evaluation (TIE or TRE) is being performed, unless otherwise exempted, in writing, by the Division. Notification must be received by the Division within 14 calendar days of the permittee receiving notice of the WET testing results.

c. Automatic Compliance Response

The permittee is responsible for implementing the automatic compliance response provisions of this permit when one of the following occurs:

- there is a violation of the permit limit (both the NOEC and the IC25 endpoints are less than the applicable IWC)
- during a report only period when both the NOEC and the IC25 are at any effluent concentration less than the IWC

- two consecutive monitoring periods have resulted in failure of one of the two statistical endpoints (either the IC25 or the NOEC) , including during a report-only period. This determination is made independently for each test species.
- the permittee is otherwise informed by the Division that a compliance response is necessary

When one of the above listed events occurs, the following automatic compliance response shall apply. The permittee shall either:

- conduct accelerated testing using the single species found to be more sensitive
- conduct a Toxicity Identification Evaluation (TIE) or a Toxicity Reduction Evaluation (TRE) investigation as described below.

i. Accelerated Testing

If accelerated testing is being performed, testing will be at least once every two weeks for up to five tests with only one test being run at a time, using only the IC25 statistical endpoint to determine if the test passed or failed at the appropriate IWC. Accelerated testing shall continue until; 1) two consecutive tests fail or three of five tests fail, in which case a pattern of toxicity has been demonstrated or 2) two consecutive tests pass or three of five tests pass, in which case no pattern of toxicity has been found. Note that the same dilution series should be used in the accelerated testing as was used in the initial test(s) that result in the accelerated testing requirement.

If accelerated testing is required due to failure of one statistical endpoint in two consecutive monitoring periods, and in both of those failures it was the NOEC endpoint that was failed, then the NOEC shall be the only statistical endpoint used to determined whether the accelerated testing passed or failed at the appropriate IWC. Note that the same dilution series should be used in the accelerated testing as was used in the initial test(s) that result in the accelerated testing requirement.

If no pattern of toxicity is found the toxicity episode is considered to be ended and routine testing is to resume. If a pattern of toxicity is found, a TIE/TRE investigation is to be performed. If a pattern of toxicity is not demonstrated but a significant level of erratic toxicity is found, the Division may require an increased frequency of routine monitoring or some other modified approach. The permittee shall provide written notification of the results within 14 calendar days of completion of the Pattern of Toxicity/No Toxicity demonstration.

ii. Toxicity Identification Evaluation (TIE) or Toxicity Reduction Evaluation (TRE)

If a TIE or a TRE is being performed, the results of the investigation are to be received by the Division within 180 calendar days of the demonstration chronic WET in the routine test, as defined above, or if accelerated testing was performed, the date the pattern of toxicity is demonstrated. A status report is to be provided to the Division at the 60 and 120 calendar day points of the TIE or TRE investigation. The Division may extend the time frame for investigation where reasonable justification exists. A request for an extension must be made in writing and received prior to the 180 calendar day deadline. Such request must include a justification and supporting data for such an extension.

Under a TIE, the permittee may use the time for investigation to conduct a preliminary TIE (PTIE) or move directly into the TIE. A PTIE consists of a brief search for possible sources of WET, where a specific parameter(s) is reasonably suspected to have caused such toxicity, and could be identified more simply and cost effectively than a formal TIE. If the PTIE allows resolution of the WET incident, the TIE need not necessarily be conducted in its entirety. If, however, WET is not identified or resolved during the PTIE, the TIE must be conducted within the allowed 180 calendar day time frame.

The Division recommends that the EPA guidance documents regarding TIEs be followed. If another method is to be used, this procedure should be submitted to the Division prior to initiating the TIE.

If the pollutant(s) causing toxicity is/are identified, and is/are controlled by a permit effluent limitation(s), this permit may be modified upon request to adjust permit requirements regarding the automatic compliance response.

If the pollutant(s) causing toxicity is/are identified, and is/are not controlled by a permit effluent limitation(s), the Division may develop limitations the parameter(s), and the permit may be reopened to include these limitations.

If the pollutant causing toxicity is not able to be identified, or is unable to be specifically identified, or is not able to be controlled by an effluent limit, the permittee will be required to perform either item 1 or item 2 below.

1) Conduct an investigation which demonstrates actual instream aquatic life conditions upstream and downstream of the discharge, or identify, for Division approval, and conduct an alternative investigation which demonstrates the actual instream impact. This should include WET testing and chemical analyses of the ambient water. Depending on the results of the study, the permittee may also be required to identify the control program necessary to eliminate the toxicity and its cost. Data collected may be presented to the WQCC for consideration at the next appropriate triennial review of the stream standards;

2) Move to a TRE by identifying the necessary control program or activity and proceed with elimination of the toxicity so as to meet the WET effluent limit.

If toxicity spontaneously disappears in the midst of a TIE, the permittee shall notify the Division within 10 calendar days of such disappearance. The Division may require the permittee to conduct accelerated testing to demonstrate that no pattern of toxicity exists, or may amend the permit to require an increased frequency of WET testing for some period of time. If no pattern of toxicity is demonstrated through the accelerated testing or the increased monitoring frequency, the toxicity incident response will be closed and normal WET testing shall resume.

The control program developed during a TRE consists of the measures determined to be the most feasible to eliminate WET. This may happen through the identification of the toxicant(s) and then a control program aimed specifically at that toxicant(s) or through the identification of more general toxicant treatability processes. A control program is to be developed and submitted to the Division within 180 calendar days of beginning a TRE. Status reports on the TRE are to be provided to the Division at the 60 and 120 calendar day points of the TRE investigation.

If toxicity spontaneously disappears in the midst of a TRE, the permittee shall notify the Division within 10 calendar days of such disappearance. The Division may require the permittee to conduct accelerated testing to demonstrate that no pattern of toxicity exists, or may amend the permit to require an increased frequency for some period of time. If no pattern of toxicity is demonstrated through the accelerated testing or the increased monitoring frequency, the toxicity incident response will be closed and normal WET testing shall resume.

d. Toxicity Reopener

This permit may be reopened and modified to include additional or modified numerical permit limitations, new or modified compliance response requirements, changes in the WET testing protocol, the addition of both acute and chronic WET requirements, or any other conditions related to the control of toxicants.

6. Compliance Schedule(s)

a. Activities to Meet Total Inorganic Nitrogen and Phosphorous Final Limits – In order to meet T.I.N. and phosphorous final limits, the following schedule for construction (if deemed necessary by the permittee) are included in the permit.

Code	Event	Description	Due Date
06599	Hire a Consultant/ Professional Engineer	Submit a letter of notification that a Colorado licensed engineering consultant has been obtained and funding has been secured for planning aspects	06/30/2020
CS011	Plan, Report, or Scope of Work	Submit a progress report in obtaining funding for design and construction aspects	12/31/2021
73905	Engineering Plan	Submit a letter of notification that funding has been obtained for design and construction aspects, and final plans specifications have been submitted to the Division. Note that a Site Application and a preliminary design must be submitted and approved by the Division prior to final plans and specifications.	12/31/2022
CS015	Commence Required Work or On-Site Construction	Submit a letter of notification that Final Design Approval has been received from the Division and construction has commenced.	12/31/2023
CS010	Status/Progress Report	Submit a construction progress report summarizing the progress in construction or other activities.	06/30/2024
CS016	Complete Required Work or On-Site Construction	Complete construction of facilities or other appropriate actions, which will allow the permittee to meet the final limitations.	12/31/2024

b. Activities to Meet Dissolved Manganese, Dissolved Lead, Total Recoverable Lead*, Dissolved Selenium, and Nonylphenol Final Limits – In order to meet dissolved manganese, dissolved lead, total recoverable lead, dissolved selenium, and Nonylphenol limitations, the following schedule are included in the permit.

Code	Event	Description	Due Date
43699	Facility Evaluation Plan	Submit a report that identifies sources of the above parameters to the wastewater treatment facility and identifies strategies to control these sources or treatment alternatives such that compliance with the final limitations may be attained.	7/31/2020
00899	Implementation Schedule	Submit a progress report summarizing the progress in implementing the strategies to control sources such that compliance with the final limitations may be attained.	7/31/2021
CS017	Achieve Final Compliance with Emissions or Discharge Limits	Submit study results that show compliance has been attained with the final limitations.	7/31/2022

* Note that because Total Recoverable Lead has an ADBAC limitation, 2-years of data collection after the end of the compliance schedule are needed prior to reporting.

Regulation 61.8(3)(n)(i) states that a report shall be submitted to the Division no later than 14 calendar days following each date identified in the schedule of compliance. The 14 days have already been incorporated into the above dates and therefore all reports are due on or before the date listed in the table.

7. Pretreatment Program - Industrial Waste Management

a. The Permittee has the responsibility to protect the Domestic Wastewater Treatment Works (DWTW), as defined at section 25.8.103(5) of the Colorado Water Quality Control Act, or the Publicly-Owned Treatment Works (POTW), as defined at 40 CFR section 403.3(q) of the federal pretreatment regulations, from pollutants which would cause pass through or interference, as defined at 40 CFR 403.3(p) and (k), or otherwise be incompatible with operation of the treatment works including interference with the use or disposal of municipal sludge.

b. Pretreatment Standards (40 CFR Section 403.5) developed pursuant to Section 307 of the Federal Clean Water Act (the Act) require that the Permittee shall not allow, under any circumstances, the introduction of the following pollutants to the DWTW from any source of non-domestic discharge:

i. Pollutants which create a fire or explosion hazard in the DWTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than sixty (60) degrees Centigrade (140 degrees Fahrenheit) using the test methods specified in 40 CFR Section 261.21;

ii. Pollutants which will cause corrosive structural damage to the DWTW, but in no case discharges with a pH of lower than 5.0 s.u., unless the treatment facilities are specifically designed to accommodate such discharges;

iii. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the DWTW, or otherwise interfere with the operation of the DWTW;

iv. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with any treatment process at the DWTW;

v. Heat in amounts which will inhibit biological activity in the DWTW resulting in Interference, but in no case heat in such quantities that the temperature at the DWTW treatment plant exceeds forty (40) degrees Centigrade (104 degrees Fahrenheit) unless the Approval Authority, upon request of the DWTW, approves alternate temperature limits;

vi. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through;

vii. Pollutants which result in the presence of toxic gases, vapors, or fumes within the DWTW in a quantity that may cause acute worker health and safety problems;

viii. Any trucked or hauled pollutants, except at discharge points designated by the DWTW; and

ix. Any specific pollutant that exceeds a local limitation established by the Permittee in accordance with the requirements of 40 CFR Section 403.5(c) and (d).

x. Any other pollutant which may cause Pass Through or Interference.

c. EPA shall be the Approval Authority and the mailing address for all reporting and notifications to the Approval Authority shall be: USEPA 1595 Wynkoop St. 8ENF-W-NP, Denver, CO 80202-1129. Should the State be delegated authority to implement and enforce the Pretreatment Program in the future, the Permittee shall be notified of the delegation and the state permitting authority shall become the Approval Authority.

d. In addition to the general limitations expressed above, more specific Pretreatment Standards have been and will be promulgated for specific industrial categories under Section 307 of the Act (40 CFR Part 405 et. seq.).

e. The Permittee must notify the state permitting authority and the Approval Authority, of any new introductions by new or existing industrial users or any substantial change in pollutants from any industrial user within sixty (60) calendar days following the introduction or change. Such notice must identify:

i. Any new introduction of pollutants into the DWTW from an industrial user which would be subject to Sections 301, 306, or 307 of the Act if it were directly discharging those pollutants; or

ii. Any substantial change in the volume or character of pollutants being introduced into the DWTW by any industrial user;

iii. For the purposes of this section, adequate notice shall include information on:

(A) The identity of the industrial user;

(B) The nature and concentration of pollutants in the discharge and the average and maximum flow of the discharge to be introduced into the DWTW; and

(C) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from or biosolids or sludge produced at such DWTW.

iv. For the purposes of this section, a significant industrial user shall include:

(A) Any discharger subject to Categorical Pretreatment Standards under Section 307 of the Act and 40 CFR chapter I and subchapter N;

(B) Any discharger which has a process wastewater flow of 25,000 gallons or more per day;

(C) Any discharger contributing five percent or more of the average dry weather hydraulic or organic capacity of the DWTW treatment plant;

(D) Any discharger who is designated by the Approval Authority as having a reasonable potential for adversely affecting the DWTWs operation or for violating any Pretreatment Standard or requirements;

f. At such time as a specific Pretreatment Standard or requirement becomes applicable to an industrial user of the Permittee, the state permitting authority and/or Approval Authority may, as appropriate:

i. Amend the Permittee's NPDES discharge permit to require the Permittee to develop and submit an approvable Pretreatment program under a compliance schedule, in accordance with procedures in 40 CFR 403.8(e). The modification of a POTW's NPDES Permit for the purposes of incorporating a POTW Pretreatment Program approved in accordance with the procedure in §403.11 shall be deemed a minor Permit modification subject to the procedures in 40 CFR 122.63(g); or,;

ii. Require the Permittee to specify, by ordinance, order, or other enforceable means, the type of pollutant(s) and the maximum amount which may be discharged to the Permittee's DWTW for treatment. Such requirement shall be imposed in a manner consistent with the program development requirements of the General Pretreatment Regulations at 40 CFR Part 403; and/or,

iii. Require the Permittee to monitor its discharge for any pollutant which may likely be discharged from the Permittee's DWTW, should the industrial user fail to properly pretreat its waste.

The state permitting authority and the Approval Authority retains, at all times, the right to take legal action against any source of nondomestic discharge, whether directly or indirectly controlled by the Permittee, for violations of a permit, order or similar enforceable mechanism issued by the Permittee, violations of any Pretreatment Standard or requirement, or for failure to discharge at an acceptable level under national standards issued by EPA under 40 CFR, chapter I, subchapter N. In those cases where a CDPS permit violation

has occurred because of the failure of the Permittee to properly develop and enforce Pretreatment Standards and requirements as necessary to protect the DWTW, the state permitting authority and/or Approval Authority shall hold the Permittee and/or industrial user responsible and may take legal action against the Permittee as well as the Industrial user(s) contributing to the permit violation.

C. DEFINITION OF TERMS

1. "Acute Toxicity" - The acute toxicity limitation is exceeded if the LC50 is at any effluent concentration less than or equal to the IWC indicated in this permit.

2. “Antidegradation limits” – See “Two (2) - Year Rolling Average”.

3. “Applicable water quality criterion (AWQC)” is the quantitation target level or goal. The AWQC may be one of the following:

   Where an effluent limit has been established,
   i. The AWQC is the effluent limit.

   Where an effluent limit has not been established, the AWQC may be
   i. An applicable technology based effluent limit (TBEL);
   ii. Half of a water quality standard;
   iii. Half of a water quality standard as assessed in the receiving water, or potential WQBEL; or
   iv. Half of a potential antidegradation based effluent limitation, which can be an antidegradation based average concentration or a potential non-impact limit.

4. "Chronic toxicity", which includes lethality and growth or reproduction, occurs when the NOEC and IC25 are at an effluent concentration less than the IWC indicated in this permit.

5. "Composite" sample is a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow. For a SBR type treatment system, a composite sample is defined as sampling equal aliquots during the beginning, middle and end of a decant period, for two consecutive periods during a day (if possible).

6. "Continuous" measurement, is a measurement obtained from an automatic recording device which continually measures the effluent for the parameter in question, or that provides measurements at specified intervals.

7. "Daily Maximum limitation" for all parameters (except temperature, pH, dissolved oxygen, and WET) means the limitation for this parameter shall be applied as an average of all samples collected in one calendar day. For these parameters the DMR shall include the highest of the daily averages. For pH and dissolved oxygen, this means an instantaneous maximum (and/or instantaneous minimum) value. For WET, this means an instantaneous minimum value. The instantaneous value is defined as the analytical result of any individual sample. For pH and dissolved oxygen, DMRs shall include the maximum (and/or minimum) of all instantaneous values within the calendar month. For WET, DMRs shall include the minimum of all instantaneous values within the reporting period. For pH and dissolved oxygen, the value beyond the noted daily maximum limitation for the indicated parameter shall be considered a violation of this permit. For temperature, see Daily Maximum Temperature. For WET violation and failure descriptions, see Part I.B.5.

8. “Daily Maximum Temperature (DM)” is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as the highest two-hour average water temperature recorded during a given 24-hour period. This will be determined using a rolling 2-hour maximum temperature. If data is collected every 15 minutes, a 2 hour maximum can be determined on every data point after the initial 2 hours of collection. Note that the time periods that overlap days (Wednesday night to Thursday morning) do not matter as the reported value on the DMR is the greatest of all the 2-hour averages.

   This would continue throughout the course of a calendar day. The highest of these 2 hour averages over a month would be reported on the DMR as the daily maximum temperature. At the end/beginning of a month,

the collected data should be used for the month that contains the greatest number of minutes in the 2-hour maximum.

9. "Dissolved (D) metals fraction" is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as that portion of a water and suspended sediment sample which passed through a 0.40 or 0.45 UM (micron) membrane filter. Determinations of "dissolved" constituents are made using the filtrate. This may include some very small (colloidal) suspended particles which passed through the membrane filter as well as the amount of substance present in true chemical solution.

10. "Geometric mean" for *E. coli* bacteria concentrations, the thirty (30) day and seven (7) day averages shall be determined as the geometric mean of all samples collected in a thirty (30) day period and the geometric mean of all samples taken in a seven (7) consecutive day period respectively. The geometric mean may be calculated using two different methods. For the methods shown, a, b, c, d, etc. are individual sample results, and n is the total number of samples.

    Method 1:

    Geometric Mean = $(a*b*c*d*...)^{(1/n)}$ "*" - means multiply

    Method 2:

    Geometric Mean = antilog ([log(a)+log(b)+log(c)+log(d)+...]/n)

    Graphical methods, even though they may also employ the use of logarithms, may introduce significant error and may not be used.

    In calculating the geometric mean, for those individual sample results that are reported by the analytical laboratory to be "less than" a numeric value, a value of 1 should be used in the calculations. If all individual analytical results for the month are reported to be less than numeric values, then report "less than" the largest of those numeric values on the monthly DMR. Otherwise, report the calculated value.

    For any individual analytical result of "too numerous to count" (TNTC), that analysis shall be considered to be invalid and another sample shall be promptly collected for analysis. If another sample cannot be collected within the same sampling period for which the invalid sample was collected (during the same month if monthly sampling is required, during the same week if weekly sampling is required, etc.), then the following procedures apply:

    i. A minimum of two samples shall be collected for coliform analysis within the next sampling period.

    ii. If the sampling frequency is monthly or less frequent: For the period with the invalid sample results, leave the spaces on the corresponding DMR for reporting coliform results empty and attach to the DMR a letter noting that a result of TNTC was obtained for that period, and explain why another sample for that period had not been collected.

    If the sampling frequency is more frequent than monthly: Eliminate the result of TNTC from any further calculations, and use all the other results obtained within that month for reporting purposes. Attach a letter noting that a result of TNTC was obtained, and list all individual analytical results and corresponding sampling dates for that month.

11. "Grab" sample, is a single "dip and take" sample so as to be representative of the parameter being monitored.

12. "IC25" or "Inhibition Concentration" is a point estimate of the toxicant concentration that would cause a given percent reduction in a non-lethal biological measurement (e.g. growth or reproduction) calculated from a continuous model (i.e. interpolation method). IC25 is a point estimate of the toxic concentration that would cause a 25-percent reduction in a non-lethal biological measurement.

13. "In-situ" measurement is defined as a single reading, observation or measurement taken in the field at the point of discharge.

14. "Instantaneous" measurement is a single reading, observation, or measurement performed on site using existing monitoring facilities.

15. “LC50” or “Lethal Concentration” is the toxic or effluent concentration that would cause death in 50 percent of the test organisms over a specified period of time.

16. “Maximum Weekly Average Temperature (MWAT)” is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as an implementation statistic that is calculated from field monitoring data. The MWAT is calculated as the largest mathematical mean of multiple, equally spaced, daily temperatures over a seven-day consecutive period, with a minimum of three data points spaced equally through the day. For lakes and reservoirs, the MWAT is assumed to be equivalent to the maximum WAT from at least three profiles distributed throughout the growing season (generally July-September).

    The MWAT is calculated by averaging all temperature data points collected during a calendar day, and then averaging the daily average temperatures for 7 consecutive days. This 7 day averaging period is a rolling average, i.e. on the 8th day, the MWAT will be the averages of the daily averages of days 2-8. The value to be reported on the DMR is the highest of all the rolling 7-day averages throughout the month. For those days that are at the end/beginning of the month, the data shall be reported for the month that contains 4 of the 7 days.

    Day 1: Average of all temperature data collected during the calendar day.
    Day 2: Average of all temperature data collected during the calendar day.
    Day 3: Average of all temperature data collected during the calendar day.
    Day 4: Average of all temperature data collected during the calendar day.
    Day 5: Average of all temperature data collected during the calendar day.
    Day 6: Average of all temperature data collected during the calendar day.
    Day 7: Average of all temperature data collected during the calendar day.
    1st MWAT Calculation as average of previous 7 days
    Day 8: Average of all temperature data collected during the calendar day.
    2nd MWAT Calculation as average of previous 7 days
    Day 9: Average of all temperature data collected during the calendar day.
    3rd MWAT Calculation as average of previous 7 days

17. “Minimum level (ML)” means the lowest concentration of an analyte that can be accurately and precisely quantified using a given method, as determined by the laboratory.

18. “NOEC” or “No-Observed-Effect-Concentration” is the highest concentration of toxicant to which organisms are exposed in a full life cycle or partial life cycle (short term) test, that causes no observable adverse effects on the test organisms (i.e. the highest concentration of toxicant in which the values for the observed responses are not statistically different from the controls). This value is used, along with other factors, to determine toxicity limits in permits.

19. "Potentially dissolved (PD) metals fraction” is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as that portion of a constituent measured from the filtrate of a water and suspended sediment sample that was first treated with nitric acid to a pH of 2 or less and let stand for 8 to 96 hours prior to sample filtration using a 0.40 or 0.45-UM (micron) membrane filter. Note the "potentially dissolved" method cannot be used where nitric acid will interfere with the analytical procedure used for the constituent measured.

20. “Practical Quantitation Limit (PQL)” means the minimum concentration of an analyte (substance) that can be measured with a high degree of confidence that the analyte is present at or above that concentration. The use of PQL in this document may refer to those PQLs shown in Part I.D of this permit or the PQLs of an individual laboratory.

21. "Quarterly measurement frequency" means samples may be collected at any time during the calendar quarter if a continual discharge occurs. If the discharge is intermittent, then samples shall be collected during the period that discharge occurs.

22. "Recorder" requires the continuous operation of an automatic data retention device for providing required records such as a data logger, a chart and/or totalizer (or drinking water rotor meters or pump hour meters where previously approved.)

23. SAR and Adjusted SAR - The equation for calculation of SAR-adj is:

$$SAR\text{-}adj = \frac{Na^{+}}{\sqrt{\frac{Ca_{x} + Mg^{++}}{2}}}$$

Where:

Na+ = Sodium in the effluent reported in meq/l
Mg++ = Magnesium in the effluent reported in meq/l
Cax = calcium (in meq/l) in the effluent modified due to the ratio of bicarbonate to calcium

The values for sodium (Na+), calcium (Ca++), bicarbonate (HCO3-) and magnesium (Mg++) in this equation are expressed in units of milliequivalents per liter (meq/l). Generally, data for these parameters are reported in terms of mg/l, which must then be converted to calculate the SAR. The conversions are:

$$\text{meq/l} = \frac{Concentration\ in\ mg/l}{Equivalent\ weight\ in\ mg/meq}$$

Where the equivalent weights are determined based on the atomic weight of the element divided by the ion's charge:

Na+ = 23.0 mg/meq (atomic weight of 23, charge of 1)
Ca++ = 20.0 mg/meq (atomic weight of 40.078, charge of 2)
Mg++ = 12.15 mg/meq (atomic weight of 24.3, charge of 2)
HCO3- = 61 mg/mep (atomic weight of 61, charge of 1)

The EC and the HCO3 -/Ca++ ratio in the effluent (calculated by dividing the HCO3 - in meq/l by the Ca++ in meq/l) are used to determine the Cax using the following table.

Table – Modified Calcium Determination for Adjusted Sodium Adsorption Ratio

HCO3/Ca Ratio And EC 1, 2, 3													
Salinity of Effluent (EC)(dS/m)													
		0.1	0.2	0.3	0.5	0.7	1.0	1.5	2.0	3.0	4.0	6.0	8.0
Ratio of HCO3/Ca	.05	13.20	13.61	13.92	14.40	14.79	15.26	15.91	16.43	17.28	17.97	19.07	19.94
	.10	8.31	8.57	8.77	9.07	9.31	9.62	10.02	10.35	10.89	11.32	12.01	12.56
	.15	6.34	6.54	6.69	6.92	7.11	7.34	7.65	7.90	8.31	8.64	9.17	9.58
	.20	5.24	5.40	5.52	5.71	5.87	6.06	6.31	6.52	6.86	7.13	7.57	7.91
	.25	4.51	4.65	4.76	4.92	5.06	5.22	5.44	5.62	5.91	6.15	6.52	6.82
	.30	4.00	4.12	4.21	4.36	4.48	4.62	4.82	4.98	5.24	5.44	5.77	6.04
	.35	3.61	3.72	3.80	3.94	4.04	4.17	4.35	4.49	4.72	4.91	5.21	5.45
	.40	3.30	3.40	3.48	3.60	3.70	3.82	3.98	4.11	4.32	4.49	4.77	4.98
	.45	3.05	3.14	3.22	3.33	3.42	3.53	3.68	3.80	4.00	4.15	4.41	4.61
	.50	2.84	2.93	3.00	3.10	3.19	3.29	3.43	3.54	3.72	3.87	4.11	4.30
	.75	2.17	2.24	2.29	2.37	2.43	2.51	2.62	2.70	2.84	2.95	3.14	3.28
	1.00	1.79	1.85	1.89	1.96	2.01	2.09	2.16	2.23	2.35	2.44	2.59	2.71

	1.25	1.54	1.59	1.63	1.68	1.73	1.78	1.86	1.92	2.02	2.10	2.23	2.33
	1.50	1.37	1.41	1.44	1.49	1.53	1.58	1.65	1.70	1.79	1.86	1.97	2.07
	1.75	1.23	1.27	1.30	1.35	1.38	1.43	1.49	1.54	1.62	1.68	1.78	1.86
	2.00	1.13	1.16	1.19	1.23	1.26	1.31	1.36	1.40	1.48	1.54	1.63	1.70
	2.25	1.04	1.08	1.10	1.14	1.17	1.21	1.26	1.30	1.37	1.42	1.51	1.58
	2.50	0.97	1.00	1.02	1.06	1.09	1.12	1.17	1.21	1.27	1.32	1.40	1.47
	3.00	0.85	0.89	0.91	0.94	0.96	1.00	1.04	1.07	1.13	1.17	1.24	1.30
	3.50	0.78	0.80	0.82	0.85	0.87	0.90	0.94	0.97	1.02	1.06	1.12	1.17
	4.00	0.71	0.73	0.75	0.78	0.80	0.82	0.86	0.88	0.93	0.97	1.03	1.07
	4.50	0.66	0.68	0.69	0.72	0.74	0.76	0.79	0.82	0.86	0.90	0.95	0.99
	5.00	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.76	0.80	0.83	0.88	0.93
	7.00	0.49	0.50	0.52	0.53	0.55	0.57	0.59	0.61	0.64	0.67	0.71	0.74
	10.00	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.48	0.51	0.53	0.56	0.58
	20.00	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.32	0.33	0.35	0.37
	30.00	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.27	0.28

1 Adapted from Suarez (1981).
2 Assumes a soil source of calcium from lime ($CaCO_3$) or silicates; no precipitation of magnesium, and partial pressure of CO_2 near the soil surface (PCO_2) is 0.0007 atmospheres.
3 Cax, HCO_3, Ca are reported in meq/l; EC is in dS/m (deciSiemens per meter).

Because values will not always be quantified at the exact EC or HCO_3^-/Ca^{++} ratio in the table, the resulting Cax must be determined based on the closest value to the calculated value. For example, for a calculated EC of 2.45 dS/m, the column for the EC of 2.0 would be used. However, for a calculated EC of 5.1, the corresponding column for the EC of 6.0 would be used. Similarly, for a HCO_3^-/Ca^{++} ratio of 25.1, the row for the 30 ratio would be used.

The Division acknowledges that some effluents may have electrical conductivity levels that fall outside of this table, and others have bicarbonate to calcium ratios that fall outside this table. For example, some data reflect HCO_3^-/Ca^{++} ratios greater than 30 due to bicarbonate concentrations reported greater than 1000 mg/l versus calcium concentrations generally less than 10 mg/l (i.e., corresponding to HCO_3^-/Ca^{++} ratios greater than 100). Despite these high values exceeding the chart's boundaries, it is noted that the higher the HCO_3^-/Ca^{++} ratio, the greater the SAR-adj. Thus, using the Cax values corresponding to the final row containing bicarbonate/calcium ratios of 30, the permittee will actually calculate an SAR-adj that is less than the value calculated if additional rows reflecting HCO_3^-/Ca^{++} ratios of greater than 100 were added.

24. "Seven (7) day average" means, with the exception of fecal coliform or *E. coli* bacteria (see geometric mean), the arithmetic mean of all samples collected in a seven (7) consecutive day period. Such seven (7) day averages shall be calculated for all calendar weeks, which are defined as beginning on Sunday and ending on Saturday. If the calendar week overlaps two months (i.e. the Sunday is in one month and the Saturday in the following month), the seven (7) day average calculated for that calendar week shall be associated with the month that contains the Saturday. Samples may not be used for more than one (1) reporting period. (See the **"Analytical and Sampling Methods for Monitoring and R**eporting Section in Part I.D.5 for guidance on calculating averages and reporting analytical results that are less than the PQL).

25. "Sufficiently sensitive test procedures":

    i. An analytical method is ''sufficiently sensitive'' when the method detects and accurately and precisely quantifies the amount of the analyte. In other words there is a valid positive result; or
    ii. An analytical method is "sufficiently sensitive" when the method accurately and precisely quantifies the result to the AWQC, as demonstrated by the ML is less than or equal to the AWQC. In other words, the level of precision is adequate to inform decision making; or
    iii. An analytical method is "sufficiently sensitive" when the method achieves the required level of accuracy and precision, as demonstrated by the ML is less than or equal to the PQL. In other words, the most sensitive method is being used and properly followed.

26. "Thirty (30) day average" means, except for fecal coliform or *E. coli* bacteria (see geometric mean), the arithmetic mean of all samples collected during a thirty (30) consecutive-day period, which represents a calendar month. The permittee shall report the appropriate mean of all self-monitoring sample data collected during the calendar month on the Discharge Monitoring Reports. Samples shall not be used for more than one (1) reporting period. **(See the "Analytical and Sampling Methods for Monitoring and Reporting Section in** Part I.D.5 for guidance on calculating averages and reporting analytical results that are less than the PQL).

27. Toxicity Identification Evaluation (TIE) is a set of site-specific procedures used to identify the specific chemical(s) causing effluent toxicity.

28. "Total Inorganic Nitrogen (T.I.N.)" is an aggregate parameter determined based on ammonia, nitrate and nitrite concentrations. To determine T.I.N. concentrations, the facility must monitor for total ammonia and total nitrate plus nitrite (or nitrate and nitrite individually) on the same days. The calculated T.I.N. concentrations in mg/L shall then be determined as the sum of the analytical results of same-day sampling for total ammonia (as N) in mg/L, and total nitrate plus nitrite (as N) in mg/L (or nitrate as N and nitrite as N individually). From these calculated T.I.N. concentrations, the daily maximum and thirty (30) day average concentrations for T.I.N. shall be determined in the same manner as set out in the definitions for the daily maximum and thirty (30) day average. **(See the "Analytical and Sampling Methods for Monitoring and** Reporting Section in Part I.D.5 for guidance on calculating averages and reporting analytical results that are less than the PQL).

29. "Total Metals" means the concentration of metals determined on an unfiltered sample following vigorous digestion (Section 4.1.3), or the sum of the concentrations of metals in both the dissolved and suspended fractions, as described in Manual of Methods for Chemical Analysis of Water and Wastes, U.S. Environmental Protection Agency, March 1979, or its equivalent.

30. "Total Recoverable Metals" means that portion of a water and suspended sediment sample measured by the total recoverable analytical procedure described in Methods for Chemical Analysis of Water and Wastes, U.S. Environmental Protection Agency, March 1979 or its equivalent.

31. Toxicity Reduction Evaluation (TRE) is a site-specific study conducted in a step-wise process to identify the causative agents of effluent toxicity, isolate the source of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity after the control measures are put in place.

32. "Twenty four (24) hour composite" sample is a combination of at least eight (8) sample aliquots of at least 100 milliliters, collected at equally spaced intervals during the operating hours of a facility over a twenty-four (24) hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the wastewater or effluent flow at the time of sampling or the total wastewater or effluent flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

33. "Twice Monthly" monitoring frequency means that two samples shall be collected each calendar month on separate weeks with at least one full week between the two sample dates. Also, there shall be at least one full week between the second sample of a month and the first sample of the following month.

34. "Two (2) -Year Rolling Average" (Antidegradation limits)- the average of all monthly average data collected in a two year period. Reporting of two-year rolling average results should begin in the first DMR due once the reporting requirements has been in place for a two year period. To calculate a two-year rolling average, add the current monthly average to the previous 23 monthly averages and divide the total by 24. This methodology continues on a rolling basis as long as the two year rolling average reporting and/or effluent limit applies (i.e., in the first reporting period use data from month 1 to month 24, in the second reporting period use data from month 2 to month 25, then month 3 to month 26, etc). Ongoing reporting is required across permit terms when data is available for a two year period.

35. "Visual" observation is observing the discharge to check for the presence of a visible sheen or floating oil.

36. "Water Quality Control Division" or "Division" means the state Water Quality Control Division as established in 25-8-101 et al.)

Additional relevant definitions are found in the Colorado Water Quality Control Act, CRS §§ 25-8-101 et seq., the Colorado Discharge Permit System Regulations, Regulation 61 (5 CCR 1002-61) and other applicable regulations.

D. GENERAL MONITORING, SAMPLING AND REPORTING REQUIREMENTS

1. Routine Reporting of Data

Reporting of the data gathered in compliance with Part I.A or Part I.B shall be on a monthly basis. Reporting of all data gathered shall comply with the requirements of Part I.D. (General Requirements).

Monitoring results shall be summarized for each calendar month via the division's NetDMR service unless a waiver is granted in compliance with 40 CFR 127. If a waiver is granted, monitoring results shall be reported on division approved discharge monitoring report (DMR) forms (EPA form 3320-1).

Reporting No Discharge:
If no discharge occurs during the reporting period, a DMR must still be submitted. However, "No Discharge" shall be reported on the paper DMR and if reporting electronically please use the No Data Code (NODI) "C" for No Discharge in NetDMR.

When submitting monitoring results via NetDMR, the Copy of Record shall reflect that the DMR was signed and submitted no later than the 28th day of the month following the reporting period. If submitting DMRs by mail, which is only allowed if a waiver has been granted, one copy of the DMR form shall be mailed to the division at the address provided below, so that the DMR is received no later than the 28th day of the month following the reporting period.

If mailing, the original signed copy of each DMR shall be submitted to the division at the following address:

Colorado Department of Public Health and Environment
Water Quality Control Division
WQCD-P-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

The Discharge Monitoring Report paper and electronic forms shall be filled out accurately and completely in accordance with the requirements of this permit and the instructions on the forms; and signed by an authorized person as identified in Part II.K.1.

2. Annual Biosolids Report

The permittee shall provide the results of all biosolids monitoring and information on management practices, land application sites, site restrictions and certifications. Such information shall be provided no later than February 19th of each year. Reports shall be submitted addressing all such activities that occurred in the previous calendar year. If no biosolids were applied to the land during the reporting period, "no biosolids applied" shall be reported. Until further notice, biosolids monitoring results shall be reported on forms, or copies of forms, provided by the Division. Annual Biosolids Reports required herein, shall be signed and certified in accordance with the Signatory Requirements, Part I.D.1, and submitted as follows:

The original copy of each form shall be submitted to the following address:

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT,
WATER QUALITY CONTROL DIVISION
WQCD-PERMITS-B2
4300 CHERRY CREEK DRIVE SOUTH

DENVER, COLORADO 80246-1530

A copy of each form shall be submitted electronically or to the following address if any one of below conditions applies to this facility:

1. design flow rate is equal to or greater than one million gallons per day,
2. serves 10,000 people or more, or
3. is required to have an approved pretreatment program.

EPA BIOSOLIDS CENTER
EPA REGION 7
WWPD/WENF
11201 RENNER BOULEVARD
LENEXA, KANSAS 66219

ATTENTION: BIOSOLIDS PROGRAM MANAGER

3. Representative Sampling

Samples and measurements taken for the respective identified monitoring points as required herein shall be representative of the volume and nature of: 1) all influent wastes received at the facility, including septage, biosolids, etc.; 2) the monitored effluent discharged from the facility; and 3) biosolids produced at the facility. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the influent, effluent, or biosolids wastestream joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and prior approval by the Division.

4. Influent and Effluent Sampling Points

Influent and effluent sampling points shall be so designed or modified so that: 1) a sample of the influent can be obtained after preliminary treatment and prior to primary or biological treatment and 2) a sample of the effluent can be obtained at a point after the final treatment process and prior to discharge to state waters. The permittee shall provide access to the Division to sample at these points.

5. Analytical and Sampling Methods for Monitoring and Reporting

The permittee shall install, calibrate, use and maintain monitoring methods and equipment, including biological and indicated pollutant monitoring methods. All sampling shall be performed by the permittee according to specified methods in 40 C.F.R. Part 136; methods approved by EPA pursuant to 40 C.F.R. Part 136; or methods approved by the division in the absence of a method specified in or approved pursuant to 40 C.F.R. Part 136.

The permittee may use an equivalent and acceptable alternative to an EPA-approved method without EPA review where the requirements of 40 CFR Part 136.6 are met and documented. The permittee may use an Alternative Test Procedure (ATP). An ATP is defined as a way in which an analyte is identified and quantified that is reviewed and approved by EPA in accordance with 40 CFR Part 136.4 for nationwide use, or a modification to a 40 CFR 136 approved method that is reviewed and approved by EPA in accordance with 40 CFR Part 136.5 for limited use.

a. The permittee must select a test procedure that is “sufficiently sensitive” for all monitoring conducted in accordance with this permit.

b. The PQLs for specific parameters are listed in the table below.

c. If the permit contains an interim effluent limitation (a limit is report until such time as a numeric effluent limit becomes effective) for a parameter, the final numeric effluent limit shall be considered the AWQC for the purpose of determining whether a test method is sufficiently sensitive.

d. When the analytical method which complies with the above requirements has an ML greater than the permit limit, and the permittee's analytical result is less than the ML, the permittee shall report "BDL" on the DMR. Such reports will not be considered as violations of the permit limit, as long as the method is sufficiently sensitive. For parameters that have a report only limitation, and the permittee's analytical result is less than the ML, (where X = the ML) "< X" shall be reported on the DMR.

e. In the calculation of average concentrations (i.e. 7- day, 30-day average, 2-year rolling average) any individual analytical result that is less than the ML shall be considered to be zero for the calculation purposes. When reporting:

   If all individual analytical results are less than the ML, the permittee shall report either "BDL" or "<X" (where X = the ML), following the guidance above.

   If one or more individual results is greater than the ML, an average shall be calculated and reported. Note that it does not matter if the final calculated average is greater or less than the ML, it must be reported as a value.

Table Practical quantitation limits - Metals, inorganics, nutrients, radiological parameters, and nonylphenol

Parameter	Reporting Units	PQL	Parameter	Reporting Units	PQL
Aluminum	µg/L[1]	15	Ammonia Nitrogen	mg/L[2] N	0.2
Antimony	µg/L	2	Nitrate+Nitrite Nitrogen	mg/L N	0.1
Arsenic	µg/L	1	Nitrate Nitrogen	mg/L N	0.1
Barium	µg/L	1	Nitrite Nitrogen	mg/L N	0.05
Beryllium	µg/L	2	Total Kjeldahl Nitrogen	mg/L N	0.5
Boron	µg/L	20	Total Nitrogen	mg/L N	0.5
Cadmium	µg/L	0.5	Total Inorganic Nitrogen	mg/L N	0.2
Calcium	µg/L	120	Phosphorus	mg/L P	0.05[3]
Chromium	µg/L	20	BOD/CBOD	mg/L	2
Chromium, Trivalent	µg/L	---	Chloride	mg/L	2
Chromium, Hexavalent	µg/L	20[3, 4]	Total Residual Chlorine, DPD	mg/L	0.5
Copper	µg/L	2	Total Residual Chlorine, Amperiometric	mg/L	0.05
Iron	µg/L	20[3]	Cyanide	µg/L	10[3]
Lead	µg/L	0.5	Fluoride	mg/L	0.5
Magnesium	µg/L	35	Phenols	µg/L	30
Manganese	µg/L	2	Sulfate	mg/L	2
Mercury	µg/L	0.2[3]	Sulfide	mg/L H_2S	0.1
Mercury, Low Level	µg/L	0.002	Total Dissolved Solids (TDS)	mg/L	10
Molybdenum	µg/L	0.5	Total Suspended Solids (TSS)	mg/L	5
Nickel	µg/L	1	Radium-226	pCi/L	1
Selenium	µg/ L	1[3]	Radium-228	pCi/L	1

Parameter	Reporting Units	PQL	Parameter	Reporting Units	PQL
Silver	µg/ L	0.5	Uranium	µg/ L	1
Sodium	µg/ L	150	Nonylphenol, ASTM D7065	µg/ L	10
Thallium	µg/ L	0.5			
Zinc	µg/ L	10			

[1] µg/L = micrograms per liter
[2] mg/L = milligrams per liter
[3] PQL established based on parameter specific evaluation
[4] For hexavalent chromium, samples must be unacidified so dissolved concentrations will be measured rather than potentially dissolved concentrations.

6. Flow Measuring Devices

Unless exempted in Part I.A of this permit, flow metering at the headworks shall be provided to give representative values of throughput and treatment of the wastewater system. The metering device shall be equipped with a local flow indication instrument and a flow indication-recording-totalization device suitable for providing permanent flow records, which should be in the plant control building.

For mechanical facilities, where influent flow metering is not practical and the same results may be obtained from metering at the effluent end of the treatment facility, this type of flow metering arrangement will be considered, and if approved, noted in Part I.A of this permit. For lagoons, an instantaneous or continuous effluent flow measuring device shall be required in addition to the above described influent flow measuring device.

At the request of the Division, the permittee must be able to show proof of the accuracy of any flow-measuring device used in obtaining data submitted in the monitoring report. The flow-measuring device must indicate values within ten (10) percent of the actual flow being measured.

PART II

A. DUTY TO COMPLY

1. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Water Quality Control Act and is grounds for: 1) enforcement action; 2) permit termination, revocation and reissuance, or modification; or 3) denial of a permit renewal application.
2. Federal Enforcement:
    a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
    b. The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who *negligently* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
    c. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

B. DUTY TO REAPPLY

If the permittee plans to continue an activity regulated by this permit after the expiration date of this permit, they must apply for and obtain a new permit within 180 days as required by Regulation 61.4 and 61.10.

C. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. DUTY TO MITIGATE

A permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. PROPER OPERATION AND MAINTENANCE

A permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed only when the operation is necessary to achieve compliance with the conditions of this permit. See 40 C.F.R. §122.41(e).

F. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. Any request for modification, revocation, reissuance, or termination under this permit must comply with all terms and conditions of Regulation 61.8(8). See also (40 C.F.R. § 122.41(f)).

G. PROPERTY RIGHTS

In accordance with 40 CFR §122.41(g) and Regulation 61.8(9):

1. The issuance of a permit does not convey any property or water rights in either real or personal property, or stream flows or any exclusive privilege.
2. The issuance of a permit does not authorize any injury to person or property or any invasion of personal rights, nor does it authorize the infringement of federal, state, or local laws or regulations.
3. Except for any toxic effluent standard or prohibition imposed under Section 307 of the Clean Water Act or any standard for sewage sludge use or disposal under Section 405(d) of the Federal act, compliance with a permit during its term constitutes compliance, for purposes of enforcement, with Sections 301, 302, 306, 318, 403, and 405(a) and (b) of the Clean Water Act. However, a permit may be modified, revoked and reissued, or terminated during its term for cause as set forth in Section 61.8(8) of the Colorado Discharge Permit System Regulations.

H. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the division, within a reasonable time, any information which the division may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the division, upon request, copies of records required to be kept by this permit in accordance with 40 CFR §122.41(h) and/or Regulation 61.8(3)(q).

I. INSPECTION AND ENTRY

The permittee shall allow the division and the authorized representative, including U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials as required by law, to conduct inspections in accordance with 40 CFR §122.41(i), Regulation 61.8(3), and Regulation 61.8(4):

1. To enter upon the permittee's premises where a regulated facility or activity is located or conducted in which any records are required to be kept under the terms and conditions of this permit;
2. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit and to inspect any facilities, equipment (including monitoring and control equipment), practices, operations or monitoring method regulated or required in the permit;

3. To enter upon the permittee's premises in a reasonable manner and at a reasonable time to inspect or investigate, any actual, suspected, or potential source of water pollution, or to ascertain compliance or noncompliance with the Colorado Water Quality Control Act or any other applicable state or federal statute or regulation or any order promulgated by the division, and;
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

J. MONITORING AND RECORDS

1. Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the monitored activity. (40 C.F.R. § 122.41(j)(1).
2. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. subchapters N or O. In the case of pollutants for which there are no approved methods under 40 C.F.R. part 136 or otherwise required under 40 C.F.R. subchapters N or O, monitoring must be conducted according to a test procedure specified in this permit for such pollutants. See 40 C.F.R. § 122.41(j)(4); 122.44(i)(1)(iv)(B).
3. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.
4. Records of monitoring information must include:
    a. The date, exact place, and time of sampling or measurements;
    b. The individual(s) who performed the sampling or measurements;
    c. The date(s) analyses were performed
    d. The individual(s) who performed the analyses;
    e. The analytical techniques or methods used; and
    f. The results of such analyses.
5. The permittee shall install, calibrate, use and maintain monitoring methods and equipment, including biological and indicated pollutant monitoring methods. All sampling shall be performed by the permittee according to specified methods in 40 C.F.R. Part 136; methods approved by EPA pursuant to 40 C.F.R. Part 136; or methods approved by the National ATP Coordinator in the absence of a method specified in or approved pursuant to 40 C.F.R. Part 136.
6. The permittee shall retain for a minimum of three (3) years records of all monitoring information, including all original strip chart recordings for continuous monitoring instrumentation, all calibration and maintenance records, copies of all reports required by this permit and records of all data used to complete the application for this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the permittee or when requested by the Division or Regional Administrator.

K. SIGNATORY REQUIREMENTS

1. Authorization to Sign: All documents required to be submitted to the division by the permit must be signed in accordance with 40 CFR §122.22, Regulation 61.4, and the following criteria:
    a. For a corporation: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, 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 (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which 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 laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or
c. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency. (e.g., Regional Administrator of EPA).
d. By a duly authorized representative in accordance with 40 C.F.R. 122.22(b), only if:
    i. the authorization is made in writing by a person described in Part II.K.1.a, b, or c above;
    ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and,
    iii. The written authorization is submitted to the Division.

2. Any person(s) signing documents required for submittal to the Division must make the following certification:
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified 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 for knowing violations."

3. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. See 40 C.F.R. §122.41(k)(2).

L. REPORTING REQUIREMENTS

1. Planned Changes: The permittee shall give advance notice to the division, in writing, of any planned physical alterations or additions to the permitted facility in accordance with 40 CFR §122.41(l) and Regulation 61.8(5)(a) and Part II.O. of this permit. Notice is required only when:
    a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b); or
    b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR §122.41(a)(1).
    c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. See 40 C.F.R.§122.41(l)(1)(iii).
2. Anticipated Non-Compliance: The permittee shall give advance notice to the division, in writing, of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements. The timing of notification requirements differs based on the type of non-compliance as described below.

3. Transfer of Ownership or Control: The permittee shall notify the division, in writing, thirty (30) calendar days in advance of a proposed transfer of the permit. This permit is not transferable to any person except after notice to the division. The division may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. See Regulation 61.8(6); 40 C.F.R. §§ 122.41(l)(3); 122.61).
4. Monitoring reports: Monitoring results must be reported at the intervals specified in this permit.
    a. If the permittee monitors any pollutant at the approved monitoring locations listed in Part I.A.1 more frequently than that required by this permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Division.
    b. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Division in the permit.
5. Compliance Schedules: Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule in the permit, shall be submitted on the date listed in the compliance schedule section. The fourteen (14) calendar day provision in Regulation 61.8(4)(n)(i) has been incorporated into the due date.
6. Twenty-four hour reporting:
    a. In addition to the reports required elsewhere in this permit, the permittee shall report the following circumstances orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances, and shall mail to the division a written report containing the information requested within five (5) working days after becoming aware of the following circumstances:
        i. Circumstances leading to any noncompliance which may endanger health or the environment regardless of the cause of the incident;
        ii. Circumstances leading to any unanticipated bypass which exceeds any effluent limitations in the permit;
        iii. Circumstances leading to any upset which causes an exceedance of any effluent limitation in the permit; or
        iv. Daily maximum violations for any of the pollutants limited by Part I.A of this permit as specified in Part III of this permit] . This includes any toxic pollutant or hazardous substance or any pollutant specifically identified as the method to control any toxic pollutant or hazardous substance.
    b. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times), and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
    c. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (combined sewer overflows, sanitary sewer overflows, or bypass events), type of sewer overflow structure (*e.g.,* manhole, combine sewer overflow outfall), discharge volumes untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the sewer overflow event, and whether the noncompliance was related to wet weather.
7. Other non-compliance: A permittee must report all instances of noncompliance at the time monitoring reports are due. These reports may be submitted annually in accordance with Regulation 61.8(4)(p) and/or 61.8(5)(f), but may be submitted at a more frequent interval.
8. Other information: Where a permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the division it has a duty to promptly submit such facts or information.

M. BYPASS

1. Definitions:

a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility in accordance with 40 CFR §122.41(m)(1)(i) and Regulation 61.2(12).
b. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. See 40 CFR §122.41(m)(1)(ii).

2. Bypass not exceeding limitations. You may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Appendix I, Subsections I.13.3 and I.13.4. See 40 CFR §122.41(m)(2).
3. Notice of bypass:
   a. Anticipated bypass. If you know in advance of the need for a bypass, you must submit prior notice, if possible at least ten days before the date of the bypass. See 40 CFR §122.41(m)(3)(i).
   b. Unanticipated bypass. You must submit notice of an unanticipated bypass as required in Part II.L.6. See 40 CFR §122.41(m)(3)(ii).
4. Prohibition of Bypass: Bypasses are prohibited and the division may take enforcement action against the permittee for bypass, unless:
   a. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
   c. Proper notices were submitted to the division.
      i. The Division may approve an anticipated bypass, after considering its adverse effects, if the Division determines that it will meet the three conditions listed.

N. UPSET

1. Definition: "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. In accordance with 40 CFR §122.41(n) and Regulation 61.2(114), an upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation in accordance with 40 CFR §122.41(n) and Regulation 61.2(114).
2. Effect of an upset: An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of section 3 are met. A determination made during administrative review of claims that noncompliance was caused by upset is final administrative action subject to judicial review in accordance with Regulation 61.8(3)(j).
3. Conditions necessary for demonstration of an Upset: A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed contemporaneous operating logs, or other relevant evidence that
   a. an upset occurred and the permittee can identify the specific cause(s) of the upset;
   b. the permitted facility was at the time being properly operated and maintained; and
   c. the permittee submitted proper notice of the upset as required in Part II.L.6 (24-hour notice); and
   d. The permittee complied with any remedial measure necessary to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. See 40 C.F.R. 122.41(n)(3)(i)-(iv).
4. In addition to the demonstration required above, a permittee who wishes to establish the affirmative defense of upset for a violation of effluent limitations based upon water quality standards shall also demonstrate through monitoring, modeling or other methods that the relevant standards were achieved in the receiving water.

5. Burden of Proof: In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

O. REOPENER CLAUSE

Procedures for modification or revocation. Permit modification or revocation of this permit or coverage under this permit will be conducted according to Regulation 61.8(8). This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary), or other appropriate requirements if one of the following events occurs, including but not limited to:

1. Water Quality Standards: The water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit.
2. Wasteload Allocation: A wasteload allocation is developed and approved by the State of Colorado and/or EPA for incorporation in this permit.
3. Discharger-specific variance: A variance is adopted by the Water Quality Control Commission.
4. Water Quality Assessment: a different water quality assessment is developed for the receiving waters that modifies the permittee discharges in such a manner as to require different effluent limits than contained in this permit.

P. OTHER INFORMATION

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Division or U.S. EPA, the Discharger shall promptly submit such facts or information. See 40 C.F.R. § 122.41(l)(8).

Q. SEVERABILITY

The provisions of this permit are severable. If any provisions or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances and the application of the remainder of this permit shall not be affected.

R. NOTIFICATION REQUIREMENTS

1. Notification to Parties: All notification requirements shall be directed as follows:
   a. Oral Notifications, during normal business hours shall be to:
      CDPHE-Emergency Reporting Line: 1-877-518-5608; or

      Water Quality Protection Section – Domestic Compliance Program
      Water Quality Control Division
      Telephone: (303) 692-3500

      After hours notifications should be made to the CDPHE-Emergency Reporting Line: 1-877-518-5608.

   b. Written notification shall be to:
      Water Quality Protection Section – Compliance Program
      Water Quality Control Division
      Colorado Department of Public Health and Environment
      WQCD-WQP-B2
      4300 Cherry Creek Drive South
      Denver, CO 80246-1530

S. RESPONSIBILITIES

Reduction, Loss, or Failure of Treatment Facility: The permittee has the duty to halt or reduce any activity if necessary to maintain compliance with the effluent limitations of the permit. It shall not be a defense for a permittee in an enforcement action that it would be necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

T. OIL AND HAZARDOUS SUBSTANCES LIABILITY

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under Section 311 (Oil and Hazardous Substance Liability) of the Clean Water Act.

U. EMERGENCY POWERS

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority granted by Section 510 of the Clean Water Act.

V. CONFIDENTIALITY

Any information relating to any secret process, method of manufacture or production, or sales or marketing data which has been declared confidential by the permittee, and which may be acquired, ascertained, or discovered, whether in any sampling investigation, emergency investigation, Colorado Open Records Act (CORA) request, or otherwise, shall not be publicly disclosed by any member, officer, or employee of the Water Quality Control Commission or the division, but shall be kept confidential. Any person seeking to invoke the protection of this section shall bear the burden of proving its applicability. This section shall never be interpreted as preventing full disclosure of effluent data.

W. FEES

The permittee is required to submit payment of an annual fee as set forth in the 2016 amendments to the Water Quality Control Act. Section 25-8-502 (1.1) (b), and the Regulation 61.15 as amended. Failure to submit the required fee when due and payable is a violation of the permit and will result in enforcement action pursuant to Section 25-8-601 et. seq., C.R.S.1973 as amended.

X. DURATION OF PERMIT

The duration of a permit shall be for a fixed term and shall not exceed five (5) years. If the permittee desires to continue to discharge, a permit renewal application shall be submitted at least one hundred eighty (180) calendar days before this permit expires. Filing of a timely and complete application shall cause the expired permit to continue in force to the effective date of the new permit. The permit's duration may be extended only through administrative extensions and not through interim modifications. If the permittee anticipates there will be no discharge after the expiration date of this permit, the division should be promptly notified so that it can terminate the permit in accordance with Regulation 61.

Y. SECTION 307 TOXICS

If a toxic effluent standard or prohibition, including any applicable schedule of compliance specified, is established by regulation pursuant to section 307 of the clean water act for a toxic pollutant which is present in the permittee's discharge and such standard or prohibition is more stringent than any limitation upon such pollutant in the discharge permit, the division shall institute proceedings to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition.

PART III

Table I—Testing Requirements for Organic Toxic Pollutants by Industrial Category for Existing Dischargers

Industry Category	
Adhesives and sealants	Ore mining
Aluminum forming	Organic chemicals manufacturing
Auto and other laundries	Paint and ink formulation
Battery manufacturing	Pesticides
Coal mining	Petroleum refining
Coil coating	Pharmaceutical preparations
Copper forming	Photographic equipment and supplies
Electrical and electronic components	Plastics processing
Electroplating	Plastic and synthetic materials manufacturing
Explosives manufacturing	Porcelain enameling
Foundries	Printing and publishing
Gum and wood chemicals	Pulp and paper mills
Inorganic chemicals manufacturing	Rubber processing
Iron and steel manufacturing	Soap and detergent manufacturing
Leather tanning and finishing	Steam electric power plants
Mechanical products manufacturing	Textile mills
Nonferrous metals manufacturing	Timber products processing

Table II—Organic Toxic Pollutants in Each of Four Fractions in Analysis by Gas Chromatography/Mass

Volatiles	Acid Compounds	Base/Neutral	Pesticides
1V acrolein	1A 2-chlorophenol	1B acenaphthene	1P aldrin
2V acrylonitrile	2A 2,4-dichlorophenol	2B acenaphthylene	2P alpha-BHC
3V benzene	3A 2,4-dimethylphenol	3B anthracene	3P beta-BHC
5V bromoform	4A 4,6-dinitro-o-cresol	4B benzidine	4P gamma-BHC
6V carbon tetrachloride	5A 2,4-dinitrophenol	5B benzo(a)anthracene	5P delta-BHC
7V chlorobenzene	6A 2-nitrophenol	6B benzo(a)pyrene	6P chlordane
8V chlorodibromomethane	7A 4-nitrophenol	7B 3,4-benzofluoranthene	7P 4,4′-DDT
9V chloroethane	8A p-chloro-m-cresol	8B benzo(ghi)perylene	8P 4,4′-DDE
10V 2-chloroethylvinyl ether	9A pentachlorophenol	9B benzo(k)fluoranthene	9P 4,4′-DDD
11V chloroform	10A phenol	10B bis(2-chloroethoxy)methane	10P dieldrin
12V dichlorobromomethane	11A 2,4,6-trichlorophenol	11B bis(2-chloroethyl)ether	11P alpha-endosulfan
14V 1,1-dichloroethane		12B bis(2-chloroisopropyl)ether	12P beta-endosulfan
15V 1,2-dichloroethane		13B bis (2-ethylhexyl)phthalate	13P endosulfan sulfate
16V 1,1-dichloroethylene		14B 4-bromophenyl phenyl ether	14P endrin
17V 1,2-dichloropropane		15B butylbenzyl phthalate	15P endrin aldehyde
18V 1,3-dichloropropylene		16B 2-chloronaphthalene	16P heptachlor
19V ethylbenzene		17B 4-chlorophenyl phenyl ether	17P heptachlor epoxide
20V methyl bromide		18B chrysene	18P PCB-1242
21V methyl chloride		19B dibenzo(a,h)anthracene	19P PCB-1254
22V methylene chloride		20B 1,2-dichlorobenzene	20P PCB-1221
23V 1,1,2,2-tetrachloroethane		21B 1,3-dichlorobenzene	21P PCB-1232
24V tetrachloroethylene		22B 1,4-dichlorobenzene	22P PCB-1248
25V toluene		23B 3,3′-dichlorobenzidine	23P PCB-1260
26V 1,2-trans-dichloroethylene		24B diethyl phthalate	24P PCB-1016
27V 1,1,1-trichloroethane		25B dimethyl phthalate	25P toxaphene
28V 1,1,2-trichloroethane		26B di-n-butyl phthalate	
29V trichloroethylene		27B 2,4-dinitrotoluene	
31V vinyl chloride		28B 2,6-dinitrotoluene	
		29B di-n-octyl phthalate	
		30B 1,2-diphenylhydrazine (as azobenzene)	
		31B fluroranthene	
		32B fluorene	
		33B hexachlorobenzene	
		34B hexachlorobutadiene	
		35B hexachlorocyclopentadiene	
		36B hexachloroethane	
		37B indeno(1,2,3-cd)pyrene	
		38B isophorone	
		39B napthalene	
		40B nitrobenzene	
		41B N-nitrosodimethylamine	
		42B N-nitrosodi-n-propylamine	
		43B N-nitrosodiphenylamine	
		44B phenanthrene	
		45B pyrene	
		46B 1,2,4-trichlorobenzene	

Table III—Other Toxic Pollutants (Metals and Cyanide) and Total Phenols

- Antimony, Total
- Arsenic, Total
- Beryllium, Total
- Cadmium, Total
- Chromium, Total
- Copper, Total
- Lead, Total
- Mercury, Total
- Nickel, Total
- Selenium, Total
- Silver, Total
- Thallium, Total
- Zinc, Total
- Cyanide, Total
- Phenols, Total

Table IV—Conventional and Nonconventional Pollutants Required To Be Tested by Existing Dischargers if Expected to be Present

- Bromide
- Chlorine, Total Residual
- Color
- Fecal Coliform
- Fluoride
- Nitrate-Nitrite
- Nitrogen, Total Organic
- Oil and Grease
- Phosphorus, Total
- Radioactivity
- Sulfate
- Sulfide
- Sulfite
- Surfactants
- Aluminum, Total
- Barium, Total
- Boron, Total
- Cobalt, Total
- Iron, Total
- Magnesium, Total
- Molybdenum, Total
- Manganese, Total
- Tin, Total
- Titanium, Total

Table V—Toxic Pollutants and Hazardous Substances Required To Be Identified by Existing Dischargers if Expected To Be Present

Toxic Pollutants

Asbestos

Hazardous Substances

Acetaldehyde
Allyl alcohol
Allyl chloride
Amyl acetate
Aniline
Benzonitrile
Benzyl chloride
Butyl acetate
Butylamine
Captan
Carbaryl
Carbofuran
Carbon disulfide
Chlorpyrifos
Coumaphos
Cresol
Crotonaldehyde
Cyclohexane
2,4-D (2,4-Dichlorophenoxy acetic acid)
Diazinon
Dicamba
Dichlobenil
Dichlone
2,2-Dichloropropionic acid
Dichlorvos
Diethyl amine
Dimethyl amine
Dintrobenzene
Diquat
Disulfoton
Diuron
Epichlorohydrin
Ethion
Ethylene diamine
Ethylene dibromide
Formaldehyde
Furfural
Guthion
Isoprene
Isopropanolamine Dodecylbenzenesulfonate
Kelthane
Kepone
Malathion
Mercaptodimethur
Methoxychlor
Methyl mercaptan
Methyl methacrylate
Methyl parathion
Mevinphos
Mexacarbate
Monoethyl amine
Monomethyl amine
Naled
Napthenic acid
Nitrotoluene
Parathion
Phenolsulfanate
Phosgene
Propargite
Propylene oxide
Pyrethrins
Quinoline
Resorcinol
Strontium
Strychnine
Styrene
2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)
TDE (Tetrachlorodiphenylethane)
2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Trichlorofan
Triethanolamine dodecylbenzenesulfonate
Triethylamine
Trimethylamine
Uranium
Vanadium
Vinyl acetate
Xylene
Xylenol
Zirconium

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
1994	Beaugureau & MacKenzie	2
	Echo Canyon Ranch	25
	Cloman	20
	Collins	2
	Dempsey & Leal	2
	Eagle Peak Ranches	12
	Giordano	1
	P. & M. Gupta	2
	R. Gupta	13
	Hyde	19
	Quintana	10
	Wilsey	1
1995	Martinez	1
	Sands	1
1996	Alpine Hills Subdivision	12
	Dawson	23
	Forrest	4
	Leake	2
	Maez	3
	Outerbridge	1
	Schaeper	2
1997	Ray	6
	Wagner	3
	Dillard	3
	Downey	1
	Bauer	1
	Wildflower Sub. (ex. lots 27, 35, 42–45)	45
	Kukla	1
	Tesman	1
	The River Ranch (S.J.R.E., LLC)	8

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
	Lucero	1
	Stretton	1
	Frazier (Valley View Ranch, Tr. 1)	1
	Victory Mgmt. (Valley View Ranch, Tr. 2)	2
	Clare (Valley View Ranch, Tr. 3)	1
	Frazier (Valley View Ranch, Tr. 4)	1
	Brown (Valley View Ranch, Tr. 5)	2
	Pond	1
	Gibson	1
	Phy. Med. (Barker)	1
1998	Thalman	2
	Ketchum	2
	Colorado's Timber Ridge (Machock)	260
	Belmear	14
1999	Maes	1
	Macht Ranch	2
	Timbered Canyon, LLC (Elk Park)	119
	David and Yolanda Parker	4
2002	Lunnen/Carter (Hidden Meadows)	5
	Atkinson/Donharl	0
	Wienpahl	1
	Hansen	0
2003	Lomasney	1
	Payne	1
	Morris	1

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
2004	Humane Society of Pagosa Springs	2
	Hockett	1
2005	Jimmy Lucero	2
	Bernardo Lucero	1
	Madaline Lucero	2
2006	Dillard (Wastewater for 2 lot subdivision)	2
	Knudson (Wastewater Lot 59 Mtz. Mtn.)	1
2007	Thibault (Portion Lot 266X Meadows 4)	0
	Maun (Wastewater Mtz. Mtn., Lot 57)	1
	Humane Soc. of P.S. (2 add. W & WW)	2
2010	Cecka Family Living Trust	1
2012	N.C.F.R.P., Inc. (Wildflower, Lot 45)	1
2013	Blackmon	1
	Mazur	1
	Corley	1
	Soniat	1
	Williams	2
	Wilson	1
	Burnett/Toland	1

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
2014	Vail	1
	Jones	1
	Williams	1
	Log Park	42
2016	Schabel (Wastewater Mtz. Mtn. 2, Lot 1)	1
2017	Brown/Hill	1
	Rizzo (Wastewater Mtz. Mtn., Lot 103)	1
2018	Zappone	1
	Black (Wastewater Mtz. Mtn. Lot 54)	1
	LKM, Ltd. (for 570129100115)	1
2020	Murray (Wastewater Mtz. Mtn. 2 Lot 11)	1
	Scoggins (Wastewater Mtz. Mtn. Lot 56)	1
	Pitcher	1
	Rivera	1
	River Rock Estates	10

P.A.W.S.D.

PAGOSA AREA WATER AND SANITATION DISTRICT

ORIGINAL SCALE: 1" = 7000'

0' 7000'

INCLUDED IN DISTRICT WATER AND SEWER SERVICE

INCLUDED IN DISTRICT WATER SERVICE ONLY

EXCLUDED FROM DISTRICT

MAP OF
PAGOSA AREA WATER AND SANITATION DISTRICT
ARCHULETA COUNTY, COLORADO

PREPARED BY

DAVIS ENGINEERING SERVICE, INC.
188 S. 8th STREET – P.O. BOX 1208
PAGOSA SPRINGS, COLORADO 81147

REVISED DECEMBER 22, 2020

Pagosa Area Water and Sanitation District
Wastewater Capital Improvement Program

20-Year Regulatory Outlook

Project No. 200-324541-21001
Initial: March 16, 2021
Revised: January 3, 2023

PRESENTED TO

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Mark J. Maxwell — 1/3/2023

Mark J. Maxwell, PE — Date
Sr. Project Engineer

1.0 INTRODUCTION

The 20-Year Regulatory Outlook provides the basis of planning for the Wastewater Treatment Capital Improvement Program (CIP) for the Pagosa Area Water and Sanitation District (PAWSD or District). This document will review current permit compliance schedules and the future regulatory landscape for District's Vista Wastewater Treatment Plant (Vista WWTP or WWTP) that services the town of Pagosa Springs and nearby areas in Archuleta County, Colorado.

The text for the 20-Year Regulatory Outlook is intended to be brief and serves as a look forward and not a written recap of all prior studies and actions that brought the District to this point in time. The 20-Year Regulatory Outlook will also not include future flow, load, and inflow and infiltration (I/I) projections, process design alternatives, and energy efficiency savings, as these will be presented elsewhere in the Project Needs Assessment (PNA) report.

2.0 REGULATORY LANDSCAPE FOR THE WWTP

This section forecasts the future regulatory landscape that will help drive the schedule of capital improvements at Vista WWTP over the next 20 years (i.e. through 2041). When reading the text, please refer to Figure 1, which is inserted at the end of this section and summarizes the timing of potential projects that may be required over the course of the planning period. The current permit referenced throughout this text is the "Authorization to Discharge Under the Colorado Discharge Permit System" Permit Number CO0031755, originally issued June 28, 2019.

Unless a permit modification is obtained, the District is obligated to meet the compliance schedules outlined in Part I(B)(6) of the permit. The first of the two compliance schedules establishes steps toward meeting the daily maximum total inorganic nitrogen (TIN) limit of 10 mg-N/L by 2025 and the running 12-month median total phosphorus (TP) limit of 1.0 mg-P/L by 2026. The above-noted TIN and TP limits are respectively driven by drinking water protection and Regulation 85 compliance. The additions and modifications needed to meet these limits are herein termed the Phase 1 Improvements. PAWSD has fulfilled the first step of the TIN/TP compliance schedule by contracting with Tetra Tech to prepare a PNA to assist the District in securing a State Revolving Fund (SRF) loan to help finance the improvements required to meet these limits. Subsequent steps by the District will include formally submitting a SRF loan application to the Colorado Department of Public Health and Environment (CDPHE) as well as requesting preliminary effluent limits (if required), as well as site amendment and design approvals from CDPHE.

The second of the two compliance schedules outlines requirements for meeting limits on dissolved manganese, dissolved lead, total recoverable lead, dissolved selenium, and nonylphenol. The District must submit a report to CDPHE identifying sources of these pollutants and strategies to control these sources or treatment alternatives to come into compliance by August 2022. It is currently anticipated that compliance with these limits can be met through source controls and removals that are incidental to the existing activated sludge treatment process. The District will update CDPHE of its progress in implementing control strategies through a progress report and finally submit study results to show that compliance has been attained.

This 20-Year Regulatory Outlook was prepared by considering Vista WWTP's liquid stream treatment capacity, the available assimilative capacity of receiving streams, and potential future discharge requirements. These topics will be discussed in subsequent sections of the PNA.

2.1 LIQUID STREAM TREATMENT CAPACITY

The existing Vista WWTP is rated by CDPHE for a maximum month (30-day average) flow and biochemical oxygen demand (BOD) organic load based on the time of year. For January through March, the capacity is 3.7 million gallons per day (MGD) for flow and 3,765 pounds per day (ppd) for BOD organic load. For April through December, the capacity is 3.9 MGD for flow and 3,906 ppd for BOD organic load.

The U.S. Census Bureau estimates the average occupancy per household in Archuleta County, Colorado to be about 2.23 persons per household based on data collected from 2015 to 2019. Because Pagosa Springs is a peak summer season tourist destination area, Tetra Tech recommends using 2.5 people per household or equivalent dwelling unit (EQDU). It is difficult to know how many EQDUs are in use at any point in time, or their level of occupancy. One consideration that is relatively consistent with primarily domestic wastewater is the average amount of BOD load per capita (ppcd) or population equivalent (PE). While this unit BOD loading value does vary somewhat from community to community, an average (i.e. unpeaked) value of 0.21 ppcd (or 0.21 ppd/PE) is representative of service areas with primarily domestic wastes and will be used here to estimate service area population and number of connected EQDUs assuming 2.5 people per EQDU.

As detailed in Attachment 8, higher levels of collection system infiltration and inflow (I/I) are normally experienced in February, March, and April, and these are the months when maximum month flows occur at the Vista WWTP. However, maximum month organic loads occur during the summer tourist season and are not coincidental with maximum month flows. Currently, maximum month flows during February through April are about 3.0 MGD, and monthly average flows hold steady at about 1.1 MGD for the remaining nine months of the year (May through January). If District and Town of Pagosa Springs I/I correction efforts are successful over time, it is forecasted that maximum month flows may decline to about 2.0 MGD by 2032, and then slowly increase due to population growth to about 2.5 MGD at the end of the 20-year planning period.

Based on recent and sustained compound annual growth rates of about 2.2% per year in the District service area, current summertime maximum month BOD loadings of 2,800 ppd are expected to reach 95% of CDPHE's existing 3,906 ppd CDPHE summertime capacity rating by 2035 (0.95 x 3,906 = 3,711 ppd of BOD). This means the existing Vista WWTP does not need to be expanded as part of the Phase 1 Improvements for TIN and TP compliance, and capacity expansion or re-rating can be deferred until the Phase 2 Improvements that are slated for the 2030-2035 timeframe when additional effluent quality enhancements are projected to be necessary for compliance with Regulation 31-based, in-stream numeric nutrient quality standards.

2.2 RECEIVING STREAMS AVAILABLE ASSIMILATIVE CAPACITY

The Vista WWTP's receiving streams are Stevens Draw, Martinez Creek, and Stollsteimer Creek (consecutively in that order). These streams are located in the San Juan River Basin and Piedra River Sub-Basin (Figure 2). These streams typically run dry, except during spring runoff, storm events, or effluent discharge from the WWTP. Therefore, there is no available assimilative capacity (dilution) to consider when CDPHE develops discharge limits for the WWTP. Effluent discharge flows via an ephemeral stream to Stevens Draw, which is designated as Use Protected. Stevens Draw and its confluent rivers, Martinez Creek and Stollsteimer Creek, are classified as Aquatic Life Warm 2, Recreation Class P (potential primary contact use), Agriculture. Martinez Creek and Stollsteimer Creek are designated as Reviewable for Anti-Degradation purposes and are also considered drinking water supply sources.

Figure 2: Colorado Water Basins

2.3 LIQUID STREAM DISCHARGE REQUIREMENTS

This discussion will focus on upcoming nutrient removal and water quality requirements that will have potential impact on the design of the WWTP and the corresponding costs of construction and operation. Nutrients and other water quality parameters that may have more stringent limits in the future include TIN, TP, total nitrogen (TN), ammonia, cadmium, selenium, arsenic, and temperature. CDPHE regulations that impact Vista WWTP, along with the expected timeline for standards adoption from the CDPHE Water Quality Roadmap, are shown in Table 1.

In addition to the parameters outlined on the CDPHE Water Quality Roadmap, per- and polyfluoroalkyl substances (PFAS), and perhaps other trace organic compounds that have public health risk and occurrence concerns, are expected to receive increased attention and regulatory action in the next 20 years. These will be discussed in a later section.

Table 1 – Colorado Regulations with Potential Impact on Vista WWTP's Effluent Quality Requirements

Regulation No.	Description
Regulation 11 (5 CCR 1002-11)	Colorado Primary Drinking Water Regulations: ▪ TIN (Standards to take effect for PAWSD in 2026)
Regulation 31 (5 CCR 1002-31)	Basic Standards and Methodologies for Surface Water: ▪ Cadmium (Standards adopted in 2019) ▪ Arsenic (Standards scheduled to be adopted in 2024) ▪ Selenium (Standards scheduled to be adopted in 2027) ▪ Ammonia (Standards scheduled to be adopted in 2027) ▪ Total Nitrogen (Stream scheduled standards to be adopted in 2027) ▪ Total Phosphorus (Stream standards scheduled to be adopted in 2027)
Regulation 34 (5 CCR 1002-34)	Classifications and Numeric Standards for San Juan River and Dolores River Basins
Regulation 85 (5 CCR 1002-85)	Nutrients Management Control Regulation (Initially Adopted in 2012)

2.3.1 Nutrients (Nitrogen and Phosphorus)

Although nitrogen and phosphorus are vital nutrients to the aquatic ecosystem, excessive concentrations can cause overabundant aquatic plant growth and subsequent dissolved oxygen (DO) depletion in affected waters. Regulations 31 and 85 were promulgated to improve nutrient control over Colorado lakes and streams. Regulation 31 sets standards based on stressor-response relationship between macroinvertebrates and nutrient concentrations, while Regulation 85 sets effluent TIN and TP limits based on technology.

Since Martinez Creek and Stollsteimer Creek are considered drinking water supplies by the CDPHE, the Vista WWTP must treat for a daily maximum (24-hour composite) TIN concentration of 10 mg-N/L, in accordance with Regulation 11, beginning in 2025. When in-stream numeric nutrient limits are promulgated by CDPHE via Regulation 31 (currently anticipated to be no sooner than the end of 2027), the Vista WWTP will also get an effluent discharge limit for TN and a more stringent limit for TP.

Vista WWTP must report TP until 2026 when a running 12-month median of 1.0 mg-P/L and 95th percentile limit of 2.5 mg-P/L will take effect. When the District's discharge permit is next renewed after 2027, supplemental phosphorous removal through biological or chemical means will be needed to comply with Regulation 31 TP requirements. Compliance with anticipated Regulation 31 TN requirements may require four-stage nitrate removal (anoxic-oxic-anoxic-oxic zones) with a potential fifth stage for phosphorous removal.

2.3.2 Ammonia

Ammonia is a form of nitrogen that is toxic to aquatic life when present in sufficient concentrations. It enters wastewater influent through fertilizer runoff, industrial waste, and decomposing organic, animal, and human wastes. The EPA updated its recommended Clean Water Act (CWA) 304(a) criteria for ammonia in 2013 to include protection for sensitive aquatic species, including freshwater mussels and gill-bearing snails. CDPHE is currently studying the distribution of these sensitive species in Colorado to determine the applicability of these criteria to particular lakes and streams in the state. It is anticipated that CDPHE will propose that new ammonia criteria be adopted by the Water Quality Control Commission (WQCC) in 2027.

Due to the periodic nature of flows through Stevens Draw, Martinez Creek, and Stollsteimer Creek, it is unlikely for freshwater species to inhabit these streams. However, it may be possible for species to inhabit downstream waters with regular flow, like the Piedra River, provided the proper environmental and aquatic conditions are present for ammonia-sensitive species. Until CDPHE reaches a formal determination, it is prudent from a planning standpoint to assume that in-stream ammonia standards will not be higher, and could be lower, than indicated in the current permit.

The current permit imposes more stringent 30-day average limitations on the ammonia for January, November, and December than the previous permit, based on the water quality based effluent limit (WQBEL). February through October were based on the non-impact limit (NIL), like the previous permit. The 30-day average limits for January, November, and December range from 6.1 to 6.3 mg-N/L with daily maximums of 22 to 23 mg-N/L. For February through October, the 30-day average limits range from 3.0 to 6.1 mg-N/L with daily maximums of 23 to 29 mg-N/L.

If fresh water mussels and gill-bearing snails themselves, or just their habitat, are found in the receiving streams, Tetra Tech advises that future ammonia standards and effluent limits could be set as low as 50% of the existing values. In this case, Vista WWTP should have sufficient capacity in its extended aeration oxidation ditches to reduce ammonia to these lower levels. There is no anticipated need for additional treatment steps.

2.3.3 Cadmium

Cadmium is a naturally-occurring metal found in mineral deposits or in lower concentrations in the environment. It is also used in industry for manufacturing of batteries, pigments, plastic stabilizers, metal coatings, alloys, electronics, and nanoparticles. Cadmium can cause premature mortality and negative impacts to the growth, reproduction, immune and endocrine systems, development, and behavior of aquatic organisms.

The EPA updated its CWA 304(a) criteria for cadmium in 2016 to increase protections for sensitive cold water species, like trout. These criteria were adopted in 2019 to several cold water segments in Regulations 32, 33, 34, 35, 36, and 37. However, the receiving streams from Vista WWTP are all classified as Warm Water 2, and therefore, the new cold water cadmium standards do not apply.

The acute aquatic life cadmium standard in warm water are calculated as follows:

(1.136672- (ln(hardness)* 0.041838))*e(0.9789*ln(hardness)-3.443)

The chronic aquatic life cadmium standard in warm water are calculated as follows:

(1.101672- (ln(hardness)*0.041838))* e (0.7977*ln(hardness)-3.909)

Additionally, the agriculture cadmium standard is 10 µg/L (30-day).

PAWSD's discharge permit dictates that Vista WWTP will report the 30-day average and daily maximum potentially dissolved cadmium for two days per month. For total recoverable cadmium, the WWTP will report the daily maximum for two days per month. Starting in August 2021, it will also report the two-year average for two days per month. The total recoverable cadmium limit is 0.75 µg/L (ADBAC), and the PD cadmium limit is 1.1 µg/L.

There is no data available on cadmium from the previous permit term, so Vista WWTP is required to report for this permit term to conduct a reasonable potential (RP) analysis for the next permit renewal. Because no data has been collected on this parameter, it is not known whether this will present a compliance challenge in the future.

2.3.4 Selenium

Selenium is a naturally-occurring metal in rocks, shales, coal and phosphate deposits and soils, and usually occurs in the form of metal sulfides. Selenium is released into water resources via weathering and anthropogenic sources such as surface mining, coal-fired power plants, and irrigated agriculture, and causes reproductive or growth impairments or premature death in aquatic species.

The EPA released updated recommended CWA 304(a) criteria for selenium in June 2016, based on a more complex approach than currently used in Colorado. The Water Quality Control Division (Division) is evaluating adoption of EPA criteria, and will propose revised criteria in 2027. The current aquatic life protection stream standards for selenium are 4.6 µg/L as a 30-day average (chronic) and 18.4 µg/L as a daily maximum (acute). The selenium limitation for Vista WWTP, however, is based on the NILs of 2.1 µg/L (chronic) and 18 µg/L (acute), which should not be exceeded more than once every three years. Average effluent concentrations from the Vista WWTP, based on DMR data, range from 0.1 to 5 µg/L.

PAWSD is required to report a 30-day average and daily maximum for selenium through July 2022. Beginning in August of 2022, PAWSD's discharge permit imposes a 30-day average selenium limitation of 2.1 µg/L (NIL) and a daily maximum selenium limitation of 18 µg/L (WQBEL). Average concentrations reported for the Vista WWTP range from 0.1 to 5 µg/L, averaging 1.8 µg/L, for 16 samples taken between March 2015 and June 2016. To meet these standards, PAWSD was given a compliance schedule to identify selenium sources and control strategies and submit progress reports summarizing progress in implementing the strategies. One potential source may be infiltration from groundwater that runs through selenium rich soil, in which case, selenium in the influent may be addressed by reducing I/I in the I/I compliance schedule. Reduction of selenium in the influent is highly preferable to expensive removal technologies, such as use of reducing agents within membrane bioreactors. Overall, the compliance posture of the Vista WWTP with respect to selenium is good, but there is little to no room for selenium levels to increase.

2.3.5 Arsenic

Arsenic is a toxic metalloid found in the natural environment as well as industrial products and waste streams. The EPA is in the process of updating the Integrated Risk Information System (IRIS) toxicity assessment for inorganic arsenic. The draft assessment will be released for public review in 2022. CDPHE expects to use the EPA's toxicity values to derive updated arsenic water quality standards that are protective of human health and adopt these standards in 2024.

The current permit term requires Vista WWTP to sample for total recoverable (TR) and potentially dissolved (PD) arsenic in order to conduct a RP analysis for the next permit renewal.

Currently, the numeric standard for total recoverable arsenic is given a range in Regulation 31 of 0.02 to 10 µg/L, with the first value based on Colorado's methodology for human health standards and the second value based on the Safe Drinking Water Act maximum contaminant level (MCL) for arsenic.

The interim total recoverable arsenic (As) limit of 1.0 µg/L is based on the practical quantitation level (PQL). Arsenic removal using biological nutrient removal (BNR) and granular media filtration technology is estimated to be about 3 µg/L. Additional polishing steps with multiple in-stage media filtration have been shown to reduce arsenic levels down to 1-2 µg/L, which can be considered the limit of technology (LOT). The current low range limit for arsenic of 0.02 µg/L may or may not stay as the standard in 2024. It is premature for the CDPHE to predict what the As standard will be after the efforts of the Phase 2 Workgroup and follow up rule-making by the WQCC are complete.

Arsenic DMR collected over the current permit term will demonstrate the feasibility of meeting arsenic standards between 0.02 to 10 µg/L. While meeting 10 µg/L is reasonably feasible, a standard of 0.02 µg/L

would be under the detection limits of some sample test procedures and is also not achievable by current technology. Tetra Tech will not recommend expensive arsenic removal steps until the arsenic standard is established and an appropriate course of action can be established.

2.3.6 Temperature

CDPHE is still discussing how temperature standards will be revised. In 2021, the division will propose limited changes to temperature excursions in Regulation 31 and will continue to make site-specific temperature changes in basin rulemaking hearings. From the latest permit (2019), Vista WWTP is currently exempt from temperature requirements based on flow ratios in the Water Quality Assessment (WQA).

2.3.7 PFAS and Other Trace Organics

Although not covered in the WQCD's 10-Year Water Quality Roadmap (Policy CW 8), PFAS are chemicals of growing concern on a national level and are likely to elicit monitoring and/or regulation within the 20-year regulatory planning horizon.

PFAS refers to a family of over 5,000 manmade chemicals, widely used in fire-fighting foams and oil- or water-resistant coatings. They are extremely resistant to environmental degradation, to the extent that they are referred to as "forever chemicals." These chemicals are linked to cancer, kidney and liver disease, pregnancy complications, and developmental defects.

In Colorado, PFAS is primarily a concern in areas surrounding military bases or fire districts that use PFAS aqueous film forming foam (AFFF). The PFAS in AFFF infiltrate groundwater and surface water sources and are not removed by typical water and wastewater treatment processes.

The CDPHE set drinking water standards on five prominent PFAS compounds and four parent constituents that degrade into PFAS as measured at the point of discharge (Table 2). As of 2018, two species of PFAS (PFOS and PFOA) are listed as hazardous chemicals in Section 261 Appendix VIII. As of July 2020, the CDPHE is also preparing a PFAS Narrative Policy, which will implement narrative provisions in Regulations 31.11(1)(a)(iv) and 41.5(A)(1) to protect public health against harmful substances in surface water and groundwater, respectively.

Statewide sampling of about half of community drinking water systems, serving three-quarters of the state population, identified four entities with PFAS levels exceeding the EPA health advisory: Stratmoor Hills WSD, Security WSD, Sugarloaf Fire District (Boulder County), and Fourmile Fire District (Teller County).

Depending on the species of PFAS, the concentration, competing co-contaminants, facility footprint and capital/operating budget, and wastestream disposal options, PFAS may be removed by granular activated carbon (GAC), anion exchange resin (AIX), or reverse osmosis (RO). All methods will be more effective with turbidity removal pretreatment. PFAS disposal is a topic that still needs more research for feasible, affordable treatment and wastestream disposal solutions.

Table 2 – PFAS Limits for the State of Colorado per Policy 20-1

PFAS Species	Abbreviation	Translation Level
Perfluoroctanoic acid	PFOA	70 ppt
PFOA parent constituents	8:2 FTS	70 ppt
Perfluorooctanesulfonic acid	PFOS	70 ppt
PFOS parent consituents	NEtFOSAA, NMeFOSAA, PFOSA/FOSA	70 ppt
Perfluorononanoic acid	PFNA	70 ppt
Perfluorohexanesulfonic acid	PFHxS	700 ppt
Perfluorobutanesulfonic acid	PFBS	400,000 ppt

As more data is gathered on PFAS at a federal, state, and local level, it is likely that additional PFAS species will be added to the monitoring and limitations list. CDPHE states that treatment may not be required if PFAS levels in influent wastewater can be sufficiently lowered through source control measures, as demonstrated in other states.

3.0 SUMMARY

In summary, the most certain regulatory changes for which PAWSD will need to be prepared are more stringent standards for nitrogen and phosphorus. PAWSD will also need to update its equipment and its organic loading capacity to meet the demands of the 20-year planning period. Possible, but uncertain to happen, are more stringent limits on ammonia, cadmium, selenium, and arsenic. These will depend on the applicability of the criteria to the Pagosa area and its receiving waters (in the case of ammonia and cadmium), and the natural or industrial inputs, in the case of selenium and arsenic, which will be studied via monitoring during this permit term. Also uncertain are the implementation of PFAS or other trace organic effluent limits on Vista WWTP in particular. While elevated PFAS concentrations are not expected and have not been identified in the Pagosa area, it is likely that CDPHE will require at least monitoring for RP analysis in the next 5, 10, or 20 years.

Nitrogen, phosphorus, and ammonia can all be feasibly managed with adjustments and additions to Vista WWTP's existing treatment process, such as increasing oxic residence time, constructing separate anaerobic and anoxic basins or repurposing existing secondary clarifiers for this purpose, and implementing chemical or biological phosphorus removal. These process solutions will be investigated in further detail in the remainder of the PNA study. For selenium, arsenic, PFAS, and trace organics, source control, rather than removal or treatment, is the preferred and recommended method of addressing the pollutants, if sufficient to the task of meeting effluent quality requirements.

The 20-year wastewater treatment CIP presented in this PNA study will recommend facility upgrades in 5 to 10-year compliance schedule increments. In this way, the District can meet effluent quality requirements while providing time for the District to plan, finance, design, permit, construct, commission, and troubleshot treatment improvements. By managing its overall cash flow and rate increases, the District will be able to meet both its environmental, debt financing, and customer service requirements. These improvements will provide 'building block' flexibility for affordable long-term compliance while limiting short- and medium-term capital and O&M expenses to the maximum extent possible.

TETRA TECH

TECHNICAL MEMO

To:	Justin Ramsey, PAWSD
cc:	Jason Randall, Honeywell
From:	Mark Maxwell, Ben Miller, Lauren Riedle, Tetra Tech
Date:	April 29, 2021
Subject:	Infiltration and Inflow (I/I) Assessment

Introduction

The purpose of this memorandum is to provide a desk-top estimation of I/I rates in the collection system tributary to the Vista WWTP. This estimation serves as a screening step to determine if a more complete I/I analysis should be conducted. The following data were used in this estimation: Discharge Monitoring Report (DMR) data and sewer tap counts spanning five years (2016 through 2020), plus 2020 influent data. The scope of work did not include the collection of new field data (e.g. manhole monitoring data).

This desk-top estimation seeks to provide guidance regarding whether or not I/I rates in Vista WWTP's collection system are excessive. Existing EPA guidance (CG 1985) suggests that I/I rates may be potentially excessive if maximum month (maximum 30-day average) flows received at the WWTP are greater than 120 gpcd, exclusive of large industrial customers. This value consisted of approximately 70 gpcd of carriage water (true sewage flow) and about 50 gpd of clean water infiltration and inflow. It is recognized that the 1985 value of 120 gpcd is conservative today due to the widespread adoption of low-flow toilets and appliances.

Monthly Flowrates: Relation to Precipitation and Snowmelt

Over the five-year evaluation period, the annual average flowrate at Vista WWTP was 1.1 MGD, and the maximum month flowrate was 4.0 MGD (in March 2019). The 30-day average flowrates for Vista WWTP from 2016 to 2020 are summarized in Table 1 at the end of this memo, and plotted on Figure 1. For most of the year, except for the early spring, the average influent flow is about 1 MGD. The highest flows typically occur from February through April, peaking in March. The lowest flows occur from October through December. The highest 30-day average flows range from 1.4 to 5.6 times the lowest 30-day average flows for a given year. This variability in monthly flows during February through April indicates potential I/I.

Precipitation and snow depth data for Pagosa Springs was collected from the National Oceanic and Atmospheric Administration database and is displayed next to influent flow rates in Table 1 for potential correlation. Influent flowrate, precipitation, and snow depth are plotted together on Figure 2 for better visualization. As anticipated, undulations in monthly flowrates appear to relate to seasonal precipitation and freeze/thaw cycles. The high flows in early spring (February, March, April) followed by relative stability in flow throughout the remainder of the year indicates that snow melt and spring showers are the most prominent contributor to I/I. Irrigation is unlikely to contribute significantly to I/I because the flowrate is not significantly higher in the summer than in the winter.

In March 2019, flow through the Vista WWTP reached an all-time daily peak of 5.7 MGD, which PAWSD assumes to be the limit of the collection system. March 2019 is the only month in the past five years in which the 30-day average flow exceeded the permit limit of 3.7 MGD. Figure 2 supports the theory that rainfall paired with (and possibly leading to) rapid snowmelt resulted in high flows. PAWSD believes I/I is possibly caused by rapid infiltration

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from sump pumps and foundation drains immediately following rain events. Conversely, influent wastewater flow in 2018 was relatively stable and missing the early spring high flow period, most likely due to a lack of winter snowfall.

Monthly Flowrates: Relation to Organic Loading

Another indicator of I/I is the dilution of organic loading during high flow periods. If high flows were simply high volumes of sanitary wastewater, BOD_5 loading would be expected to remain consistent. However, when sanitary wastewater is diluted with large volumes of stormwater and snowmelt, the BOD_5 loading is correspondingly lower.

When plotted together on Figure 3, BOD_5 loading generally increases as flowrates increase, excepting the early spring months in which there is low BOD_5 loading with high flowrates. It is expected that the highest loading will occur in the summer months, presumably due to seasonal visitors and the subsequent higher utilization of taps. However, during periods of high I/I caused by snowmelt and spring rainfall, it is clear that BOD_5 in sanitary wastewater is diluted by large volumes of clean water I/I.

Estimation of Per Capita Wastewater Contribution

To determine whether I/I rates are potentially excessive, as compared to the 120 gpcd guidance, per capita wastewater contribution and population equivalents (PEs) are estimated from the annual average and maximum month organic loadings. A second estimate of PEs using equivalent residential sewer taps (EQRs or taps) and assumed household occupancy was calculated as a check on the PEs estimated by the BOD loading method.

The annual average and maximum month BOD_5 loading in 2020 was 1,985 ppd and 2,807 ppd, respectively. Assuming a per capita BOD contribution of 0.21 ppcd, that equates to 9,500 to 13,400 PEs. The approximate number of sewer taps in PAWSD's service area from 2016 to 2020 is shown in Table 2. In 2020, the Town of Pagosa Springs owned 1,510 of the total reported taps. The average annual increase in EQRs within the PAWSD service area during 2016 through 2020 is 2.2%. As of 2020, the number of EQRs served by PAWSD is 3,382. The estimate assumes each tap serves an equivalent single family residence and does not account for one tap serving a multi-family unit.

Tetra Tech assumes an average occupancy of 2.5 to 3.0 PEs per household/EQR in resort areas such as Pagosa Springs where housing prices and visitor impacts are higher than in other communities. This assumed occupancy value is slightly higher than the US Census Bureau estimate for Archuleta County of 2.23 people per household, but close to the estimate for Pagosa Springs of 2.48 people per household. Using the 2.5 to 3.0 PE per household values results in an estimated service area PE range of 8,400 to 10,100 based on tap counts, which corresponds reasonably well with the PE range estimated from BOD loading rates.

Using these assumptions, Table 3 shows the calculated per capita wastewater contributions assuming a PE range of 8,400 to 13,400. Annual average flows per PE range from 86 to 140 gpcd, while maximum month (maximum 30-day average) flow contributions varied from 300 to 480 gpcd. All maximum month values are substantially higher than the EPA's benchmark value of 120 gpcd. Therefore, it is apparent that PAWSD's collection system has potentially excessive levels of I/I that should be investigated in greater depth via with field measurements of I/I and determination of the areas most prone to I/I.

Conclusion

From analysis of existing 5-year DMR data and 2020 daily influent data, it is apparent that PAWSD experiences significant I/I within its collection system during February through April, some of which could be excessive, subject to further investigation. The most likely sources of the I/I appear to be as follows:

- *Infiltration from Snowmelt*: A clear correlation is observed between periods of high-volume rapid snowmelt and high influent flows. Snowmelt percolating through the ground contributes to a higher water table with infiltration through cracks and openings in sewer pipes, manholes, service connections, and basement foundation drains. According to PAWSD, an estimated 80 to 90% of the pipe in the PAWSD's collection system is PVC. It is possible that poor installation resulted in areas where the gaskets have 'rolled' and are subject to significant infiltration. The PAWSD collection system includes not just the Town of Pagosa Springs, but surrounding areas as well. The sprawling nature of the collection system and subsequent length of pipe makes it more susceptible to infiltration.
- *Rapid Infiltration from Sump Pumps and Foundation Drains*: Sump pumps and foundation drains are a potential contributor to elevated I/I rates in the collection system. Resolving sump pump and foundation drain connections can be a sensitive political issue to navigate if the financial burden is left to the individual sewer customers. Nonetheless, the District and City need to include this source of I/I when developing its I/I identification and source reduction plan.

PAWSD is bound by its discharge permit compliance schedule to conduct an I/I assessment and propose a plan to reduce I/I by 25% each year over the next four years. I/I study requirements from Permit No. CO0031755 are included below for reference. Experience suggests this is a very aggressive, and perhaps unmeetable goal, as I/I sources are hard to find, expensive to eliminate, and new leaks are developed each year as the collection system infrastructure depreciates over time. First steps in this process include early morning flow observation/monitoring to isolate areas of the collection system with high I/I rates, followed by TV inspection to pinpoint specific locations for corrective action. If excessive I/I is emanating from collection systems outside of PAWSD's direct control, installing flow meters and imposing a peak flow surcharge may be needed to obtain compliance.

5. Special Studies and Additional Monitoring

a. Inflow/Infiltration Study - The permittee shall identify areas where significant I/I exists and begin reducing I/I in accordance with the following schedule.

Code	Event	Description	Due Date
04399	Inflow/Infiltration Report	Submit a plan that identifies sources of I/I and prioritizes repairs and rehabilitation to the collection system to reduce I/I below 120 gallons per day per capita, monthly average influent flow. The plan must be based on a study of the collection system that identifies the areas of the collection system that are contributing significant I/I. A report, summarizing the findings of the study, must be prepared by a professional engineer registered in Colorado, and must accompany the plan. The plan must include annual milestones that should correct I/I at 25% each year over the next four years beginning July 31, 2020, with elimination of the most significant contributions of I/I beginning first.	06/30/2020
04399	Inflow/Infiltration Report	Submit a progress report summarizing the progress in implementing the I/I control program, including notification that the first 25% of I/I targeted repairs have been completed.	06/30/2021
04399	Inflow/Infiltration Report	Submit a progress report summarizing the progress in implementing the I/I control program, including notification that 50% of I/I targeted repairs have been completed.	06/30/2022
04399	Inflow/Infiltration Report	Submit a progress report summarizing the progress in implementing the I/I control program, including notification that 75% of I/I targeted repairs have been completed.	06/30/2023
04399	Inflow/Infiltration Report	Submit final study results that indicate that 100% of I/I targeted repairs have been completed and that the 120 gallons per day per capita maximum monthly average influent flow goal is met.	06/30/2024

Tables and Figures

Table 1: Monthly Flows, Loads, Precipitation, and Snow Depth

Year	Month	30-Day Avg Flow (MGD)	Avg Influent BOD (mg/L) [2]	BOD Loading (lbs)	Precipitation (in)	Snow Depth (in)
2016	January	0.700	--	--	1.31	15.0
	February	1.073	--	--	1.38	13.0
	March	1.000	--	--	0.71	0.6
	April	0.733	--	--	2.48	0.6
	May	0.778	--	--	3.11	0.1
	June	0.843	--	--	0.53	0.0
	July	0.882	--	--	3.11	0.0
	August	0.814	--	--	6.46	0.0
	September	-- [1]	--	--	3.15	0.0
	October	-- [1]	--	--	1.58	0.0
	November	-- [1]	--	--	4.48	3.3
	December	-- [1]	--	--	6.18	5.4
2017	January	1.658	--	--	5.83	18.0
	February	2.874	--	--	2.64	16.0
	March	2.963	--	--	1.12	11.0
	April	1.655	--	--	2.82	0.9
	May	1.116	--	--	1.17	0.0
	June	1.155	--	--	1.11	0.0
	July	1.155	--	--	6.80	0.0
	August	1.068	--	--	4.16	0.0
	September	1.150	--	--	4.00	0.0
	October	1.023	--	--	2.88	0.0
	November	0.873	--	--	0.86	0.0
	December	0.904	--	--	0.28	0.5
2018	January	0.890	--	--	1.20	1.5
	February	0.956	--	--	2.43	2.2
	March	1.130	--	--	1.31	0.1
	April	0.982	--	--	1.02	0.0
	May	0.969	--	--	1.03	0.1
	June	1.015	--	--	2.00	0.0
	July	1.014	--	--	4.33	0.0
	August	0.903	--	--	2.91	0.0
	September	0.897	--	--	1.89	0.0
	October	0.859	--	--	4.90	0.3
	November	0.789	--	--	0.91	0.4
	December	0.806	--	--	2.29	1.8

Table 1: Monthly Flows, Loads, Precipitation, and Snow Depth

Year	Month	30-Day Avg Flow (MGD)	Avg Influent BOD (mg/L) [2]	BOD Loading (lbs)	Precipitation (in)	Snow Depth (in)
2019	January	0.839	--	--	5.11	14.4
	February	0.860	--	--	6.40	15.8
	March	4.029	--	--	6.01	9.6
	April	2.393	--	--	2.14	0.2
	May	1.408	--	--	4.08	0.0
	June	1.106	--	--	1.60	0.0
	July	0.991	--	--	4.40	0.0
	August	0.960	160	1282	7.31	0.0
	September	0.847	185	1308	2.52	0.0
	October	0.741	245	1515	1.17	0.1
	November	0.720	185	1112	3.80	1.2
	December	0.822	190	1303	4.91	5.7
2020	January	0.820	185	1266	1.58	7.2
	February	1.109	155	1435	1.30	4.7
	March	1.693	122	1724	3.11	1.0
	April	1.012	185	1562	0.36	0.0
	May	0.951	170	1349	1.63	0.0
	June	1.106	300	2769	2.44	0.0
	July	1.180	285	2807	8.27	0.0
	August	1.081	305	2752	3.28	0.0
	September	1.036	280	2421	3.14	0.0
	October	0.970	220	1781	1.14	0.0
	November	1.018	250	2124	3.18	0.6
	December	0.997	220	1830	2.40	5.1
All	Average	1.149	214	1785	2.93	2.6
	Max Month	4.029	305	2807	8.27	18.0

[1]Flow meter out of service. No effluent measurement.

[2]BOD_5 reported monthly since Aug 2019.

Table 2: PAWSD Sewer Tap Counts, 2016 to 2020

Year	Sewer Tap Count	% Annual Increase
2016	3,078	2.3%
2017	3,162	2.7%
2018	3,243	2.6%
2019	3,309	2.0%
2020	3,382	2.2%
	Average:	2.2%

Table 3: Per Capita Wastewater Contribution (gpcd) by Population Equivalents

Year	Month	30-Day Avg Flow (MGD)	Population Equivalents (PEs) 8,400	13,400
2016	January	0.700	83	52
	February	1.073	128	80
	March	1.000	119	75
	April	0.733	87	55
	May	0.778	93	58
	June	0.843	100	63
	July	0.882	105	66
	August	0.814	97	61
	September	N/A[(1)]	N/A	N/A
	October	N/A[(1)]	N/A	N/A
	November	N/A[(1)]	N/A	N/A
	December	N/A[(1)]	N/A	N/A
2017	January	1.658	197	124
	February	2.874	342	214
	March	2.963	353	221
	April	1.655	197	124
	May	1.116	133	83
	June	1.155	138	86
	July	1.155	138	86
	August	1.068	127	80
	September	1.150	137	86
	October	1.023	122	76
	November	0.873	104	65
	December	0.904	108	67
2018	January	0.890	106	66
	February	0.956	114	71
	March	1.130	135	84
	April	0.982	117	73
	May	0.969	115	72
	June	1.015	121	76
	July	1.014	121	76
	August	0.903	108	67
	September	0.897	107	67
	October	0.859	102	64
	November	0.789	94	59
	December	0.806	96	60

Table 3: Per Capita Wastewater Contribution (gpcd) by Population Equivalents

			Population Equivalents (PEs)	
Year	Month	30-Day Avg Flow (MGD)	8,400	13,400
2019	January	0.839	100	63
	February	0.860	102	64
	March	4.029	480	301
	April	2.393	285	179
	May	1.408	168	105
	June	1.106	132	83
	July	0.991	118	74
	August	0.960	114	72
	September	0.847	101	63
	October	0.741	88	55
	November	0.720	86	54
	December	0.822	98	61
2020	January	0.820	98	61
	February	1.109	132	83
	March	1.693	202	126
	April	1.012	120	76
	May	0.951	113	71
	June	1.106	132	83
	July	1.180	140	88
	August	1.081	129	81
	September	1.036	123	77
	October	0.970	115	72
	November	1.018	121	76
	December	0.997	119	74
All	Average	1.149	137	86
	Max Month	4.029	480	301

Greater than 120 ppcd

Note:

(1) Flow meter out of service. No effluent measurement.

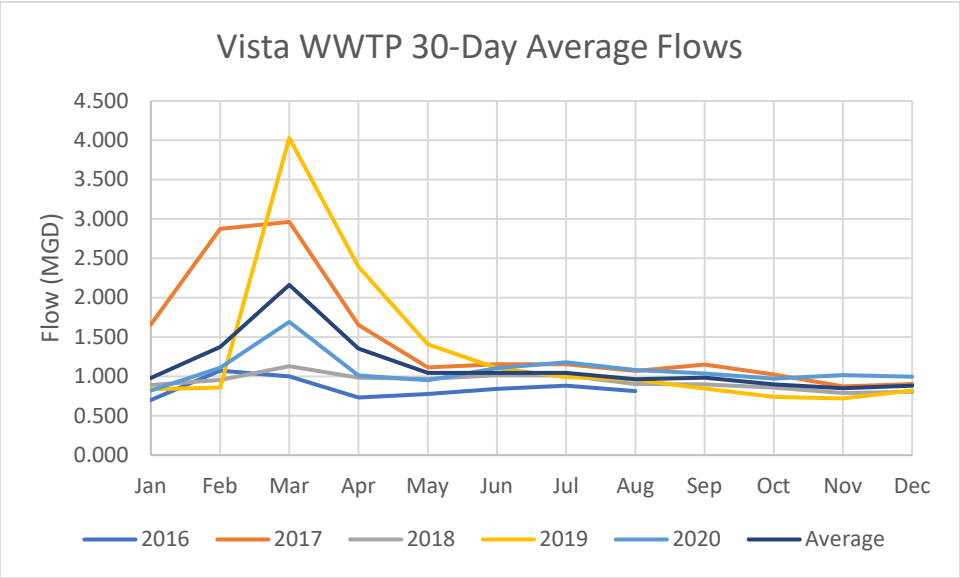


Figure 1: 30-Day Average Flows by Month from 2016 through 2020

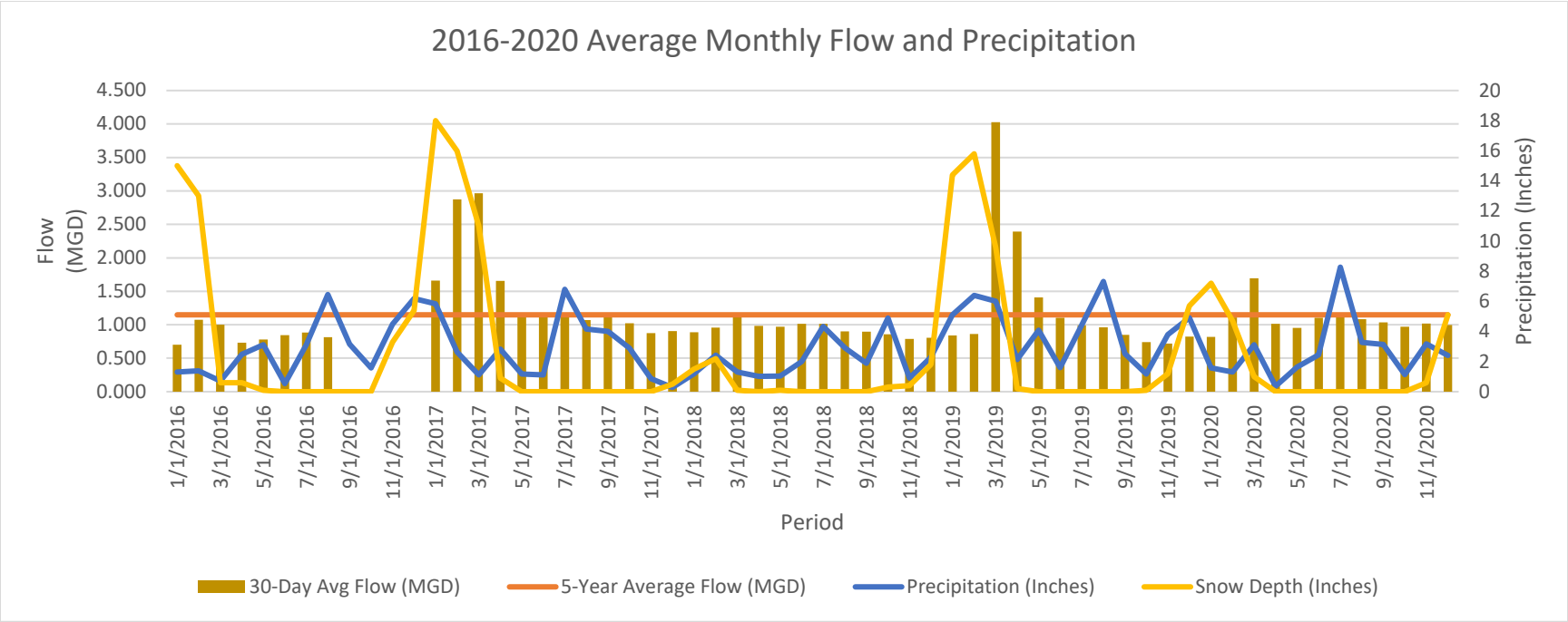
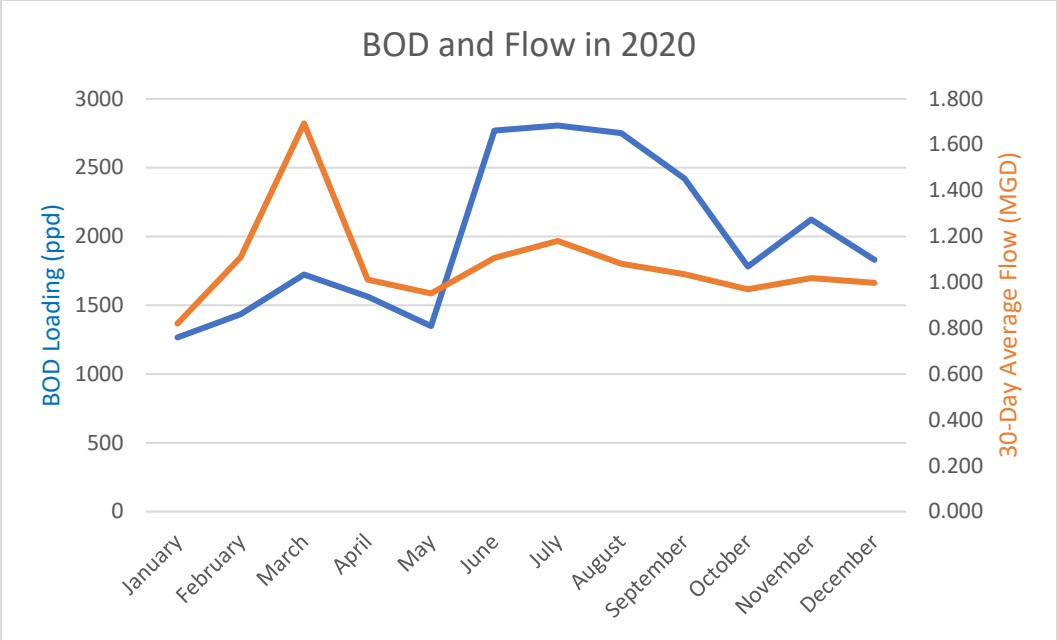


Figure 2: 2016-2020 Average Monthly Flow and Precipitation



Date	Flow (MGD)	BOD Load (ppd)
1/14/2020	0.781	1,433
1/28/2020	0.823	1,031
2/12/2020	1.109	1,388
2/25/2020	1.524	2,036
3/10/2020	1.628	1,902
3/24/2020	2.010	1,745
4/14/2020	0.982	902
4/28/2020	0.921	1,997
5/12/2020	0.984	1,642
5/26/2020	0.949	1,108
6/9/2020	1.024	2,735
6/23/2020	1.133	2,648
7/14/2020	0.993	2,485
7/28/2020	1.332	3,001
8/11/2020	1.068	2,051
8/25/2020	1.110	3,520
9/15/2020	0.985	2,056
9/29/2020	0.981	2,538
10/13/2020	1.001	1,922
10/27/2020	0.921	1,615
11/10/2020	1.103	2,761
11/23/2020	1.049	1,751
12/15/2020	0.941	1,727

Figure 3: BOD and Flow in 2020

TETRA TECH

TECHNICAL MEMO

To:	Justin Ramsey, PAWSD
cc:	Jason Randall, Honeywell
From:	Mark Maxwell, Ben Miller, Lauren Riedle, Tetra Tech
Date:	September 13, 2021
Subject:	Phase 1 – Drinking Water TIN and Regulation 85 TP Compliance Schedule

General Narrative

Phase 1 improvements are targeted to meeting the daily maximum TIN limit of 10 mg-N/L for drinking water protection and the running 12-month median TP limit of 1.0 mg-P/L, as per Regulation 85. From a capital cost standpoint, it is less expensive to implement these improvements as a single project, phased as much as possible to reduce cash flow obligations and customer cost impacts of the District.

Biological Nutrient Removal

Due to the size and configuration of the existing oxidation ditches, they are best used as the oxic zone in a three-stage biological nutrient removal (BNR) process that includes the addition of anaerobic and anoxic zones in the available hydraulic profile between, and to the south of, the splitter structure that distributes screened and degritted influent flow to the oxidation ditches (see Figure 1). The anaerobic basins will provide for biological phosphorous release, which will be followed by luxury uptake of phosphorus, primarily in the oxic zone, and to a lesser extent in the anoxic basins. An initial stage of nitrate removal, up to about 70 percent, will also occur in the anoxic basins. Based on the existing drawings, there is adequate hydraulic head available to allow gravity flow through new anaerobic and anoxic (ANA) basins and then to distribute the mixed liquor to the existing oxidation ditches.

Because the controlling TIN limit of 10 mg-N/L in the discharge permit is for drinking water protection, and not Regulation 85, compliance is assessed as a daily maximum of 10 mg-N/L based on 24-hour composite samples of the effluent. Experience indicates that to reliably meet a daily maximum TIN limit of 10 mg-N/L, a second stage of nitrate reduction is required. In this situation, Tetra Tech recommends that the second stage be the use of on/off aeration in the oxidation ditches, particularly during nighttime hours when there is little risk of ammonia bleed-through into the final effluent. Proven experience with other oxidation ditch facilities in Colorado (e.g. Fruita and Gunnison) indicates effluent TIN levels can be maintained reliably below 10 mg-N/L using anoxic zones plus on/off aeration.

Change in Return Activated Sludge (RAS) Discharge Location

The discharge of RAS will be extended from the oxidation ditches to the splitter box for the new ANA complex. Capital budget has been included for new RAS pumps, although this recommendation should be revisited during detailed design when the condition and head/discharge characteristics of the existing pumps are better known. It is anticipated that the RAS from both ditches will be intimately mixed with the screened and degritted flow before it is evenly split to parallel ANA trains. This will give the operators the flexibility to use just one train of ANA basins while using both oxidation ditches, and vice versa.

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Mixed Liquor Recycle (MLR) Pumping

Submersible pumps will be installed in/next to each oxidation ditch to return nitrified mixed liquor to the first anoxic zone in the ANA complex. These MLR pumps will be located as close as possible to the ANA basins to reduce piping costs and headloss. Typically, the MLR pumps are sized for twice the design maximum month flow (i.e. 2Q), but this may result in oversizing since maximum month wet weather flows (Feb thru Apr) can be 3.3 MGD or higher, while dry weather flows (May thru Jan) are relatively steady at 1.1 MGD. Consequently, the MLR pumps must have a large actual (not theoretical) turndown ratio, or both high and low range pumps will be required.

Capacity Planning

Preliminary modeling indicates the existing oxidation ditches have the capacity to operate in the BOD and ammonia removal mode at an oxic solids retention time (SRT) of 10 days, while handling an estimated Year 2040 influent BOD load of approximately 5,000 ppd. Therefore, addition of a third oxidation ditch does not appear necessary within the planning period encompassed by this PNA. Due to economies of scale, the ANA basins will be sized for Year 2040 BOD and nitrogen loads, and associated maximum month and peak hour design flows based on successful reduction of wet weather I/I.

To be conservative with respect to capacity planning, it is recommended the Year 2040 maximum month flow be set at 3.0 MGD (the plant has already handled over 4.0 MGD) and a peak hour of 5.7 MGD, which also has been experienced in prior years as well. In summary, the District will diligently work to reduce I/I so maximum month flows are less than what has been experienced, and peak hourly flows do not increase above what the Vista WWTP has already demonstrated it can handle.

Secondary Clarification

It is also recommended that Phase 1 include a second, 60-foot diameter secondary clarifier so the District will have adequate settling capacity throughout the planning period. Assuming a Year 2040 design maximum month flow of 3.0 MGD and a surface overflow rate (SOR) of 600 gpd/ft^2, the District will need 5,000 ft^2 of clarifier surface area. Each 60-foot diameter unit provides 2,830 ft^2 of clarification area, so two clarifiers (one existing, one new) of this diameter are required. The mixed liquor splitter box and distribution piping appears to have been configured to facilitate the addition of a second, 60-foot diameter clarifier. It is recommended that the clarifier have a Stamford baffle and weir covers.

The two old 40-foot diameter units are in poor condition, and it is anticipated that renovation or replacement of the concrete, piping, and collector mechanisms for the old clarifiers will be more expensive than construction of a new 60-foot diameter unit. These older units can remain in place as standby or emergency clarifiers for the near future and then abandoned and/or converted to another use later in the planning period.

Influent Flow Equalization

The existing Vista WWTP has successfully conveyed peak hour flows of 5.7 MGD without bypass, and met effluent limits when handling a wet weather maximum month flow of 4.08 MGD during March 2019. Dry weather monthly average flows (i.e. during May through January) are currently about 1.1 MGD and effluent quality has been reliably excellent during these months, and in compliance with permit limits throughout the year. The two principal advantages of equalization are leveling out flows and organic loads throughout the day.

To completely equalize normal diurnal flow variations requires a volume of about 15% of the design maximum month flow. This equates to about 450,000 gallons of volume if a future wet weather maximum month flow of 3.0 MGD can realized via I/I reduction. Since wet weather flows can be of extended duration, such as during the entire month of March 2019, it would take millions of gallons of storage volume to capture wet weather peaks, which must

be then bled back into the influent flow over an extended period of time. In addition to pumping power, odor control is also a consideration. To control odors, the equalization basin must be aerated or covered and mixed, with foul air handling and odor control.

As for concentration equalization, that does not reduce the total daily amount of oxygen that is required to meet BOD and ammonia oxidation requirements. The hourly rise and fall in oxygenation needs can be met in a more cost and power efficient manner by installing a small (jockey) HST blower to increase and decrease air flow with hourly demands. This will also help avoid over-aeration in the oxidation ditch, which has a deleterious effect on mixed liquor nitrate reduction in the anoxic zones. Accordingly, the District's focus in the next 10 years should be on I/I reduction and deferring the final decision on implementing flow equalization into the future.

Solids Handling

The District has a viable, effective, and adequately sized solids handling plan, which consists of WAS pumping, aerobic digestion of WAS, centrifuge dewatering, and landfill disposal of the dewatered cake. During the late spring, summer, and early fall, the operators can achieve additional sludge volume reduction by further drying the dewatered cake in the greenhouse-enclosed, paved drying beds prior to trucking to the landfill. Since landfilling does not require WAS to be fully digested as per EPA 503 Criteria, the District can use the digesters more like aerated sludge holding tanks (ASHTs) and not be concerned about providing sufficient aeration to meet pathogen reduction (PAR) and vector attraction reduction (VAR) criteria.

While operating the digesters as ASHTs will reduce energy costs, net sludge production will increase slightly as will the odor generating potential for dewatered cake that is placed in the greenhouse drying beds for supplemental drying. As noted in the Phase 2 Project description, it would be appropriate to replace, and upsize as needed, the centrifuges at that time (about 10 years from now). The existing units have worked well and reliably, but they will be nearly 20 years old when the Phase 2 Project is implemented and will have met their physical and technological useful lives at that time.

List of Major Process Unit Details

For facility planning purposes, the design maximum month flow and BOD load for the following facilities are respectively 3.0 MGD and 5,000 ppd.

1. **ANA Basins:**
    - Anaerobic detention time of 60 minutes based on influent flow (Q).
    - Anoxic detention time of 90 minutes based on influent flow (Q).
    - Two parallel trains of five basins in series (two anaerobic and three anoxic basins in series in each train).
    - Each of the 10 total basins has a liquid volume of 32,000 gallons each (4,300 cu ft).
    - Configure piping to combine the flow from all MLR pumping and evenly distribute it to the first anoxic pass of each ANA train.
    - Provide large bubble mixing or floating mixers at approximately 1 HP per basin.
    - Basins are to be separated by overflow baffles to reduce short circuiting and allow scum and floatables to move with the mixed liquor to the oxidation ditches.
    - Influent splitter structure shall provide for complete mixing of screened and degritted influent flow with RAS and then evenly distributing the mixed liquor to one or both of the ANA trains.
    - Effluent splitter shall collect the mixed liquor from both ANA trains and then evenly distribute it to one or both of the oxidation ditches.

2. **Mixed Liquor Distribution to Oxidation Ditches:**

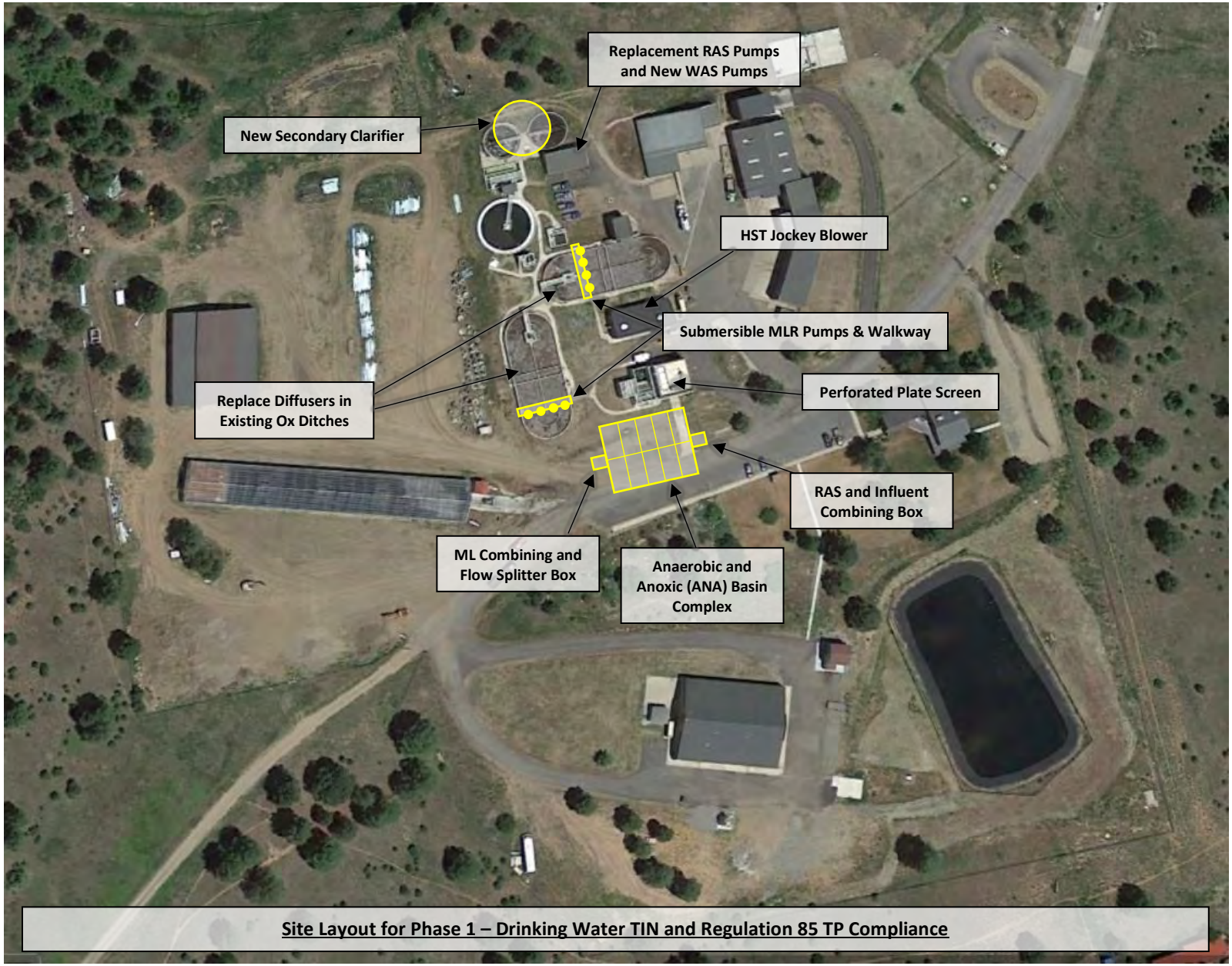
- Convey mixed liquor from the ANA Complex back to the north and connect to the existing influent piping that currently feeds screened and degritted raw wastewater to the oxidation ditches. During design, the engineer should check hydraulic profile to make sure the RAS + MLR can be conveyed in addition to peak hour Q through the existing conduits without excessive headloss. If necessary, the influent piping to the oxidation ditches can be upsized/replaced to accommodate the mixed liquor flows.

3. **Mixed Liquor Recycle Pumps:**
   - It is anticipated that mixed liquor recycle pumps will be required for each oxidation ditch as it is unlikely the existing mixed liquor piping is sufficient to handle RAS + MLR + peak hour Q flows. Both low and high range pumps will be installed to cover the required range in MLR flows.
   - Assuming a design maximum month flow of 3.0 MGD and a high-range MLR:Q ratio of 2.0, not including RAS recycle flows, pumps at each oxidation ditch must provide a cumulative maximum MLR pumping capacity of 3.0 MGD (1.5 MGD of Q per train times a high end MLR:Q ratio of 2.0 = 3.0 MGD). Two high range pumps of 3.0 MGD each will be provided for each oxidation ditch. Each pump will be equipped with variable frequency drives (VFDs).
   - Low-range MLR pumping will be based on a MLR:Q ratio of 1.0 and the current monthly average flow of 1.1 MGD. This indicates that cumulative MLR pumping capacity at each oxidation ditch must be able to turn down to a minimum of 0.55 MGD assuming two oxidation ditches in service (0.55 MGD of Q per train times a low end: MLR:Q ratio of 1.0 = 0.55 MGD). Assuming each VFD-equipped pump can be turned down to 50% of capacity, the low-range pumps will be sized for 1.1 MGD each (0.55 MGD divided by 0.5 = 1.1 MGD).

4. **Secondary Clarification and Sludge Pumping:**
   - Construct a new (i.e. second) 60-foot diameter secondary clarifier with a 14-foot sidewater depth (SWD) and perimeter weirs covered by 'tilt up' fiberglass reinforced plastic (FRP) panels to reduce the need to clean algal growth from the weirs. Some plants have had success with weir brushes that rotate with the skimmer arms and these can be further investigated during detailed design. It is recommended that the new clarifier have a Stamford baffle, the cost for which is included in the budget.
   - It is likely the existing RAS pumps do not provide sufficient head to convey RAS to the ANA complex without a significant reduction in output. Consequently, it is recommended the Phase 1 budget include funds to upsize the MCC feeders for the pumps as well as replace all of the VFDs, pumps, and motors. The increase in motor size will not be significant so the new pumps should be able to fit into the existing pump station.
   - As for WAS, the discharge location is not changing and a significant increase in capacity is not required. Currently, however, wasting is cumbersome and inefficient because the RAS pumps are used both to return and waste sludge, so wasting requires interruption of RAS, which is not recommended for control of the activated sludge process. Therefore, new WAS pumps will be installed in the existing sludge pumping station so the operators can maintain proper control of sludge wasting and return at the same time. Budget will be included to install sludge flow and density meters, and upgrade the controls, so the operators can program the SCADA system to waste an adjustable amount of WAS solids and maintain a target oxic SRT in the oxidation ditches. The operators will also be able to waste (1) an operator-programmable mass of solids or (2) a desired volume of WAS using setpoints for flow rate and time.
   - A new scum pump may be needed for the new 60-foot diameter secondary clarifier, although it may be possible to use the one from the old 40-foot diameter units. For PNA budgeting purposes, a new scum grinder and pump will be assumed for the new 60-foot diameter clarifier.

5. Other Plant Modernization Improvements:

- The existing mechanical screen is a step screen installed in 2003 and could be replaced with a perforated plate screen for enhanced solids and debris removal.
- The fine bubble membrane diffusers should be replaced every 5 to 7 years. Since the last replacement was over 7 years ago, the diffusers will be replaced in Phase 1. Allowance will be included for miscellaneous repairs to piping and pipe supports, as needed.



Site Layout for Phase 1 – Drinking Water TIN and Regulation 85 TP Compliance

TETRA TECH

Project: PAWSD PNA Study
PN: 200-324541-21001
Date: 9/13/2021
Desc: Phase 1 (3.0 MGD)
Class: 4 (-30% to +50%)

Item	Unit	Quantity	Unit Cost	Installation %	Installation $	Item Cost
Headworks						
New Perforated Plate Screen	EA	1	$170,000	30%	$51,000	$221,000
Subtotal Headworks						**$221,000**
ANA Basins						
ANA Basins	SF	2,785	$670	Incl		$1,866,000
Mixers (Large Bubble Mixing + Enclosure)	EA	1	$300,000	40%	$120,000	$420,000
Davit Crane & Base	EA	10	$6,000	Incl		$60,000
Gates	EA	6	$15,000	Incl		$90,000
Splitter Box - Concrete - Slab	CY	3	$600	Incl		$2,000
Splitter Box - Concrete - Walls	CY	60	$800	Incl		$48,000
Subtotal ANA Basins						**$2,486,000**
Oxidation Ditches						
Replacement Diffusers and Minor In-Basin Piping Repairs	LS	2	$100,000	Incl		$200,000
Subtotal Oxidation Ditches						**$200,000**
Secondary Clarifier						
Clarifier	SF	2,826	$670	Incl		$1,894,000
Circular Sludge Collection Mechanism (New)	EA	1	$174,000	40%	$70,000	$244,000
Subtotal Secondary Clarifier						**$2,138,000**
Pumps and Blowers						
MLR Pumps	EA	3	$45,000	30%	$14,000	$177,000
Replacement RAS Pumps	EA	3	$25,000	40%	$10,000	$105,000
New WAS Pumps	EA	3	$20,000	40%	$8,000	$84,000
Density and Flow Meters for WAS Pumping	LS	1	$30,000	20%	$6,000	$36,000
New Scum Pump for New 60-ft Clarifier	EA	1	$13,000	40%	$6,000	$19,000
4-Inch Inline Grinder	EA	1	$20,000	20%	$4,000	$24,000
New HST Jockey Blower	EA	1	$126,000	40%	$51,000	$177,000
Subtotal Pumps and Blowers						**$622,000**
Equipment/ Materials Subtotal						***$5,670,000***
Electrical, Sitework, and Demolition						
Electrical I&C (25%)	LS	1	$210,750	Incl		$220,000
Demolition (12%)	LS	1	$70,440	Incl		$71,000
Subtotal Equipment and Labor						**$5,961,000**
Contractor Markups						
Contracts/Bonds/Insurance (3%)	LS	1	$178,830	N/A		$179,000
Mobilization/Demobilization (2%)	LS	1	$119,220	Incl		$120,000
Overhead and Profit (12%)	LS	1	$715,320	N/A		$716,000
Subtotal Pre-Contingency Construction Cost						**$6,976,000**
Contingency (30%)	LS	1	$2,092,800	N/A		$2,093,000
Inflation Contingency (5%)	LS	1	$283,500	N/A		$284,000
Subtotal Construction Cost						**$9,353,000**
Design and Construction Phase Engineering (15%)	LS	1	$850,500	N/A		$1,403,000
Project Total						***$10,756,000***
Hard Rock Removal Allowance	LS	1	$500,000	Incl		$500,000
Project Total	**$11,256,000 ($12,900,000** see note 3 below**)**					

Note:

1. Project total rounded to the nearest $1,000
2. Incl = Included
3. Project total represents the cost opinion in September 2021 dollars. Based on recent and estimated near-term ENR cost indices, Tetra Tech recommends that a cost escalation factor of 7% per year be used to forecast a construction cost of approximately $12,900,000 at the projected bid/pricing date of September 2023.

TETRA TECH

TECHNICAL MEMO

To:	Justin Ramsey, PAWSD
cc:	Jason Randall, Honeywell
From:	Mark Maxwell, Ben Miller, Lauren Riedle, Tetra Tech
Date:	July 23, 2021
Subject:	Phase 2 – Regulation 31 (TN and TP) plus Capacity Expansion

General Narrative

Phase 2 improvements are targeted to meet the median annual TN and TP effluent limits that will be established when in-stream numeric nutrient standards are adopted statewide via Regulation 31, which is currently projected to occur at the end of 2027. However, Regulation 31-related effluent limits will not be included in discharge permits until the first renewal following the state-wide promulgation of the stream standards.

While permits are supposed to be renewed by CDPHE every five years, the state is often three to five years late in renewing permits and typically administratively extends the prior permit limits until the renewal is issued. The most recent renewal of the discharge permit for the Vista WWTP was in 2019, so the next two renewals will be in 2024 and 2029, if they occur on schedule. Although it is likely that both renewals will be delayed, the 20-year regulatory outlook schedule and the maximum month BOD capacity staging graph suggest the Phase 2 project should be initiated on or about 2029.

Unless changed by CDPHE, the median annual in-stream TP standard for Stevens Draw, Martinez Creek, and Stollsteimer Creek will be 0.17 mg-P/L, and that for TN will be 2.01 mg-N/L. Unfortunately, the receiving stream(s) will not be able to provide much, if any, dilution at the regulatory low flow conditions defined by CDPHE, so the District needs to be prepared to meet stream standard values at end-of-pipe.

Supplemental TN and TP Removal

With the TIN compliance improvements proposed for Phase 1, the Vista WWTP will be able to produce a median annual effluent TN residual of 4 to 8 mg-N/L, which is sufficient to comply with drinking water protection requirements, but not Regulation 31. Tetra Tech's opinion is meeting an effluent TN limit of 2.01 mg-P/L is not feasible without the addition of reverse osmosis (RO) treatment, which is inordinately expensive with respect to both capital and annual costs, and is environmentally counterproductive, taking into consideration the commitment of energy, loss of water (i.e. brine disposal), and increase in greenhouse gas emissions. Tetra Tech recommends the District be prepared to add another stage of nitrate reduction in Phase 2, providing an effluent consistent with the biological treatment limit of technology (LOT), plus polishing filtration, which is approximately 3 to 4 mg-N/L on a median annual basis. It is anticipated that many dischargers in the State will be petitioning CDPHE to adopt a LOT for nitrogen removal if an effluent TN limit less than 4 mg-N/L is required for Regulation 31 compliance.

With the Regulation 85 TP compliance improvements proposed for Phase 1, the Vista WWTP will be able to produce a median annual effluent TP residual of 0.5 to 0.75 mg-P/L, which is sufficient to comply with Regulation 85, but not Regulation 31. The Vista WWTP may be able to achieve 0.17 mg-P/L through Bio-P removal plus plain filtration, although the margin for error (i.e. compliance cushion) will be very small. Therefore, the District should budget for coagulation, flocculation, plate sedimentation (i.e. tertiary pretreatment facilities), and granular media filtration for

chemical polishing of phosphorus and compliance with the 0.17 mg-P/L limit. The headloss entailed in filtering the effluent will require the installation of an intermediate pump station.

For Phase 2 budgeting purposes, Tetra Tech recommends the additional nitrate removal stage be the addition of soluble carbon feed (acetate) and a denitrifying moving bed biofilm reactor (MBBR) following secondary clarification, but upstream of chemical polishing facilities required for supplemental phosphorous removal. The intermediate pump station noted previously may need to be located upstream of the MBBR basins depending on the site layout and the amount of additional hydraulic head required. If UV disinfection improvements are deferred until Phase 2, then a new low-pressure in-vessel system is recommended, taking advantage of coagulation, flocculation, and sedimentation and/or filtration alone to reduce the density of *E.coli* to be disinfected and improve effluent UVT, both of which will reduce UV dosage and power requirements.

Capacity Expansion

The other main aspect of Phase 2 is to replace and upsize the dewatering centrifuges so both the liquid and solids stream treatment processes will be able to handle the projected Year 2040 maximum month flow of 3.0 MGD and BOD load of 5,000 ppd, and the WAS generated from that load. While all of the Phase 1 and Phase 2 improvements will be designed for these values, the request to rerate the Vista WWTP can be deferred until the Phase 2 Project. This will also provide time to evaluate the success of I/I reduction efforts and whether the target maximum month flow of 3.0 MGD is still appropriate for design.

Solids Handling

Note that since the District landfills its dewatered sludge cake, it does not need to comply with EPA Part 503 PAR or VAR requirements prior to ultimate disposal. Therefore, it could save power costs by operating the aerobic digesters as ASHTs, using the storage volume to balance sludge production rates with dewatering operations, and not try to attain specific fecal coliform or volatile solids reduction goals. The VAR that does occur when utilizing the basins in the ASHT mode of operation will reduce the odor generating potential, which is primarily a concern when utilizing the drying beds to further dry the cake solids.

Accordingly, Phase 2 does not include expansion of digester capacity, although it may be prudent to budget for replacement of the in-basin diffused aeration equipment, and any other aging appurtenance, at that time. Odors permitting, which is the same case as at present, the District can still utilize the sludge drying beds in the late spring, summer, and early fall to further dry centrifuge dewatered sludge and reduce the volume of material that is hauled to the landfill.

List of Major Unit Process Details

For facility planning purposes, the design maximum month flow and BOD load for the following facilities are respectively 3.0 MGD and 5,000 ppd. For hydraulic conveyance, the estimated design peak hour flow is 5.7 MGD.

1. **Supplemental Nitrate Removal Treatment via MBBR Basins:**
    - Assume a one-hour detention time based on 3.0 MGD subdivided into two trains of two complete mix reactors in series, which results in a total volume of 125,000 gallons, or 16,710 cubic feet. Therefore, the site plan layout will be similar to that for the ANA basins, except there will only be a total of four MBBRs. Square basins provide the ideal biological and hydraulic process configuration for MBBR systems.
    - Each MBBR basin will have a liquid volume of 31,250 gallons or 4,178 cubic feet.
    - Assuming a SWD of 15 feet, the surface water dimensions will be 17 feet by 17 feet, same as for the ANA basins.

- The MBBR supplier will be responsible for providing all of the in-basin equipment including media, vertical sieves, slow speed mixers, and air sparge system to keep the media from blinding the vertical sieves.
- The contractor will separately install an acetate feed system to assure there is sufficient soluble carbon available to achieve LOT performance in terms of nitrate reduction. Note that acetate is simply the conjugate base on acetic acid. Acetate feed can be paced using on-line monitoring of nitrate levels in the secondary effluent (feed forward) or the final effluent (feedback), or a combination of both.

2. Intermediate Pumping Station:

- The intermediate pump station must be able to convey the peak hour flow associated with the design maximum month flow of 3.0 MGD, which is estimated to be 5.7 MGD based on historic records at the Vista WWTP.
- Most flows that will be handled by this pump station will be in the range of 1.0 to 2.0 MGD, and sometimes less that early in the planning period. Regardless of whether this pump station is located upstream or downstream of the MBBRs, the goal is to maintain a constant wet well level, using VFDs, so pumped flows match secondary clarifier flows without hydraulic spikes when flows rise and additional pumps come on-line. This will require a complement of low-range and high-range pumps, all equipped with VFDs.
- For budget purposes, it is assumed the intermediate pump station will be of the wet well/dry well type, and equipped with three, 2-MGD pumps and two, 1-MGD pumps, providing a firm capacity of 6.0 MGD. All pumps will include VFDs.
- Preliminary calculations indicate a 16-inch diameter ductile iron force main will be a good fit for this application.

3. Supplemental Chemical Phosphorous Removal Treatment:

- As noted above, it is assumed full coagulation, flocculation, Lamella plate settling, and granular media filtration will be required to assure compliance with a median annual effluent TP standard of 0.17 mg-P/L. However, plain filtration may be sufficient if Bio-P removal is successful at consistently reducing soluble orthophosphate ($PO4^{-3}$) levels to <0.15 mg-P/L, which is feasible but should be demonstrated at full-scale at the Vista WWTP before deleting the tertiary pretreatment facilities from Phase 2.
- Coagulation, flocculation, and filtration (i.e. direct filtration) is also possible, but adding significant amounts of a metal salt to precipitate phosphorus could overload the solids handling capacity of a conventional downflow granular media filter. If direct filtration is attempted, a continuous or semi-continuous backwash upflow filter will be required to provide the required hydraulic capacity and the solids load at the same time.
- The tertiary pretreatment system will include the following. Process sizing will be based on using conservative loading rates and detention times for 3.0 MGD, with the ability to convey and treat up to 5.7 MGD during wet weather peaks.
- Metal salt and polymer feed facilities followed by one minute of high-intensity rapid mix (for metal salt) and one-minute of low-intensity rapid mix (for polymer) at 3.0 MGD. The reduction of rapid mix times will have no noticeable impact on phosphorous precipitation and solids coagulation at 5.7 MGD.
- Three-stage complete mix flocculation in series with VFD-equipped vertical mixers to provide a decreasing amount of mixing energy (i.e. G factor) from Stage 1 to Stage 3. A total 40-minute flocculation time will be provided at 3.0 MGD, decreasing to a still-acceptable level of 21 minutes at 5.7 MGD.
- Plate settling design will be based on a conservative loading rate of 0.2 gpm per square foot of effective projected surface area using 3-inch spacing between plates. The plates will still provide good settling performance should flows of 5.7 MGD occur and the net effective loading rate increases to 0.35 gpm per square foot.

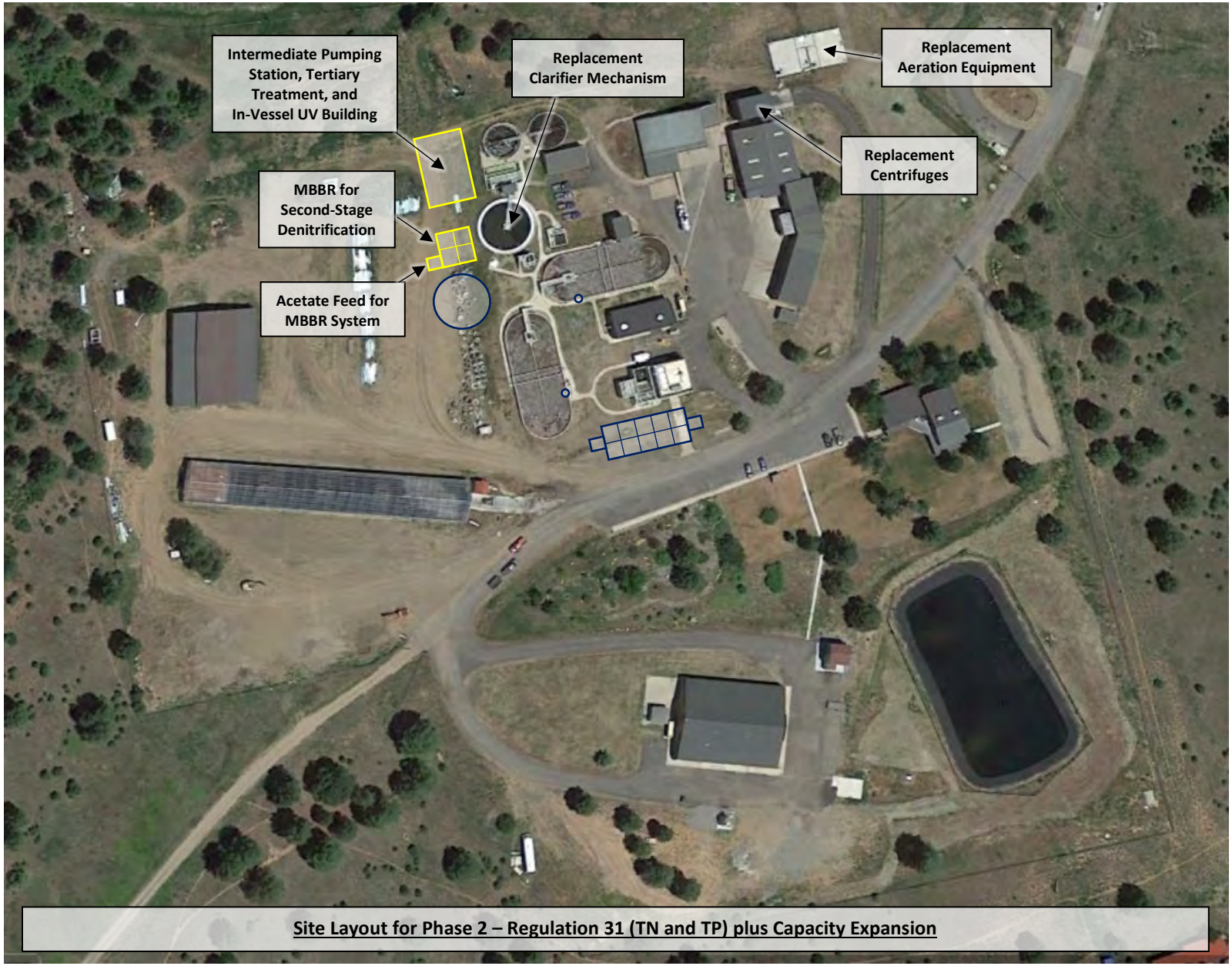
- Assuming full tertiary pretreatment is provided, or plain filtration is sufficient to achieve a median annual effluent TP residual of 0.17 mg-P/L, it is suggested that conventional dual media filters be provided. The design loading rate should be set at 2.5 gpm/ft^2 at 3.0 MGD, which increases to about 5.0 gpm/ft^2 at 5.7 MGD. Experience has shown that 2.5 gpm/ft^2 will provide low filtered effluent TP levels and long runs between backwashing, while 5.0 gpm/ft^2 could result in short filter runs, especially in the plain filtration mode. When flows are low, the operators will be able to achieve excellent TP removal and long filter runs using just one-half of the filter capacity.

4. Replace and Upsize Dewatering Centrifuges:

- Centrifuge manufacturers continue to 're-invent' their equipment to get higher throughput and drier cake solids, while using less energy per dry ton of sludge dewatered, within the same footprint of older units. Therefore, it is anticipated that simply replacing the existing units, and all appurtenant equipment, will provide more solids throughput in terms of gpm and dry pph. The operators also have the capability to run one or both centrifuges more hours per week should sludge production increase more than what can be handled through the technological advances in centrifuge performance.
- Note that if the operators opt to run the aerobic digesters as ASHTs, they may need to run the centrifuges more days per week if they want to use just one ASHT and save the aeration power costs associated with not using the other basin.

5. Other Plant Modernization Improvements:

- Replace all of the in-basin aeration equipment in the ASHTs/digesters, including the stainless steel drop piping, all of the laterals and support legs/brackets mounted to the floor. The District should consider migrating to fine bubble aeration at this time, not so much for increased oxygen transfer but to take advantage the fact that the mixing minimum aeration rate is less with full floor fine bubble coverage than with more widely spaced coarse bubble diffusers.
- The secondary clarifier mechanism for the 60-foot diameter unit installed in 2002 will be approaching 30 years old when the Phase 2 project is initiated and the District should plan on replacing the mechanism and appurtenances at that time. This should include the walkway and FRP covers for the perimeter weirs, as well as a new grinder and pump for secondary scum.
- Given the additional equipment and controls for the MBBR, tertiary treatment, and UV disinfection facilities, it seems likely that a major overhaul of the existing on-site data highway and SCADA system will be required and an allowance will be included in the budget for Phase 2.
- The existing UV system is an open channel Wedeco TAK 55. The UV system could be replaced in-kind or with an in-vessel UV system. PAWSD has expressed a preference for the new UV units to match those used at the water treatment plant, which are in-vessel units. In-vessel UV would require the construction of a new UV building to house the new equipment.



Site Layout for Phase 2 – Regulation 31 (TN and TP) plus Capacity Expansion

TETRA TECH

Project: PAWSD PNA Study
PN: 200-324541-21001
Date: 6/15/2021
Desc: Phase 2 (3.0 MGD)
Class: 4 (-30% to +50%)

Item	Unit	Quantity	Unit Cost	Installation %	Installation $	Item Cost
MBBR						
MBBR Equipment	LS	1	$682,000	Incl		$682,000
Submersible Basin Mixers	EA	4	$50,000	40%	$20,000	$280,000
Concrete - Slab	CY	50	$600	Incl		$30,000
Concrete - Walls	CY	210	$800	Incl		$168,000
Gates	EA	6	$15,000	Incl		$90,000
Splitter Box - Concrete - Slab	CY	3	$600	Incl		$2,000
Splitter Box - Concrete - Walls	CY	60	$800	Incl		$48,000
Subtotal MBBR						**$1,300,000**
Intermediate Pumping Station						
Wet Well/Dry Well Pump Station (with 4 Pumps)	LS	1	$800,000	30%	$240,000	$1,040,000
Subtotal Intermediate Pumping Station						**$1,040,000**
Tertiary Treatment						
Tertiary Phosphorus Facility	LS	1	$8,000,000	Incl		$8,000,000
Subtotal Tertiary Treatment						**$8,000,000**
UV Disinfection System						
New In-Vessel UV System	EA	3	$138,000	Incl		$414,000
Piping, Valves, and Appurtenances Allowance	LS	1	$80,000	Incl		$80,000
Tee Strainers	EA	3	$13,000	Incl		$39,000
Clamp-On Flow Meters (for Flow Balancing)	EA	3	$5,000	Incl		$15,000
Subtotal UV Disinfection System						**$548,000**
Dewatering						
Centrifuges	EA	2	$382,000	20%	$77,000	$918,000
Subtotal Dewatering						**$918,000**
Other Items						
Replacement Aeration Equipment for ASHTs/Digesters	EA	2	$300,000	40%	$120,000	$840,000
Circular Sludge Collection Mechanism (Replacement)	EA	2	$187,000	40%	$75,000	$524,000
Replacement Scum Pump for Existing 60-ft Clarifier	EA	1	$25,000	40%	$10,000	$35,000
SCADA Upgrade and Expansion Allowance	LS	1	$1,000,000	Incl		$1,000,000
Subtotal Other Items						**$2,399,000**
Equipment/ Materials Subtotal						***$14,210,000***
Electrical and Site Civil						
Electrical I&C (25%)	LS	1	$3,552,500	Incl		$3,553,000
Sitework (12%)	LS	1	$1,306,560	Incl		$1,307,000
Subtotal Equipment and Labor						**$19,070,000**
Contractor Markups						
Contracts/Bonds/Insurance (3%)	LS	1	$572,100	N/A		$573,000
Mobilization/Demobilization (2%)	LS	1	$381,400	Incl		$382,000
Overhead and Profit (12%)	LS	1	$2,288,400	N/A		$2,289,000
Subtotal Pre-Contingency Construction Cost						**$22,314,000**
Contingency (30%)	LS	1	$6,694,200	N/A		$6,695,000
Inflation Contingency (5%)	LS	1	$710,500	N/A		$711,000
Subtotal Construction Cost						**$29,720,000**
Design and Construction Phase Engineering (15%)	LS	1	$2,131,500	N/A		$4,458,000
Project Total			**$34,178,000**			

Note:

1. Project total rounded to the nearest $1,000
2. Incl = Included

TETRA TECH

TECHNICAL MEMO

To:	Justin Ramsey, PAWSD
cc:	Jason Randall, Honeywell
From:	Mark Maxwell, Ben Miller, Lauren Riedle, Tetra Tech
Date:	July 12, 2021
Subject:	State Revolving Fund Loan Green Project Reserve Evaluation

This memorandum summarizes the Environmental Protection Agency (EPA) requirements for qualifying for a Green Project Reserve (GPR) State Revolving Fund (SRF) Loan and whether the proposed Phase 1 project meets those requirements.

Introduction

Of the four categories of projects that can qualify for GPR funding, energy efficiency is the best one suited to the Vista WWTP. Within the energy efficiency category, the following EPA guidance language is pertinent:

> *3.1 Definition: Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water quality projects, use energy in a more efficient way, and/or produce/utilize renewable energy.*
>
> *3.2 Categorical Projects*
>
> *3.2-1 Renewable energy project such as wind, solar, geothermal, micro-hydroelectric, and biogas combined heat and power, that provide power to a publicly owned treatment works (POTW). Micro-hydroelectric projects involve capturing the energy from pipe flow.*
>
> *3.2-1a POTW owned renewable energy projects can be located on site or offsite.*
>
> *3.2-1b Includes the portion of a publicly owned renewable energy project that serves POTW's energy needs.*
>
> *3.2-1c Must feed into the grid that the utility draws from and/or there is a direct connection.*
>
> *3.2-2 Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR. Retrofit projects should compare energy used by the existing system or unit process to the proposed project…[text continues in the EPA guidance document].*

The calculations presented below focus on Paragraph 3.2-2, which is to demonstrate a 20% reduction in aeration-related energy use by means of the proposed Phase 1 improvements. In this specific evaluation, it is only necessary to show that aeration energy usage is reduced by 20%. However, aeration power usage is not separately metered at the Vista WWTP. In addition, it is anticipated that the Phase 1 improvements will reduce total electric energy usage by 20% and that will be the target for this GPR evaluation.

Energy Savings due to Reduced Aeration

Installation of the ANA basins will oxidize some of the influent BOD loads via the reduction of nitrate to nitrogen gas. In addition, operating the oxidation ditches at lower DO levels to foster simultaneous nitrification and denitrification during the day and on/off aeration at night will reduce blower airflow requirements for the ditches. To gain this reduction, some energy will be used for the anoxic basin mixers plus MLR pumping. Additional aeration-

based energy reduction can be realized through the installation of a small (i.e. jockey) blower to eliminate the need to 'blow off' air to the oxidation ditch that is 'off duty' 9 months of the year (i.e. when I/I flows are not peaking). Other airflow/aeration savings can be gained by fully abandoning or demolishing older facilities that will not be used in the future and for which air is currently being added to keep the tanks fresh and to suppress odors.

A. ***Denitrification Credit.*** Denitrification will reduce BOD loads to the oxidation ditches by a factor of 2.86 mg/L of BOD for each mg-N/L of nitrate reduced to nitrogen gas. The energy savings calculations assumed that biological oxidation of ammonia to nitrate will create 30 mg-N/L of nitrate and all modes of denitrification combined (the ANA basins, simultaneous nitrification-denitrification, and on/off aeration) will reduce nitrate to about 5 mg-N/L. At current dry weather average flows of 1.1 MGD, this amounts to an actual oxygen requirement (AOR) reduction of 660 ppd. This equates to a standard oxygen requirement (SOR) reduction of 1,650 ppd and a savings of approximately 300 standard cubic feet of air per minute (scfm). According to the local control panel for the existing HST blowers, about 17.5 scfm of compressed air is produced for each HP utilized by the blowers. Including standard derating factors for altitude and motor/VFD efficiencies, this converts to 15 scfm per motor HP, which equates to a savings of 20 HP on a 24/7/365 basis.

- Annual Energy Reduction = -131,000 kWh/year

B. ***Anoxic Zone Mixing Requirement.*** Assuming two parallel trains of three anoxic basins in series, each of which is 17 feet by 17 feet by 15 feet of SWD, results in a total anoxic volume of 26,000 cubic feet. Allowing for a mixing energy of 0.2 HP per 1,000 cubic feet, results in a total anoxic mixing energy input of about 6 HP on a 24/7/365 basis. While it is likely that only one train of ANA basins will need to be used 9 months of the year during the non-high I/I season, for the sake of conservatism in estimating energy savings, it is assumed that both ANA trains will be used all year.

- Annual Energy Addition = +40,000 kWh/year

C. ***MLR Pumping Requirement.*** An additional power demand of about 7 HP on a 24/7/365 basis was estimated for MLR pumping. This estimate assumes a MLR:Q pumping ratio of 2.0, the current baseline dry weather wastewater flow of 1.1 MGD, up to 10 feet of total dynamic head (TDH), and respective mechanical, motor, and VFD efficiencies of 0.6, 0.95, and 0.98.

- Annual Energy Addition = +45,000 kWh/year

D. ***Jockey Blower Credit (e.g. elimination compressed air blow off).*** Conversations with operational staff indicate that up to 730 scfm are 'blown off' every day because the Neuros blowers are oversized for current conditions and cannot be turned down to the extent necessary to avoid over-aeration in the oxidation ditches. This blow down, which is vented into the oxidation ditch that is not used during the nine low I/I months (May thru January) is estimated at 500 scfm. In addition, about 230 scfm of blower air is used to keep several abandoned/unused basins fresh to minimize off-site odor complaints. A smaller jockey HST blower is recommended to eliminate the need to blow off air for activated sludge oxidation ditch process needs. In addition, airflow requirements can be further reduced by fully abandoning and/or demolishing basins that are not needed now or in the future. At the 15 scfm per motor HP relationship noted above, a jockey blower could save about 35 HP for approximately nine months a year for activated sludge aeration, and 15 more HP for basin freshening could be eliminated on a 24/7/365 basis.

- Annual Energy Reduction = -270,000 kWh/year

E. ***Summary of Aeration-Related Energy Saving Credits and Additions***. Considering the energy reductions and additions associated with Items A-D above, the total estimated net energy savings associated with reduced aeration is approximately 316,000 kWh/year.

- Net Energy Savings Associated with Reduced Aeration = -316,000 kWh/year

F. ***Comparison to Current Electricity Usage for Aeration***. The Vista WWTP currently buys utility power from La Plata Electric Association (LPEA) through two separate meters, one labelled 'Plant' and the other 'Office'. It appears the Office meter provides power to some of the unit process at the Vista WWTP, plus the District's nearby water treatment plant as well. In addition, power supply to the HST blowers is not sub-

metered. Accordingly, it is not possible to say exactly how much of the total power usage at the Vista WWTP is taken up by the two existing 150-HP Neuros (HST) blowers.

Therefore, projected energy savings will be compared to typical aeration power requirements for nitrifying activated sludge plants without primary clarifiers and with fine bubble diffused aeration. Experience indicates approximately 75 kW (100 HP) must be provided for each 1.0 MGD of domestic wastewater that is of moderate to high strength. Given that baseline wastewater flows, not including wet season I/I, are about 1.1 MGD, this indicates the District should be using about 82.5 kW on a 24/7/365 basis for the aeration function at the Vista WWTP. This translates to an estimated, present day annual usage of 723,000 kWh/year for aeration power. Therefore, the net energy savings of -316,000 kWh/year represents a 44% reduction in aeration power usage/costs and the proposed ANA basin and jockey blower improvements qualify as 'categorically green' with respect to SRF loan funding.

Summary

While the Vista WWTP has made great strides in reducing energy usage through the use of HST blowers, there are additional energy savings to be realized via (1) construction of the ANA basins for denitrification (and Bio-P removal), (2) addition of a jockey blower to 'right size' the amount of air supplied to the activated sludge system when only one oxidation ditch is in use, and (3) eliminate the need to supply air to 'freshen up' abandoned, or to be abandoned, facilities. The calculations presented above suggest that aeration power usage can be further reduced by up to 44%, more than enough to qualify the District for GPR funding through the SRF loan program.

Calculations

1. **Anoxic Basins Denitrification Credit:**
   - Assume 30 mg-N/L ammonia to nitrate and denitrify to 5 mg-N/L.
   - The non-I/I monthly average flow is 1.1 MGD.
   - Denitrification AOR Credit:
     - 1.1 MGD x (30 mg-N/L - 5 mg-N/L) x 2.86 mg-O_2 per mg-N/L x 8.34 lb/gal = <660 ppd O_2
   - $\frac{SOR}{AOR_{20}} = \frac{\cancel{K_L a}(C_{s20}-0)}{\alpha\,\cancel{K_L a}(\beta C_{sa20}-1)}$
   - Assume 5 feet depth of submergence (DOS) for C_s calculations:
     - $C_{s20} = 9.07$ mg/L × $\left(1+\frac{5\text{ ft}}{34\text{ ft}}\right)$ = 10.40 mg/L
     - $C_{sa20} = 9.07$ mg/L × $\left(\frac{30\text{ in-Hg}-7.44\text{ in-Hg}}{30\text{ in-Hg}}+\frac{5\text{ ft}}{34\text{ ft}}\right) = 9.07\text{ mg/L}\,(0.9) = 8.16$ mg/L
   - $\frac{SOR}{AOR_{20}} = \frac{(10.40\text{ mg/L}-0)}{0.6(0.95\times 8.16\text{ mg/L}-1)} = 2.6$
   - Required SOR = 2.6 x AOR Credit = 2.6 x 660 ppd = 1,720 ppd
   - Assume 1.75% SOTE per foot of fine bubble submergence and 13 feet DOS = 13 ft x 1.75%/ft = 23% Total SOTE
   - Applied SOR = SOR Required / 0.23 = 1,720/0.23 = 7,500 ppd O_2
   - SCFM = Applied 7500 ppd O_2 x (100/23) x (1 ft^3/0.075 lb) x (1 day/1,440 min) = 300 scfm
   - Denitrification credit is worth about 300 scfm.
   - Assume Neuros blowers generate about 15 scfm/hp → <300 scfm/15 = **20 hp credit 24/7/365**
2. **Anoxic Zone Mixing Requirement:**
   - Assume two trains of 3 anoxic basins at 17 ft x 17 ft x 15 ft SWD
   - Volume per cell = 4.335 x 10^3 ft^3
   - Assume mixing energy of 0.2 hp per 1000 ft^3 = 4.335 x 10^3 ft^3 x 0.2 hp / 10^3 ft^3 = 0.9 hp per cell
   - For six cells: 6 x 0.9 hp = 5.4 hp added 24/7/365 → Round to **6.0 hp added 24/7/365**
3. **MLR Pumping Addition:**
   - Assume MLR:Q ratio of 2.0 and 1.1 MGD of real sewage flow year round.

- Total pumping = 1.1 MGD x 2.0 = 2.2 MGD or 3.41 cfs MLR pumping
- Assume 10 ft TDH for MLR pumps.
- Power $= \frac{\gamma QH}{E \times 550}$, where E = Mech x Motor x VFD = 0.60 x 0.95 x 0.98 = 0.55
- Power $= \frac{62.4\ \text{lb/cf} \times 3.41\ \text{cfs} \times 10\ \text{ft}}{0.55 \times 550\ \text{ft} \cdot \text{lbf/s}}$ = 7 hp added 24/7/365

4. **Jockey Blower Credit (Eliminate blowoff 10 months per year):**
   - Excess air: Assume 500 scfm of blowoff and 15 scfm per hp = 35 hp credit 24/7/9 months
   - Basin freshening: Assume 230 scfm of blowoff and 15 scfm per hp = 15 hp credit 24/7/365

Sum of Power Additions and Credits

1. **Anoxic Basin Denite Credit**

   20 hp x 0.746 x 24 x 365 = (131,000) kwh/year

2. **Anoxic Zone Mixing Addition**

   6.0 hp x 0.746 x 24 x 365 = + 40,000 kwh/year

3. **MLR Pumping Addition**

   7.0 hp x 0.746 x 24 x 365 = + 45,000 kwh/year

4. **Jockey Blower Credit**

   35 hp x 0.746 x 24 x 270 = (170,000) kwh/year

   15 hp x 0.746 x 24 x 365 = (100,000) kwh/year

Net Change = 40,000 + 45,000 – 131,000 – 270,000 kwh/year

Net Change = (316,000) kwh/year savings

TETRA TECH

TECHNICAL MEMO

To:	Justin Ramsey, PAWSD
cc:	Jason Randall, Honeywell
From:	Mark Maxwell, Ben Miller, Lauren Riedle, Tetra Tech
Date:	July 23, 2021
Subject:	Alternative Assessment of Chemical Phosphorus Removal

Introduction

This memorandum weighs the costs and benefits of implementing chemical phosphorus removal (Chem-P) versus enhanced biological phosphorus removal (EBPR or Bio-P) in Phase 1 of the Vista WWTP improvements. Chem-P and Bio-P are equally effective strategies for meeting the Regulation 85 TP limit of 1 mg-P/L in Phase 1. The current, in-stream numeric nutrient placeholder value for TP in Regulation 31 for warm water streams is 0.17 mg-P/L. Assuming no dilution is available at the regulatory low flows used for assessing compliance (the 20th percentile of median annual stream flows), the future effluent limit may be as low as the stream standard. While Chem-P will ultimately be required in Phase 2 to reach a Regulation 31-based TP limit of 0.17 mg-P/L, the following evaluation indicates it is not necessary or cost effective to implement Chem-P until Phase 2.

Capital Costs

The proposed Chem-P treatment system includes coagulation, flocculation, Lamella plate settling, and granular media filtration. The estimated total cost for this system, along with the building to house the equipment, is around $8 million. Granular media filtration is not necessary until Phase 2 when TP effluent limits of 0.17 mg-P/L are required. The cost of the filtration units may be postponed until then.

Alternatively, the Bio-P treatment system only involves the addition of anaerobic basins ahead of the anoxic basins that are proposed for construction in Phase 1 for TIN compliance. New RAS pumps and piping would already be in place for the anoxic basins, enabling some cost-sharing between the denitrification and the Bio-P removal processes. The anaerobic basins are, therefore, estimated at approximately $1 million.

Selection of Bio-P for Phase 1 would allow PAWSD to postpone the capital costs of the Chem-P system until Phase 2. PAWSD would ultimately need to construct the coagulation, flocculation, settling, and filtration process, thereby incurring both the capital costs of the anaerobic basins and the tertiary treatment building. While capital costs of the Bio-P option will be higher over the course of plant improvements, Bio-P has the advantage of lower lifetime operating costs.

Operating Costs

Major operating costs for Chem-P removal include chemical, electric energy, and sludge management, while only a small amount of mixing energy is needed for Bio-P as no chemicals are required and no additional sludge is generated. For Chem-P, metal salt addition (aluminum or iron) is typically the greatest contributor to increased operating costs, while rapid mixing and flocculation increase energy usage as does the chemical sludge that is generated in the phosphorus precipitation process, which must be dewatered and hauled to the landfill.

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The delivery, storage, and feeding of metal salt and polymer chemicals to effect Chem-P removal is more operationally complex and entails more of a safety risk for operating personnel than Bio-P removal, which requires no chemicals. In addition, with Chem-P removal, the dose of alum or iron salts needed to precipitate soluble phosphorus out of solution depends on the phosphorus concentration and whether the chemicals are fed to the mixed liquor or to the secondary effluent.

Influent TP levels in municipal wastewater range from 4 to 6 mg-P/L and Chem-P treatment by itself requires a molar Al:P or Fe:P ratio of 1.0 to 1.5 to create a final effluent with less than 1.0 mg-P/L. Molar ratios of 1.5 to 2.0 are needed for a TP residual less than 0.20 mg-P/L since an excess of metal salt is needed to make contact with and precipitate the relatively few phosphate molecules present below 1.0 mg-P/L. As a frame of reference and assuming 5 mg-P/L of influent TP, the above-noted molar ratios suggest an alum dose of 60 to 70 mg/L is needed to achieve 1.0 mg-P/L, and 90 to 100 mg/L for less than 0.20 mg-P/L when using Chem-P by itself.

With Bio-P removal, reducing influent TP to 1.0 mg-P/L will not require metal salt addition. However, to further reduce effluent TP levels to below 0.20 mg-P/L with tertiary (i.e. polishing) Chem-P treatment will require relatively high molar ratios, in the range of 4 to 6, to remove the 'last' 1.0 mg-P/L. Assuming 1.0 mg-P/L remains in the BNR effluent after Bio-P treatment, up to 50 mg/L of alum may be needed to polish the effluent to $\leq$ 0.20 mg-P/L. The alum dosage can be decreased to about 25 mg/L if Bio-P can be optimized to achieve a secondary effluent of 0.5 mg-P/L, which some BNR plants routinely achieve. Therefore, metal salt feed rates can be significant, but still less, when Bio-P removal is used ahead of Chem-P polishing.

Bio-P relies on the presence of phosphorus accumulating organisms (PAOs) in the mixed liquor to provide luxury uptake of phosphorus in the wastewater. To provide for phosphorus release in the anaerobic zone, with subsequent luxury uptake in the anoxic and oxic zones, an adequate amount of VFAs must be present in the screened and degritted wastewater. Feeding acetate or another carbon source may be needed if there is not a sufficient concentration of VFAs in the raw wastewater to support the PAOs. PAWSD provided five months of influent VFA data from August through December 2020. During these months, the average influent VFA concentration was 135 ± 30 mg/L as acetic acid. Although at least a full year's worth of data should be in hand to be completely conclusive, it appears that VFA concentrations are sufficient to support biological phosphorus removal without supplemental carbon feed. Using Bio-P eliminates the need for additional alum or ferric chloride to treat TP down from influent levels of 6 mg-P/L, on average, to 1.0 mg-P/L and is anticipated to require no supplemental carbon.

Avoiding use of metal salts, at least for Phase 1, would eliminate the additional sludge generation associated with chemical precipitation of phosphorus (e.g. aluminum phosphate and aluminum hydroxide precipitates). Chem-P generates an additional 10-20% of sludge mass on top of the usual WAS production, leading to a proportional increase in sludge dewatering and management costs. Note that the District's current method for sludge stabilization, aerated sludge holding/digestion, should not generate either (1) a centrate high in phosphorus, even with PAO organisms present in the WAS, or (2) struvite at its operating pH and low ammonia levels.

In addition to metal salt and polymer feed, Chem-P requires energy for mixers, chemical feed pumps, and lighting and heating of the tertiary treatment building. The flocculation process requires slow to moderate mixing speeds, and the coagulation process requires high energy input, at least for metal salt addition. Anaerobic basins, on the other hand, require just enough mixing energy to intermittently homogenize the mixed liquor. Mixing for Chem-P would, therefore, use more energy than mixing for Bio-P. The anaerobic basins need not be enclosed by a building and would not require the lighting and heating costs of the Chem-P tertiary treatment building, except for a small enclosure to house air compressors, receivers, solenoid valve panels, and controls if large bubble mixing is used in these basins. Floating or submersible mixers would not necessitate a building at the ANA complex.

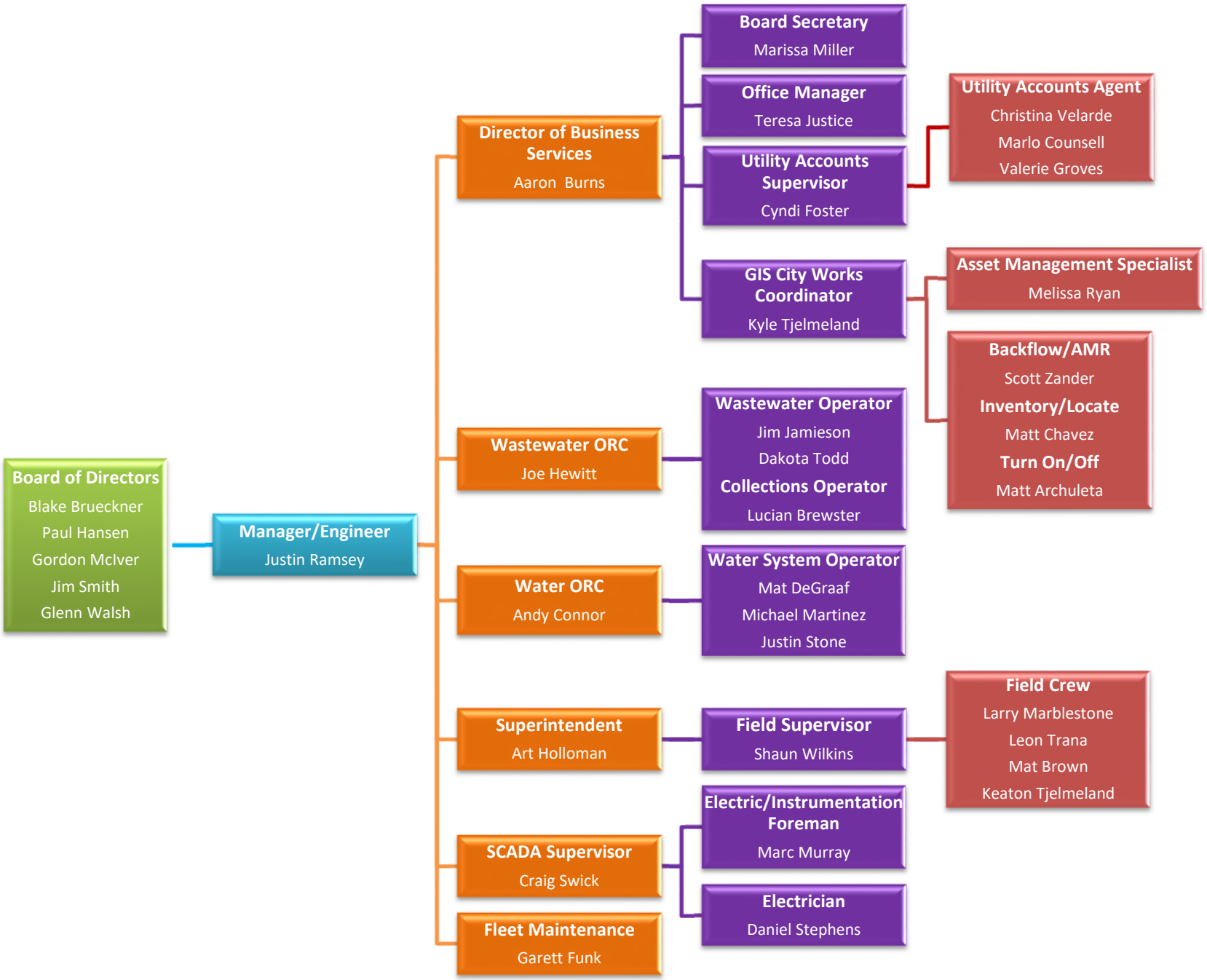
In summary, Chem-P treatment requires more chemical addition, energy usage, and sludge management than Bio-P, and will result in greater operating costs than Bio-P removal.

Summary

Meeting the rolling 12-month median TP limit of 1.0 mg-P/L required by Regulation 85 using Bio-P removal makes the most sense in terms of both upfront capital costs and long-term operating costs. Bio-P will be significantly less expensive to install in Phase 1 than Chem-P. While tertiary Chem-P treatment will be needed in Phase 2 to meet a potential median annual TP limit of 0.17 mg-P/L (Regulation 31), the capital and operating costs of Chem-P can be deferred to Phase 2. Accordingly, Tetra Tech recommends PAWSD install anaerobic basins for enhanced Bio-P removal in Phase 1, and defer the tertiary treatment system for Chem-P removal to Phase 2.


COLORADO REGISTERED
MARK J. MAXWELL
15036
01/03/23
PROFESSIONAL ENGINEER

PAWSD ORGANIZATIONAL CHART



WASTEWATER TREATMENT PLANT OPERATOR

Working under the direct supervision of the Operator in Responsible Charge (ORC) performs limited skilled mechanical and technical work for the daily efficient operation and maintenance of the treatment plant.

ESSENTIAL JOB FUNCTIONS/DUTIES:

The incumbent in this position must be able to successfully perform the following essential job functions and duties:

- Operate pumps, blowers, motors, valves and other plant equipment
- Perform general equipment inspection and maintenance
- Perform minor equipment repair and adjustment to mechanical, electrical and pneumatic equipment
- Monitor clarifier blanket depths, chemical usage and dosage, plant flow, and other equipment and plant conditions
- Collect wastewater samples and run basic laboratory and process control tests
- Calculate basic wastewater operation and control data and enter into computer database
- Assist with tank switching, draining and cleaning
- Perform daily plant maintenance duties
- Perform yard maintenance
- Haul biosolids to composting site
- Perform collection system inspections
- Attend weekly staff meetings
- Attend training seminars as required or recommended
- Perform other duties as assigned

Knowledge, Skills and Abilities:

- *Knowledge of:* Basic knowledge of the operation of a wastewater treatment plant and sewage collection systems; Basic knowledge of chemistry, microbiology, laboratory testing procedures, and process control related mathematical calculations; MS Excel, MSWord and general database reporting.
- *Ability to:* Learn and apply department policies and procedures; make appropriate decisions in an industrial setting; adapt to change; be a member of a team; deal with conflict effectively; exhibit patience and composure in difficult situations; take initiative and follow-through on projects; report status of on-going projects to rest of staff on timely basis to ensure time lines are met and staff are informed; work independently, safely and execute judgment appropriately; communicate effectively both orally and in writing; review and analyze information and formulate logical

`recommendations; interact with the public and County employees in a positive and informed manner and be willing to receive corrective feedback in a positive manner. Ability and commitment to support the County leadership goals, objective and organizational needs.
- *Skills:* Basic process treatment troubleshooting skills, along with mechanical repair and maintenance skills, and experience with hand and power tools for work on mechanical, plumbing and electrical systems.

Materials and Equipment Directly Used: Personal computers and printers; calculators; District vehicles; hand tools; power tools; diagnostic tools; hazardous and non-hazardous chemicals; personal safety equipment; typical wastewater treatment plant equipment such as pumps, pipe systems, blowers, mixers, bar screens and valves; lawn mower; snow blower; dump truck; front end loader and fork lift.

Physical Demands and Work Environment

The physical demands and work environment described here are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential job functions. Request for reasonable accommodation(s) must be made to the Pagosa Area Water and Sanitation District Human Resources Department.

Working Environment/Physical Demands: Work is performed inside the treatment plant, outside on the treatment plant property, anywhere within the customer service area, and can be very physically demanding. Physical activities include heavy lifting; walking long distances; climbing and descending stairs, ladders and steep terrain; using hand tools, power tools, lawn care equipment and snow removal equipment; operating district vehicles and heavy equipment.

Environmental factors would include exposure to: weather conditions; loud noise; high humidity; odors; confined spaces; poor air quality; bio-hazardous aerosols; hazardous chemicals; rotating equipment; open tanks; electrical equipment and tripping hazards.

Interpersonal communications include contact with the public or employees where explanatory or interpretive information is exchanged, gathered or presented.

EDUCATION, EXPERIENCE, AND FORMAL TRAINING:

- High school graduation or equivalent
- Ability to perform basic plant process control mathematical calculations
- Minimum of one year of wastewater treatment experience

LICENSES OR CERTIFICATES:

- Minimum Class “D” Colorado Wastewater Treatment Plant Operator’s Certification
- Colorado Class “B” CDL Drivers License
- Colorado Class I Collection Systems Certification

This job description is not intended to be an exclusive list of all duties, responsibilities or qualifications associated with the job. Nothing in this job description restricts Districts ability to assign, reassign or eliminate duties and responsibilities of the job at any time. It does not prescribe or restrict the tasks that may be assigned. This job description describes the District’s current assignment of essential functions.

Those functions may change at any time as the needs of the County change or for other reasons deemed appropriate by the District.

WASTEWATER TREATMENT PLANT ORC

Working under the direct supervision of the Operator in Responsible Charge (ORC) performs limited skilled mechanical and technical work for the daily efficient operation and maintenance of the treatment plant.

ESSENTIAL JOB FUNCTIONS/DUTIES:

The incumbent in this position must be able to successfully perform the following essential job functions and duties:

- Responsible for the operation and maintenance of the facility
- Must know and understand requirements of applicable permits, laws and regulations
- Will supervise other operators and develop work schedules, approve time off and discipline subordinates as necessary.
- Responsible for developing and maintaining written delegation plan, tasks and activities for subordinates.
- Operate pumps, blowers, motors, valves and other plant equipment
- Perform general equipment inspection and maintenance
- Perform minor equipment repair and adjustment to mechanical, electrical and pneumatic equipment
- Monitor clarifier blanket depths, chemical usage and dosage, plant flow, and other equipment and plant conditions
- Collect wastewater samples and run basic laboratory and process control tests
- Calculate basic wastewater operation and control data and enter into computer database
- Assist with tank switching, draining and cleaning
- Perform daily plant maintenance duties
- Perform collection system inspections
- Attend bi-weekly manager meetings
- Attend training seminars as required or recommended
- Perform other duties as assigned

Knowledge, Skills and Abilities:

- Extensive knowledge of the operation of a wastewater treatment plant and sewage collection systems; Basic knowledge of chemistry, microbiology, laboratory testing procedures, and process control related mathematical calculations; MS Excel, MSWord and general database reporting.
- Must know and understand requirements of applicable permits, laws and regulations.
- Ability to learn and apply department policies and procedures; make appropriate decisions in an industrial setting; adapt to change; be a member of a team; deal with conflict effectively; exhibit

patience and composure in difficult situations; take initiative and follow-through on projects; report status of on-going projects to rest of staff on timely basis to ensure time lines are met and staff are informed; work independently, safely and execute judgment appropriately; communicate effectively both orally and in writing; review and analyze information and formulate logical `recommendations; interact with the public and County employees in a positive and informed manner and be willing to receive corrective feedback in a positive manner. Ability and commitment to support the County leadership goals, objective and organizational needs.

- *P*rocess treatment troubleshooting skills, along with mechanical repair and maintenance skills, and experience with hand and power tools for work on mechanical, plumbing and electrical systems.

Materials and Equipment Directly Used: Personal computers and printers; calculators; District vehicles; hand tools; power tools; diagnostic tools; hazardous and non-hazardous chemicals; personal safety equipment; typical wastewater treatment plant equipment such as pumps, pipe systems, blowers, mixers, bar screens and valves; lawn mower; snow blower; dump truck; front end loader and fork lift.

Physical Demands and Work Environment

The physical demands and work environment described here are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential job functions. Request for reasonable accommodation(s) must be made to the Pagosa Area Water and Sanitation District Human Resources Department.

Working Environment/Physical Demands: Work is performed inside the treatment plant, outside on the treatment plant property, anywhere within the customer service area, and can be very physically demanding. Physical activities include heavy lifting; walking long distances; climbing and descending stairs, ladders and steep terrain; using hand tools, power tools, lawn care equipment and snow removal equipment; operating district vehicles and heavy equipment.

Environmental factors would include exposure to: weather conditions; loud noise; high humidity; odors; confined spaces; poor air quality; bio-hazardous aerosols; hazardous chemicals; rotating equipment; open tanks; electrical equipment and tripping hazards.

Interpersonal communications include contact with the public or employees where explanatory or interpretive information is exchanged, gathered or presented.

EDUCATION, EXPERIENCE, AND FORMAL TRAINING:

- High school graduation or equivalent
- Ability to perform basic plant process control mathematical calculations
- Minimum of one year of wastewater treatment experience

LICENSES OR CERTIFICATES:

- Minimum Class “A” Colorado Wastewater Treatment Plant Operator’s Certification
- Colorado Class 3 Collection Systems Certification

This job description is not intended to be an exclusive list of all duties, responsibilities or qualifications associated with the job. Nothing in this job description restricts Districts ability to assign, reassign or

eliminate duties and responsibilities of the job at any time. It does not prescribe or restrict the tasks that may be assigned. This job description describes the District's current assignment of essential functions. Those functions may change at any time as the needs of the County change or for other reasons deemed appropriate by the District.

Pagosa Area Water & Sanitation, Colorado
Wastewater Utility
20-Year Cash Flow Projection
Operating Fund

(Revision Date: 9-13-21)

Wastewater Operating Fund								
1.0 Annual Revenues	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
User Charges Under Current Rate Plan (w/2% customer growth)								
Sewer Rate Revenue	$ 1,714,240	$ 1,744,320	$ 1,772,532	$ 1,793,000	$ 1,814,000	$ 1,835,000	$ 1,902,000	$ 1,971,000
Waste Hauler Revenue	$ 66,962	$ 94,701	$ 108,141	$ 110,000	$ 112,000	$ 114,000	$ 116,000	$ 118,000
Availability Charge [(2)]	$ 265,990	$ 311,462	$ 299,428	$ 286,000	$ 273,000	$ 260,000	$ 248,000	$ 237,000
Municipal Wastewater Treatment	$ 168,558	$ 223,272	$ 122,131	$ 125,000	$ 128,000	$ 131,000	$ 134,000	$ 137,000
Inclusion Fee	$ 5,154	$ (16)	$ 9,794	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400
Customer Hookups	$ 29,180	$ 22,195	$ 20,805	$ 21,000	$ 21,400	$ 21,800	$ 22,200	$ 22,600
Penalty & Interest Delin Accts	$ 2,246	$ 2,000	$ 1,434	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800
Current Tax Interest	$ 1,090	$ 1,244	$ 1,153	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
Other Revenue	$ 7,839	$ 5,221	$ 4,656	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500
Transfer From General Fund	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000
PSSGID- Total DS Payment (Pipeline payment)	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900
Interest Income - Other	$ 28,916	$ 45,352	$ 17,249	$ 30,912	$ 30,183	$ 29,297	$ 27,948	$ 23,654
Interest Income - CIF	$ 17,097	$ 19,441	$ 7,161	$ 15,477	$ 16,212	$ 16,898	$ 17,681	$ 16,307
Interest on Delinquent Taxes	$ 500	$ 196	$ 62	$ 63	$ 64	$ 65	$ 66	$ 67
Total Annual Revenue								
Under Current Rates (Includes 2024-2027 Increase)	$ 2,642,672	$ 2,804,288	$ 2,699,446	$ 2,732,052	$ 2,745,459	$ 2,758,660	$ 2,818,495	$ 2,876,228
Proposed Annual Rate Increase (%)	0%	0%	0%	0%	0%	0%	0%	0%
Proposed Cumulative Rate Increase ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2.0 Annual Expenses and Routine Capital Improvements								
Work in Progress	$ 5,135	$ 4,290	$ 14,129	$ 14,412	$ 14,700	$ 14,994	$ 15,294	$ 15,600
Wastewater Collection	$ 576,015	$ 605,479	$ 714,497	$ 736,000	$ 758,000	$ 781,000	$ 804,000	$ 828,000
Wastewater Treatment	$ 716,645	$ 590,818	$ 677,828	$ 698,000	$ 719,000	$ 741,000	$ 763,000	$ 786,000
Maintenance	$ 58,964	$ 68,073	$ 63,870	$ 66,000	$ 68,000	$ 70,000	$ 72,000	$ 74,000
Administration	$ 187,485	$ 177,742	$ 163,937	$ 169,000	$ 174,000	$ 179,000	$ 184,000	$ 190,000
Personnel & Billing	$ 127,629	$ 136,753	$ 128,401	$ 132,000	$ 136,000	$ 140,000	$ 144,000	$ 148,000
Total Annual Expenses	$ 1,671,873	$ 1,583,155	$ 1,762,662	$ 1,815,412	$ 1,869,700	$ 1,925,994	$ 1,982,294	$ 2,041,600
3.0 Net Operation Revenue								
Starting Year Balance	$ 2,552,203	$ 3,122,000	$ 3,942,000	$ 4,478,000	$ 4,994,000	$ 5,469,000	$ 5,901,000	$ 6,336,000
Excess of Revenue over Expenses w/o Rate Increase	$ 970,799	$ 1,221,133	$ 936,784	$ 916,640	$ 875,759	$ 832,666	$ 836,201	$ 834,628
Net Operating Revenue w/o Rate Increase	$ 3,523,002	$ 4,343,133	$ 4,878,784	$ 5,394,640	$ 5,869,759	$ 6,301,666	$ 6,737,201	$ 7,170,628
Additional Net Operating Revenue w/Rate Increase	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Net Operating Revenue (Total NOR)	$ 3,523,002	$ 4,343,000	$ 4,879,000	$ 5,395,000	$ 5,870,000	$ 6,302,000	$ 6,737,000	$ 7,171,000
Debt Service (see below)	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654
End-of-Year Balance	$ 3,122,000	$ 3,942,000	$ 4,478,000	$ 4,994,000	$ 5,469,000	$ 5,901,000	$ 6,336,000	$ 6,770,000
4.0 Debt Service								
Current	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654
Green Project Reserve Fund	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean Water Fund	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654
5.0 Debt Service Coverage Ratio (Total NOR/Debt Service)								
Target **(Manually Input Desired Coverage Ratio)**	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Projected with Rate Increases Indicated	8.79	10.84	12.18	13.47	14.65	15.73	16.82	17.90

	Year												
	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
	$ 2,043,000	$ 2,118,000	$ 2,142,000	$ 2,167,000	$ 2,192,000	$ 2,217,000	$ 2,243,000	$ 2,269,000	$ 2,295,000	$ 2,321,000	$ 2,348,000	$ 2,375,000	$ 2,402,000
	$ 120,000	$ 122,000	$ 124,000	$ 126,000	$ 129,000	$ 132,000	$ 135,000	$ 138,000	$ 141,000	$ 144,000	$ 147,000	$ 150,000	$ 153,000
	$ 226,000	$ 216,000	$ 206,000	$ 197,000	$ 188,000	$ 179,000	$ 171,000	$ 163,000	$ 156,000	$ 149,000	$ 142,000	$ 135,000	$ 129,000
	$ 140,000	$ 143,000	$ 146,000	$ 149,000	$ 152,000	$ 155,000	$ 158,000	$ 161,000	$ 164,000	$ 167,000	$ 170,000	$ 173,000	$ 176,000
	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400	$ 4,400
	$ 23,100	$ 23,600	$ 24,100	$ 24,600	$ 25,100	$ 25,600	$ 26,100	$ 26,600	$ 27,100	$ 27,600	$ 28,200	$ 28,800	$ 29,400
	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800	$ 2,800
	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500	$ 7,500
	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000
	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ 174,900	$ -	$ -
	$ 19,256	$ 17,687	$ 16,389	$ 25,507	$ 31,585	$ 29,440	$ 30,912	$ 30,183	$ 29,297	$ 27,948	$ 23,654	$ 19,256	$ 17,687
	$ 15,120	$ 15,917	$ 17,147	$ 16,016	$ 17,409	$ 14,599	$ 15,477	$ 16,212	$ 16,898	$ 17,681	$ 16,307	$ 15,120	$ 15,917
	$ 68	$ 69	$ 70	$ 71	$ 72	$ 73	$ 74	$ 75	$ 77	$ 79	$ 81	$ 83	$ 85
	$ 2,937,144	$ 3,006,873	$ 3,026,306	$ 3,055,794	$ 3,085,766	$ 3,103,312	$ 3,130,163	$ 3,154,670	$ 3,179,972	$ 3,204,908	$ 3,225,842	$ 3,071,959	$ 3,098,789
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	$ 15,912	$ 16,230	$ 16,555	$ 16,886	$ 17,224	$ 17,568	$ 17,919	$ 18,277	$ 18,643	$ 19,016	$ 19,396	$ 19,784	$ 20,180
	$ 853,000	$ 879,000	$ 905,000	$ 932,000	$ 960,000	$ 989,000	$ 1,019,000	$ 1,050,000	$ 1,082,000	$ 1,114,000	$ 1,147,000	$ 1,181,000	$ 1,216,000
	$ 810,000	$ 834,000	$ 859,000	$ 885,000	$ 912,000	$ 939,000	$ 967,000	$ 996,000	$ 1,026,000	$ 1,057,000	$ 1,089,000	$ 1,122,000	$ 1,156,000
	$ 76,000	$ 78,000	$ 80,000	$ 82,000	$ 84,000	$ 87,000	$ 90,000	$ 93,000	$ 96,000	$ 99,000	$ 102,000	$ 105,000	$ 108,000
	$ 196,000	$ 202,000	$ 208,000	$ 214,000	$ 220,000	$ 227,000	$ 234,000	$ 241,000	$ 248,000	$ 255,000	$ 263,000	$ 271,000	$ 279,000
	$ 152,000	$ 157,000	$ 162,000	$ 167,000	$ 172,000	$ 177,000	$ 182,000	$ 187,000	$ 193,000	$ 199,000	$ 205,000	$ 211,000	$ 217,000
	$ 2,102,912	$ 2,166,230	$ 2,230,555	$ 2,296,886	$ 2,365,224	$ 2,436,568	$ 2,509,919	$ 2,585,277	$ 2,663,643	$ 2,743,016	$ 2,825,396	$ 2,909,784	$ 2,996,180
	$ 6,770,000	$ 7,203,000	$ 7,643,000	$ 8,038,000	$ 7,781,000	$ 7,486,000	$ 7,538,000	$ 7,543,000	$ 7,497,000	$ 7,398,000	$ 7,245,000	$ 7,030,000	$ 6,577,000
	$ 834,232	$ 840,643	$ 795,751	$ 758,908	$ 720,542	$ 666,744	$ 620,244	$ 569,393	$ 516,329	$ 461,892	$ 400,446	$ 162,175	$ 102,609
	$ 7,604,232	$ 8,043,643	$ 8,438,751	$ 8,796,908	$ 8,501,542	$ 8,152,744	$ 8,158,244	$ 8,112,393	$ 8,013,329	$ 7,859,892	$ 7,645,446	$ 7,192,175	$ 6,679,609
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	$ 7,604,000	$ 8,044,000	$ 8,439,000	$ 8,797,000	$ 8,502,000	$ 8,153,000	$ 8,158,000	$ 8,112,000	$ 8,013,000	$ 7,860,000	$ 7,645,000	$ 7,192,000	$ 6,680,000
	$ 400,654	$ 400,654	$ 400,654	$ 1,015,526	$ 1,015,526	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872
	$ 7,203,000	$ 7,643,000	$ 8,038,000	$ 7,781,000	$ 7,486,000	$ 7,538,000	$ 7,543,000	$ 7,497,000	$ 7,398,000	$ 7,245,000	$ 7,030,000	$ 6,577,000	$ 6,065,000
	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ 400,654	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	$ -	$ -	$ -	$ 157,900	$ 157,900	$ 157,900	$ 157,900	$ 157,900	$ 157,900	$ 157,900	$ 157,900	$ 157,900	$ 157,900
	$ -	$ -	$ -	$ 456,972	$ 456,972	$ 456,972	$ 456,972	$ 456,972	$ 456,972	$ 456,972	$ 456,972	$ 456,972	$ 456,972
	$ 400,654	$ 400,654	$ 400,654	$ 1,015,526	$ 1,015,526	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872	$ 614,872
	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	2.10
	18.98	20.08	21.06	8.66	8.37	13.26	13.27	13.19	13.03	12.78	12.43	11.70	10.86

2039	2040
$ 2,430,000	$ 2,458,000
$ 156,000	$ 159,000
$ 123,000	$ 117,000
$ 180,000	$ 184,000
$ 4,400	$ 4,400
$ 30,000	$ 30,600
$ 2,800	$ 2,800
$ 1,000	$ 1,000
$ 7,500	$ 7,500
$ 160,000	$ 160,000
$ -	$ -
$ 16,389	$ 25,507
$ 17,147	$ 17,409
$ 87	$ 89
$ 3,128,323	$ 3,167,305
0%	0%
$ -	$ -
$ 20,584	$ 20,996
$ 1,252,000	$ 1,290,000
$ 1,191,000	$ 1,227,000
$ 111,000	$ 114,000
$ 287,000	$ 296,000
$ 224,000	$ 231,000
$ 3,085,584	$ 3,178,996
$ 6,065,000	$ 5,493,000
$ 42,739	$ (11,691)
$ 6,107,739	$ 5,481,309
$ -	$ -
$ 6,108,000	$ 5,481,000
$ 614,872	$ 614,872
$ 5,493,000	$ 4,866,000
$ -	$ -
$ 157,900	$ 157,900
$ 456,972	$ 456,972
$ 614,872	$ 614,872
3.10	4.10
9.93	8.91

Pagosa Area Water & Sanitation, Colorado
Wastewater Utility
20-Year Cash Flow Projection
Major Capital Improvement Fund

(Revision Date: 9-13-21)

Wastewater Captial Fund

1.0 Revenue

1.1 Starting Balance	$	1,059,922.00
1.2 Capital Investment Fees	$	328,254.00
1.3 Phase 1 SRF Planning/Design Grant	$	400,000.00
1.4 Phase 1 DOLA Energy Impact Grant	$	800,000.00
1.5 Phase 1 SRF Loans		
1.5.1 Green Reserve at 0.5%	$	3,000,000.00
1.5.2 Clean Water Fund at 2%	$	7,927,746.00
1.6 Transfer to/from Operating Fund	$	-

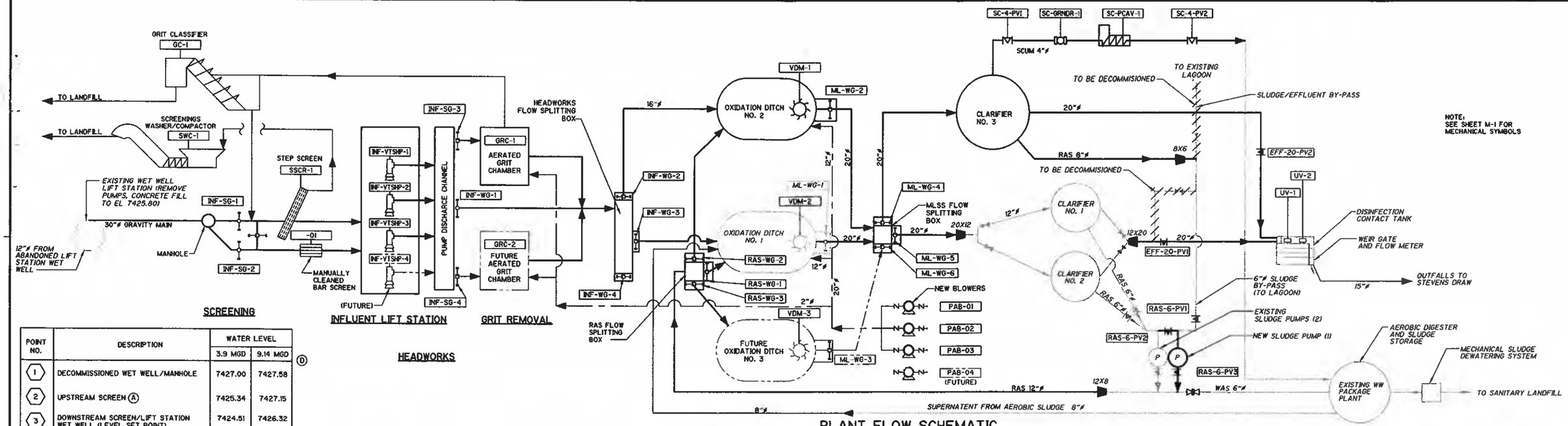
2.0 Major Capital Expenditures

2.1 Phase 1 Collection System	$	1,200,000.00
2.2 Phase 1 WWTP (Liquid + Biosolids + Lab)	$	11,256,000.00
2.3 Total for Phase 1	$	12,456,000.00

3.0 Capital Fund Balance $ 1,059,922.00

Notes:

1) Clean Water Fund loan amount was determined by subtracting capital investment fees, SRF Planning/Design Grant, DOLA Energy Impact Grant, and Green Project Reserve amounts from the Phase 1 project total.
2) Debt service for the Phase 2 improvements will not show in the District's balance sheet until after 2040. Therefore, Phase 2 debt service was not included in this 20-year cash flow projection.



PLANT FLOW SCHEMATIC

NTS

POINT NO.	DESCRIPTION	WATER LEVEL 3.9 MGD	WATER LEVEL 9.14 MGD
1	DECOMMISSIONED WET WELL/MANHOLE	7427.00	7427.58
2	UPSTREAM SCREEN (A)	7425.34	7427.15
3	DOWNSTREAM SCREEN/LIFT STATION WET WELL (LEVEL SET POINT)	7424.51	7426.32
4	PUMP DISCHARGE CHANNEL (B)	7454.25	7455.20
5	GRIT CHAMBER	7452.76	7452.80
6	HEADWORKS FLOW SPLITTING BOX	7450.62	7451.13
7	OUTFALL BOX TO EXISTING DITCH	7444.90	7448.42
	OUTFALL BOX TO NEW DITCH	7444.53	7446.46
8	EXISTING OXIDATION DITCH	7444.18	7444.54
	NEW OXIDATION DITCH	7444.18	7444.57
9	EXISTING DITCH OUTFALL BOX	7442.18	7443.75
	NEW DITCH OUTFALL BOX	7442.14	7443.80
10	MLSS FLOW SPLIT BOX (C)	7441.44	7441.64
11	OUTFALL BOX TO EXISTING CLARIFIERS	7439.11	7440.18
	OUTFALL BOX TO NEW CLARIFIER	7438.42	7440.03
12	EXISTING CLARIFIERS (C)	7437.97	7437.99
	NEW CLARIFIER (C)	7437.98	7438.04
13	EXISTING CLARIFIER LAUNDER (C)	7436.44	7437.24
	NEW CLARIFIER LAUNDER (C)	7436.10	7436.87
14	DISINFECTION CONTACT CHAMBER	7436.00	7436.00

NOTES:

(A) AT 9.14 MGD PEAK HOUR FLOW, ALL FLOW MAY NOT BE ABLE TO BE PUT THROUGH THE STEP SCREEN SINCE IT IS ONLY RATED FOR A 6.0 MGD DIRTY WATER FLOW. THEREFORE, 3.14 MGD MAY HAVE TO BY-PASS THE SCREEN USING THE SCREEEN BY-PASS WEIR (CHANNEL WALL KNOCKOUT) THAT BY-PASSES FLOW TO THE SECOND CHANNEL WITH THE MANUALLY CLEANED BAR SCREEN. THE KNOCK OUT INVERT ELEVATION IS SET AT 7428.00 WHICH IS ABOVE THE 7427.15 WATER SURFACE PREDICTED FOR A 6.0 MGD DIRTY WATER FLOW TO ALLOW FOR A FACTOR OF SAFETY IN ACTUAL FLOWS VERSUS DESIGN FLOW THROUGH THE SCREEN. ACTUAL WET WELL LEVEL MAY NEED TO BE ADJUSTED TO ALLOW FOR PROPER BY-PASS DURING HIGH FLOW PERIODS (i.e. THE WET WELL LEVEL SETPOINT OF 7426.32 AT 9.14 MGD MAY REQUIRE UPWARD ADJUSTMENT TO CAUSE BY-PASS FLOW TO OCCUR). MAXIMUM ALLOWABLE DEPTH ON THE UPSTREAM SIDE OF THE SCREEN IS 7.5 FEET OR WATER SURFACE ELEVATION OF 7430.50.

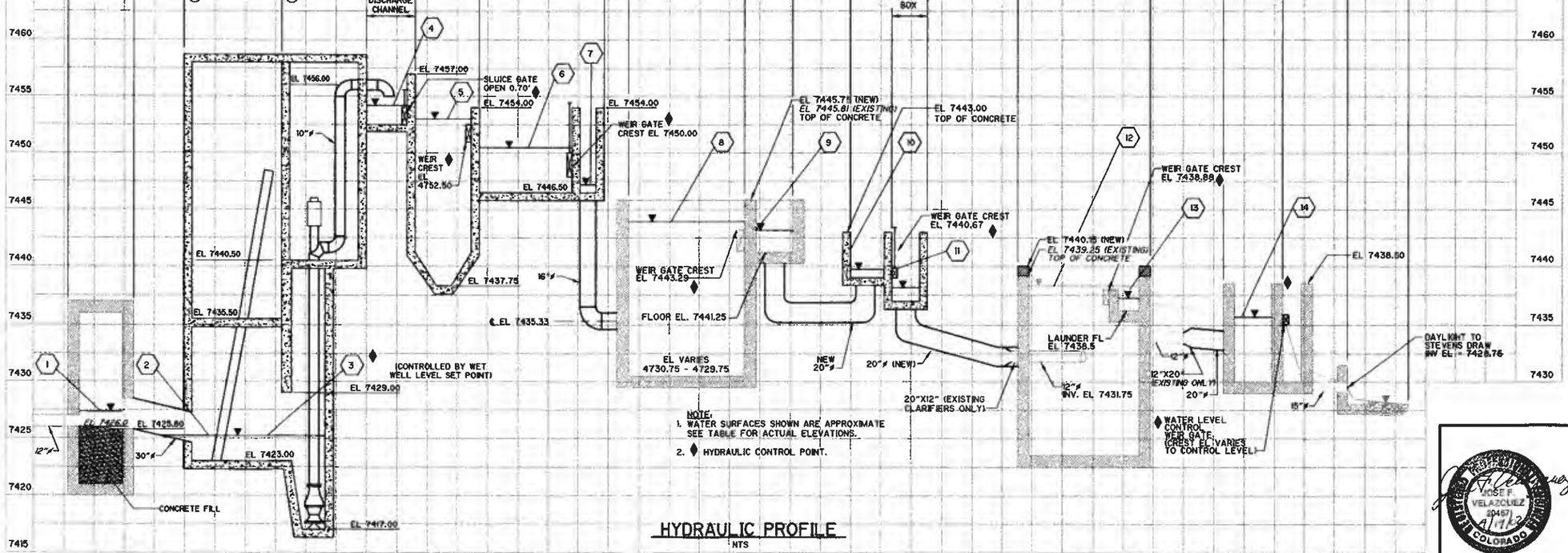
(B) 9.15 MGD IS THE THREE PUMP CAPACITY OF THE NEW HEADWORKS PUMPING STATION. FIRM CAPACITY = 6.10 MGD.

(C) AT 9.14 MGD PEAK HOUR FLOW, FLOW CANNOT BE EVENLY SPLIT BETWEEN THE EXISTING CLARIFIERS AND THE NEW CLARIFIER DUE TO HYDRAULICS. APPROXIMATELY 7.32 MGD FROM THE MLSS FLOW SPLITTING BOX WILL FLOW TO THE NEW CLARIFIER BY AUTOMATIC LOWERING OF THE NEW CLARIFIER WEIR TO ELEVATION 7440.23 AT THE BOX WHILE APPROXIMATELY 4.75 MGD WILL FLOW TO THE EXISTING CLARIFIERS. THEREFORE, THE FLOW LEAVING THE CLARIFIERS TO THE CONTACT BASIN (ACCOUNTING FOR RAS RATE OF 75% AT 3.9 MGD (i.e. 2.93 MGD)) IS 5.86 MGD FROM THE NEW CLARIFIER AND 3.28 MGD FROM THE EXISTING CLARIFIERS.

(D) 3.9 MGD = AVERAGE DAY MAX. MONTH FLOW YEAR 2010.
9.14 MGD = PEAK HOUR FLOW YEAR 2010.

HYDRAULIC PROFILE

NTS



NOTE:
1. WATER SURFACES SHOWN ARE APPROXIMATE SEE TABLE FOR ACTUAL ELEVATIONS.
2. ◆ HYDRAULIC CONTROL POINT.

JOSE F. VELAZQUEZ 20457 COLORADO 4/19/02

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. OLDS
DRAWN BY: P. HERN
SHEET CHK'D BY: K. OLDS
CROSS CHK'D BY: K. OLDS
APPROVED BY: J. VELAZQUEZ
DATE: APRIL 2002

CDM Camp Dresser & McKee Inc.
1331 17TH STREET, SUITE 1200
DENVER, COLORADO 80202

PAGOSA AREA WATER & SANITATION DISTRICT
PAGOSA SPRINGS, COLORADO

VISTA WASTEWATER TREATMENT PLANT

PLANT FLOW SCHEMATIC AND HYDRAULIC PROFILE

PROJECT NO. 1181-28329
FILE NAME: 1181C-2.DWG

SHEET NO. C-3

S:\1181\28329\CIVIL\ 1:C 03 04/16/02 10:45 Reddinop XREFS: X-TB

Pagosa Area Water & Sanitation District Wastewater System

Legend

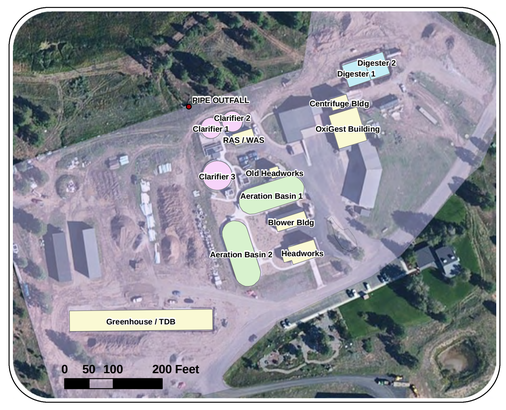
- Sewer Lift Station
- Manhole
- Force Main
- PSSGID Force Main

Gravity Main

OWNER

- PAWSD
- PRIVATE
- TOPS

Wastewater Facility Grounds



N

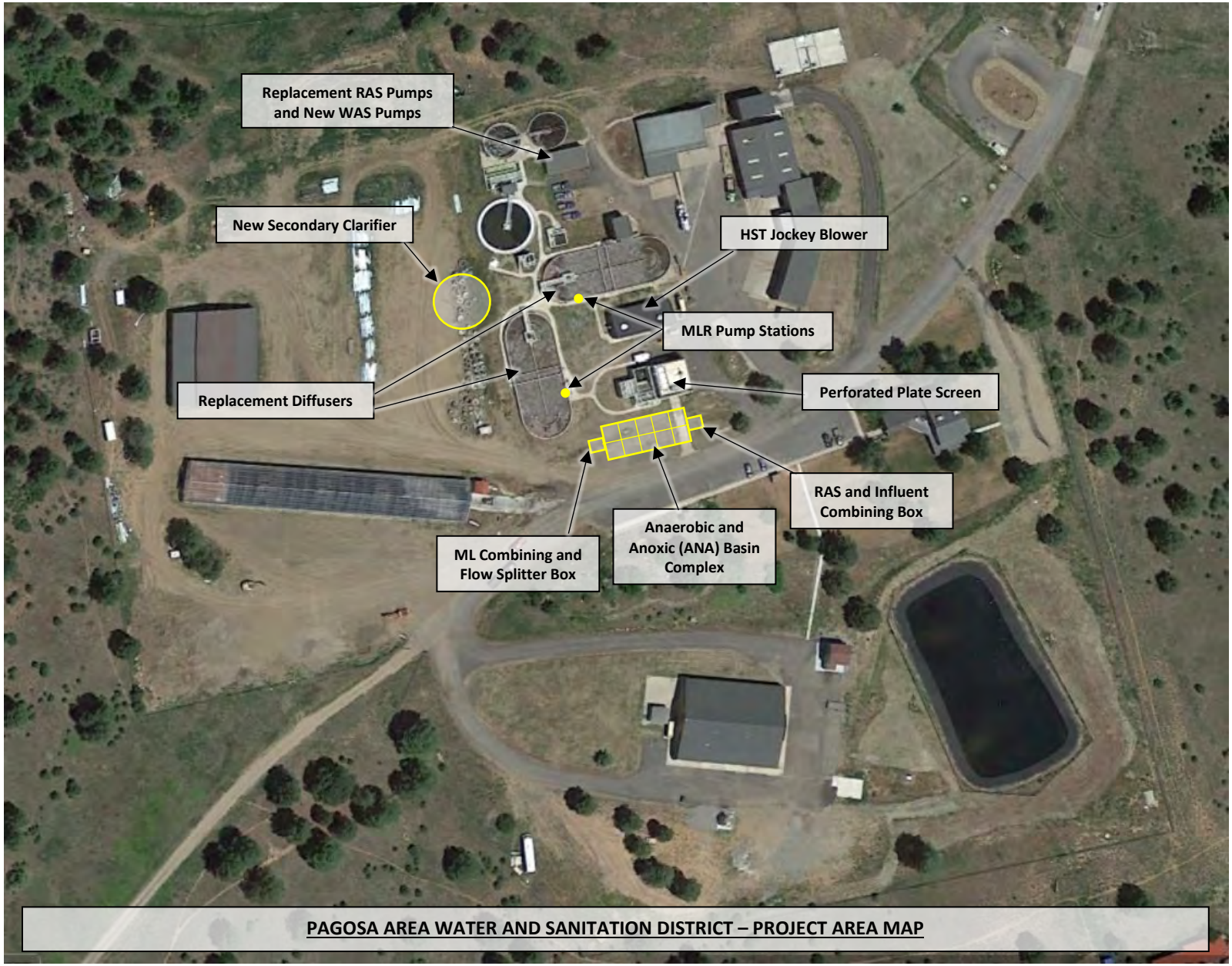
W E

S

1:12,500

0 0.25 0.5 1 Miles

PAGOSA AREA WATER AND SANITATION DISTRICT



PAGOSA AREA WATER AND SANITATION DISTRICT – PROJECT AREA MAP

Project Site:
Pagosa Area Water and Sanitation District, Vista WWTP

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
1994	Beaugureau & MacKenzie	2
	Echo Canyon Ranch	25
	Cloman	20
	Collins	2
	Dempsey & Leal	2
	Eagle Peak Ranches	12
	Giordano	1
	P. & M. Gupta	2
	R. Gupta	13
	Hyde	19
	Quintana	10
	Wilsey	1
1995	Martinez	1
	Sands	1
1996	Alpine Hills Subdivision	12
	Dawson	23
	Forrest	4
	Leake	2
	Maez	3
	Outerbridge	1
	Schaeper	2
1997	Ray	6
	Wagner	3
	Dillard	3
	Downey	1
	Bauer	1
	Wildflower Sub. (ex. lots 27, 35, 42–45)	45
	Kukla	1
	Tesman	1
	The River Ranch (S.J.R.E., LLC)	8

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
	Lucero	1
	Stretton	1
	Frazier (Valley View Ranch, Tr. 1)	1
	Victory Mgmt. (Valley View Ranch, Tr. 2)	2
	Clare (Valley View Ranch, Tr. 3)	1
	Frazier (Valley View Ranch, Tr. 4)	1
	Brown (Valley View Ranch, Tr. 5)	2
	Pond	1
	Gibson	1
	Phy. Med. (Barker)	1
1998	Thalman	2
	Ketchum	2
	Colorado's Timber Ridge (Machock)	260
	Belmear	14
1999	Maes	1
	Macht Ranch	2
	Timbered Canyon, LLC (Elk Park)	119
	David and Yolanda Parker	4
2002	Lunnen/Carter (Hidden Meadows)	5
	Atkinson/Donharl	0
	Wienpahl	1
	Hansen	0
2003	Lomasney	1
	Payne	1
	Morris	1

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
2004	Humane Society of Pagosa Springs	2
	Hockett	1
2005	Jimmy Lucero	2
	Bernardo Lucero	1
	Madaline Lucero	2
2006	Dillard (Wastewater for 2 lot subdivision)	2
	Knudson (Wastewater Lot 59 Mtz. Mtn.)	1
2007	Thibault (Portion Lot 266X Meadows 4)	0
	Maun (Wastewater Mtz. Mtn., Lot 57)	1
	Humane Soc. of P.S. (2 add. W & WW)	2
2010	Cecka Family Living Trust	1
2012	N.C.F.R.P., Inc. (Wildflower, Lot 45)	1
2013	Blackmon	1
	Mazur	1
	Corley	1
	Soniat	1
	Williams	2
	Wilson	1
	Burnett/Toland	1

YEAR ADDED	INCLUSION NAME	EQUIVALENT UNITS
2014	Vail	1
	Jones	1
	Williams	1
	Log Park	42
2016	Schabel (Wastewater Mtz. Mtn. 2, Lot 1)	1
2017	Brown/Hill	1
	Rizzo (Wastewater Mtz. Mtn., Lot 103)	1
2018	Zappone	1
	Black (Wastewater Mtz. Mtn. Lot 54)	1
	LKM, Ltd. (for 570129100115)	1
2020	Murray (Wastewater Mtz. Mtn. 2 Lot 11)	1
	Scoggins (Wastewater Mtz. Mtn. Lot 56)	1
	Pitcher	1
	Rivera	1
	River Rock Estates	10

P.A.W.S.D.

PAGOSA AREA WATER AND SANITATION DISTRICT

ORIGINAL SCALE: 1" = 7000'

0' 7000'

INCLUDED IN DISTRICT WATER AND SEWER SERVICE

INCLUDED IN DISTRICT WATER SERVICE ONLY

EXCLUDED FROM DISTRICT

MAP OF
PAGOSA AREA WATER AND SANITATION DISTRICT
ARCHULETA COUNTY, COLORADO

PREPARED BY

DAVIS ENGINEERING SERVICE, INC.
188 S. 8th STREET – P.O. BOX 1208
PAGOSA SPRINGS, COLORADO 81147

REVISED DECEMBER 22, 2020

TETRA TECH

TECHNICAL MEMO

To:	Justin Ramsey, PAWSD
cc:	Jason Randall, Honeywell
From:	Mark Maxwell, Ben Miller, Lauren Riedle, Tetra Tech
Date:	September 13, 2021
Subject:	Future Flow and Loadings Projections

Introduction

This assessment will project future flow and loadings from the PAWSD service area to the Vista WWTP, based on available data, to determine a timeline for required capacity expansions. CDPHE requires wastewater treatment providers to begin engineering and financial planning when maximum month flows or loads surpass 80% of the plant's rated capacity, and to begin construction (or stop selling taps) when maximum month throughput exceeds 95% of the plant's rated capacity.

Vista WWTP's rated hydraulic capacity as of the July 2019 permit renewal is 3.7 MGD from January through March, and 3.9 MGD from April through December. The rated organic loading capacity is 3,765 ppd of BOD_5 from January through March, and 3,906 ppd of BOD_5 from April through December. The timeline for beginning capacity expansions will be based on the April through December values when the highest organic loads are expected to occur.

Service Area Growth Projections

PAWSD provides wastewater treatment service for the Town of Pagosa Springs and neighboring areas including unincorporated Pagosa Lakes, Lake Hatcher, Colorado's Timber Ridge, and the Archuleta County Airport. Over the past five years, the number of sewer taps serviced by PAWSD has increased at a rate of 2.2% per year.

According to Pagosa Springs' 2018 Comprehensive Plan titled "Pagosa Springs Forward," the population of Archuleta County is expected to grow by 28.6% in the next decade. Due to the limited remaining land area within the town boundaries of Pagosa Springs, most of this growth is expected to occur in surrounding areas outside of town limits. Projections from the Colorado State Demography office suggest that between 2010 and 2050, the population of Archuleta County will more than double.

Much of the population served by PAWSD is comprised of second homeowners and tourists drawn to the hot springs and activities in the San Juan National Forest and other surrounding wilderness areas. Pagosa Springs is also a regional destination for shopping and entertainment for residents and visitors from other parts of Archuleta County, La Plata County, and northern New Mexico border towns. Summer is the peak tourism season in Pagosa Springs. As stated by Pagosa Springs planning authorities, the Town hopes to maintain summer visitation while also encouraging visitation in the winter.

From the above population projections, Tetra Tech believes it is reasonable to assume that the 2.2% increase in sewer tap counts, observed over the past five years of tap counts, could extend into the next 20 years to 2040.

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Flow Projections

Table 1 includes all data for historic and projected monthly flows and loads from 2016 to 2040. Figure 1 plots 30-day average influent flow rates in MGD, reported monthly on DMRs from 2016 through 2020, as well as maximum month flow projections based on a 2.2% service population growth rate. Based on review of the data and conversations with District staff, the maximum monthly flow in March of 2019 appears to be an outlier. Accordingly, Tetra Tech has selected the highest value, approximately 3.0 MGD, from the remaining peak I/I months from 2016 through 2020, as representative of current maximum month flow conditions.

As presented in the I/I Assessment, influent flows average around 1.1 MGD for most of the year, with highest flows occurring between February and April due to I/I from spring rainfall and snowmelt. If PAWSD can reduce I/I to non-excessive levels, Tetra Tech believes the ratio of maximum month flow in the early spring compared to the rest of the year can be reduced to a factor of 1.75. Accordingly, based on current monthly average flows of 1.1 MGD during May through January, maximum month flows could be reduced to approximately 2.0 MGD, if excessive I/I can be removed. In accordance with its discharge permit, the District should take action to reduce I/I.

It is suggested that the District set a ten-year goal of reducing maximum month flows (including both sewage and non-excessive I/I), to 2.0 MGD during February through April. Ongoing (as in permanent) I/I abatement efforts should be incorporated into PAWSD's regular maintenance activities and budgeting. It is understood that the District will need the cooperation and financial participation of the communities it serves to identify and remove the sources of I/I that caused influent flows to peak to over 4.0 MGD in March 2019. When I/I has been reduced to non-excessive levels, and annual efforts to keep it in check are established and implemented, the maximum month flowrate should increase gradually in line with growth in service area population.

Load Projections

Figure 2 plots influent BOD_5 loads in ppd from 2016 through 2020 as well as maximum month load projections based on a 2.2% service population growth rate. Influent BOD_5 data from January 2016 through July 2019 was acquired from quarterly DMRs. One BOD_5 measurement from the quarter was applied to all three months of that quarter. Influent BOD_5 data from August 2019 to December 2020 was available from influent reports starting after the July 2019 permit renewal. The use of quarterly data from 2016 through the first half of 2019 potentially misrepresents actual monthly BOD concentrations, so 2020 data is believed to be more accurate in representing seasonal patterns in loading. As seen from Figure 2, in 2020, the highest loading occurs over a period of four summer months (June, July, August, and September), which is best explained by seasonal tourism.

Summer is peak tourism season for Pagosa Springs, as noted by the Town's Comprehensive Plan and reflected by high summer sales records (primarily retail goods and services) shown on Figure 3. While December is the only month with higher sales revenue than the summer months, there is no corresponding increase in BOD_5 load in December. Consistently high December sales in Pagosa Springs (and many other towns across Colorado) are most likely due to Christmas shopping by locals and daytime visitors.

Sales revenue in 2020 ($34 million) was roughly 30% greater than the average of previous four years ($26.6 million). This is most likely explained by "pandemic flight" as more people sought relief from isolation in owned or rented vacation homes or in local hotels. The higher sales revenue in 2020 suggests that EQR utilization (e.g. occupancy) in 2020 might be correspondingly higher than in previous years and the Vista WWTP should be designed to meet this possible loading scenario. The 2020 maximum month load of 2,800 ppd of BOD_5 will be used as a conservative approximation of baseline maximum month loading for future projections.

Capacity Expansion Timeline

In line with state regulations, professional consultation must be acquired when plant capacity (either hydraulic capacity or organic loading capacity) reaches 80% of the maximum rated capacity of the facility. PAWSD is already seeking consultation from Tetra Tech to assess future expansion needs. Construction of necessary expansions and improvements should begin when the plant reaches 95% of capacity.

With I/I abatement over the next ten years to reduce maximum month flows to 2.0 MGD, it is not expected that the current hydraulic capacity of the Vista WWTP will be exceeded before 2040 (Figure 1). Organic loading will be the more likely motivator for plant expansion. The current maximum month organic loading is 2,800 ppd of BOD_5, which is 72% of rated capacity of 3,906 ppd of BOD_5. Organic loading is expected to reach 95% of its organic loading limit between 2031 and 2034, depending on the assumed service population growth factor (Figure 2). Construction beginning in either 2031 or 2034 is expected to take at least two years and be complete before loads reach the existing maximum month capacity of 3,906 ppd of BOD_5. Depending upon anticipated growth at the time the expansion is implemented, it is recommended that maximum month capacity be increased to at least 5,000 ppd of BOD.

Note that the District may want to incorporate the organic load capacity expansion with its future Regulation 31 compliance project rather than completing the projects back-to-back. The Regulation 31 improvements for TN and TP compliance should be designed for the increased amount of load.

PAWSD Future Flow and Loadings Projections

Table 1: Monthly Flows, Loads, and Gross Sales in Pagosa Springs

Year	Month	30-Day Avg Flow (MGD)	2.2% Growth Max Month Flow Projection (MGD)	Avg Influent BOD (mg/L)	BOD Loading (ppd)	2.2% Growth Max Month BOD Projection (MGD)	Pagosa Springs Gross Sales ($)
2016	January	0.700	3.000	256	2136	2800	$16,560,000
	February	1.073	3.000	256	2136	2800	$15,849,000
	March	1.000	3.000	256	2136	2800	$21,085,000
	April	0.733	3.000	64	450	2800	$15,755,000
	May	0.778	3.000	64	450	2800	$19,008,000
	June	0.843	3.000	64	450	2800	$27,333,000
	July	0.882	3.000	214	1575	2800	$25,770,000
	August	0.814	3.000	214	1454	2800	$23,529,000
	September	--	3.000	214	--	2800	$24,739,000
	October	--	3.000	220	--	2800	$20,496,000
	November	--	3.000	220	--	2800	$17,783,000
	December	--	3.000	220	--	2800	$30,651,000
2017	January	1.658	3.000	79	1952	2800	$15,935,000
	February	2.874	3.000	79	1952	2800	$15,144,000
	March	2.963	3.000	79	1952	2800	$20,066,000
	April	1.655	3.000	150	2070	2800	$15,974,000
	May	1.116	3.000	150	2070	2800	$19,430,000
	June	1.155	3.000	150	2070	2800	$25,884,000
	July	1.155	3.000	140	1343	2800	$27,130,000
	August	1.068	3.000	140	1343	2800	$25,144,000
	September	1.150	3.000	140	1343	2800	$25,025,000
	October	1.023	3.000	180	1357	2800	$21,510,000
	November	0.873	3.000	180	1357	2800	$20,204,000
	December	0.904	3.000	180	1357	2800	$31,206,000
2018	January	0.890	3.000	200	1885	2800	$15,061,000
	February	0.956	3.000	200	1885	2800	$17,398,000
	March	1.130	3.000	200	1885	2800	$24,352,000
	April	0.982	3.000	190	1608	2800	$17,126,000
	May	0.969	3.000	190	1608	2800	$20,393,000
	June	1.015	3.000	190	1608	2800	$26,126,000
	July	1.014	3.000	220	1646	2800	$26,667,000
	August	0.903	3.000	220	1646	2800	$25,497,000
	September	0.897	3.000	220	1646	2800	$24,207,000
	October	0.859	3.000	170	1143	2800	$20,839,000
	November	0.789	3.000	170	1143	2800	$19,855,000
	December	0.806	3.000	170	1143	2800	$29,971,000
2019	January	0.839	3.000	180	6048	2800	$16,150,000
	February	0.860	3.000	180	6048	2800	$17,459,000
	March	4.029	3.000	180	6048	2800	$24,281,000
	April	2.393	3.000	100	922	2800	$17,916,000
	May	1.408	3.000	100	922	2800	$20,267,000
	June	1.106	3.000	100	922	2800	$29,519,000
	July	0.991	3.000	--	--	2800	$31,387,000
	August	0.960	3.000	160	1282	2800	$28,734,000
	September	0.847	3.000	185	1308	2800	$29,205,000
	October	0.741	3.000	245	1515	2800	$25,969,000
	November	0.720	3.000	185	1112	2800	$22,451,000
	December	0.822	3.000	190	1303	2800	$35,504,000

PAWSD Future Flow and Loadings Projections

Table 1: Monthly Flows, Loads, and Gross Sales in Pagosa Springs

Year	Month	30-Day Avg Flow (MGD)	2.2% Growth Max Month Flow Projection (MGD)	Avg Influent BOD (mg/L)	BOD Loading (ppd)	2.2% Growth Max Month BOD Projection (MGD)	Pagosa Springs Gross Sales ($)
2020	January	0.820	3.000	185	1266	2800	$18,049,000
	February	1.109	3.000	155	1435	2800	$22,761,000
	March	1.693	3.000	122	1724	2800	$24,154,000
	April	1.012	3.000	185	1562	2800	$18,403,000
	May	0.951	3.000	170	1349	2800	$24,054,000
	June	1.106	3.000	300	2769	2800	$32,016,000
	July	1.180	3.000	285	2807	2800	$34,741,000
	August	1.081	3.000	305	2752	2800	$33,588,000
	September	1.036	3.000	280	2421	2800	$35,707,000
	October	0.970	3.000	220	1781	2800	$32,207,000
	November	1.018	3.000	250	2124	2800	$28,848,000
	December	0.997	3.000	220	1830	2800	$45,415,000
All	Average	1.149	N/A	182	1837	N/A	$23,958,117
	Max Month	2.963	N/A	305	2807	N/A	$45,415,000

PAWSD Future Flow and Loadings Projections

Table 1: Monthly Flows, Loads, and Gross Sales in Pagosa Springs

Year	Month	30-Day Avg Flow (MGD)	2.2% Growth Max Month Flow Projection (MGD)	Avg Influent BOD (mg/L)	BOD Loading (ppd)	2.2% Growth Max Month BOD Projection (MGD)	Pagosa Springs Gross Sales ($)
Projections (2021-2040)	2021	--	3.000	--	--	2862	--
	2022	--	2.900	--	--	2925	--
	2023	--	2.800	--	--	2989	--
	2024	--	2.700	--	--	3055	--
	2025	--	2.600	--	--	3122	--
	2026	--	2.500	--	--	3191	--
	2027	--	2.400	--	--	3261	--
	2028	--	2.300	--	--	3332	--
	2029	--	2.200	--	--	3406	--
	2030	--	2.100	--	--	3481	--
	2031	--	2.000	--	--	3557	--
	2032	--	2.044	--	--	3636	--
	2033	--	2.089	--	--	3716	--
	2034	--	2.135	--	--	3797	--
	2035	--	2.182	--	--	3881	--
	2036	--	2.230	--	--	3966	--
	2037	--	2.279	--	--	4053	--
	2038	--	2.329	--	--	4143	--
	2039	--	2.380	--	--	4234	--
	2040	--	2.433	--	--	4327	--

(1) Flow meter out of service. No effluent measurement.

(2) Influent BOD_5 reported quarterly from Jan 2016 to Jul 2019 and monthly since Aug 2019.

(3) Quarterly flow and loading measured in March 2019 and extended to the 1st QTR of 2019 is an outlier and was not used to determine Max Month values.

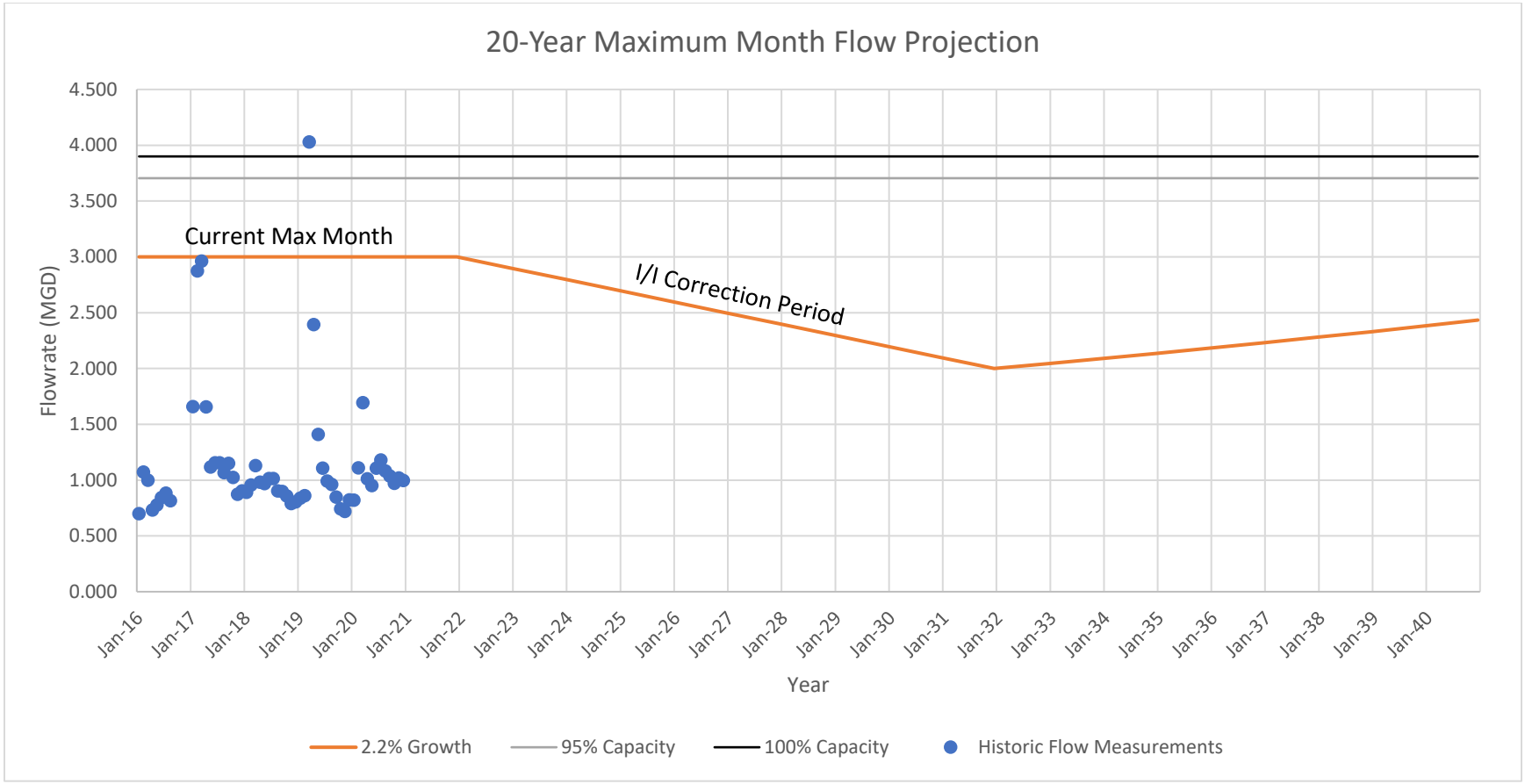


Figure 1: 20-Year Maximum Month Flow Projection

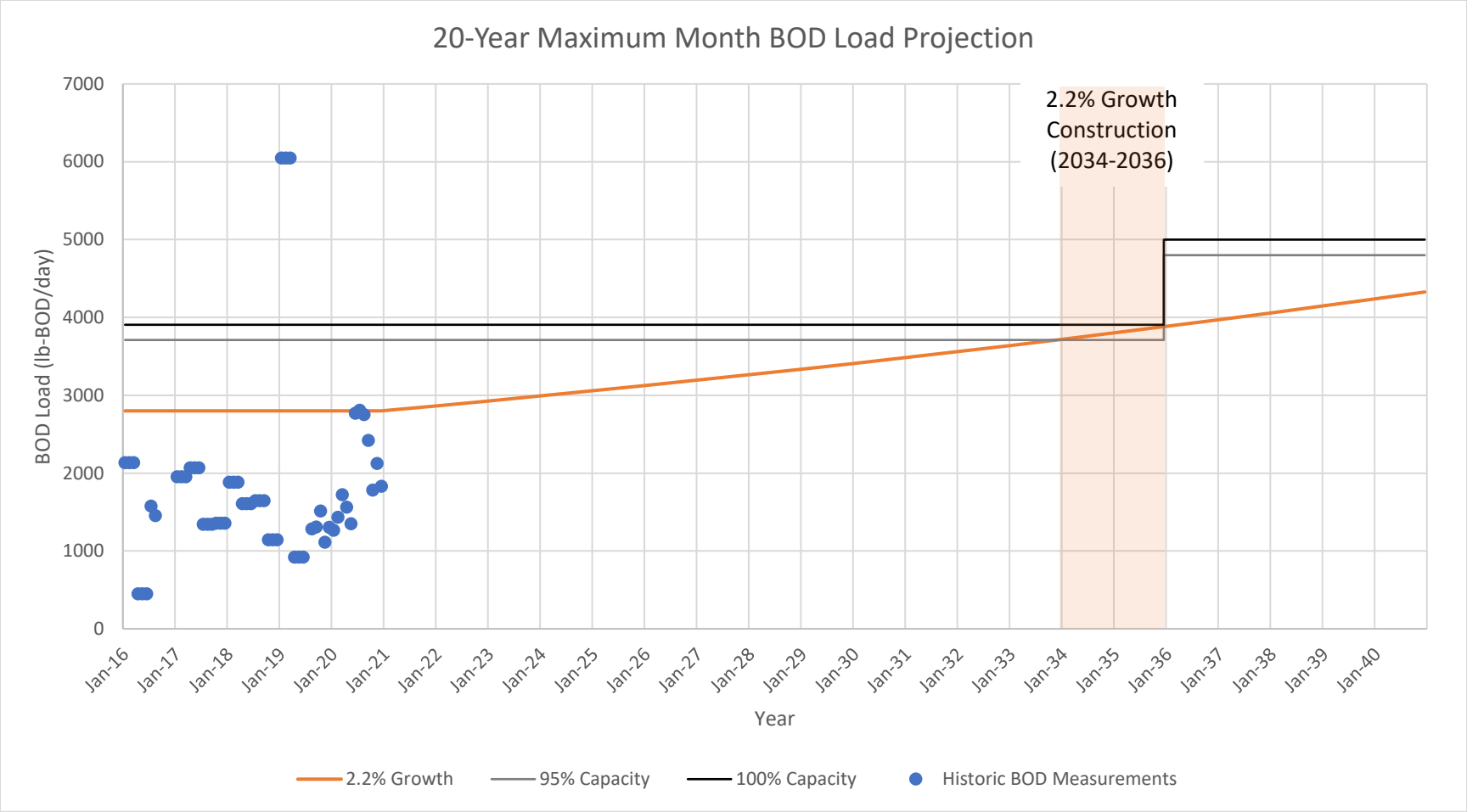


Figure 2: 20-Year Maximum Month BOD Load Projection

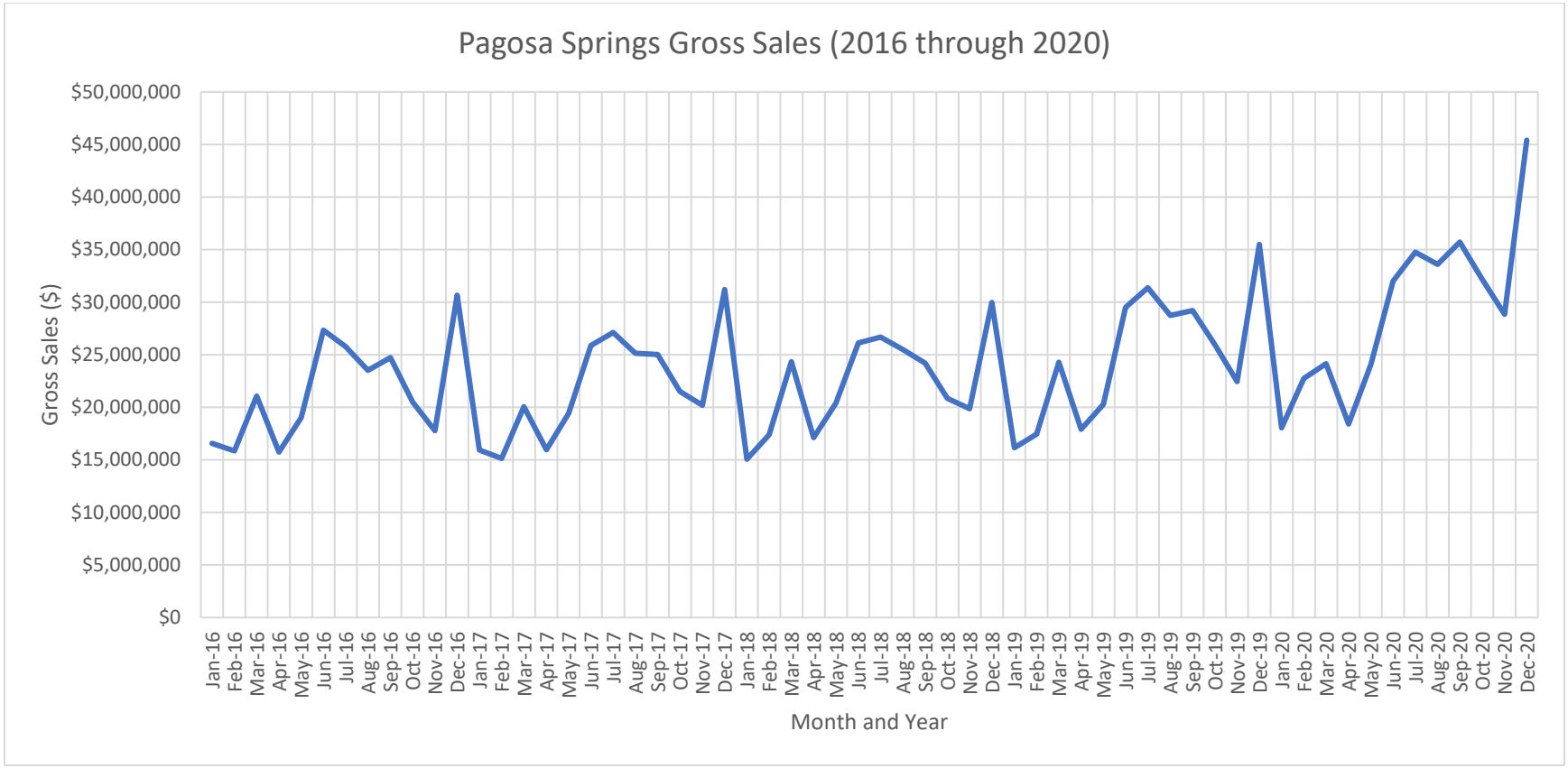
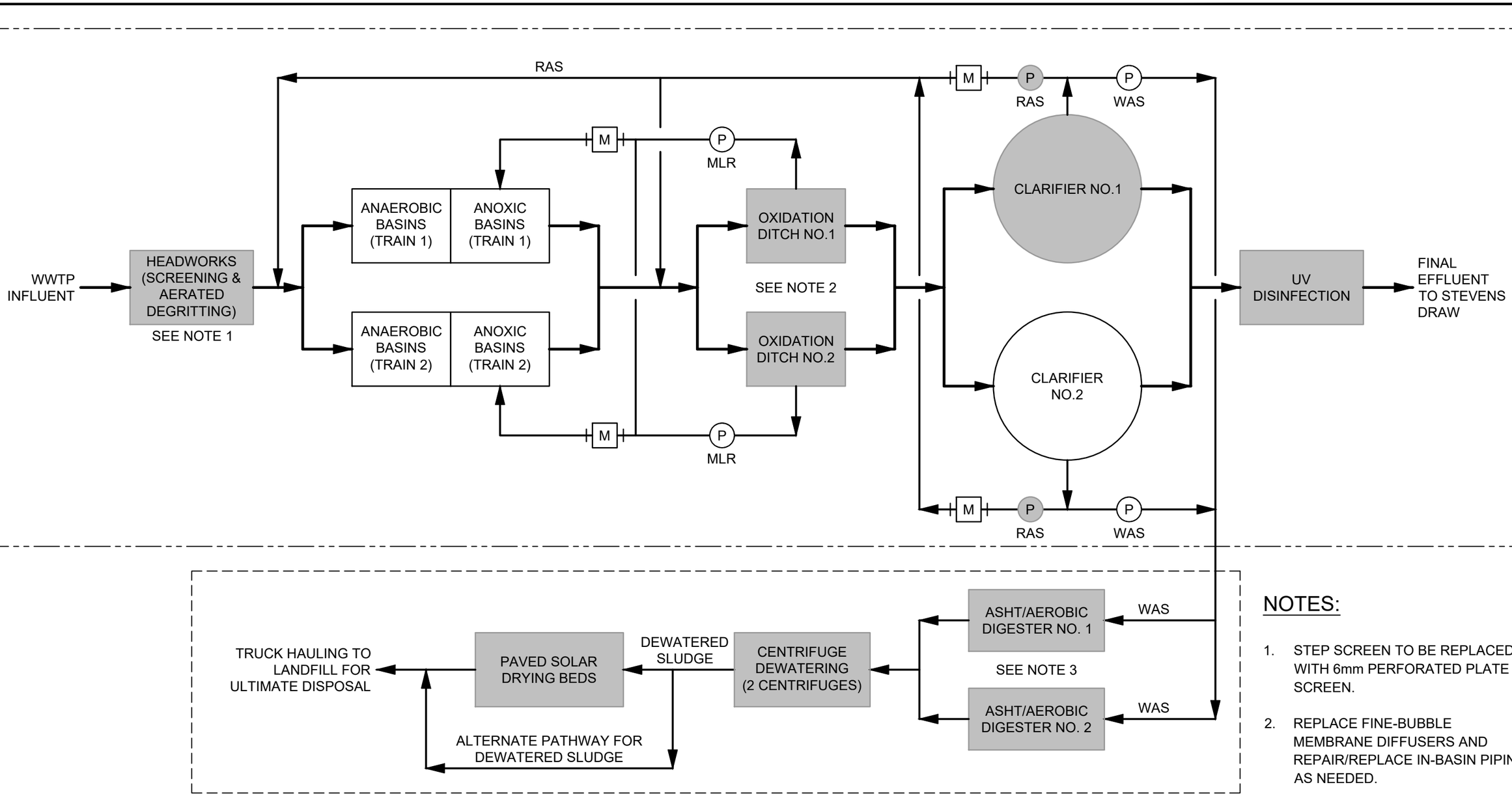


Figure 3: Pagosa Springs Gross Sales (2016 through 2020)



NOTES:

1. STEP SCREEN TO BE REPLACED WITH 6mm PERFORATED PLATE SCREEN.
2. REPLACE FINE-BUBBLE MEMBRANE DIFFUSERS AND REPAIR/REPLACE IN-BASIN PIPING AS NEEDED.
3. DECANT IS RETURNED TO THE OXIDATION DITCHES.

LEGEND

- LIQUID STREAM PROCESS FLOW
- SOLIDS & SIDESTREAM FLOW
- EXISTING
- LIQUID STREAM PROCESS
- SOLIDS HANDLING
- P — PUMPING
- M — FLOW METER

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PAGOSA AREA WATER AND SANITATION DISTRICT

PROPOSED PHASE 1 WWTP IMPROVEMENTS

PROCESS FLOW DIAGRAM

PROJ: 200-324541-21001
DATE: 8/21
DESN:

Figure 1

Bar Measures 1 inch

COLORADO
Department of Public Health & Environment

ENVIRONMENTAL CHECKLIST

Use the Discussion and References space at the end of each section to document your responses. For example, explain how you determined the level of impact and document the reasoning if checking PA (possible adverse) for any resource. Attach additional pages if necessary.

1. Brief project description, including identification of selected alternative:

   The proposed project will (1) replace major process equipment that is obsolete or unable to provide another 20 years of useful life, (2) significantly reduce the facility's overall energy consumption, (3) comply with Regulation 85-based TP effluent limits and daily maximum TIN standards for drinking water source protection, and (4) position the District to meet more stringent TN and TP discharge requirements associated with future implementation of Regulation 31

2. Describe if the project will improve or maintain water quality, and if the project addresses a TMDL, and/or Watershed Management Plan.

   The project will improve water quality by bringing treatment into compliance with Regulation 85-based TP effluent limits and maximum TIN standards for drinking water source protection.

3. Provide latitude and longitude of the proposed project (if a transmission / distribution / collection line identify the center point not the whole line):

   37.25525 degrees latitude N and 107.10243 degrees longitude W

4. Provide discharge (WW) or source (DW) information: N/A □

   Discharge to Stevens Draw, Martinez Creek, and Stollsteimer Creek

5. Provide NPDES/PWSID number:

   Permit number CO0031755

6. Provide primary waterbody name and waterbody ID, secondary name (if available), and State designated surface water use:

   N/A

7. Did your analysis consider how this project impacts community planning efforts in other areas (i.e. transportation, housing, etc.)?

N/A - The project will be built on previously disturbed land at the existing water/wastewater treatment site.

Y = Yes N = No PA = Possible Adverse

1. Physical Aspects - Topography, Geology and Soils

Y ☐ N ☑ PA ☐ a. Are there physical conditions (e.g., steep slopes, shrink-swells soils, etc.) that might be adversely affected by or might affect construction of the facilities?

Y ☐ N ☑ PA ☐ b. Are there similar limiting physical conditions in the planning area that might make development unsuitable?

Y ☐ N ☑ PA ☐ c. Are there any unusual or unique geological features that might be affected?

Y ☐ N ☑ PA ☐ d. Are there any hazardous areas (slides, faults, etc.) that might affect construction or development?

Discussion and References:

2. Climate

Y ☐ N ☑ PA ☐ a. Are there any unusual or special meteorological constraints in the planning area that might result in an air quality problem?

Y ☐ N ☑ PA ☐ b. Are there any unusual or special meteorological constraints in the planning area that might affect the feasibility of the proposed alternative?

Discussion and References:

3. Population

Y ☐ N ☑ PA ☐ a. Are the proposed growth rates excessive (exceeding State projections, greater than 6% per annum for the 20 year planning period)?

Y ☐ N ☑ PA ☐ b. Will additional growth be induced or growth in new areas encouraged as a result of facilities construction?

Y ☐ N ☑ PA ☐ c. Will the facilities serve areas which are largely undeveloped areas at present?

Discussion and References:

4. Housing, Industrial and Commercial Development and Utilities

Y ☐ N ☑ PA ☐ a. Will existing homes or business be displaced as a result of construction of this property?

Y ☐ N ☑ PA ☐ b. Will new housing serviced by this facility affect existing facilities, transportation patterns, environmentally sensitive areas, or be in special hazard or danger zones?

Y ☐ N ☑ PA ☐ c. Will new housing create strains on other utilities and services - policies, power, water supply, schools, hospital care, etc.?

Discussion and References:

5. Economics and Social Profile

Y ☐ N ☑ PA ☐ a. Will certain landowners benefit substantially from the development of land due to location and size of the facilities?
Y ☐ N ☑ PA ☐ b. Will the facilities adversely affect land values?
Y ☐ N ☑ PA ☐ c. Are any poor or disadvantaged groups especially affected by this project?

Discussion and References:

6. Land Use

Y ☐ N ☑ PA ☐ a. Will projected growth defeat the purpose of local land use controls (if any)?
Y ☐ N ☑ PA ☐ b. Is the location of the facilities incompatible with local land use plans?
Y ☐ N ☑ PA ☐ c. Will inhabited areas be adversely impacted by the project site?
Y ☐ N ☑ PA ☐ d. Will new development have adverse effects on older existing land uses (agriculture, forest land, etc.)?
Y ☐ N ☑ PA ☐ e. Will this project contribute to changes in land use in association with recreation (skiing, parks, etc.), mining or other large industrial or energy developments?

Discussion and References:

7. Floodplain Development

Y ☐ N ☑ PA ☐ a. Does the planning area contain 100 year floodplains?
If yes -
Y ☐ N ☑ PA ☐ b. Will the project be constructed in a 100 year floodplain?
Y ☐ N ☑ PA ☐ c. Will the project serve direct or indirect development in a 100 year floodplain anywhere in the planning area?

Discussion and References:

8. Wetlands

Y ☐ N ☑ PA ☐ a. Does the planning area contain wetlands as defined by the U.S. Fish and Wildlife Service?
If yes -
Y ☐ N ☑ PA ☐ b. Will any structure of the facility be located in wetlands?
Y ☐ N ☑ PA ☐ c. Will the project serve growth and development which will directly or indirectly affect wetlands?

Discussion and References:

9. Wild and Scenic Rivers

Y ☐ N ☑ PA ☐ a. Does the planning area contain a designated or proposed wild and scenic river?
If yes -
Y ☐ N ☑ PA ☐ b. Will the project be constructed near the river?

Y ☐ N ☑ PA ☐ c. Will projected growth and development take place contiguous to or upstream from the river segment?

Y ☐ N ☑ PA ☐ d. Will the river segment be used for disposal of effluent?

Discussion and References:

10. Cultural Resources (Archeological/Historical)

Y ☐ N ☑ PA ☐ a. Are there any properties (historic, architectural, and archeological) in the planning area which are listed on or eligible for listing on the National Register of Historic Places?

If yes -

Y ☐ N ☑ PA ☐ b. Will the project have direct or indirect adverse impacts on any listed or eligible property?

Discussion and References:

11. Flora and Fauna (including endangered species)

Y ☐ N ☑ PA ☐ a. Are there any designated threatened or endangered species or their habitat in the planning area?

Y ☐ N ☑ PA ☐ b. Will the project have direct or indirect adverse impacts on any such designated species?

Y ☐ N ☑ PA ☐ c. Will the project have direct or indirect adverse impacts on fish, wildlife or their habitat including migratory routes, wintering or calving areas?

Y ☐ N ☑ PA ☐ d. Does the planning area include a sensitive habitat area designed by a local, State or Federal wildlife agency?

Discussion and References:

12. Recreation and Open Space

Y ☐ N ☑ PA ☐ a. Will the project eliminate or modify recreational open space, parks or areas of recognized scenic or recreational value?

Y ☐ N ☑ PA ☐ b. Is it feasible to combine the project with parks, bicycle paths, hiking trails, waterway access and other recreational uses?

Discussion and References:

13. Agricultural Lands

Y ☐ N ☑ PA ☐ a. Does the planning area contain any environmentally significant agricultural lands (prime, unique, statewide importance, local importance, etc.) as defined in the EPA Policy to Protect Environmentally Significant Agricultural Lands dated September 8, 1978?

Y ☐ N ☑ PA ☐ b. Will the project directly or indirectly encourage the irreversible conversion of Environmentally Significant Agricultural Lands to uses which result in the loss of these lands as an environmental or essential food production resource?

Discussion and References:

14. Air Quality

Y ☐ N ☑ PA ☐	a.	Are there any direct air emissions from the project (e.g., odor controls, sludge incinerator) which do not meet Federal and State emission standards contained in the State Air Quality Implementation Plan (SIP)?
Y ☐ N ☑ PA ☐	b.	Is the project service area located in an area without an approved or conditionally approved SIP?
Y ☐ N ☑ PA ☐	c.	Is the increased capacity of the project greater than 1 mgd?
Y ☐ N ☑ PA ☐	d.	Do the population projections used in the facilities plan exceed the Sate or area wide projections in the SIP by more than 5%?
Y ☐ N ☑ PA ☐	e.	Does the project conform to the requirements of the SIP? (See EPA regulations under Section 316 of the Clean Air Act.)
Y ☐ N ☑ PA ☐	f.	Is the project inconsistent with the SIP of an adjoining State that may be impacted by the Project?
Y ☐ N ☑ PA ☐	g.	Does the project violate national ambient Air Quality Standards in an attainment or unclassified area?
Y ☐ N ☑ PA ☐	h.	Will the facilities create an odor nuisance problem?

Discussion and References:

15. Water Quality and Quantity (Surface/Groundwater)

Y ☐ N ☑ PA ☐	a.	Are present stream classifications in the receiving stream being challenged as too low to protect present or recent uses?
Y ☐ N ☑ PA ☐	b.	Is there a substantial risk that the proposed discharge will not meet existing stream standards or will not be of sufficient quality to protect present or recent stream uses?
Y ☐ N ☑ PA ☐	c.	Will construction of the project and development to be served by the project result in non-point water quality problems (sedimentation, urban stormwater, etc.)?
Y ☐ N ☑ PA ☐	d.	Will water rights be adversely affected by the project?
Y ☐ N ☑ PA ☐	e.	Will the project cause a significant amount of water to be transferred from one sub-basin to another (relative to the 7-day, 10 year flow of the diverted basin)?
Y ☐ N ☑ PA ☐	f.	Will stream habitat be affected as a result of the change in flow or stream bank modification?
Y ☐ N ☑ PA ☐	g.	Are stream conditions needed for deciding upon the required limitations inadequately specified in the 208 Plan? If so, have the wasteload allocations calculations been performed and approved by the State and EPA?
Y ☐ N ☑ PA ☐	h.	Is an Antidegradation Review required?
Y ☐ N ☑ PA ☐	i.	Will the project adversely affect the quantity or quality of a groundwater resource?
Y ☐ N ☑ PA ☐	j.	Does the project adversely affect an aquifer used as a potable drinking water supply?
Y ☐ N ☑ PA ☐	k.	Are there additional cost effective water conservation measures that could be adopted by community to reduce sewage generation?

Discussion and References:

16. Public Health

Y ☐ N ☑ PA ☐	a.	Will there be adverse direct or indirect noise impacts from the project?
Y ☐ N ☑ PA ☐	b.	Will there be a vector problem (e.g., mosquito) from the project?

Y ☐ N ☑ PA ☐ c. Will there be any unique public health problems as a result of the project (e.g., increased disease risks)?

Discussion and References:

17. Solid Waste (Sludge Management)

Y ☐ N ☑ PA ☐ a. Will sludge disposal occur in an area with inadequate sanitary landfills or on land unsuitable for land application?

Y ☐ N ☑ PA ☐ b. Are there special problems with the sludge that makes disposal difficult (hazardous, difficult to treat)?

Y ☐ N ☑ PA ☐ c. Is the technology selected for sludge disposal controversial?

Discussion and References:

18. Energy

Y ☑ N ☐ PA ☐ a. Are there additional cost effective measures to reduce energy consumption or increase energy recovery which could be included in this project?

Discussion and References:

Jockey blower will be installed for use in place of larger blowers to reduce blowoff and save energy

19. Land Application

Y ☐ N ☑ PA ☐ a. Has a new or unproven technique been selected?

Y ☐ N ☑ PA ☐ b. Is there considerable public controversy about the project?

Y ☐ N ☑ PA ☐ c. Will the project require additional water rights or impact existing water Rights?

Y ☐ N ☑ PA ☐ d. Is the project multi-purpose?

Discussion and References:

20. Regionalization

Y ☐ N ☑ PA ☐ a. Are there jurisdictional disputes or controversy over the project?

Y ☐ N ☑ PA ☐ b. Is conformance with the 208 plan in question?

Y ☐ N ☑ PA ☐ c. Is the proliferation of small treatment plants and septic systems creating a significant health problem?

Y ☐ N ☑ PA ☐ d. Have inter-jurisdictional agreements been signed?

Discussion and References:

21. Public Participation

Y ☐ N ☑ PA ☐ a. Is there a substantial level of public controversy?

Y ☐ N ☑ PA ☐ b. Is there adequate evidence of public participation in the project?

Discussion and References:

22. Environmental Laws

Y ☐ N ☑ PA ☐ a. Does the project threaten to violate any State, Federal or local law or requirement imposed to protect the environment?

Discussion and References:

Prepared By: Lauren Riedle, Environmental Engineer, Tetra Tech
Name, Title, and Affiliation

Date: 8/5/2021

Figure 1
20-Year Regulatory Outlook and Potential Project Schedule

Potential Projects	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Permit Cycles (if renewed by CDPHE on time)																							
1. Drinking Water TIN and Reg 85 TP Compliance Schedule*																							
Permit Issued		X																					
Compliance Schedule (formally request extension from CDPHE)		**Current**					**Proposed Extension**																
Hire Engineer			X																				
PNA, SRF Loan Application, Rate Study Update, SRF Loan Issuance																							
District Completion, Commission., Start-up of the Snowball WTP																							
CDPHE Permitting (Site App., Process Design, Self-Certification)																							
Engineering Design to 100% Complete																							
Solicit GC Bids or GMP via CMAR Delivery																							
Construction of Phase 1A																							
Startup, Commissioning, Optimization, Achieve Compliance																							
2. Regulation 31 (TN and TP) + Capacity Expansion																							
Regulation is Promulgated Statewide										X													
Permit Issued											X												
Compliance Schedule											**Proposed by District**												
Hire Engineer											X												
PNA, SRF Loan Application, Rate Study Update, SRF Loan Issuance																							
CDPHE Permitting (Site App., Process Design, Self-Certification)																							
Engineering Design to 100% Complete																							
Solicit GC Bids or GMP via CMAR Delivery																							
Construction of Phase 2																							
Startup, Commissioning, Optimization, Achieve Compliance																							
3. I&I Compliance																							
Compliance Schedule		**Current**																					
Sewer Evaluation Survey (I&I Report)																							
Annual Progress Reports																							
Final Study																							
4. Mn, Pb, Se, Nonylphenol																							
Compliance Schedule		**Current**																					
Facility Evaluation																							
Implementation																							
Final Compliance																							
5. PFAS and/or Other Trace Organics (if required by CDPHE)																							
Anticipated Permit Inclusion																	X						
Compliance Schedule																	**Proposed by District (if Project is Required)**						
Hire Engineer																	X						
PNA, SRF Loan Application, Rate Study Update, SRF Loan Issuance																							
CDPHE Permitting (Site App., Process Design, Self-Certification)																							
Engineering Design to 100% Complete																							
Solicit GC Bids or GMP via CMAR Delivery																							
Construction of Phase 5																							
Startup, Commissioning, Optimization, Achieve Compliance																							

** According to the 2019 renewal of the CDPHE discharge permit, the daily maximum TIN limit of 10 mg-N/L is to be implemented by the beginning of 2025, while the rolling 12-month median TP limit of 1.0 mg-P/L is to be implemented one year later by the beginning of 2026.*

COLORADO
Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Cost and Effectiveness Certification

Project Name: _____

Borrower: _____

As a condition for receiving assistance through the Colorado Water Pollution Control Revolving Fund (WPCRF), I certify that the cost and effectiveness evaluation has been performed per Section 602(b)(13) of the Water Resources Reform and Development Act of 2014 (WRRDA).

This cost and effectiveness evaluation included the following.

A. The borrower has studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which assistance is sought under this title; and

B. The borrower has selected, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation; and energy conservation, taking into account:

   a. the cost of constructing the project or activity;
   b. the cost of operating and maintaining the project or activity over the life of the project or activity; and
   c. the cost of replacing the project or activity.

Mark J. Maxwell
Licensed Professional Engineer (Printed)

August 2, 2021
Date

Mark J. Maxwell
Signature and Stamp of Licensed Professional Engineer

APPENDIX C

20 YEAR REGULATORY OUTLOOK

Pagosa Area Water and Sanitation District
Wastewater Capital Improvement Program

20-Year Regulatory Outlook

Project No. 200-324541-21001
March 16, 2021

PRESENTED TO

Pagosa Area Water and Sanitation District
100 Lyn Avenue
Pagosa Springs, CO 81147

PRESENTED BY

Tech Tech
1560 Broadway Ste. 1400
Denver, CO 80202

P +1-303-825-5999
F +1-303-825-0655
tetratech.com

Reviewed and Approved by:

Mark J. Maxwell, PE Date
Sr. Project Engineer

1.0 INTRODUCTION

The 20-Year Regulatory Outlook provides the basis of planning for the Wastewater Treatment Capital Improvement Program (CIP) for the Pagosa Area Water and Sanitation District (PAWSD or District). This document will review current permit compliance schedules and the future regulatory landscape for District's Vista Wastewater Treatment Plant (Vista WWTP or WWTP) that services the town of Pagosa Springs and nearby areas in Archuleta County, Colorado.

The text for the 20-Year Regulatory Outlook is intended to be brief and serves as a look forward and not a written recap of all prior studies and actions that brought the District to this point in time. The 20-Year Regulatory Outlook will also not include future flow, load, and inflow and infiltration (I/I) projections, process design alternatives, and energy efficiency savings, as these will be presented elsewhere in the Project Needs Assessment (PNA) report.

2.0 REGULATORY LANDSCAPE FOR THE WWTP

This section forecasts the future regulatory landscape that will help drive the schedule of capital improvements at Vista WWTP over the next 20 years (i.e. through 2041). When reading the text, please refer to Figure 1, which is inserted at the end of this section and summarizes the timing of potential projects that may be required over the course of the planning period. The current permit referenced throughout this text is the "Authorization to Discharge Under the Colorado Discharge Permit System" Permit Number CO0031755, originally issued June 28th, 2019.

Unless a permit modification is obtained, the District is obligated to meet the compliance schedules outlined in Part I(B)(6) of the permit. The first of the two compliance schedules establishes steps toward meeting the daily maximum total inorganic nitrogen (TIN) limit of 10 mg-N/L by 2025 and the running 12-month median total phosphorus (TP) limit of 1.0 mg-P/L by 2026. PAWSD has fulfilled the first step of the TIN/TP compliance schedule by contracting with Tetra Tech to prepare a PNA to assist the District secure a State Revolving Fund (SRF) loan to help finance the improvements required to meet these limits. Subsequent steps by the District will include formally submitting the SRF loan application to the Colorado Department of Public Health and Environment (CDPHE) and requesting an extension to the TIN/TP compliance schedules so the District can raise customer rates in a sustainable fashion to cover the added debt service for the TIN, TP, and other District projects occurring on or about the same time.

The second of the two compliance schedules outlines requirements for meeting limits on dissolved manganese, dissolved lead, total recoverable lead, dissolved selenium, and nonylphenol. The District must submit a report to CDPHE identifying sources of these pollutants and strategies to control these sources or treatment alternatives to come into compliance by August 2022. It is currently anticipated that compliance with these limits can be met through source controls and removals that are incidental to the existing activated sludge treatment process. The District will update CDPHE of its progress in implementing control strategies through a progress report and finally submit study results to show that compliance has been attained.

This 20-Year Regulatory Outlook was prepared by considering Vista WWTP's liquid stream treatment capacity, the available assimilative capacity of receiving streams, and potential future discharge requirements. These topics will be discussed in the following sections.

2.1 LIQUID STREAM TREATMENT CAPACITY

The existing Vista WWTP is rated by CDPHE for a maximum month (30-day average) flow and biochemical oxygen demand (BOD) organic load based on the time of year. For January through March, the capacity is 3.7 million gallons per day (MGD) for flow and 3,765 pounds per day (ppd) for BOD organic load. For April through December, the capacity is 3.9 MGD for flow and 3,906 ppd for BOD organic load.

The U.S. Census Bureau estimates the average occupancy per household in Archuleta County, Colorado to be 2.23 persons per household based on data collected from 2015 to 2019. Because Pagosa Springs is a peak season tourist destination area, Tetra Tech recommends using 2.5 people per household or equivalent dwelling unit (EQDU). It is difficult to know how many EQDUs are in use at any point in time, or their level of occupancy. One consideration that is relatively consistent with primarily domestic wastewater is the average amount of BOD load per capita (ppcd) or population equivalent (PE). While this unit BOD loading value does vary somewhat from community to community, an average (i.e. unpeaked) value of 0.21 ppcd (or 0.21 ppd/PE) is representative of service areas with primarily domestic wastes and will be used here to estimate service area population and number of connected EQDUs assuming 2.5 people per EQDU.

Tetra Tech used the District's discharge monitoring reports (DMRs) for the last five years to estimate monthly service area population and connected EQDUs. A summary of that data evaluation is presented in Table __. This data was used to estimate total systemwide per capita (i.e. per PE) wastewater flows for the 2016-2020 data set. Based on that evaluation, average and maximum month flows are respectively about ___ and ___ gallons per capita per day (gpcd), or ___ and ___ gallons per EQDU (gpd/tap). Peak day (24-hour) flows during high infiltration/inflow (I/I) events ranged from ___ to ___ gpcd, or ___ to ___ gpd/tap. Given that the domestic wastewater production rate, which is carriage water (sewage) exclusive of I/I, is in the range of 60 to 70 gpcd in the United States, I/I rates are significant in the PAWSD service area. Nonetheless, as discussed elsewhere in this PNA report, the Vista WWTP is much more limited with respect to BOD load than it is on flow. Therefore, increasing and/or rerating the maximum month organic load capacity of the plant will be given high priority in the initial 10-year portion of the wastewater treatment capital improvement program (CIP).

According to the District, all recent studies of service population, taps, and equivalent units have estimated a service population growth rate of approximately 2% per year. This modest but consistent growth will be analyzed in greater detail in the future flow and load projections sections of the PNA.

2.2 RECEIVING STREAMS AVAILABLE ASSIMILATIVE CAPACITY

The Vista WWTP's receiving streams are Stevens Draw, Martinez Creek, and Stollsteimer Creek (consecutively in that order). These streams are located in the San Juan River Basin and Piedra River Sub-Basin (Figure 2). These streams typically run dry, except during spring runoff, storm events, or effluent discharge from the WWTP. Therefore, there is no available assimilative capacity (dilution) to consider when CDPHE develops discharge limits for the WWTP. Released effluent runs via an ephemeral stream to Stevens Draw, which is designated as Use Protected. Stevens Draw and its confluent rivers, Martinez Creek and Stollsteimer Creek, are classified as Aquatic Life Warm 2, Recreation Class P (potential primary contact use), Agriculture. Martinez Creek and Stollsteimer Creek are designated as Reviewable for Anti-Degradation purposes and are also considered drinking water supply sources.

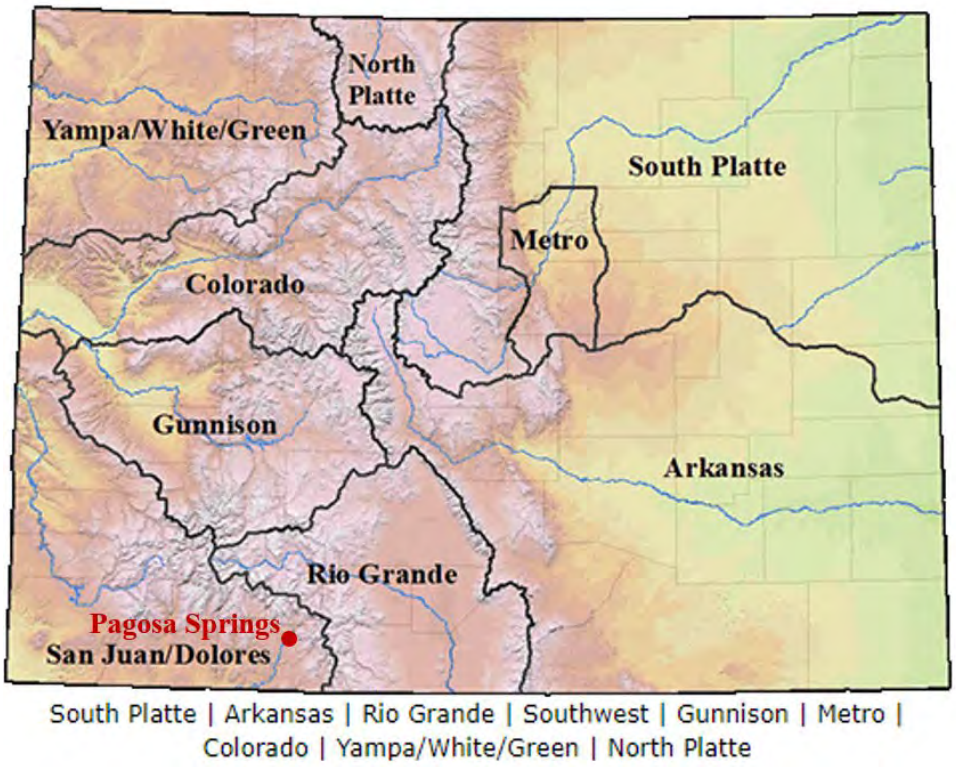

Figure 2: Colorado Water Basins

2.3 LIQUID STREAM DISCHARGE REQUIREMENTS

This discussion will focus on upcoming nutrient removal and water quality requirements that will have potential impact on the design of the WWTP and the corresponding costs of construction and operation. Nutrients and other water quality parameters that may have more stringent limits in the future include TIN, TP, total nitrogen (TN), ammonia, cadmium, selenium, arsenic, and temperature. CDPHE regulations that impact Vista WWTP, along with the expected timeline for standards adoption from the CDPHE Water Quality Roadmap, are shown in Table 1.

In addition to the parameters outlined on the CDPHE Water Quality Roadmap, per- and polyfluoroalkyl substances (PFAS), and perhaps other trace organic compounds that have public health risk and occurrence concerns, are expected to receive increased attention and regulatory action in the next 20 years. These will be discussed in a later section.

Table 1 – Colorado Regulations with Potential Impact on Vista WWTP's Effluent Quality Requirements

Regulation No.	Description
Regulation 11 (5 CCR 1002-11)	Colorado Primary Drinking Water Regulations: ▪ TIN (Standards to take effect for PAWSD in 2026)
Regulation 31 (5 CCR 1002-31)	Basic Standards and Methodologies for Surface Water: ▪ Cadmium (Standards adopted in 2019) ▪ Arsenic (Standards scheduled to be adopted in 2024) ▪ Selenium (Standards scheduled to be adopted in 2027) ▪ Ammonia (Standards scheduled to be adopted in 2027) ▪ Total Nitrogen (Stream scheduled standards to be adopted in 2027) ▪ Total Phosphorus (Stream standards scheduled to be adopted in 2027)
Regulation 34 (5 CCR 1002-34)	Classifications and Numeric Standards for San Juan River and Dolores River Basins
Regulation 85 (5 CCR 1002-85)	Nutrients Management Control Regulation (Initially Adopted in 2012)

2.3.1 Nutrients (Nitrogen and Phosphorus)

Although nitrogen and phosphorus are vital nutrients to the aquatic ecosystem, excessive concentrations can cause overabundant aquatic plant growth and subsequent dissolved oxygen (DO) depletion in affected waters. Regulations 31 and 85 were promulgated to improve nutrient control over Colorado lakes and streams. Regulation 31 sets standards based on stressor-response relationship between macroinvertebrates and nutrient concentrations, while Regulation 85 sets effluent TIN and TP limits based on technology.

Since Martinez Creek and Stollsteimer Creek are considered drinking water supplies by the CDPHE, the Vista WWTP must treat for a daily maximum (24-hour composite) TIN concentration of 10 mg-N/L, in accordance with Regulation 11, beginning in 2025. When in-stream numeric nutrient limits are promulgated by CDPHE via Regulation 31 (currently anticipated to be no sooner than the end of 2027), the Vista WWTP will also get an effluent discharge limit for TN and a more stringent limit for TP.

Vista WWTP must report TP until 2026 when a running 12-month median of 1.0 mg-P/L and 95th percentile limit of 2.5 mg-P/L will take effect. When the District's discharge permit is next renewed after 2027, supplemental phosphorous removal through biological or chemical means will be needed to comply with Regulation 31 TP requirements. Compliance with anticipated Regulation 31 TN requirements may require four-stage nitrate removal (anoxic-oxic-anoxic-oxic zones) with a potential fifth stage for phosphorous removal.

2.3.2 Ammonia

Ammonia is a form of nitrogen that is toxic to aquatic life when present in sufficient concentrations. It enters wastewater influent through fertilizer runoff, industrial waste, and decomposing organic, animal, and human wastes. The EPA updated its recommended Clean Water Act (CWA) 304(a) criteria for ammonia in 2013 to include protection for sensitive aquatic species, including freshwater mussels and gill-bearing snails. CDPHE is currently studying the distribution of these sensitive species in Colorado to determine the applicability of these criteria to particular lakes and streams in the state. It is anticipated that CDPHE will propose that new ammonia criteria be adopted by the Water Quality Control Commission (WQCC) in 2027.

Due to the periodic nature of flows through Stevens Draw, Martinez Creek, and Stollsteimer Creek, it is unlikely for freshwater species to inhabit these streams. However, it may be possible for species to inhabit downstream waters with regular flow, like the Piedra River, provided the proper environmental and aquatic conditions are present for ammonia-sensitive species. Until CDPHE reaches a formal determination, it is prudent from a planning standpoint to assume that in-stream ammonia standards will not be higher, and could be lower, than indicated in the current permit.

The current permit imposes more stringent 30-day average limitations on the ammonia for January, November, and December than the previous permit, based on the water quality based effluent limit (WQBEL). February through October were based on the non-impact limit (NIL), like the previous permit. The 30-day average limits for January, November, and December range from 6.1 to 6.3 mg-N/L with daily maximums of 22 to 23 mg-N/L. For February through October, the 30-day average limits range from 3.0 to 6.1 mg-N/L with daily maximums of 23 to 29 mg-N/L.

If fresh water mussels and gill-bearing snails themselves, or just their habitat, are found in the receiving streams, Tetra Tech advises that future ammonia standards and effluent limits could be set as low as 50% of the existing values. In this case, Vista WWTP should have sufficient capacity in its extended aeration oxidation ditches to reduce ammonia to these lower levels. There is no anticipated need for additional treatment steps.

2.3.3 Cadmium

Cadmium is a naturally-occurring metal found in mineral deposits or in lower concentrations in the environment. It is also used in industry for manufacturing of batteries, pigments, plastic stabilizers, metal coatings, alloys, electronics, and nanoparticles. Cadmium can cause premature mortality and negative impacts to the growth, reproduction, immune and endocrine systems, development, and behavior of aquatic organisms.

The EPA updated its CWA 304(a) criteria for cadmium in 2016 to increase protections for sensitive cold water species, like trout. These criteria were adopted in 2019 to several cold water segments in Regulations 32, 33, 34, 35, 36, and 37. However, the receiving streams from Vista WWTP are all classified as Warm Water 2, and therefore, the new cold water cadmium standards do not apply.

The acute aquatic life cadmium standard in warm water are calculated as follows:

(1.136672- (ln(hardness)* 0.041838))*e(0.9789*ln(hardness)-3.443)

The chronic aquatic life cadmium standard in warm water are calculated as follows:

(1.101672- (ln(hardness)*0.041838))* e (0.7977*ln(hardness)-3.909)

Additionally, the agriculture cadmium standard is 10 µg/L (30-day).

PAWSD's discharge permit dictates that Vista WWTP will report the 30-day average and daily maximum potentially dissolved cadmium for two days per month. For total recoverable cadmium, the WWTP will report the daily maximum for two days per month. Starting in August 2021, it will also report the two-year average for two days per month. The total recoverable cadmium limit is 0.75 µg/L (ADBAC), and the PD cadmium limit is 1.1 µg/L.

There is no data available on cadmium from the previous permit term, so Vista WWTP is required to report for this permit term to conduct a reasonable potential (RP) analysis for the next permit renewal. Because no data has been collected on this parameter, it is not known whether this will present a compliance challenge in the future.

2.3.4 Selenium

Selenium is a naturally-occurring metal in rocks, shales, coal and phosphate deposits and soils, and usually occurs in the form of metal sulfides. Selenium is released into water resources via weathering and anthropogenic sources such as surface mining, coal-fired power plants, and irrigated agriculture, and causes reproductive or growth impairments or premature death in aquatic species.

The EPA released updated recommended CWA 304(a) criteria for selenium in June 2016, based on a more complex approach than currently used in Colorado. The Water Quality Control Division (Division) is evaluating adoption of EPA criteria, and will propose revised criteria in 2027. The current aquatic life protection stream standards for selenium are 4.6 µg/L as a 30-day average (chronic) and 18.4 µg/L as a daily maximum (acute). The selenium limitation for Vista WWTP, however, is based on the NILs of 2.1 µg/L (chronic) and 18 µg/L (acute), which should not be exceeded more than once every three years. Average effluent concentrations from the Vista WWTP, based on DMR data, range from 0.1 to 5 µg/L.

PAWSD is required to report a 30-day average and daily maximum for selenium through July 2022. Beginning in August of 2022, PAWSD's discharge permit imposes a 30-day average selenium limitation of 2.1 µg/L (NIL) and a daily maximum selenium limitation of 18 µg/L (WQBEL). Average concentrations reported for the Vista WWTP range from 0.1 to 5 µg/L, averaging 1.8 µg/L, for 16 samples taken between March 2015 and June 2016. To meet these standards, PAWSD was given a compliance schedule to identify selenium sources and control strategies and submit progress reports summarizing progress in implementing the strategies. One potential source may be infiltration from groundwater that runs through selenium rich soil, in which case, selenium in the influent may be addressed by reducing I/I in the I/I compliance schedule. Reduction of selenium in the influent is highly preferable to expensive removal technologies, such as use of reducing agents within membrane bioreactors. Overall, the compliance posture of the Vista WWTP with respect to selenium is good, but there is little to no room for selenium levels to increase.

2.3.5 Arsenic

Arsenic is a toxic metalloid found in the natural environment as well as industrial products and waste streams. The EPA is in the process of updating the Integrated Risk Information System (IRIS) toxicity assessment for inorganic arsenic. The draft assessment will be released for public review in 2022. CDPHE expects to use the EPA's toxicity values to derive updated arsenic water quality standards that are protective of human health and adopt these standards in 2024.

The current permit term requires Vista WWTP to sample for total recoverable (TR) and potentially dissolved (PD) arsenic in order to conduct a RP analysis for the next permit renewal.

Currently, the numeric standard for total recoverable arsenic is given a range in Regulation 31 of 0.02 to 10 µg/L, with the first value based on Colorado's methodology for human health standards and the second value based on the Safe Drinking Water Act maximum contaminant level (MCL) for arsenic.

The interim total recoverable arsenic (As) limit of 1.0 ug/L is based on the practical quantitation level (PQL). Arsenic removal using biological nutrient removal (BNR) and granular media filtration technology is estimated to be about 3 ug/L. Additional polishing steps with multiple in-stage media filtration have been shown to reduce arsenic levels down to 1-2 ug/L, which can be considered the limit of technology (LOT). The current low range limit for arsenic of 0.02 ug/L may or may not stay as the standard in 2024. It is premature for the CDPHE to predict what the As standard will be after the efforts of the Phase 2 Workgroup and follow up rule-making by the WQCC are complete.

Arsenic DMR collected over the current permit term will demonstrate the feasibility of meeting arsenic standards between 0.02 to 10 µg/L. While meeting 10 µg/L is reasonably feasible, a standard of 0.02 µg/L

would be under the detection limits of some sample test procedures and is also not achievable by current technology. Tetra Tech will not recommend expensive arsenic removal steps until the arsenic standard is established and an appropriate course of action can be established.

2.3.6 Temperature

CDPHE is still discussing how temperature standards will be revised. In 2021, the division will propose limited changes to temperature excursions in Regulation 31 and will continue to make site-specific temperature changes in basin rulemaking hearings. From the latest permit (2019), Vista WWTP is currently exempt from temperature requirements based on flow ratios in the Water Quality Assessment (WQA).

2.3.7 PFAS and Other Trace Organics

Although not covered in the WQCD's 10-Year Water Quality Roadmap (Policy CW 8), PFAS are chemicals of growing concern on a national level and are likely to elicit monitoring and/or regulation within the 20-year regulatory planning horizon.

PFAS refers to a family of over 5,000 manmade chemicals, widely used in fire-fighting foams and oil- or water-resistant coatings. They are extremely resistant to environmental degradation, to the extent that they are referred to as "forever chemicals." These chemicals are linked to cancer, kidney and liver disease, pregnancy complications, and developmental defects.

In Colorado, PFAS is primarily a concern in areas surrounding military bases or fire districts that use PFAS aqueous film forming foam (AFFF). The PFAS in AFFF infiltrate groundwater and surface water sources and are not removed by typical water and wastewater treatment processes.

The CDPHE set drinking water standards on five prominent PFAS compounds and four parent constituents that degrade into PFAS as measured at the point of discharge (Table 2). As of 2018, two species of PFAS (PFOS and PFOA) are listed as hazardous chemicals in Section 261 Appendix VIII. As of July 2020, the CDPHE is also preparing a PFAS Narrative Policy, which will implement narrative provisions in Regulations 31.11(1)(a)(iv) and 41.5(A)(1) to protect public health against harmful substances in surface water and groundwater, respectively.

Statewide sampling of about half of community drinking water systems, serving three-quarters of the state population, identified four entities with PFAS levels exceeding the EPA health advisory: Stratmoor Hills WSD, Security WSD, Sugarloaf Fire District (Boulder County), and Fourmile Fire District (Teller County).

Depending on the species of PFAS, the concentration, competing co-contaminants, facility footprint and capital/operating budget, and wastestream disposal options, PFAS may be removed by granular activated carbon (GAC), anion exchange resin (AIX), or reverse osmosis (RO). All methods will be more effective with turbidity removal pretreatment. PFAS disposal is a topic that still needs more research for feasible, affordable treatment and wastestream disposal solutions.

Table 2 – PFAS Limits for the State of Colorado per Policy 20-1

PFAS Species	Abbreviation	Translation Level
Perfluoroctanoic acid	PFOA	70 ppt
PFOA parent constituents	8:2 FTS	70 ppt
Perfluorooctanesulfonic acid	PFOS	70 ppt
PFOS parent consituents	NEtFOSAA, NMeFOSAA, PFOSA/FOSA	70 ppt
Perfluorononanoic acid	PFNA	70 ppt
Perfluorohexanesulfonic acid	PFHxS	700 ppt
Perfluorobutanesulfonic acid	PFBS	400,000 ppt

As more data is gathered on PFAS at a federal, state, and local level, it is likely that additional PFAS species will be added to the monitoring and limitations list. CDPHE states that treatment may not be required if PFAS levels in influent wastewater can be sufficiently lowered through source control measures, as demonstrated in other states.

3.0 SUMMARY

In summary, the most certain regulatory changes for which PAWSD will need to be prepared are more stringent standards for nitrogen and phosphorus. PAWSD will also need to update its equipment and its organic loading capacity to meet the demands of the 20-year planning period. Possible, but uncertain to happen, are more stringent limits on ammonia, cadmium, selenium, and arsenic. These will depend on the applicability of the criteria to the Pagosa area and its receiving waters (in the case of ammonia and cadmium), and the natural or industrial inputs, in the case of selenium and arsenic, which will be studied via monitoring during this permit term. Also uncertain are the implementation of PFAS or other trace organic effluent limits on Vista WWTP in particular. While elevated PFAS concentrations are not expected and have not been identified in the Pagosa area, it is likely that CDPHE will require at least monitoring for RP analysis in the next 5, 10, or 20 years.

Nitrogen, phosphorus, and ammonia can all be feasibly managed with adjustments and additions to Vista WWTP's existing treatment process, such as increasing oxic residence time, constructing separate anaerobic and anoxic basins or repurposing existing secondary clarifiers for this purpose, and implementing chemical or biological phosphorus removal. These process solutions will be investigated in further detail in the remainder of the PNA study. For selenium, arsenic, PFAS, and trace organics, source control, rather than removal or treatment, is the preferred and recommended method of addressing the pollutants, if sufficient to the task of meeting effluent quality requirements.

The 20-year wastewater treatment CIP presented in this PNA study will recommend facility upgrades in 5 to 10-year compliance schedule increments. In this way, the District can meet effluent quality requirements while providing time for the District to plan, finance, design, permit, construct, commission, and troubleshot treatment improvements. By managing its overall cash flow and rate increases, the District will be able to meet both its environmental, debt financing, and customer service requirements. These improvements will provide 'building block' flexibility for affordable long-term compliance while limiting short- and medium-term capital and O&M expenses to the maximum extent possible.

APPENDIX D

PNA REPORT

COLORADO
Department of Public Health & Environment

Water Pollution Control Project Needs Assessment (PNA) Form

Water Quality Control Division

1. Applicant Information:

Entity Name	Pagosa Area Water and Sanitation District				
Facility Name:	Pagosa Area Water and Sanitation District			Original ID:	
Mailing Address 1:	PO Box 4610	Mailing Address 2:		County:	
City:	Pagosa Springs	State:	CO	Zip Code:	81147
Property Address 1:	PO Box 4610	Property Address 2:		County:	
City:	Pagosa Springs	State:	CO	Zip Code:	81147
Latitude :	39.7517291	Longitude :	-104.992107		
Name of Project:	Phase 1 Permit Compliance and Energy Efficiency Improvements				

Type of Project (Check all that apply)

- ☐ New domestic wastewater treatment plant
- ☐ Construction project resulting in increase or decrease in design capacity of existing wastewater treatment plant
- ☑ Modification of wastewater treatment plant that will not result in a change to treatment capacity
- ☐ New or relocated wastewater treatment plant outfall
- ☐ New or expansion of lift station
- ☑ Collection system (gravity sewer mains less than 24-inches in diameter)
- ☐ New interceptor (24-inch diameter or larger pipeline)
- ☑ In-Kind Replacement (Replacement of any process or hydraulic treatment conveyance component with an identical or similar component. Usually in cases where equipment has reached end of life and replacement is necessary to maintain compliance)
- ☐ Stormwater
- ☐ Non-Point Source Discharge

Please enter the following information for your organization if you have it. Visit http://fedgov.dnb.com/webform and https://www.sam.gov/portal/public/SAM/ for details. Note: you will be required to obtain both of these items prior to loan execution.

Owner Information:

First Name:	Aaron	Middle Name:		Last Name:	Burns
Phone Number:	970-731-7631				
Mailing Address1:	100 Lyn Avenue		Mailing Address2:		
City:	Pagosa Springs	State:	CO	Zip Code:	81147
E-mail:	aaron@pawsd.org				

Consulting Engineer Information:

First Name:	Mark	Middle Name:		Last Name:	Maxwell

Phone Number:	720-931-9369				
Mailing Address1:	1560 Broadway Suite 1400		Mailing Address2:		
City:	Denver	State:	CO	Zip Code:	80202
E-mail:	mark.maxwell@tetratech.com				

Self-Certification:

☑ Yes ☐ No Does the system intend to self-certify all or a portion of the project?

If yes, please identify the portions of the project that the system will self-certify.

☑ Collection system piping

Provide additional explanation, if necessary:

I/I control efforts may require renovation of service connections, manholes, and pipes smaller than 24 inches in diameter. The District will discuss I/I control with its connectors and it is likely that a sewer evaluation survey will be needed to identify specific targets to control I/I.

Streamlined Review:

☑ Yes ☐ No Does the system intend to use the streamlined review process for all or a portion of the project?

If yes, please identify the portions of the project that the system will utilize streamlined review process.

☑ Wastewater treatment new construction or modifications that do not include an alternative technology

Phase 1 Improvements to the Vista WWTP to comply with daily maximum TIN limits for drinking water protection, and Regulation 85 TP limits, will be completed within one project that will use the Streamlined Review process. After a separate sewer evaluation survey is completed by the District, there may be a second project consisting of collection system rehabilitation improvements to keep I/I at non-excessive levels and maintain adequate hydraulic capacity in the sanitary sewer system and treatment plant.

Yes No Does the system intend to use the streamlined review process for all or a portion of the project?

2. Executive Summary

The proposed project will (1) replace major process equipment that is obsolete or unable to provide another 20 years of useful life, (2) significantly reduce the facility's overall energy consumption, (3) comply with Regulation 85-based TP effluent limits and daily maximum TIN standards for drinking water source protection, and (4) position the District to meet more stringent TN and TP discharge requirements associated with future implementation of Regulation 31 in-stream numeric nutrient values.

Each proposed improvement is categorized in terms of its long-term benefit: Renovation or replacement of equipment that is obsolete or nearing the end of its service life (RR), increasing energy efficiency (EE), or complying with current and future nutrient removal requirements (NR).
- Install one new 6-mm perforated plate influent screen to replace the step screen installed in 2003 and provide enhanced solids and debris removal (RR).
- Replacement of the fine bubble membrane diffusers in the oxidation ditches which have exceeded their useful life with respect to providing high oxygen transfer efficiencies (RR).
- Install new WAS pumps to improve operator control over sludge return and wasting. (RR)
- Add anaerobic and anoxic basins for enhanced phosphorus and nitrogen removal (NR, EE), and install MLR pumps and piping to return nitrified mixed liquor to the anoxic basins (NR).
- Upsize and replace RAS pumps, motors, VFDs, and MCC to meet increased head and horsepower requirements for the anaerobic and anoxic basins (RR).
- Add one new 60-ft secondary clarifier to match the one existing and provide adequate settling capacity throughout the planning period (RR).
- Add additional scum pumping for use with the new secondary clarifier (RR).
- Install a small (jockey) high speed turbo blower to eliminate excess air blowoff associated with using existing larger blowers for lower load conditions (EE).
- I&I control/collection system repairs (EE, RR).

3.System Structure and Operation

3.1 Legal Ownership of System (TMF: Managerial-1)

First Name:	Pagosa Area Water and Sanitation District				
Mailing Address1:	100 Lyn Avenue		Mailing Address2:		
City:	Pagosa Springs	State:	CO	Zip Code:	81147
Phone Number:	970-731-7631	Fax:	970-731-2693		

3.2 Organizational Chart

Include an Organizational Chart as Attachment 2.

3.3 Current Operator in Responsible (ORC) Charge

First Name:	Joseph	Middle Name:	Christopher	Last Name:	Hewitt
Certification Number:	CWP-XA-01016-1016	Certification Expiration Date:	10/31/2022		

Operator Certification Level (check one) ☑ Staff Operator ☐ Contract Operator

Treatment	☐ Class D	☐ Class C	☐ Class B	☑ Class A
Distribution	☐ Class 4	☐ Class 3	☐ Class 2	☐ Class 1

Combined Treatment/Distribution ☐ Class S

3.4 Operator Certification

☑ Yes ☐ No Do the system operators have adequate operator certification levels for the proposed project as defined by Regulation 100 Water and Wastewater Facility Operators Certification Requirements?

Explain the impact of the proposed project on the required operator in responsible charge (ORC) certification level and other predicted staffing changes.

There will be no changes in the rated hydraulic and organic load capacity of the Vista WWTP as a result of the Phase 1 improvements.

3.5 20-year cash flow projection

Include a copy of the 20-year cash flow projection as Attachment 4.

4. Project Purpose and Need

Discuss the issue or concern that the proposed project will address. Specific issues are outlined below. All issues must be discussed in each sub section below even if they are not the project driver.

4.1 Compliance

Summarize the system's compliance status that necessitates the proposed project.

As detailed in the Executive Summary, the project includes a wide range of improvements to renovate or replace obsolete/end-of-service life equipment, reduce energy consumption, or comply with Regulation 85 TP limits and downstream drinking water TIN requirements. The Phase 1 nitrogen and phosphorus removal improvements will be configured to allow the District to cost-effectively comply with Regulation 31-based instream numeric nutrient values in the future.

4.2 Existing facility limitations

Summarize existing water system facility(ies) limitations that necessitate the proposed project.

Vista WWTP is unable to meet current permit limits of 10 mg-N/L of TIN and 1 mg-P/L of TP. Biological phosphorus removal and denitrification by addition of anaerobic and anoxic basins will allow for enhanced nutrient removal. Addition of a new 60-ft secondary clarifier will ensure that Vista WWTP has the settling area needed for its current rated capacity. Please refer to the Executive Summary.

4.3 Operations and Maintenance Issues

Summarize operational and maintenance (O&M) issues with the existing water facilities.

With respect to existing O&M issues, the principle proposed adjustment to current operations is to add new WAS pumps such that returning sludge and wasting activated sludge can be performed independently. Currently, the RAS pumps control both return sludge and waste sludge, necessitating an interruption in return in order to waste.

5. Existing Facilities Analysis

5.1 Existing Source Water– Section required for treatment and supply projects

☐ Not applicable (for collection system piping, lift stations, interceptors, only)

Existing Permitted Treatment Capacity: Flow: 3.7 (Jan to Mar) / 3.9 (Apr to Dec) MGD Loading: 3765 (Jan to Mar) / 3906 (Apr to Dec) Pounds per Day BOD5

5.1.1 Area Discharge Permits

Identify all other discharge permits for facilities discharging to the same stream segment as the existing treatment facilities.

The water quality assessment for the current discharge permit did not include any upstream facilities in CDPHE's derivation of effluent limits for the Vista WWTP.

5.1.2 Service Area

Describe the existing service area including residential, commercial and industrial users, as well as flows and loads from the service area.

See Appendix B-Service Areas.

From 2016 to 2020, the maximum 30-day average wastewater flow during the high I/I season (Feb-Apr) was 4.0 MGD. During the remainder of the year (May-Jan), monthly average flows consistently averaged 1.1 MGD.

From 2016 to 2020, the maximum 30-day average BOD load was approximately 2,800 ppd.

5.1.3 Facilities Layout and Description

Describe existing facilities including design capabilities and conditions of existing treatment processes including treatment processes used and major design parameters (e.g. process capacities, unit loading rates, side stream flows, and solids handling).

The Vista WWTP consists of three clarifiers (one 60-ft units, two old 40-ft units), two aeration basins (oxidation ditches), aerobic digesters, and a solar thermal sludge drying facility. The process flow is as follows: wastewater enters a headworks building and screened with a mechanical step screen, influent flow monitoring, aerated grit removal, and grit washing and dewatering equipment. Following the headworks are two oxidation ditch aeration basins operated in parallel and equipped with fine bubble, perforated membrane diffusers and three clarifiers. Disinfection is accomplished via Wedeco open-channel UV equipment prior to final flow measurement and discharge to Stevens Draw.

5.1.4 Existing Process Flow Diagram

Provide a process flow diagram of the existing treatment system as Attachment 5.

5.1.5 Wastewater Flows

Please describe the existing wastewater flows and influent characteristics (including toxic pollutants), discharge permit limits, and overload conditions. Discuss and analyze the average, peak, dry, and wet weather flows. Describe flow contributions from residential, commercial, and industrial users, as well as infiltration and inflow.

The wastewater service area is almost exclusively domestic in nature, with a minor amount of light commercial customers. There has been a longstanding concern with seasonal I/I rates within the collection systems connected to the Vista WWTP. Clean water I/I peaks between February and April and declines to minimal amounts during the late fall and winter. Following a recent peak spring flow in March of 2019, the District's objective is to reduce peak flows related to I/I below the rated plant capacity of 3.9 MGD permit allowance. To assist in that effort, and to minimize the potential for sanitary sewer overflows (SSOs) at various constrictions/pinch points within the collection systems, a sewer evaluation survey (SES) is one of the proposed recommendations in the PNA. See Appendix D - Inflow and Infiltration Assessment.

5.1.6 Appropriateness of Treatment Technologies

Discuss if the existing treatment process(es) are appropriate to meet the current discharge permit considering existing influent quality and discharge permit limits.

There will be no changes in the rated hydraulic and organic load capacity of the Vista WWTP as a result of the Phase 1 project. However, the 2019 permit renewal included compliance schedules for meeting Regulation 85 TP limits and drinking water protection TIN standards. The existing unit processes are not sufficient to comply with these new requirements. The Phase 1 improvements will include biological denitrification and phosphorus removal sufficient to meet the compliance schedule treatment requirements.

5.1.7 Capacity of Treatment Technologies

☐ Yes ☑ No Is the capacity of the existing wastewater treatment system appropriate to accommodate wastewater flows through the next 20 years?

Please explain:

Expansion of organic load treatment capacity is forecasted to occur in Phase 2. See Attachment 8 - Future Flows and Loadings Projections (and Regulatory Compliance Schedule)

5.1.8 Operational Controls

Describe if the existing treatment processes have appropriate operational controls.

Principally, the WWTP is operated manually or by local control panels. With the addition of in situ probes for ORP, DO, ammonia, and nitrate, the current level of automation should be sufficient for operational control of the Phase 1 improvements. However, it is anticipated that the entire SCADA system will need to be upgraded and expanded in Phase 2.

5.2 Collection - Required for collection system, lift station, and interceptor projects only

☐ Not applicable (for treatment and outfall projects, only)

5.2.1 Service Area
Describe the existing service area including residential, commercial and industrial users, as well as flows and loads from the service area.

See Appendix B-Service Areas.

From 2016 to 2020, the maximum 30-day average wastewater flow during the high I/I season (Feb-Apr) was 4.0 MGD. During the remainder of the year (May-Jan), monthly average flows consistently averaged 1.1 MGD.

From 2016 to 2020, the maximum 30-day average BOD load was approximately 2,800 ppd.

5.2.2 Overall Collection System Description
Discuss the existing collection system including: gravity collection pipelines, facility age, material type, condition of materials, and amount of AC pipe. Describe the location and capacities of all relevant lift stations and interceptor sewers and their relation to the proposed project. Provide a map of the existing collection system as Attachment 6.

Refer to Attachment 6 - Collection system map

Provide information on current infiltration and inflow.

Refer to Appendix D - Inflow and Infiltration Assessment

6.Facility Planning Analysis

6.1 Planning Area Description

6.1.1 Project Area Map
Provide a map or maps showing the current and projected service area for the 20-year planning period; identify environmental features such as streams, lakes, wetlands, and floodplains for the entire planning area. On the map, identify the locations of municipal and industrial treatment plants, sludge management areas and facilities, pretreatment plants, lift station sites and any significantly developed areas served by onsite or unconventional systems. Include the map as Attachment 7.

6.1.2 208 Plan Coordination

☐ Yes ☑ No Is the project within or near the boundaries of a 208 Agency or regional council of governments (COG)?

6.1.3 Local and Regional Issues

☑ Yes ☐ No Were local and regional planning efforts considered?

Please describe.

A SES will be implemented by the District, the focus for which will be to identify the collection system rehabilitation projects needed to (1) reduce I&I flows such that monthly average flows are less than the current 3.9 MGD rated plant capacity and (2) maintain adequate capacity at known bottlenecks (pinch points) within the pipe network, thereby reducing the possibility of future sanitary sewer overflows (SSOs). The SES should be jointly conducted by PAWSD, the City of Pagosa Springs, and other major connectors, since I&I can be contributed by the pipe networks under the jurisdiction of multiple entities.

☐ Yes ☑ No Was consolidation with another wastewater system / treatment facility considered?

Please describe.

PAWSD, the City of Pagosa Springs, and other major connectors will maintain wastewater treatment agreements that are currently in place.

6.2 Population and Water Demand Projections (TMF: Technical-2)

For a 20 year planning period, forecast the population growth, projected increase in Equivalent Residential Taps (ERT), and projected drinking water demands.

Current SFEs - As Calculated in the Prequalification Form:

Population and Demand Projections - The department generally accepts two methodologies for projecting water flows over the 20 year planning period. Other methodologies are acceptable with a clear explanation and all assumptions and parameters listed:

☑ Method 1: Population based projections. Recommended for primarily residential systems and/or for systems without potable water meter data.

☐ Method 2: Equivalent Residential Unit (EQR) Analysis. Recommended for systems with a high multifamily, commercial, and industrial users.

Method 1 and 2 templates can be found at the end of this form.
Attach the population projection as Attachment 8.

Discuss supporting data and reasons for projected future growth during the 20 year planning period.
Note: Projects designed solely to serve future development or population growth are not eligible for State Revolving Fund financing.

With ongoing I/I control, the existing Vista WWTP should have adequate hydraulic capacity to handle growth over the next 20 years, but will need an organic load capacity expansion in Phase 2, which is scheduled to be completed in 2035. Increasing organic load treatment capacity will be addressed with Regulation 31 TN and TP requirements in Phase 2.

Identify waste load projections for major effluent parameters such as BOD, TSS, ammonia, phosphorus, metals, etc.

It is anticipated that TN and TP removal requirements will be significantly tightened when the Regulation 31 numeric nutrient standards are adopted and facilities are installed to meet those standards in Phase 2. See Appendices E and F - Phase 1 and Phase 2 Narratives and Cost Opinions.

7.Assessment of Alternatives

This section should contain a description of the reasonable alternatives that were considered in planning a solution to meet the identified needs. If the proposed project includes new technology then the please discuss whether or not the technology is covered in the CDPHE Design Criteria.

7.1 Alternatives

For each alternative, please provide:
1. A description of the alternative addressing the issues identified in Section 4: Project Purpose and Need. (TMF: Technical-7)
2. Capital cost estimates and annual operation and maintenance costs.
3. Advantages and Disadvantages of each alternative.

Alternative 1 Title : Phosphorus Removal

Alternative 1 Description (2000 character limit):

Biological phosphorus removal was selected over chemical phosphorus removal as the most cost-effective and least operationally complex method of reducing phosphorus to meet the running 12-month median TP limit of 1.0 mg-P/L by 2026. See Appendix H - Chem-P Alternative Assessment for more details.

Alternative 1 Capital and Operation and Maintenance Costs (2000 character limit):

See Appendix E for the capital cost opinion for the ANA basins. While energy costs will overall decrease through the addition of the ANA basins, a minimal amount of energy (~1hp) will be required to mix each one of the anaerobic and anoxic basins. It is anticipated that basin mixing will be provided by a large bubble mixing system, or either submersible or floating mechanical mixers.

Alternative 1 Advantages and Disadvantages (2000 character limit):

See Appendix H - Chem-P Alternative Assessment

Alternative 2 Title : Nitrogen Removal

Alternative 2 Description (2000 character limit):

Denitrification is needed to meet a daily maximum TIN limit of 10 mg-N/L by 2025. The District considered two options: establishing anoxic zones in the existing oxidation ditches and constructing new anoxic basins ahead of fully-aerobic oxidation ditches. Modeling showed the two existing oxidation ditches do not have the size and geometry to establish dedicated anoxic zones. Therefore, separate upstream anoxic basins are proposed. In addition, the oxidation ditches will be designed to run in both the simultaneous nitrification/denitrification and on/off modes to maximize nitrate reduction and meet the daily maximum TIN limits.

Alternative 2 Capital and Operation and Maintenance Costs (2000 character limit):

See Appendix E for the capital cost opinion for the ANA basins. While energy costs will overall decrease through the addition of the ANA basins, a minimal amount of energy (~1hp) will be required to mix each one of the anaerobic and anoxic basins. It is anticipated that basin mixing will be provided by a large bubble mixing system, or either submersible or floating mechanical mixers.

Alternative 2 Advantages and Disadvantages (2000 character limit):

Given the current facilities layout and land availability, there are two principal alternatives available to achieve the level of denitrification required. One is to optimize simultaneous nitrification/denitrification within the existing oxidation ditches, and the second is to install upstream anoxic zones. Because the geometry of the existing oxidation ditches inhibits proper establishment of anoxic zones and the oxidation ditches cannot sustain both nitrification and denitrification at future anticipated design loads, constructing separate anoxic basins is the preferred option.

Alternative 3 Title : Influent Screen

Alternative 3 Description (2000 character limit):

The District will need to replace the step screen installed in 2003. The existing unit will be replaced in the same channel using a perforated plate screen to enhance solids and debris removal.

Alternative 3 Capital and Operation and Maintenance Costs (2000 character limit):

No change is anticipated. O&M costs may decrease due to reduced plugging potential in downstream unit processes and pumps. See Appendix E for the capital cost opinion for the screen replacement.

Alternative 3 Advantages and Disadvantages (2000 character limit):

The primary purpose of screening is to remove lightweight material that does not require downstream biological treatment. Removal of this material also reduces the plugging potential of the wastewater and lowers O&M cost. Therefore, moving to 6-mm diameter perforated plates will enhance the benefits that the District previously gained when installing the step screens in 2003.

Provide discussions of additional alternatives as Attachment 19.

8. Selected Alternative

8.1 Justification of Selected Alternative

Please demonstrate why the selected alternative best meets system needs based on both monetary and non-monetary considerations.

The proposed improvements were identified in order to replace outdated equipment, reduce energy consumption, and ensure the Vista WWTP complies with current nitrogen and phosphorus removal mandates listed in the discharge permit. In addition, the proposed improvements position the District to cost-effectively provide additional nitrogen and phosphorus removal when Regulation 31 numeric nutrient values are implemented by CDPHE after 2027.

The proposed improvements meet the system needs as described in Section 7 and do not require any pilot testing or design criteria waivers from CDPHE.

8.2 Technical Description and Design Parameters

For the selected alternative, please describe all proposed project components and assumed design parameters.

See Appendix A - The 2019 permit renewal included new effluent limits for TIN for drinking water protection (a daily maximum of 10 mg-N/L) and TP for compliance with Regulation 85 (1.0 mg-P/L running 12 -month median). Since the existing facilities at the Vista WWTP cannot meet these requirements, CDPHE provided a compliance schedule for installing and commissioning the required improvements. Through the Phase 1 project, the District will meet Regulation 85 TP limits and drinking water protection-related TIN requirements. Stricter TN and TP requirements as part of Regulation 31 will not be adopted until the end of 2027 and will not be implemented until the next permit renewal following that.

8.3 Proposed Process Flow Diagram

Include a proposed treatment facility process flow diagram or map of the collection system, lift station, or interceptor, as applicable as Attachment 10.

8.4 Appropriateness of Treatment Technologies

Discuss appropriateness of the proposed treatment process(es) to meet proposed discharge limits considering anticipated influent wastewater quality.

Addition of anaerobic and anoxic basins will provide phosphorus and nitrogen removal to meet the Regulation 85 TP limits and drinking water protection-related TIN requirements in Phase 1, and position the District to more cost-effectively comply with Regulation 31-based nutrient standards in Phase 2. Refer to Appendices E and F - Phase 1 and Phase 2 Narratives and Cost Opinions.

8.5 Environmental Impacts

Describe direct and indirect impacts on floodplains, wetlands, wildlife habitat, historical and archaeological properties, etc., including any projected permits and certifications. Indicate the need for a stormwater permit application, 401/404 permit applications, and CDOT and railroad permit applications.

This project will be completed entirely within the boundary of the existing facility, all of which has been previously disturbed. Therefore, it is anticipated that CDPHE will prepare and issue a categorical exclusion for this project.

8.6 Land Requirements

Identify all necessary sites and easements, permits and certifications, and specify if the properties are currently owned, to be acquired, or leased by the applicant.

No additional land or easements are needed to construct the wastewater treatment plant improvements.

8.7 Construction Challenges

Discuss construction challenges such as subsurface rock, high water table, limited access, or other conditions that may affect cost of construction or operation of a facility.

One of the most significant construction challenges is seasonally high groundwater levels, which leads to elevated influent flows due to I/I between February and April. Below-grade excavation and concrete work should be scheduled for the summer through late fall, when groundwater levels are lower and air temperatures are more suitable for placing and curing concrete. In addition, based on the 2003 improvement drawings, it is anticipated that a significant amount of hard rock removal will be required to construct new below-grade facilities.

The contractor will also need to lower the groundwater table, by gravity drainage or pumping, prior to work on empty BNR basins and secondary clarifiers. Indoor work, such as replacement of the bar screen, can be done in June through December when flows are lowest. Tetra Tech and District staff will identify these and other constructability issues and prepare a suggested construction sequencing plan for inclusion in the bid documents.

8.8 Operational Aspects

Discuss the operator staffing requirements, operator certification level requirements, the expected basic operating configuration and process control complexities, and the operational controls and equipment that allows operational personnel to respond to routine and unanticipated treatment challenges, such as flow rate, fluctuations in influent quality, process monitoring and chemical feed dosing.

To effect biological phosphorus and nitrogen removal, the operators will control mixed liquor recycle and RAS flow rates to the ANA basins. The ANA basins will be equipped with ORP probes to provide the information necessary for the staff to optimize Bio-P release and nitrate reduction performance. In addition, the oxidation ditches will be equipped with DO and ORP meters to minimize aeration energy usage while optimizing ammonia oxidation and supplemental nitrate reduction via on/off aeration and/or simultaneous nit/denite process control. Other operational aspects will stay the same as current, and overall, the changes will require no additional operator staff. The current operator is Class A certified.

8.9 Costs

Summarize the capital costs associated with the selected alternative. The 20 year cash flow projection included in Attachment 4 must reflect the capital and operation and maintenance costs associated with the selected alternative.

Please see Appendices E and F - Phase 1 and 2 Narratives and Cost Estimates

Cost Category Selection (Assign a percent to each applicable category)

Secondary Treatment (Category I)	45
Advanced Treatment (Category II)	45
Infiltration/Inflow (Category IIIA)	10
Sewer System Rehabilitation (Category IIIB)	0
New Collector Sewers (Category IVA)	0
New Interceptors (Category IVB)	0
CSO Correction (Category V)	0
Storm Sewers (Category VI)	0
Recycle Water Distribution (Category X)	0
Nonpoint Source Pollution Control Activities (Category VII)	0
Total: (must equal 100%)	100

Please include an estimate of the projected increase in and total average monthly user charges. Does the user charge system allow for billing, collection, and enforcement?

8.10 Green Project Reserve

Check one or more green category that applies to the project:

☐ Green Infrastructure ☐ Water Efficiency ☑ Energy Efficiency ☐ Environmentally Innovative

Describe any green components incorporated into the selected alternative.

By adding a jockey high speed turbo blower and reducing BOD and subsequent aeration needs via anoxic basin denitrification, the operators will be able to achieve a 20 percent energy reduction for the aeration process at the Vista WWTP. Please see Appendix G - Green Project Reserve memo.

The system must reference the most recent copy of the EPA Green Project Reserve guidance and procedures. These references are available on the CDPHE WQCD GLU website under “Green Project Reserve”: https://www.colorado.gov/pacific/cdphe/wq-green-project-reserve
Include a business case for the project as Attachment 11, if applicable.

8.11 Environmental Checklist

Include the Environmental Checklist for the Selected Alternative as Attachment 12.

8.12 Project Implementation

8.12.1 Proposed Schedule

Request for WQPTs/PELs	12/27/22	Site Application Submittal Date	03/31/23
Process Design Report/Basis of Design Report Submittal Date		05/01/23	
Final Plans and Specifications Submittal Date (for Non-Streamlined Review only)		06/15/23	
Discharge Permit	08/01/2019	Miscellaneous Permits	
Public Meeting Date	04/15/23	Loan Application Submittal Date	06/15/23
Advertisement for Bids Publication Date	08/01/23	Construction Contract Award Date	10/01/23
Construction Start Date	10/01/23	Construction Completion Date	10/30/24

8.12.2 Public Meeting

Provide documentation of a public meeting held or describe when and where the meeting will be held. The meeting must be noticed for 30 days. Provide the public notice, proof of publication, sign in sheet, and agenda as Attachment 14 or provide to your project manager in the Grants and Loans Unit after the meeting has taken place.

☐ Include the public meeting documentation as Attachment 14.

Or, will be provided to the Grants and Loans Unit project manager after the meeting takes place.

9. Projecting Water Flows Method 1: Population based projections

Assumptions/Data			Information Source
Current System Population		People	
Current Service Area Population (If providing water to neighboring community)		People	
Population Growth Rates		% increase/year	
Average Daily per Capita Flow Rate		Gallons per capita day	
Average Day Maximum Month per Capita Flow Rate		Gallons per capita day	
Maximum Daily per Capita Flow Rate		Gallons per capita day	
Peak Hour Factor			
Average Influent BOD5 Concentration		mg/L	
Average Day Maximum Month Influent BOD5 Concentration		mg/L	

Year	System Population	Service Area Population (if different)	Average Daily Flow	Maximum Daily Flow	Peak Hour Flow	Average BOD5 Loading (pounds per day)
+0	0	0				
+5						
+10						
+15						
+20						

10. Projecting Water Flow Method 2: Equivalent Residential Taps (ERT)

Current Equivalent Residential Taps (ERT)			
A	Number of active residential taps:	0	Units
B	Total Annual Potable Water Use less Irrigation Usage (gallons per year) – Residential	0	
C	Estimated equivalent residential potable water usage Annual flow per EQR = A/B	0	Gallons per SFE
D	Wastewater flow from commercial users	0	Gallons per ft2
E	Equivalent EQRs per 1000 ft2 of commercial space EQRs per 1000 ft2=D*1000/C	0	SFEs per 1000 ft2
F	Commercial space in service area	0	1000 ft2
G	Commercial EQRs Commercial EQRs = F*E	0	SFEs
H	Wastewater flow from industrial users	0	1000 ft2
I	Equivalent EQRs per 1000 ft2 of industrial space EQRs per 1000 ft2 = H*1000/C	0	1000 ft2
J	Industrial space in service area	0	1000 ft2
K	Industrial EQRs Industrial EQRs = H*J	0	1000 ft2
L	Length of sewer pipe in collection system	0	1000 ft2
M	Infiltration/Inflow contribution per 1000 feet of sewer pipe	0	1000 ft2
N	Equivalent EQRs per 1000 feet of sewer pipe EQRs per 1000 LF=M/C	0	1000 ft2
O	Infiltration/Inflow EQRs Infiltration/Inflow EQRs = L/1000*N	0	1000 ft2
P	Total EQR = A + G + K + N	0	1000 ft2

Population and Flow Assumptions / Data — Information Source

Current System Population _____ People _____

Current Service Area Population
(If providing water to neighboring community) _____ People _____

Population Growth Rates _____ % increase/year _____

Average daily flow per ERT _____ Gallons per capita day _____

Maximum daily flow per ERT _____ Gallons per capita day _____

Peak Hour Factor _____ Gallons per capita day _____

Year	System Population	Service Area Population (if different)	Residential Taps (ERTs)	Multifamily Residential Taps (ERTs)	Commercial/ Industrial Taps (ERTs)	Irrigation Taps (ERTs)	Total Taps (ERTs)	Average Daily Flow	Maximum Daily Flow	Peak Hour Flow
+0										
+5										
+10										
+15										
+20										

APPENDIX E

POLLUTANT REPORT

Pagosa Area Water and Sanitation District
Pollutant Source Identification and Control Report

Project No. 200-324541-21001
July 29, 2022

PRESENTED TO

Pagosa Area Water and Sanitation District
100 Lyn Avenue
Pagosa Springs, Colorado 81147

PRESENTED BY

Tetra Tech, Inc.
1560 Broadway Suite 1400
Denver, Colorado 80202
P +1-303-825-5999
tetratech.com

Prepared and Authorized by:

Lauren Riedle 7/29/2022

Lauren Riedle, P.E. Date
Project Manager/Engineer

Reviewed by:

Mark L. Maxwell 7/29/2022

Mark Maxwell, P.E. Date
Technical Director

TETRA TECH

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
DMR	Discharge Monitoring Report
EPA	(U.S.) Environmental Protection Agency
MGD	Million gallons per day
µg/L	Micrograms per liter
PAWSD	Pagosa Area Water and Sanitation District
RL	Reporting limit
WQA	Water quality assessment
WQBEL	Water quality-based effluent limit
WQCD	Water Quality Control Division
WWTP	Wastewater Treatment Plant
YTD	Year-to-date

1.0 BACKGROUND

This Pollutant Source Identification and Control Report addresses "Activities to Meet Dissolved Manganese, Dissolved Lead, Total Recoverable Lead, Dissolved Selenium, and Nonylphenol Final Limits" per the requirements of Part I, Section A.5 ("Special Studies and Additional Monitoring") of Colorado Discharge Permit System (CDPS) Permit No. CO0031755, issued on June 28, 2019 and effective on August 1, 2019. The report was prepared by Tetra Tech and submitted by Pagosa Area Water and Sanitation District (PAWSD) to the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD). Throughout this text, this report is referred to as the "Pollutant Study" for short. A copy of the Pollutant Study requirements and schedule is provided in **Table 1-1**.

Table 1-1: Pollutant Study Requirements per Permit No. CO0031755 (2019)

Code	Event	Description	Due Date
43699	Facility Evaluation Plan	Submit a report that identifies sources of the above parameters to the wastewater treatment facility and identifies strategies to control these sources or treatment alternatives such that compliance with the final limitations may be attained.	7/31/2020
00899	Implementation Schedule	Submit a progress report summarizing the progress in implementing the strategies to control sources such that compliance with the final limitations may be attained.	7/31/2021
CS017	Achieve Final Compliance with Emissions or Discharge Limits	Submit study results that show compliance has been attained with the final limitations.	7/31/2022

The current permit limits for PAWSD's Vista Wastewater Treatment Plant (WWTP) for dissolved manganese, dissolved lead, total recoverable lead, dissolved selenium, and nonylphenol are summarized in **Table 1-2**, in micrograms per liter (µg/L). Compliance requirements for the listed pollutants, with the exception of total recoverable lead, are scheduled to change from "Report" to a specified effluent limit beginning on August 1, 2022. Total recoverable lead will require reporting for both the daily maximum and the 2-year average starting on August 1, 2022, with a specific limit for the 2-year average to be effective starting on August 1, 2024.

Table 1-2: Identified Pollutant Limits per Permit No. CO0031755 (2019)

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations			Monitoring Requirements	
		30-Day Average	Daily Maximum	2-Year Average	Frequency	Sampling Type
01056	Manganese, Dis, WS (µg/L) until 7/31/2022	Report			2 Days/ Month	Composite
01056	Manganese, Dis, WS (µg/L) beginning 8/1/2022	50			2 Days/ Month	Composite
01318	Lead, PD (µg/L) until 7/31/2022	Report	Report		2 Days/ Month	Composite
01318	Lead, PD (µg/L) beginning 8/1/2022	4.6	248		2 Days/ Month	Composite
01114	Lead, TR (µg/L) until 7/31/2022		Report		2 Days/ Month	Composite
01114	Lead, TR (µg/L) beginning 8/1/2022		Report	Report	2 Days/ Month	Composite
01114	Lead, TR (µg/L) beginning 8/1/2024		Report	7.5	2 Days/ Month	Composite
01323	Selenium, PD (µg/L) until 7/31/2022	Report	Report		2 Days/ Month	Composite
01323	Selenium, PD (µg/L) beginning 8/1/2022	2.1	18		2 Days/ Month	Composite
51568	Nonylphenol (µg/L) until 7/31/2022	Report	Report		2 Days/ Month	Grab
51568	Nonylphenol (µg/L) beginning 8/1/2022	5.0	28		2 Days/ Month	Grab

Dis = Dissolved, PD = Partially Dissolved, TR = Total Recoverable, AQ = Aquatic Life, WS = Water Supply

The following sections assess each pollutant individually to determine the likely source, control strategies, and potential for limit exceedance in the effluent from PAWSD's Vista WWTP. Presented data spans August 2019, when the latest permit renewal took effect, through May 2022.

2.0 POLLUTANT SOURCE IDENTIFICATION

2.1 MANGANESE

Manganese is a naturally-occurring metal found in rocks and soils, often coupled with iron. While manganese is an essential nutrient, long term exposure to high levels of manganese can cause neurological problems in humans. High levels of manganese can also cause discoloration of drinking water that stains fixtures and laundry. Manganese may dissolve in groundwater or be released through mining and mineral processing, emissions from alloy, steel, and iron processing, and combustion of fossil fuels. PAWSD does not serve industrial customers and has confirmed that the drinking water distributed to their service area does not have elevated levels of manganese. Therefore, manganese most likely enters the District's collection system via groundwater infiltration. Manganese may be removed from wastewater by chemical oxidation followed by filtration prior to disinfection.

In the Water Quality Assessment (WQA) that accompanies the permit, the WQCD conducted a qualitative reasonable potential analysis because there was insufficient data to conduct a quantitative analysis. The analysis was based on two years of submitted data from January 2011 through December 2012. Because sample results exceeded the water quality-based effluent limit (WQBEL), it was determined that there was reasonable potential to exceed the manganese WQBEL. As a result, a future manganese limit was established in the permit, along with monitoring and reporting requirements.

Composite samples of the Vista WWTP effluent, collected two times per month, were analyzed for manganese among other constituents. The analytical results of manganese concentrations from August 2019 through May 2022 are provided in **Table 2-1**. Because the effluent limit for manganese is based on the 30-day average value, the two results were averaged for each month and compared to the limit. Twenty-two of the thirty-four 30-day average values (65%) exceeded the limit, indicating that PAWSD will encounter challenges in meeting the manganese limit.

Since the District's drinking water has very low concentrations of manganese, and there are no known commercial or industrial sources of manganese in the District's service area, the most likely remaining source of manganese is groundwater infiltration. PAWSD is currently awaiting analytical results to rule out surface water sources and potentially confirm groundwater sources as the principal source of manganese. If groundwater infiltration is confirmed as the primary source of manganese, then the best method of control is to reduce the amount of infiltration that enters PAWSD's collection system. PAWSD is already taking steps to reduce infiltration, as detailed in the Inflow and Infiltration Study Progress Update dated June 30, 2022. The District has spent over $1.6 million from 2020 through 2022 year-to-date on collection system maintenance, lift station repairs, and line inspections, cleaning, and replacements. PAWSD is confident that the ongoing repairs will result in lower future flows, and subsequently, lower effluent concentrations of manganese.

Table 2-1: Analytical Results for Dissolved Manganese (Aug. 2019 – 2022 YTD)

Dissolved Manganese 30-Day Average Limit = 50 µg/L					RL = 0.5 µg/L
Sampling Date	Daily Maximum (µg/L)	Calculated 30-Day Avg (µg/L)	Sampling Date	Daily Maximum (µg/L)	Calculated 30-Day Avg (µg/L)
8/12/2019	64.9	**51.5**	1/12/2021	50.5	32.1
8/27/2019	38.0		1/26/2021	13.6	
9/10/2019	22.3	12.8	2/09/2021	124.0	**104.3**
9/24/2019	3.2		2/23/2021	84.6	
10/15/2019	56.9	37.6	3/16/2021	92.1	**89.8**
10/29/2019	18.3		3/30/2021	87.4	
11/12/2019	7.4	**80.7**	4/13/2021	111.0	**68.2**
11/25/2019	154		4/27/2021	25.4	
12/10/2019	64.3	**78.6**	5/12/2021	59.0	**57.7**
12/23/2019	92.9		5/25/2021	56.3	
1/14/2020	74.7	**78.0**	6/15/2021	22.4	29.5
1/28/2020	81.2		6/29/2021	36.6	
2/12/2020	90.0	**82.0**	7/13/2021	67.5	**57.5**
2/25/2020	73.9		7/27/2021	47.5	
3/10/2020	56.0	**54.7**	8/10/2021	19.4	14.7
3/24/2020	53.4		8/24/2021	9.9	
4/14/2020	82.7	**67.9**	9/14/2021	6.0	6.5
4/28/2020	53.1		9/28/2021	7.0	
5/12/2020	66.4	**76.7**	10/12/2021	26.0	27.8
5/26/2020	87.0		10/26/2021	29.5	
6/09/2020	27.7	**53.3**	11/11/2021	17.6	35.7
6/23/2020	78.9		11/28/2021	53.8	
7/14/2020	25.1	24.6	12/12/2021	93.7	**89.6**
7/28/2020	24.0		12/24/2021	85.4	
8/11/2020	103.0	**75.2**	1/11/2022	118.0	**97.4**
8/25/2020	47.3		1/25/2022	76.7	
9/15/2020	53.3	42.1	2/8/2022	54.3	**68.8**
9/29/2020	30.8		2/22/2022	83.3	
10/13/2020	24.4	17.3	3/15/2022	64.0	**69.8**
10/27/2020	10.2		3/29/2022	75.6	
11/10/2020	214.0	**128.5**	4/12/2022	57.5	**53.6**
11/23/2020	43.0		4/26/2022	49.7	
12/15/2020	67.7	**67.7**	5/10/2022	48.7	36.4
N/A	N/A		5/24/2022	24.1	

Bold red values indicate limit exceedances with the 50 µg/L limit set to go into effect on August 1, 2022.

2.2 LEAD

Lead is a naturally-occurring metal that is found in small amounts in the environment. Lead is concentrated in greater amounts in anthropogenic sources, including leaded gasoline, lead-based paints, lead pipes and plumbing, and various other consumer products. Industrial wastes and emissions from activities such as soldering, mining, smelting, and refining are also sources of concentrated lead. Lead is distinguished as either dissolved or total recoverable. Dissolved lead refers to soluble lead particles that cannot be removed via physical filtration during wastewater treatment. Instead, chemical precipitation is commonly used to remove dissolved lead. Total recoverable lead includes both dissolved and insoluble, or particulate, lead, the latter of which can be removed via physical filtration.

In the WQA, the WQCD conducted a qualitative reasonable potential analysis for dissolved and total recoverable lead because there was insufficient data to conduct a quantitative analysis. The dissolved lead analysis was based on two years of submitted data from February 2011 through December 2012. The total recoverable lead analysis was based on three years of submitted data from December 2008 through December 2011. Because sample results were high relative to prospective limits, it was determined that there was reasonable potential to exceed these lead limits. As a result, future dissolved and total recoverable lead limits were established in the permit, along with monitoring and reporting requirements.

Composite samples of the Vista WWTP effluent, collected two times per month, were analyzed for dissolved lead and total recoverable lead among other constituents. The analytical results of dissolved lead and total recoverable lead concentrations from August 2019 through May 2022 are provided in **Table 2-2** and **Table 2-3**, respectively. Dissolved lead was measured close to or below the detection limit (0.5 µg/L) in all 68 samples. Total recoverable lead was also regularly measured close to or below 0.5 µg/L in all samples, except for one instance of very high total recoverable lead (70.7 µg/L) in April 2020. This instance of high total recoverable lead was not accompanied by a correspondingly high level of dissolved lead. Because lead levels of this magnitude are not normally observed in Vista WWTP effluent, this instance is most likely an outlier caused by a sample collection or analytical error, or a one-time incident of contamination.

Other than plumbing system corrosion, there are no other identified sources of lead that discharge to the District's collection system. However, first draw, at the tap lead and copper sampling in the water distribution system, indicates that 90th percentile potable water lead levels are in the range of 1.6 to 2.2 µg/L. This range provides a frame of reference for the concentration of lead that is entering the collection system with domestic sewage. These levels will be diluted by groundwater infiltration and reduced by chelation of lead with activated sludge solids, followed by dewatering of the waste activated sludge.

The dissolved lead testing data to date shows that of 68 separate samples, 65 were measured at or less than 0.5 µg/L. Clearly, there is no reasonable potential for an exceedance of the 4.6 µg/L dissolved lead effluent limit slated to go into effect on August 1, 2022.

The total recoverable lead testing to date shows that of 68 separate samples, 66 were measured at or less than 0.5 µg/L and one was inordinately high at 70.7 µg/L. As noted above, Tetra Tech recommends that this specific result be listed as an outlier that does not reflect the day-to-day concentration of total recoverable lead in the final effluent. Even if the outlier is included, the two-year average effluent concentration would be 2.0 µg/L and compliant with the proposed limit, scheduled to go into effect on August 1, 2024, of 7.5 µg/L.

In summary, effluent lead levels are very low and the preponderance of samples have a lead content less that the test method detection limit. Therefore, Tetra Tech recommends that PAWSD need not continue with lead source identification efforts unless lead levels reach the point that the maximum expected or two-year average concentration (whichever is applicable) exceeds 50% of the allowable permit limit. If the District continues to see a preponderance of 'non-detects' for dissolved and total recoverable lead in the effluent, it should request a reduction (or elimination) of monitoring frequency on a parameter-by-parameter basis during the next permit renewal in 2024. If permit renewal is delayed by CDPHE, the District may want to request the reduction in monitoring frequency via a permit modification.

Table 2-2: Analytical Results for Dissolved Lead (Aug. 2019 – 2022 YTD)

Dissolved Lead Daily Maximum Limit = 248 µg/L 30-Day Average Limit = 4.6 µg/L					RL = 0.5 µg/L
Sampling Date	**Daily Maximum (µg/L)**	**Calculated 30-Day Avg (µg/L)**	**Sampling Date**	**Daily Maximum (µg/L)**	**Calculated 30-Day Avg (µg/L)**
8/12/2019	0.5	0.5	1/12/2021	0.5	0.5
8/27/2019	0.5		1/26/2021	0.5	
9/10/2019	0.5	0.7	2/09/2021	0.5	0.5
9/24/2019	0.9		2/23/2021	0.5	
10/15/2019	0.5	0.5	3/16/2021	0.5	0.5
10/29/2019	0.5		3/30/2021	0.5	
11/12/2019	0.5	0.5	4/13/2021	0.5	0.5
11/25/2019	0.5		4/27/2021	0.5	
12/10/2019	0.5	0.5	5/12/2021	0.5	0.5
12/23/2019	0.5		5/25/2021	0.5	
1/14/2020	0.5	0.5	6/15/2021	0.5	0.5
1/28/2020	0.5		6/29/2021	0.5	
2/12/2020	0.5	0.5	7/13/2021	0.5	0.5
2/25/2020	0.5		7/27/2021	0.5	
3/10/2020	0.5	0.5	8/10/2021	0.5	0.5
3/24/2020	0.5		8/24/2021	0.5	
4/14/2020	0.5	0.5	9/14/2021	0.5	0.5
4/28/2020	0.5		9/28/2021	0.5	
5/12/2020	0.5	0.6	10/12/2021	0.5	0.6
5/26/2020	0.6		10/26/2021	0.7	
6/09/2020	0.5	0.5	11/11/2021	0.5	0.5
6/23/2020	0.5		11/28/2021	0.5	
7/14/2020	0.5	0.5	12/12/2021	0.5	0.5
7/28/2020	0.5		12/24/2021	0.5	
8/11/2020	0.5	0.5	1/11/2022	0.5	0.5
8/25/2020	0.5		1/25/2022	0.5	
9/15/2020	0.5	0.5	2/8/2022	0.5	0.5
9/29/2020	0.5		2/22/2022	0.5	
10/13/2020	0.5	0.5	3/15/2022	0.5	0.5
10/27/2020	0.5		3/29/2022	0.5	
11/10/2020	0.5	0.5	4/12/2022	0.5	0.5
11/23/2020	0.5		4/26/2022	0.5	
12/15/2020	0.5	0.5	5/10/2022	0.5	0.5
N/A	N/A		5/24/2022	0.5	

No limits exceeded.

Table 2-3: Analytical Results for Total Recoverable Lead (Aug. 2019 – 2022 YTD)

Total Recoverable Lead 2-Year Average = 7.5 µg/L					RL = 0.5 µg/L
Sampling Date	Daily Maximum (µg/L)	Calculated 30-Day Avg (µg/L)	Sampling Date	Daily Maximum (µg/L)	Calculated 30-Day Avg (µg/L)
8/12/2019	0.5	0.5	1/12/2021	0.5	0.5
8/27/2019	0.5		1/26/2021	0.5	
9/10/2019	0.5	0.5	2/09/2021	0.5	0.5
9/24/2019	0.5		2/23/2021	0.5	
10/15/2019	0.5	0.5	3/16/2021	0.5	0.5
10/29/2019	0.5		3/30/2021	0.5	
11/12/2019	0.5	0.5	4/13/2021	0.5	0.5
11/25/2019	0.5		4/27/2021	0.5	
12/10/2019	0.5	0.5	5/12/2021	0.5	0.5
12/23/2019	0.5		5/25/2021	0.5	
1/14/2020	0.5	0.5	6/15/2021	0.5	0.5
1/28/2020	0.5		6/29/2021	0.5	
2/12/2020	0.5	0.5	7/13/2021	0.5	0.5
2/25/2020	0.5		7/27/2021	0.5	
3/10/2020	0.5	0.5	8/10/2021	0.5	0.5
3/24/2020	0.5		8/24/2021	0.5	
4/14/2020	0.5	35.6*	9/14/2021	0.5	0.5
4/28/2020	70.7*		9/28/2021	0.5	
5/12/2020	0.5	0.5	10/12/2021	0.5	0.6
5/26/2020	0.5		10/26/2021	0.7	
6/09/2020	0.5	0.5	11/11/2021	0.5	0.5
6/23/2020	0.5		11/28/2021	0.5	
7/14/2020	0.5	0.5	12/12/2021	0.5	0.5
7/28/2020	0.5		12/24/2021	0.5	
8/11/2020	0.5	0.5	1/11/2022	0.5	0.5
8/25/2020	0.5		1/25/2022	0.5	
9/15/2020	0.5	0.5	2/8/2022	0.5	0.5
9/29/2020	0.5		2/22/2022	0.5	
10/13/2020	0.5	0.5	3/15/2022	0.5	0.5
10/27/2020	0.5		3/29/2022	0.5	
11/10/2020	0.5	0.5	4/12/2022	0.5	0.5
11/23/2020	0.5		4/26/2022	0.5	
12/15/2020	0.5	0.5	5/10/2022	0.5	0.5
N/A	N/A		5/24/2022	0.5	
2-Year Average = 0.5 to 2.0 µg/L*					

* The 70.7 µg/L daily maximum value for total recoverable lead is most likely an outlier. This value subsequently impacts the 30-day average for April 2020 and the 2-year average, depending on the 2-year period used.

2.3 SELENIUM

Selenium is a naturally occurring non-metal found in bedrock and underlying shale. In trace amounts, selenium is necessary for cellular functions in many organisms; however, it is toxic in large amounts. Consumption of selenium in excess of the drinking water maximum containment level may lead to fingernail loss, numbness in fingers or toes, or circulatory problems. Some common sources of concentrated selenium are agricultural, mining, petroleum and metal refining, and industrial manufacturing, including electronic and photocopier components, glassmaking, and rubber, metal alloys, petroleum, and textile emulsions. PAWSD does not serve industrial users, such as refineries and mines.

In the WQA, the WQCD conducted a quantitative reasonable potential analysis for dissolved selenium. The dissolved selenium analysis was based submitted data from the previous permit. Because the maximum estimated pollutant concentration exceeded the maximum allowable pollutant concentration, it was determined that there was reasonable potential to exceed these selenium limits. As a result, future dissolved selenium limits were established in the permit, along with monitoring and reporting requirements.

Composite samples of the Vista WWTP effluent, collected two times per month, were analyzed for dissolved selenium among other constituents. The analytical results of selenium concentrations from August 2019 through May 2022 are provided in **Table 2-4**. Dissolved selenium has a daily maximum limit of 18 µg/L and a 30-day average limit of 2.1 µg/L, beginning August 1, 2022. Out of 68 datapoints, all dissolved selenium concentrations have measured far below the daily maximum limit of 18 µg/L, ranging from 1.0 (the test method detection limit) to 2.6 µg/L. The 30-day average has ranged from 1.0 to 1.9 µg/L, still under the 2.1 µg/L limit.

The data suggests there is no reasonable potential to exceed the daily maximum dissolved selenium limit of 18 µg/L. However, the 30-day average effluent limit is so low, 2.1 µg/L, that continued dissolved selenium monitoring is warranted. Based on results from other Colorado WWTPs (e.g. Pueblo and Berthoud), it is expected that selenium removals through the Vista WWTP activated sludge system will improve when anaerobic and anoxic basins are installed upstream of the oxidation ditches. In addition, selenium loading to the WWTP should decrease as I/I identification and reduction measures are implemented on an ongoing basis. This will help increase the relatively narrow 'compliance cushion' the Vista WWTP currently has for the monthly average effluent limit for dissolved selenium.

Table 2-4: Analytical Results for Dissolved Selenium (Aug. 2019 – 2022 YTD)

Dissolved Selenium Daily Maximum Limit = 18 µg/L 30-Day Average Limit = 2.1 µg/L					RL = 1.0 µg/L
Sampling Date	Daily Maximum (µg/L)	Calculated 30-Day Avg (µg/L)	Sampling Date	Daily Maximum (µg/L)	Calculated 30-Day Avg (µg/L)
8/12/2019	1.0	1.1	1/12/2021	1.0	1.0
8/27/2019	1.2		1/26/2021	1.0	
9/10/2019	1.0	1.0	2/09/2021	1.0	1.1
9/24/2019	1.0		2/23/2021	1.2	
10/15/2019	1.0	1.0	3/16/2021	1.4	1.6
10/29/2019	1.0		3/30/2021	1.7	
11/12/2019	1.0	1.1	4/13/2021	1.9	1.5
11/25/2019	1.2		4/27/2021	1.0	
12/10/2019	1.1	1.1	5/12/2021	1.1	1.1
12/23/2019	1.0		5/25/2021	1.1	
1/14/2020	1.0	1.0	6/15/2021	1.0	1.2
1/28/2020	1.0		6/29/2021	1.3	
2/12/2020	1.2	1.9	7/13/2021	1.0	1.2
2/25/2020	2.6		7/27/2021	1.3	
3/10/2020	1.4	1.5	8/10/2021	1.0	1.1
3/24/2020	1.6		8/24/2021	1.2	
4/14/2020	1.9	1.5	9/14/2021	1.1	1.1
4/28/2020	1.0		9/28/2021	1.0	
5/12/2020	1.0	1.0	10/12/2021	1.0	1.0
5/26/2020	1.0		10/26/2021	1.0	
6/09/2020	1.1	1.1	11/11/2021	1.0	1.0
6/23/2020	1.0		11/28/2021	1.0	
7/14/2020	1.0	1.0	12/12/2021	1.0	1.0
7/28/2020	1.0		12/24/2021	1.0	
8/11/2020	1.0	1.0	1/11/2022	1.0	1.1
8/25/2020	1.0		1/25/2022	1.2	
9/15/2020	1.0	1.0	2/8/2022	1.0	1.1
9/29/2020	1.0		2/22/2022	1.2	
10/13/2020	1.0	1.0	3/15/2022	1.2	1.7
10/27/2020	1.0		3/29/2022	2.1	
11/10/2020	1.0	1.0	4/12/2022	1.8	1.5
11/23/2020	1.0		4/26/2022	1.1	
12/15/2020	1.0	1.0	5/10/2022	1.4	1.3
N/A	N/A		5/24/2022	1.1	

No limits exceeded.

2.4 NONYLPHENOL

Nonylphenol is non-ionic compound used as a surfactant in detergents, degreasers, dry cleaning, emulsifiers, and many other commonly used products. Due to its ubiquitous use in residential, industrial, and commercial applications, it can be difficult to control nonylphenol sources. Polymer carrier fluid, used at wastewater treatment plants for flocculation and dewatering, may potentially contain nonylphenol as well. Nonylphenol can be toxic to aquatic life. Nonylphenol may be partially removed through existing biological processes at wastewater treatment plants, especially with increased solids retention times (SRTs).

In the WQA, the WQCD conducted a quantitative reasonable potential analysis for nonylphenol. The nonylphenol analysis was based on submitted data from the previous permit. Because the maximum expected pollutant concentration was greater than half of the maximum allowable pollutant concentration, it was determined that there was reasonable potential to exceed these nonylphenol limits. As a result, future nonylphenol limits were established in the permit, along with monitoring and reporting requirements.

Composite samples of the Vista WWTP effluent, collected two times per month, were analyzed for nonylphenol among other constituents. The analytical results of nonylphenol concentrations from August 2019 through May 2022 are provided in **Table 2-5**. In this timeframe, the concentration of nonylphenol in effluent was generally low, around 1 µg/L. There was a period of five months, from November 2020 through March 2021, when 30-day average nonylphenol concentrations ranged from 6.6 to 10.1 µg/L, surpassing the 30-day average limit of 5.0 µg/L. The exact cause of these higher nonylphenol concentrations could not be identified.

Tetra Tech recommends continuing to monitor for nonylphenol to determine if it repeatedly occurs in high concentrations and if there is an apparent pattern to the instances of high concentrations. Initial review of the safety data sheets (SDSs) for the polymers used at Vista WWTP do not list nonylphenol as a constituent; however, the SDSs do not contain full disclosure of the product's formulation. To be certain, PAWSD will request certification from their polymer supplier that nonylphenol is not a constituent of the polymer carrier fluid. If nonylphenol is a constituent, PAWSD will pursue and use a polymer product that does not contain nonylphenol.

If nonylphenol concentrations are determined to be consistently high and in excess of the limits noted above, and polymer carrier fluid is ruled out as a possible source, PAWSD will address the upstream sources. The primary method of addressing sources of pollutants from residential, industrial, and commercial products is to implement community education and outreach. PAWSD will need to identify, inform, and educate the public on possible products containing nonylphenol that should be avoided or disposed of by alternative means. Additional investigation will be needed to pinpoint the service area's main customer-contributed sources of nonylphenol.

Table 2-5: Analytical Results for Nonylphenol (Aug. 2019 – 2022 YTD)

Nonylphenol Daily Maximum Limit = 28 µg/L 30-Day Average Limit = 5.0 µg/L					RL = 0.9 to 1.0 µg/L
Sampling Date	**Daily Maximum (µg/L)**	**Calculated 30-Day Avg (µg/L)**	**Sampling Date**	**Daily Maximum (µg/L)**	**Calculated 30-Day Avg (µg/L)**
8/12/2019	3.0	2.5	1/12/2021	10.6	**10.1**
8/27/2019	2.0		1/26/2021	9.5	
9/10/2019	3.0	2.5	2/09/2021	9.5	**9.1**
9/24/2019	1.9		2/23/2021	8.6	
10/15/2019	1.9	1.9	3/16/2021	15.8	**8.6**
10/29/2019	1.9		3/30/2021	1.3	
11/12/2019	1.9	3.1	4/13/2021	N/A	0.9
11/25/2019	4.2		4/27/2021	0.9	
12/10/2019	3.8	**5.4**	5/12/2021	0.9	1.0
12/23/2019	7.0		5/25/2021	1.0	
1/14/2020	4.0	3.0	6/15/2021	1.9	1.5
1/28/2020	1.9		6/29/2021	1.0	
2/12/2020	3.4	1.7	7/13/2021	0.9	0.9
2/25/2020	0.0		7/27/2021	0.9	
3/10/2020	0.0	0.0	8/10/2021	0.9	0.9
3/24/2020	0.0		8/24/2021	0.9	
4/14/2020	0.9	1.7	9/14/2021	0.0	0.0
4/28/2020	2.5		9/28/2021	0.0	
5/12/2020	1.0	1.0	10/12/2021	1.0	1.0
5/26/2020	0.9		10/26/2021	0.0	
6/09/2020	1.5	1.3	11/11/2021	1.0	1.0
6/23/2020	1.0		11/28/2021	1.0	
7/14/2020	1.1	1.1	12/12/2021	1.0	1.0
7/28/2020	1.0		12/24/2021	1.0	
8/11/2020	1.0	1.0	1/11/2022	1.0	1.0
8/25/2020	0.9		1/25/2022	1.0	
9/15/2020	1.0	1.0	2/8/2022	N/A	0.9
9/29/2020	0.9		2/22/2022	0.9	
10/13/2020	0.9	3.3	3/15/2022	1.0	1.0
10/27/2020	5.6		3/29/2022	1.0	
11/10/2020	6.6	**6.6**	4/12/2022	0.9	0.9
11/23/2020	6.6		4/26/2022	1.0	
12/15/2020	7.6	**7.6**	5/10/2022	1.0	1.0
N/A	N/A		5/24/2022	1.0	

Bold red values indicate limit exceedances of the 30-day average effluent limit for nonylphenol of 5 µg/L.

3.0 CONCLUSION AND RECOMMENDATIONS

A summary of the findings and recommended actions to identify and control each pollutant are provided in **Table 3-1**. Tetra Tech recommends taking action to pro-actively control two of the four pollutants: dissolved manganese and nonylphenol. The remaining two pollutants: lead (dissolved and total recoverable) and dissolved selenium were generally measured at concentrations close to non-detectable, such that exceedances are rare and not meriting additional identification and control measures at this time.

Table 3-1: Summary of Pollutant Identification and Control Action Plan

Pollutant	Recommended Action
Dissolved Manganese	Dissolved manganese is regularly measured in concentrations exceeding the 30-day average limit. PAWSD is already addressing the most likely source of manganese – groundwater infiltration – and will continue to reduce infiltration to the best of the District's ability within the available budget and staffing. PAWSD is waiting to receive analytical results to confirm manganese levels in the area's surface water and groundwater sources.
Dissolved and Total Recoverable Lead	Measured levels do not exceed limits and should not require further source identification and control. The datapoint on 4/28/2020 of 70.7 µg/L was abnormal and considered to be an outlier when compared to all other datapoints measuring below or near the method detection limit. Due to the occurrence of an outlier, PAWSD will continue to monitor dissolved and total recoverable lead through the duration of this permit cycle to ensure the outlier was an isolated incident. If lead levels remain low, with mostly non-detect values, the District should pursue and reduction or elimination of monitoring frequency for these specific parameters.
Dissolved Selenium	Measured levels of this pollutant are low, do not exceed limits, and should not require additional source identification and control efforts. However, the 'compliance cushion' for the 30-day average dissolved selenium effluent limit is relatively small, but should improve with I/I control and the additional of the anaerobic and anoxic basins for compliance with (1) drinking water-based total inorganic nitrogen limits and (2) Regulation 85-based total phosphorous effluent standards.

Pollutant	Recommended Action
Nonylphenol	An isolated period of moderately high nonylphenol levels, ranging from 6.6 to 10.1 µg/L, was measured between November 2020 and March 2021. The occurrence has not been repeated in other available data. PAWSD should continue to monitor nonylphenol to determine whether there is a seasonal pattern and source of elevated nonylphenol concentrations.

PAWSD is dedicated to providing high quality, dependable drinking water supply and wastewater collection and treatment services to its customers. The District will continue monitoring for all pollutants listed in Table 3-1, as required by the permit, but could elect to pursue reduced monitoring for selenium, if beneficial from a financial standpoint, due to selenium consistently measuring below the limit. PAWSD will actively address high levels of manganese and nonylphenol by confirming the sources. Analytical results of surface water sources and groundwater within the service area will be received shortly following the submission of this report, as well as confirmation of the polymer's constituency regarding nonylphenol. Upon receipt of the water quality analytical results for PAWSD will update this report with the new findings and resubmit to the CDPHE WQCD.