COLORADO
Department of Public Health & Environment

Water Pollution Control Project Needs Assessment (PNA) Form
Water Quality Control Division

1. Applicant Information:

Entity Name	140256W-B Crested Butte WW				
Facility Name:	CRESTED BUTTE, TOWN OF			Original ID:	
Mailing Address 1:	507 Maroon Ave PO BOX 39	Mailing Address 2:		County:	
City:	Crested Butte	State:	CO	Zip Code:	81224
Property Address 1:	507 Maroon Ave	Property Address 2:		County:	
City:	Crested Butte	State:	CO	Zip Code:	81224
Latitude :	39.7517291	Longitude :	-104.992107		
Name of Project:	Wastewater Treatment Plant 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:	Carolyn	Middle Name:	A	Last Name:	de Groot
Phone Number:	303-819-7849				
Mailing Address1:	PO Box 39		Mailing Address2:		
City:	Crested Butte	State:	CO	Zip Code:	81224
E-mail:	cdegroot@crestedbutte-co.gov				

Consulting Engineer Information:

First Name:	Leanne	Middle Name:		Last Name:	Miller

Phone Number:	303-404-6362				
Mailing Address1:	390 Interlocken Crescent Suite 800		Mailing Address2:		
City:	Broomfield	State:	CO	Zip Code:	80021
E-mail:	lmiller@carollo.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:

All of the proposed project is proposed for self certification.

The Town intends to utilize CDPHE's streamlined design submittal process. Thus, the Town will submit a Preliminary Design Report to CPDHE for review and approval (including design and specifications developed to approximately 60 percent completion) in accordance with Regulation 22.11 (1), a completed Preliminary Design Report checklist, any variance request (if applicable), and a letter of intent to self-certify the final design per Regulation 22.13.

Note: This project is a Wastewater Treatment Plant Improvements Project and does not include Collection System piping. It required me to check this to move to the next page.

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

The Town intends to utilize CDPHE's streamlined design submittal process. Thus, the Town will submit a Preliminary Design Report to CPDHE for review and approval (including design and specifications developed to approximately 60 percent completion) in accordance with Regulation 22.11 (1), a completed Preliminary Design Report checklist, any variance request (if applicable), and a letter of intent to self-certify the final design per Regulation 22.13.

Ref: Town of Crested Butte Enterprise Facilities Master Plan (January 2021) and Carollo's Scope of Work

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

2. Executive Summary

The Wastewater Treatment Plant Improvements Project engineering and design consists of three major construction aspects: 1) Aeration process building, 2) replacement of the solids processing equipment, and 3) rehabilitation of the existing compost building.

1) Aeration and Administration Building: Enclosing the secondary treatment process (aeration basins) to promote nitrification, improve reliability to meet effluent monthly discharge permit limits during cold months, improve operator health and safety, and reduce odors. A new 50kW solar panel array will be included as part of the new building to enhance the facility's energy efficiency. Centrate return metering addition to enhance system control and reliability to achieve effluent limits. Drainage and water service upgrades will also be included in the scope of work.

2) Solids process improvements are the addition of mechanical thickening equipment and replacement of existing aging infrastructure to more energy efficient equipment (aeration equipment for solids holding tanks and three solids transfer pumps). Currently one centrifuge with a polymer feed system is used for both dewatering and thickening. Improvements will decouple the thickening and dewatering processes (and associated polymer feed systems) to improve operability, increase process efficiency, and reduce energy consumption.

3) The final aspect of the project rehabilitates the existing solids compost building. It exhibits significant deterioration to the interior of the building (steel beams, interior metal building panels, insulation, etc.) and requires an enhanced HVAC system to provide sufficient air changes per hour to provide safe working conditions for the plant staff. Rehabilitation of the existing structure is required to continue to process solids generated at the facility using the current solids processing approach.

3.System Structure and Operation

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

First Name:	Town of Crested Butte				
Mailing Address1:	507 Maroon Ave.			Mailing Address2:	PO Box 39
City:	Crested Butte	State:	CO	Zip Code:	81224
Phone Number:	970-349-5338	Fax:	970-349-6626		

3.2 Organizational Chart

Include an Organizational Chart as Attachment 2.

3.3 Current Operator in Responsible (ORC) Charge

First Name:	Ian	Middle Name:		Last Name:	Baird
Certification Number:	CWP-XB-0215-0318	Certification Expiration Date:	03/03/2022		

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.

Proposed improvements will not change the required operator in responsible charge (ORC) certification level or operators staffing certification levels.

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.

At present, the WWTF is in compliance and no violations were identified in the latest compliance evaluation inspection completed in 2019. The Aeration building enclosure will improve nutrient removal by reducing temperature fluctuations and enable the WWTF to meet anticipated future stricter nutrient limits. Additionally, improvements to the solids handling process will decrease anaerobic conditions in the sludge holding tanks which increases nutrient concentrations returned to the front of the secondary treatment process. This modification will further improve the facility's ability to meet future nutrient limits.

Secondly, this project will help the Town to achieve their goal of reducing GHG emissions by 50% within the next 2 years. Based on the JCI Investment Grade Audit, the proposed improvements will reduce energy consumption at the treatment facility by over 50%. The proposed improvements also contemplate a significant upgrade to the HVAC and odor control systems at the facility. This will impact air quality at the facility, as well as, in the surrounding neighborhood.

4.2 Existing facility limitations

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

1) Currently, all administrative services, wastewater lab services, SCADA operations, and break room are located in the same 300 sq ft space. This poses a significant health and safety concern.

2) Existing aeration tanks are open to the elements. Crested Butte sits at approximately 8800 feet in elevation. As such, Crested Butte is susceptible to extreme weather, including, -30 degree temperatures, large winter snowfalls, ice, and rain which cause difficult and unsafe operational conditions around the aeration tanks (especially for on-call weekend staff when the area is not maintained).
In addition, the extreme cold weather decreases the efficiency of the biological processes associated with nitrification and denitrification. Operation and maintenance, access, safety, and process efficiency will be drastically improved with a building enclosure.

3) Existing solids equipment uses an Alfa Laval centrifuge to thicken then dewater the sludge prior to composting. Maintenance on the one piece of equipment needs to be very well planned. If there is an emergency break, then there is no redundancy at this plant. Implementing a separate thickener will allow for better solids process optimization and provide redundancy to a critical solid processing operation.

4) The compost building structure (structure beams, insulation and portions of existing concrete) is exhibiting signs of corrosion and/or deterioration due to the extremely corrosive environment created by the compost process. Repairs and rehabilitation to the building are necessary to maintain the structural integrity.

5) HVAC system in the existing solids process and compost building are undersized to provide indoor air quality suitable for working conditions and require improvements.

4.3 Operations and Maintenance Issues

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

Part 1) The aeration enclosure will allow for increased treatment efficiency during colder weather to meet current and future regulations. The aeration enclosure allows for much safer operation and maintenance conditions when compared with an open aeration tank especially during winter weather where heavy snowfalls or rain can create unsafe conditions near the tanks (anything that falls into an aeration tank sinks). Also the addition of a new administrate building allows for the separation of staff offices from the lab and SCADA control center.

Part 2) Solids equipment are necessary to create better sludge for composting. Currently a centrifuge is used for thickening and dewatering. Separating these processes by adding dedicated thickening equipment and optimizing the current centrifuge for dewatering will improve quality of sludge, increase redundancy, improve reliability, and decrease energy requirements. Having separate equipment allows for continued solids processing while maintenance can be done on one piece of equipment. New blowers are also being provided in the solids process building and improved HVAC equipment to move air through the space and improve air quality during aeration of the raw sludge holding tank. Current air handling units in the solids process building are poorly sized. As operations staff increase air to the raw sludge holding tank to limit anaerobic conditions in the tank, air is pushed from the sludge tanks into the building and is not able to be conveyed out of the building at an appropriate rate. During this operating scenario air quality in the building diminishes and odors are unmanageable for working conditions within the space.

Part 3) Compost building improvements will improve operations and safety by reinforcing the structural beams with a concrete wrap. This will allow easier access with a front end loader.

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: 0.75 MGD Loading: 2,696 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.

Currently the Town of Crested Butte WWTP is the only permitted discharger in stream segment COGUUG08 of the Slate River.

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.

The Town of Crested Butte has approximately 1783 full year residential and during peak tourism periods with hotels and second homes the total population can increase to 2,000 to 5,000. The Town is the entertainment and recreational hub for the Gunnison valley, this means the number of people coming into town during a busy weekend can increase to 8,000 to 15,000 during the day. The town is unable to document the number of daily visitors, flow accounted for by these increased visitors are captured in the flow per capita (causing this to be higher). There is small section of commercial usage, with no one user that uses more than 3%.

Existing average day maximum month population of 4,083 and flow of 0.31mgd without I/I is 41% of hydraulic design capacity, 0.61 mgd with I/I. Design organic capacity is 2,696 ppd BOD and the current organic loading is 948 ppd Biochemical Oxygen Demand (BOD) Load is 35% of organic capacity.

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 Town's Wastewater Treatment plant has a rated hydraulic design capacity is 0.75mgd and an organic loading capacity of 2,696 ppd. The facility consists of preliminary treatment including fine screening and grit removal followed by an influent pump station which conveys wastewater to one of three existing aeration basins. A Modified Ludzack Ettinger Process is configured for secondary treatment in the aeration basins with in internal mixed liquor recycle and return activated sludge from one of two secondary clarifiers to the influent splitter box. Two secondary clarifiers are provided onsite for secondary effluent clarification. Waste activated sludge is pumped to the raw sludge holding tank for solids processing. Secondary effluent flows by gravity through the UV disinfection system prior to discharge to the Slate River.

Additional details on process components that are not scheduled for any modification can be provided as necessary.

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.

Historical data from January 2016 through to September 2021 was analyzed to develop an understanding of the Town's wastewater flow and loading. Inflow and Infiltration (I&I) sources contribute between 0.3 to 0.5mgd during spring and summer months. JVA I&I Study (2020) determined the increase wet-weather flows were due to groundwater from basement sump pumps connected to the sanitary sewer collection system. The Town is in the process of developing a program to disconnect the basement sump pump connections to reduce flows to the WWTP during these peak flows. The historical flow and peaking factor (PF) include average daily annual flow (AADF) of 0.24mgd, average day maximum month flow of 0.6 and 2.51 PF, and Peak Day Flow (PDF) of 0.88 and 3.65 PF. Expectation that the commercial and industrial (C&I)customers will increase proportionally to the residential growth, therefore multiplying the future residential growth to current will reflect C&I flow and load projections.

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 are no changes to the existing liquid stream treatment process which will impact the facility's ability to meet the current discharge permit limits. The existing process is suitable to meet current discharge permit limits.

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:

The Average Daily Maximum Month hydraulic flow to the WWTP is projected to be approximately 58% of the hydraulic design capacity after completion of the residential sump pump disconnection program which is contributing to elevated average daily maximum month flows during I&I season. (0.437/0.75 MGD) and future organic loading is 42% (1139/2,696ppd of BOD), at the end of the 20 year plan. Based on this evaluation the existing facility treatment systems are appropriate to meet the projected flow and loads through the 20-year planning horizon.

5.1.8 Operational Controls

Describe if the existing treatment processes have appropriate operational controls.

The solids processing replacements and new equipment will allow for better solids process control. Currently one centrifuge is used for thickening and dewatering, by introducing a new thickening process and polymer systems, these two processes can be optimized. Solids processing includes solids from the Town and Mount Crested Butte (both communities are growing), a neighbor community who transports its solids to the Town's Solids Processing. The Solids Process is going to include one new tank (an existing tank not currently used), three new pumps, two new blowers to replace existing blowers, and piping. This update will require controls.

Although the facility has existing SCADA and instrumentation, a new centralized network hub and process control system will be provided in the new administration area (in the new aeration building) to enhance operations efficiency for process control. Electrical and IT controls will be moved to the new Aeration building, where the employees offices will be located. Currently the employees offices and network hub is provided in the existing Wastewater lab which is a health issue.

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

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

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.

Yes, the Town has an Intergovernmental Agreement (IGA) with Mount Crested Butte Water and Sanitation District WWTP to process waste activated sludge at the Town of Crested Butte's wastewater treatment plant Solids Processing facility.

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

Please describe.

The WWTP only treats the wastewater from its own service area; however the IGA with Mount Crested Butte Water and Sanitation District WWTP provides solids processing at the Town's facility.

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: 1255

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.

Information to develop the 20 year planning projections was based on future developments by user category (single family resident, second home owners and short term rentals/ hotels), land use, and projected development of existing parcels in the service area. Population scenarios have been developed for various flow conditions at the wastewater treatment plant as the population within the service area varies greatly depending on the time of year (and visitor population).

Population scenarios and per capita flow values have been developed for average day annual conditions, average day maximum month condition, peak day (flow and loading is developed for peak day summer and peak day winter but the population scenarios for each condition are the same), and shoulder season (low flow conditions). For the purposes of the PNA and the site application engineering report the projections associated with the permitted capacity (average day maximum month) scenario have been presented in addition to the categories requested for the PNA. Please note, the average day flow as shown for "method 1" is the average day annual flow as opposed to the average day maximum month (permitted) flow.

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

The average day maximum month influent wastewater treatment plant loading projections for the 20 year planning horizon (based on the maximum month population projections which include increased occupancy rates for second homes and hotels) are summarized as follows: 1,139 pound of BOD5/day (ppd), 1,275 ppd TSS, 147 ppd TKN, 98 ppd NH4, 19.6 ppd TP.

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 : New RDT & existing centrifuge

Alternative 1 Description (2000 character limit):

Alternative 1 includes the addition of mechanical thickening equipment (rotary drum thickener (RDT)), optimization of the existing centrifuge for dewatering, and new polymer feed systems dedicated to each process. Repurposing of the current thickening sludge holding tank as a second raw sludge holding tank, retrofitting two existing unused ATAD tanks as two redundant thickened sludge holding tanks with mechanical mixing, replacement of three existing positive displacement blowers with two hybrid blowers, and one additional sludge pump, replacement of existing aging sludge transfer pumps.
This project will improve energy efficiency through replacement of the three positive displacement blowers with two energy efficient Aerzen hybrid blowers to aerate the raw sludge holding tanks. The solid process aeration system and the secondary treatment system aeration demand are interconnected to the existing blowers onsite. Replacing the three positive displacement blowers with two hybrid blowers each rated for 750 scfm will provide smaller blowers that will more efficiently provide air to the raw sludge holding tanks (combined aeration demand for both tanks is 620 scfm) while meeting the firm capacity requirements for the secondary treatment process in combination with the two existing Aerzen hybrid blowers (each with a capacity of 1,110 scfm).
The current process aerates the thickened sludge holding tanks as well as the raw sludge holding tank. This alternative decreases the thickened sludge holding volume available and provides mechanical mixing for thickened sludge in lieu of aeration which will improve process performance as aeration for thickened solids is not effective above 3% TS.
Centrate tank improvements involve centrate return flow metering and hydraulic mixing via the existing centrate pump and a modulating three-way valve to return flow within the centrate tank and reduce the risk of solids deposition in the tank. Addition of a flow meter to flow pace centrate.

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

Alternative 1 option would use 29,000 kWh/yr and 27,200 lb polymer/yr and 34 operating hours per week. This estimate does not account for further efficiency realized through optimization of the centrifuge for dewatering, optimization will further decrease energy consumption and polymer. It will be closer to estimates of a new RDT and new centrifuge energy consumption of 13,500kWH/yr and 19,900 lbs polymer/yr. This is a significant improvement that aligns with the Town of Crested Butte's energy savings and Climate Action Plan.
Solids Mixing and Aeration will increase airflow for the raw sludge holding tank from 200 scfm to 620 scfm, sufficient mixing will be provided and thus there is no need to add additional mechanical mixing to the RSHTs. The two repurposed thickened sludge holding tanks (one duty, one back-up) will use a mechanical mixer instead of aeration decreasing it's energy usage from 23,500 to 12,200 kWh/yr for one tank.

Alternative 1 Advantages and Disadvantages (2000 character limit):

Separating the thickening and dewatering is a cost savings in energy and polymer cost, and aligns with the Town's Climate Action Plan. The current centrifuge was recently serviced by the manufacturer and has not reached the end of its useful life.
Adding a mixer to the two repurposed thickened sludge holding tanks will decrease energy usage from 23,500 to 12,200 kWh/ year for one tank. Blowers will still be used for the raw sludge holding tank to promote aerobic conditions and reduce the risk of anaerobic conditions which can generate high concentrations of nutrients in the centrate return. Increased dissolved oxygen (DO) provided by a higher airflow volume will be provided in the raw sludge holding tanks to limit unintended anaerobic digestion or fermentation and to allow operations staff more flexibility to minimize nutrient recycle concentrations back to the aeration basins as compared to status-quo condition. Although the airflow rates will increase to these tanks, the new blowers will provide increased efficiency as compared to the aging PD blowers.
Some disadvantages of this alternative include: adding more airflow into the existing RSHT tanks will require replacement of the HVAC system in the solids process building to ensure indoor air quality remains appropriate for working conditions. Also decoupling the thickening and dewatering process requires additional mechanical equipment which will require ongoing operation and maintenance.

Alternative 2 Title : New RDT & new dewatering equipment

Alternative 2 Description (2000 character limit):

Alternative 2 includes the same process components as Alternative 1 with one additional modification which would replace the existing centrifuge with new dewatering equipment (either new centrifuge or new screw press).

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

Although the combination of a new RDT and new screw press have the lowest energy consumption of 6,000 kWh/yr and polymer consumption of 19,900 lbs /year, the expected run time of almost 50 hours per week reduce operability and functionality when considering this equipment in lieu of the existing centrifuge.
Although a new RDT and new centrifuge would provide a reduction in electricity and polymer consumption, 13,500 kWH/yr and 19,900 lbs/ yr, respectively, the existing centrifuge was repaired and rehabilitated by the manufacturer in 2020. Due to this recent investment in rehabilitating this equipment, replacement with a new centrifuge was not an attractive option at this time. However, when the current centrifuge reaches its end of useful life (anticipated within 10-years) a new centrifuge will be considered for equipment replacement.

Alternative 2 Advantages and Disadvantages (2000 character limit):

Similar advantages to Alternative 1 with the additional advantage that a new mechanical dewatering unit would further improve energy and chemical use efficiency as compared to Alternative 1. Alternative 2 with the implementation of the screw press has the lowest energy consumption of the dewatering alternatives evaluated. A disadvantage for the screw press dewatering option is that the longer run time of the screw press may require additional staffing support and also includes an additional disadvantage in that the money spent in 2020 to rehabilitate the existing centrifuge becomes a sunk cost. Alternative 2 with the incorporation of the centrifuge has the same disadvantage related to the investment of centrifuge rehabilitation in 2020.

Alternative 3 Title : Do Nothing

Alternative 3 Description (2000 character limit):

Maintain operating the wastewater facility as is.
Currently Crested Butte uses one centrifuge for mechanical thickening and dewatering. The existing centrifuge is not optimized for either process and general leads to inefficiencies in solids processing and overuse of polymer. The centrifuge can achieve total solids percentage of 16.5% during the dewatering operation and 3 – 5% during the thickening operation with an annual energy use of approximately 67,000 kWh/year. The centrifuge 27,700 lbs/yr of polymer and is operated approximately 43 hours per week.

Alternative 3 Capital and Operation and Maintenance Costs (2000 character limit):

N/A

Alternative 3 Advantages and Disadvantages (2000 character limit):

Advantage: limited capital investment associated with the do nothing alternative

Disadvantage:
The solids processing is not optimized using one centrifuge for both thickening and dewatering. The new configuration will allow operations staff flexibility to treat process solids more efficiently. Additionally, the replacement of the existing aging infrastructure improves process reliability and resilience, allows the Town to make progress on achieving their community energy efficiency goals, and reduces anaerobic conditions in the existing process which impacts the centrate return nutrients concentrations.

The existing aeration basins to continue with no building over it, will continue to cause inconsistent nutrient removal during periods of extremely cold temperatures/ snow deposition and provide an unsafe working environment during cold and icy winter conditions. The new administration building included as part of this project also provides a clean and safe working environment for Town staff as opposed to this alternative in which the staff will continue to eat lunch and process wastewater laboratory samples in the same office location.

The Compost building is corroding and will become unsafe.

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 selected alternative is Alternative 1 of new mechanical thickener or rotary drum thickener (RDT) and optimizing the current centrifuge. The centrifuge has recently been serviced and is not at its useful end of life. Staff feel that if we optimize the current centrifuge we will get closer to the much lower energy usage and polymer usage.

Creating redundancy in the sludge processing by repurposing the existing thickening sludge tank so there are two raw sludge holding tanks with high aeration for mixing, and repurposing two ATAD tanks for redundancy of two thickened sludge holding tanks (TSHT) with mechanical mixers. Mechanical mixers are much more energy efficient for the TSHT. Adding one raw sludge pump and replacing the three existing sludge pumps will allow for redundancy and better energy efficiency. Adding new aeration blowers that are close to the raw sludge holding tank air demand and meet the full plant's firm aeration capacity requirements. Adding recycling of centrate using existing pump with a new three way valve for mixing in the centrate tank, and flow meter to add flow pacing with liquid stream into the aeration tank.

All of these changes involve utilizing existing equipment that has not reached it's end life, adding and replacement of equipment that has reached it's end life and to add redundancy for operations. Alternative 1 using the best scenario of updating the solids processing equipment to improve redundancy, operational ease and decrease of energy and polymer usage that aligns with our Town's Climate Action Plan.

8.2 Technical Description and Design Parameters

For the selected alternative, please describe all proposed project components and assumed design parameters.

This Wastewater Treatment Plant Improvements Project (Project) will improve solids process operations and decrease energy consumption through asset replacement and incorporation of a dedicated waste activated sludge (WAS) thickening process.

The proposed Project consists of the addition of approximately 120 gpm rotary drum thickener (RDT) and associated equipment, optimization of an existing centrifuge 50 gpm for solids dewatering (new plates), replacement (asset replacement) of 3 existing solids handling pumps (plus one new pump) and grinders, re-purposing of an aerated thickened sludge holding tank to an aerated raw sludge holding tank, re-purposing of two unused autothermal thermophilic aerobic digestion (ATAD) tanks to thickened sludge holding tanks, demolition of an existing C-Tank currently used for aerated thickened sludge holding, two Aerzen 800 SCFM replacement of existing positive displacement (PD) blowers for sludge aeration, and addition of mechanical mixers in the thickened sludge holding tanks, and installation of hydraulic mixers in the existing centrate tank to reduce solids settling. The goal of these process changes is to better thicken and dewater WAS at the plant, to provide redundancy and better operational ease, and to decrease the concentration of nutrients in the centrate return to the biological nutrient removal (BNR) aeration basins.

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.

Proposed improvements do not alter liquid stream treatment or aim to significantly impact effluent wastewater. The enclosure of the aeration basins will improve process efficiency and reduce operational challenges/ complex by stabilizing the aeration basin wastewater temperature during the winter months.

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.

All the work for WWTP improvements occur within the existing WWTP property boundaries or Town right of way. There are no impacts to floodplains, wetland, wildlife habitat, or historical and archaeological properties as part of this scope of work in the previously disturbed area of the WWTP site and the adjacent right of way.

Two CDPHE permits are anticipated as part of this scope of work, a Construction Dewatering Permit and a Construction Stormwater Permit. The project contractor will be required as part of the project contract documents to acquire both permits prior to the start of construction and comply with the permit requirements throughout construction.

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.

The upgrades will occur within the existing WWTP property boundaries or within the Town right of way (potable water and sanitary sewer connection). The existing WWTP property is owned by the Town of Crested Butte.

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.

Construction challenges involve shorter construction timeline for subsurface construction activities due to the shorter summers. The geotechnical report indicates that large rock and cobble may be present in addition to ground water which will need to be considered during construction activities.

Timing with detailed design, grants and loans for the first summer construction season may be difficult.

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.

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.

Cost Category Selection (Assign a percent to each applicable category)

Secondary Treatment (Category I)	100
Advanced Treatment (Category II)	0
Infiltration/Inflow (Category IIIA)	0
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.

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 _____ Site Application Submittal Date _____

Process Design Report/Basis of Design Report Submittal Date _____

Final Plans and Specifications Submittal Date (for Non-Streamlined Review only) _____

Discharge Permit _____ Miscellaneous Permits _____

Public Meeting Date _____ Loan Application Submittal Date _____

Advertisement for Bids Publication Date _____ Construction Contract Award Date _____

Construction Start Date _____ Construction Completion Date _____

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	2763	People	Town population during average day (average day annual) flow conditions
Current Service Area Population (If providing water to neighboring community)	4083	People	town population during average day maximum month conditions (permitted capacity)
Population Growth Rates	0.8	% increase/year	Town developed population projections and occupancy during maximum month flow conditions
Average Daily per Capita Flow Rate	89	Gallons per capita day	average day population in crested butte is different than the maximum month population to account for occupancy of second homes and hotels during peak tourist conditions
Average Day Maximum Month per Capita Flow Rate	150	Gallons per capita day	Site application engineering report
Maximum Daily per Capita Flow Rate	197	Gallons per capita day	peak day population in crested butte is different than maximum month population to account for the highest occupancy for hotels and second home owners.
Peak Hour Factor	4		The town does not record hourly flow data so a peak hour factor could not be developed by historical data. Peak hour factor of 4 is used based on Metcalf and Eddy industry standard peaking factors for small communities
Average Influent BOD5 Concentration	304	mg/L	historical WWTP data
Average Day Maximum Month Influent BOD5 Concentration	185	mg/L	historical WWTP data/ site application engineering report

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	0.25	0.75	0.99	624
+5	2960	4364	0.26	0.80	1.06	670
+10	3085	4571	0.28	0.84	1.10	698

+15	3210	4720	0.29	0.87	1.14	726
+20	3334	4905	0.3	0.91	1.19	754

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										