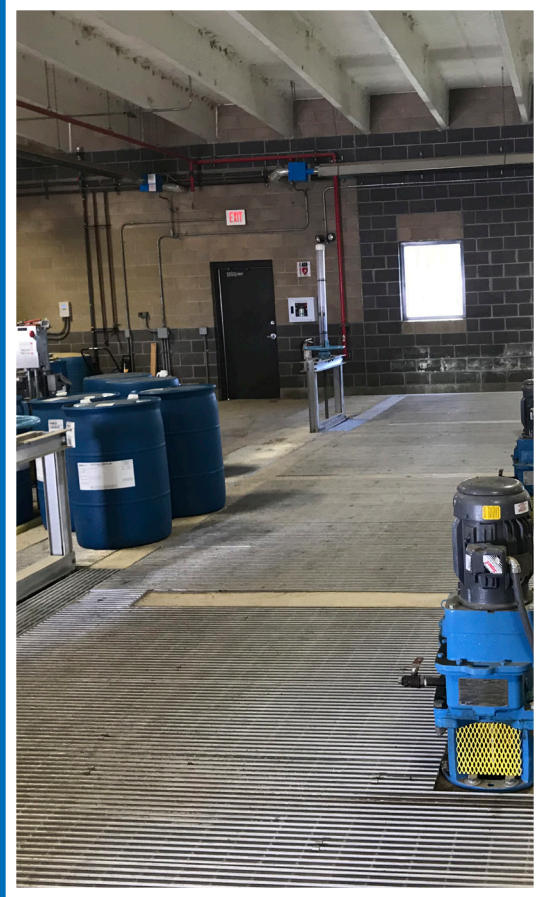

Professional Engineering Services for

# Expansion Design of the Town of Johnstown Water Treatment Plant: Expansion from 5 MGD to 10 MGD

RFP # 430-10681 | February 5, 2021

Submitted to:
Town of Johnstown

BURNS McDONNELL

February 5, 2021

Town of Johnstown
Attn: Marco Carani, Director of Public Works
450 South Parish Avenue
Johnstown CO, 80534

RE: Proposal for Professional Engineering Services for Expansion Design of the Town of Johnstown Water Treatment Plant: Expansion from 5 MGD to 10 MGD

Dear Mr. Carani:

The Town of Johnstown (the Town) is looking for a collaborative engineering team to design an expansion to the Town's drinking water facility, increasing its capacity from 5 MGD to 10 MGD plus redundancy. Burns & McDonnell has more than 30 years of experience working in Colorado and along the front range on brownfield WTP expansions, utilizing each plant's existing assets and developing designs that meet challenging cost, schedule, and technical goals.

## Why Burns & McDonnell?

**Deep Bench of Resources.** As a multi-discipline design team with more than 40 people exclusively dedicated to water and wastewater projects, our proposed project team works on projects just like yours across the front range. We have a deep enough bench to deliver multiple projects at once, without sacrificing quality, and to provide the specialized experience you need in each design discipline.

**Solve Your Taste & Odor Challenges.** Having recently completed two large WTP projects with taste & odor challenges for the City of Thornton and Town of Erie, we have a variety of tools and methods to address taste and odor concerns effectively and economically.

**More Local WTP Retrofits & Major Expansion Experience than Any Other Team.** With a local water treatment portfolio spanning the last three decades, we know the Colorado market extremely well. In 2020, we completed four major water treatment projects in the Denver Metro area alone, three of which were large scale retrofits. We excel in making the most of your existing infrastructure, positioning you for compliance with future regulations, and making your facility operator friendly.

**Flexible Approach with Design-Build Option, to Expedite Schedule and Reduce Costs.** We have assembled a design team to deliver an approach which meets the needs of the RFP as stated, with the option to seamlessly transition into a design-build team, which would benefit the project in terms of cost, schedule, and simplified execution. Our design-build option team is led by Burns & McDonnell, with a construction manager and construction team provided by Garney Construction. Regardless of which delivery method the Town selects, we will position you for compliance with future regulations, and partner with you to address issues in the watershed and solve taste and odor challenges.

If you have any questions, please reach out to Brett by phone at (303) 583-0335 or via email at bdpugh@burnsmcd.com. We are looking forward to helping you make your project a complete success.

Best regards,

Brett Pugh, PE
Project Manager

Daniel Korinek, PE
Vice President

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# Section 1. Identification of Proposer

*Making Our Clients Successful*

Burns & McDonnell is a fully integrated engineering and consulting firm with a multidiscipline staff. We are 100% employee owned, which means we are relationship-focused and dedicated to making our clients successful. We have a 90 percent repeat-business rate and client partnerships that span multiple decades.

## Consultant Name/Office/Address

Name | Burns & McDonnell Engineering Company, Inc.
Address | 9785 Maroon Circle, Suite 400 | Centennial, CO 80112
Phone | (303) 583-0335 Email | pdpugh@burnsmcd.com

### Subconsultants

Name | Kumar & Associates, Inc. (geotechnical)
Address | 10302 South Progress Way,
Parker, CO 80134

Name | Flatirons Surveying, Inc. (survey)
Address | 4501 Logan Street,
Denver, Colorado 80216

### Construction Partner for Design-Build Option

Name | Garney Construction, Inc. (contractor)
Address | 7911 Shaffer Parkway, Littleton, CO 80127

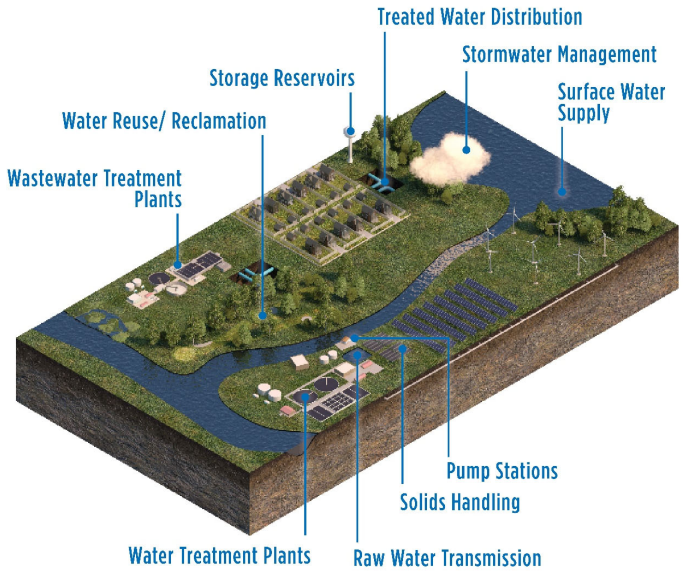
## Office in Which Production will Occur

We will provide design services from our Centennial, CO office location. This office is home to 275 design, construction, and environmental resources, more than 40 of which are dedicated exclusively to water and wastewater projects. Our key personnel live here, work here, and are committed to making your project the very best it can be. We don't just work on a few projects here and there in Colorado; most of our team's experience is right here in Colorado along the Front Range.

**40+**
**Dedicated Water Resources in Colorado**

## Industry Rankings

Honored with numerous awards for excellence by professional organizations, government agencies and the armed forces, Burns & McDonnell has a reputation for providing high-quality service and innovative solutions to clients. *Engineering News-Record* ranks Burns & McDonnell #9 in the top 500 U.S. design firms and the top one-third of the leading program management firms, design-build firms, construction management-for-fee firms, green design firms, and construction management-at-risk firms. We are ranked #9 nationwide in water treatment.



# Section 2. Project Overview & Approach

## Project Understanding

The Town is experiencing high growth in its service area due to recent annexations and subdivisions and needs to expand the capacity of its water treatment. Aging infrastructure creates challenges for operations during high demand periods. The Town also experiences seasonal taste and odor issues related to algae growth in its water supply.

### Key Project Considerations

- Rapid increase in water demand
- Increase filter capacity
- Aging infrastructure
- Taste & odor control

The Town water supply is sourced from the Big Thompson River, with water conveyed through the Home Supply Ditch to the Lonetree and Town Lake Reservoirs. The Lonetree Reservoir, near Berthoud, CO, is filled from the Big Thompson through two upstream reservoirs, Boedecker Lake and Lon Hagler Reservoir. A pump station at Lonetree Reservoir delivers water to the water treatment plant (WTP) through a 10.6 mile, 16-inch pipeline. The Home Supply Ditch can be diverted to the Lonetree Pump Station only when water levels in the reservoir are less than 17-feet. The Home Supply Ditch continues towards Johnstown and flows through the Town Lake before continuing on to downstream irrigation customers. The Town also has interconnects with Little Thompson Water District, the City of Greeley, and the Central Weld County Water District.

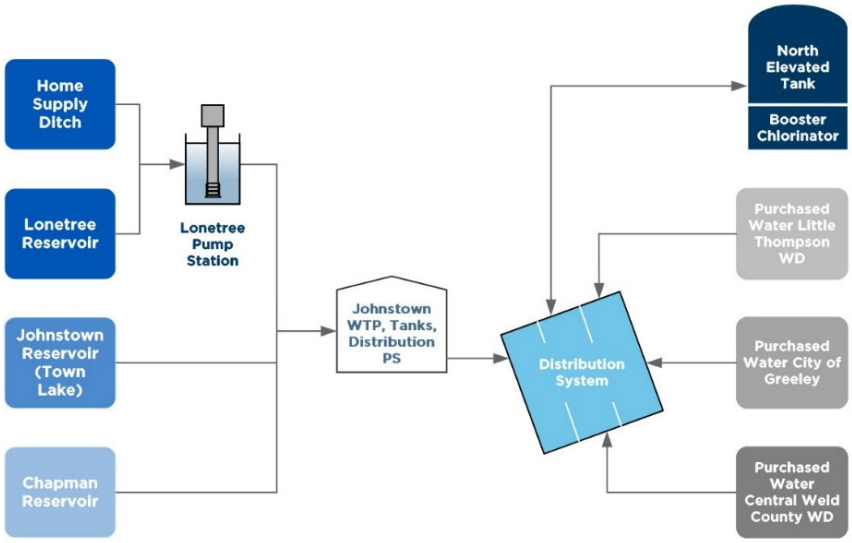



*Figure 2-1. Johnstown's Water Supply System*

Taste and odor (T&O) issues in the Lonetree Reservoir are attributed to algae growth, leading to the seasonal presence of Geosmin and Methyl-Isoborneol (MIB). Geosmin and MIB are also present in the Town Lake, but at lower levels than Lonetree Reservoir. Powdered activated carbon (PAC) is dosed at the Lonetree Reservoir to absorb taste and odor compounds. Raw water from Lonetree and Town Lake is blended at the WTP in an above ground steel tank before it flows to the pretreatment building.

Figure 2-2 on the next page is the current process flow diagram for the WTP. Pretreatment consists of alum injection, rapid mix, two-stage flocculation followed by dissolved air flotation (DAF). The Town is currently switching to a polymer-added coagulant to improve the pretreatment performance (solids, turbidity, and total organic carbon (TOC) removal).

Settled water flows by gravity to two granular media filters (GMF), each rated for 3.1 MGD. Filtered water enters a small clearwell below the filter gallery and is pumped to two ground storage tanks (GST). The GST's provide disinfection contact time, as well as backwash supply and distribution system storage. The distribution pump station is a below-grade structure that pumps finished water to the east and west pressure zones, respectively. The distribution system includes an existing 0.75 MG elevated storage tank, and a new 2 MG storage is proposed for the southeast part of the distribution system.

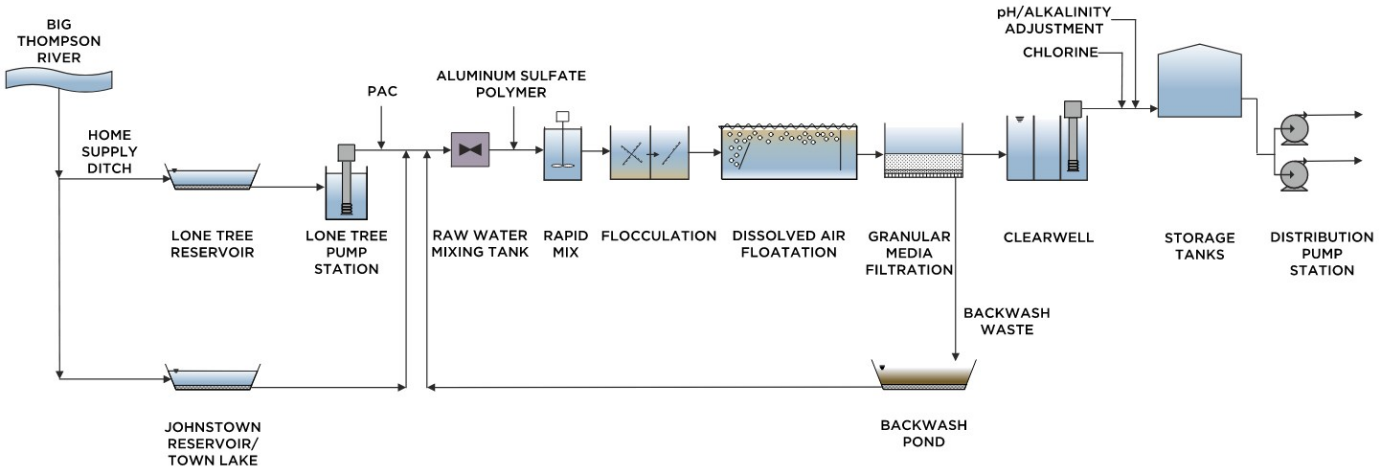



*Figure 2-2. Johnstown WTP Existing Process Flow Diagram*

The Town is facing many challenges due to growing water demands, aging infrastructure, and customer satisfaction. The existing WTP is limited by its filtration capacity, which creates challenges to maintain the necessary water levels in the GST to meet disinfection requirements. The two filters provide a total capacity of 6.2 MGD with both in service, which does not offer redundancy if one filter is offline. The existing DAF pretreatment system is rated for 10 MGD. Peak flows out of the storage tanks approach 11 MGD in summer months.

## Approach Overview

The Town has identified two options for filter expansion (Options 1 and 2), while Option 3 includes other elements of importance to the WTP operation and expansion. Our overall approach is explained in Table 2-1 where we describe additional elements identified through multiple site visits and discussions with the Town. Option 3 includes added improvements not identified in Options 1 and 2. Table 2-1. provides this information at a glance, with more detail on each option in the subsequent sections. Our Management Approach provides detail on our proposed execution of the project. We want to address your preference for filter expansion first (Options 1 and 2), in parallel with planning for the future with issues through Option 3.

**Table 2-1: Three Options to the Johnstown WTP Expansion**

| Consideration | 1 Granular Media Filtration Expansion | 2 Membrane Filtration Expansion | 3 Comprehensive Site Master Plan |
|---|---|---|---|
| **Summary** | Expand Filter Building | Add membranes in parallel with existing GMF | Increase pretreatment capacity, address T&O issues, add membrane filtration, improve disinfection and distribution pumping |
| **Meet Water Demands** | Yes, future phases more challenging | Yes, scalable for future phases | Flexible and adaptable to changing demands |
| **Aging Infrastructure** | Rely on existing 60-year-old filter building and GST | Existing 40- and 60-year-old GST remain in service | Extends the investment in your WTP and provides long term plan to reach ultimate goals |
| **T&O Issues** | Multiple options applicable | Options limited | Multi-phased, holistic approach from source management to treatment |
| **Disinfection Compliance** | Direct water to the existing clearwell and rely on existing GST's | Pump direct from membranes into the existing GST's | Consider long term approach with dedicated |

| | | | |
|---|---|---|---|
| | | | contact basin and pump station |
| **Distribution Pump Station** | Expand existing vault and pumps | Expand existing vault and pumps | Evaluate best-value of new, dedicated distribution and backwash pumps |
| **Within Your Budget** | Most expensive first phase, more expensive later phases | Least expensive for more capacity, but limits T&O adaptability in future | Tailored to your current budget and rates; adapt as funding becomes available |
| **Future Water Quality Concerns** | No | No | Adaptable for future concerns (T&O, drought, wildfire, PFAS) |

**Value Added Service – Optimize Operations**

We developed a value-added service to identify short term fixes to provide your operators relief heading into the peak demand season of 2021. These services are described following Option 3.

## Option 1 – Granular Media Filtration Expansion

The existing filter building was put into service in 1966. It contains two granular media filters, each rated for 3.1 MGD. The media and air scour system were replaced in 2020, but the existing Wheeler ball underdrain system was not upgraded. Backwash draws from the two on-site GST and discharges to the on-site pond. Backwash is recycled to the front of the WTP and solids are discharged to the sanitary sewer and sent to the Central Wastewater Treatment Plant. Issues such as solids break through, air locking in the filtered water header, and cavitation on the filtered water pumps due to the shallow clearwell limit the filtration capacity.

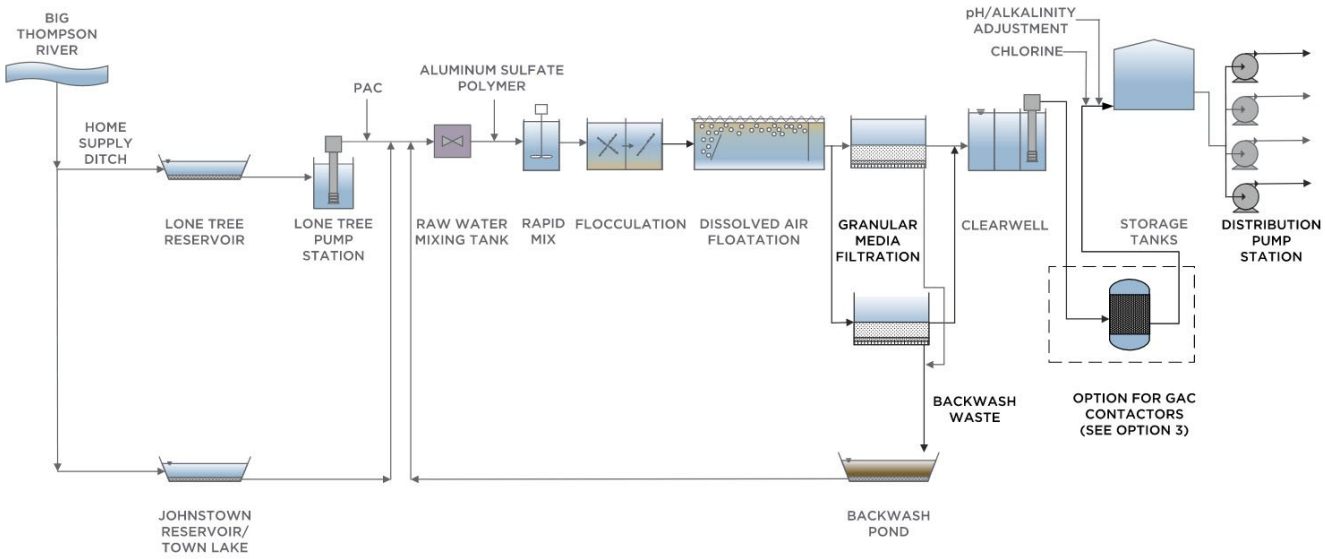



*Figure 3-4. Process Flow Diagram for Option 1 (Grey is existing, black is proposed).*

Additional capacity will be achieved by expanding the existing filter building to include new filters of the same size and configuration. Similar sized filters provide flexibility and simplify operations by avoiding complicated flow splitting. Adding two additional GMFs provides 12.4 MGD of installed filtration capacity. However, this results in a new rated capacity of only 9.3 MGD to meet the CDPHE criteria with the largest filter being offline. Three new GMFs provide a filtration capacity of 12.4 MGD but a WTP rated for the

*Figure 2-3. Existing Filter Gallery*

10 MGD capacity of the DAF pretreatment system. Depending upon budget constraints, the addition of 4 GMFs, or space for a fourth filter, may be better suited to provide redundancy, operational symmetry, and offer excess capacity to defer the next filter expansion. New filtered water pumps will transfer water into the existing GST's. The Distribution Pump Station (DPS) will be expanded in a new concrete vault.

Significant structural, mechanical, and electrical work is required to expand the existing filter building to both gain additional capacity, but also address the condition of the pipe gallery. Further improvements will be required to bring the filter building to current building codes, particularly around the existing chemical storage areas, electrical and control rooms. Care must be taken if expanding the existing building or consider a stand-alone building. Scaling the GMF system for future phases is more involved than a membrane option because of the structural costs. Expansion of the GMF to the southwest will impede on the existing backwash pond and recycle pump station, leading to additional modifications. Staying with the GMF preserves options for T&O control with GAC caps, ozone, or biologically active filtration (BAF). GAC caps or BAF are not applicable to a membrane-based solution.

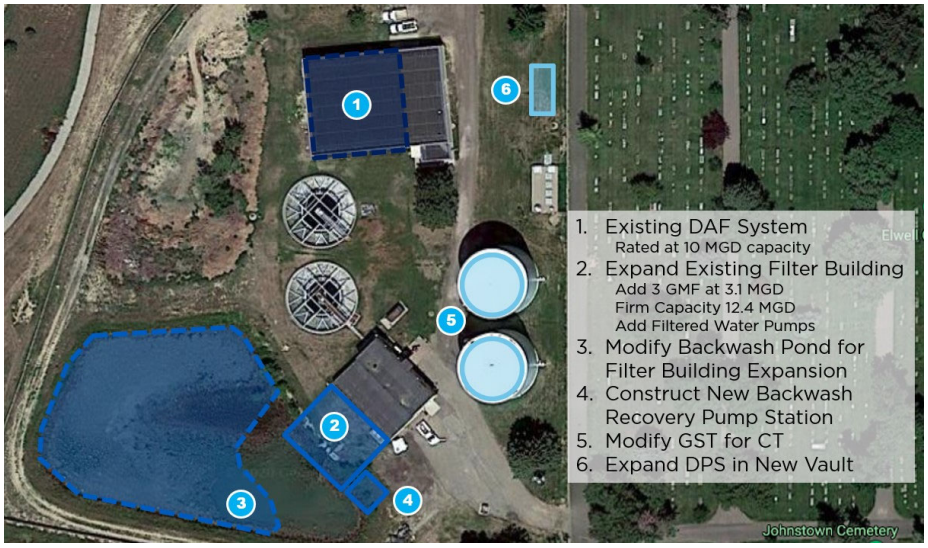



*Figure 2-5. Option 1 GMF Expansion*

## Option 2 – Pressurized Membrane Filtration Addition

Option 2 consists of utilizing membrane filtration in place of the GMF and the existing DAF pretreatment system capacity of 10 MGD. There are a number of membrane filtration sub-options, we will evaluate with the Town:

- Add 6.4 MGD pressure membrane filtration system, expandable to 12.4 MGD; utilize the existing GMF filters until their end of life and expand the membrane system at that time
- Add 12.4 MGD of pressure membrane filtration and retire the existing media filters
- Install 10 MGD submerged membrane gravity filters (MGF) in existing filter basins

**Site Visits**

Site Visits to installations of the potential membrane manufacturers is included for the Town to understand differences and features to incorporate into the design.

There are generally two options for constructing membranes at the WTP, pressure and submerged systems. Pressure systems are less expensive as a new build system versus submerged systems unless the filter basins can be reused. The existing filter basins are shallow, with very little room in the gallery to accommodate the extensive pipework required in a typical submerged membrane system. Therefore, the only real option is a submerged MGF system by Suez. Suez' MGF system operates in a similar mode as the existing GMF based on the existing hydraulic profile with no additional pumping. The two existing GMF could be converted to four MGF each rated at 3.33 MGD (10 MGD total capacity). Suez indicates that in the installations they have so far that backwashing is only needed twice per day and cleaning is only needed to limit bio-growth. However, we do not consider this option feasible since it does not provide full capacity, is only offered by one manufacturer and has not been proven for more than the past few years on a small number of installations. Cleaning systems are recommended for all membrane systems in the event of fouling, regardless of the low filter loading rate of a MGF system.

The pressure system options for the WTP are diverse and include Dupont, Pall, Suez, and H2O Innovations, among others. The listed manufacturers all have installations in Colorado. Each of these manufacturers have distinct differences in services they offer, types of membrane fiber construction, flexibility to retrofit alternative modules with a universal rack, to name a few. All are proven manufacturers with extensive installations globally.

If membranes were selected, a new membrane system will be installed in an at-grade pre-engineered metal building with climate controls for equipment operation, supplied by a new settled water pump station at the pipe gallery level of the existing pretreatment building. The new settled water pumps will be sized with enough backpressure to pass through the membranes and feed the existing GST. This bypasses the existing filtered water pump station in the filter building gallery and avoids re-pumping. A pressure membrane system is easily scalable to meet the town's growing water demand. Expansion phases can be achieved by adding new modules to installed trains or adding new treatment trains. The new membrane filtration building can be sized for the initial phase only, be designed for a future expansion or built for the ultimate build-out floor space with equipment added later as needed. A new membrane building sized for the current phase has been assumed.

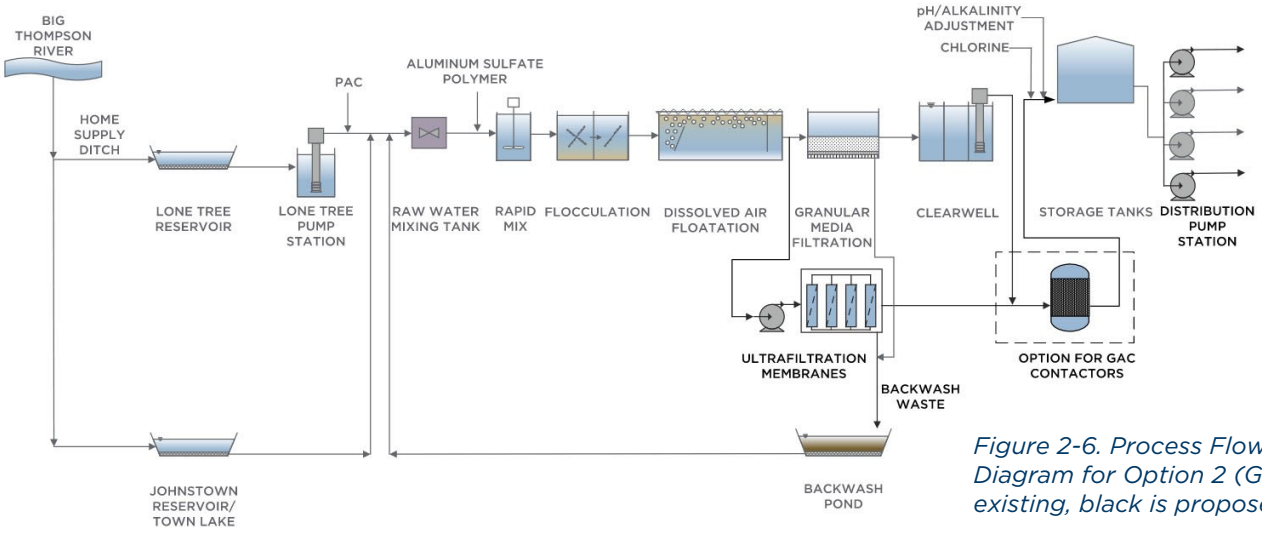



*Figure 2-6. Process Flow Diagram for Option 2 (Grey is existing, black is proposed).*

An early filtration Workshop will be used to determine Option 1 or 2 is the most-cost effective solution to meet the forecasted water demand. The GMF expansion introduces risk because of the age and condition of the filter building. GMF expansion also adds complications associated with demolition, modification of the existing clarifiers, backwash pond and recycle pump station.

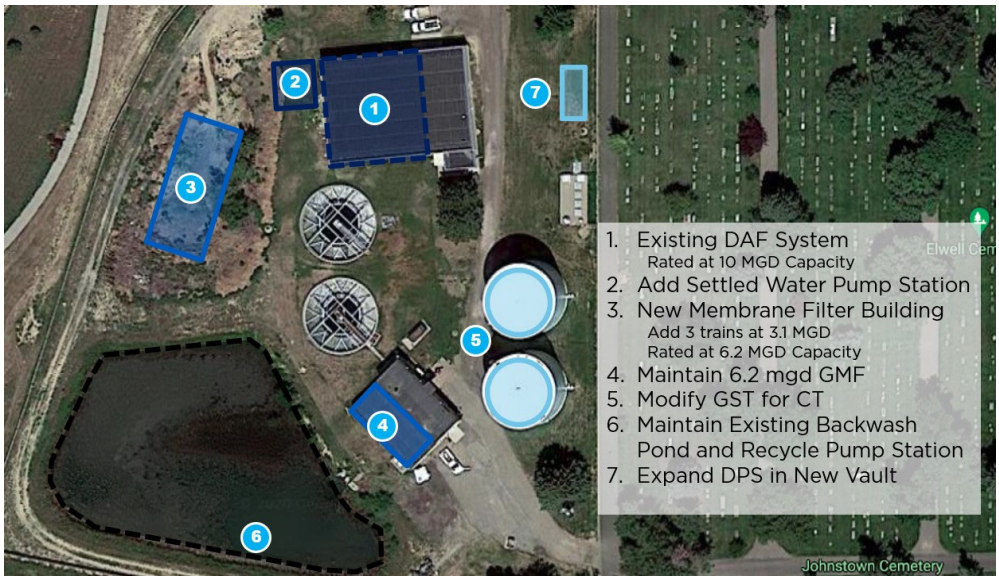



*Figure 2-7. Option 2 - Membrane Filtration Addition*

Table 2-2 provides a comparison of these sub-options versus Option 1 where the existing GMF are expanded.

| | Table 2-2: Filtration Comparison | | |
|---|---|---|---|
| Option 1 | **Expand GMF** | ▸ Gravity flow fits into existing hydraulic profile<br>▸ Recent media only 1 year old<br>▸ Potential to add GAC caps, BAF for additional T&O control<br>▸ Uses existing assets and recent media replacement | ▸ Higher backwash volumes<br>▸ More challenging for the next expansion<br>▸ Risk of filter breakthrough at high rates<br>▸ Recommend air scour over surface wash<br>▸ Existing underdrains near end of life |
| Option 2A | **Add 6.2 MGD of Pressure Membranes, Keep GMF** | ▸ Uses existing assets and recent media replacement<br>▸ Defers cost of full membrane installation<br>▸ Smaller footprint<br>▸ Higher recovery<br>▸ Competitive cost<br>▸ Straightforward expansion in a new building | ▸ Add pumping station to supply membrane system<br>▸ Must install GAC polishing downstream, cannot tolerate PAC on membranes<br>▸ Operators must manage two separate treatment systems<br>▸ Typical 10-year module replacement<br>▸ Existing underdrains near end of life, deferment may be short |
| Option 2B | **Add 12.4 MGD of Pressure Membranes, Retire GMF** | ▸ Retire and abandon existing GMF and Filter Building<br>▸ Standardizes on one technology<br>▸ Straightforward expansion in a new building<br>▸ Scalable for future expansions | ▸ Add pumping station to supply membrane system<br>▸ Must install GAC polishing downstream<br>▸ More advanced operation and maintenance than GMF |
| Option 2C | **10 MGD of Submerged MGF in Existing Filter Basins** | ▸ Retire and abandon existing GMF<br>▸ Repurpose filter basins for submerged gravity membranes<br>▸ Fit higher capacity within the existing filter basins<br>▸ Low energy and chemical costs for a membrane system | ▸ Requires re-pumping after filtration<br>▸ Rely on single GMF during winter conversion to MGF<br>▸ Limited cleaning system, may limit ability to recovery from a water quality event<br>▸ Must install separate T&O step<br>▸ Less than 10 installations worldwide |

Disinfection credits for the additional capacity under Option 2 will be achieved modifying the existing GST to include better mixing or baffling to reduce the overall contact time (CT) requirements. Disinfection log inactivation credits vary between GMF and membranes, which will contribute to lower CT requirements with a membrane system. T&O control is discussed in Option 3. Membrane filtration does not provide T&O removal. The Distribution Pump Station will be expanded in a new concrete vault, similar to Option 1.

It is anticipated that the pressurized membrane filtration is most-cost effective solution to meet the initial forecasted water demand and offers a straightforward path for expansion. The GMF expansion introduces risk because of the age and condition of the Filter Building. GMF expansion also adds complications associated with demolition, modification of the existing clarifiers, backwash pond and recycle pump station.

## Option 3 – Comprehensive Site Master Plan

Our Option 3 approach is structured around collaboration and investigation into ***seven key issues*** to select the right project that fits your budget. Each issue is investigated separately and deliberately to form the Basis of Design.

This approach builds consensus on solutions for the big questions in a sequential and timely manner such that design can progress efficiently. Our goal is to design a facility that is robust for the anticipated water quality and future regulations, be flexible for operations, organized, clean, is easily scalable and is set up for years to come.


### Advantages of a Comprehensive Plan

- Robust treatment for current and future water quality concerns (T&O, drought, wildfire)
- Scalable to allow strategic construction sequencing
- Tailored to your budget, for Phase I and subsequent Phases

### Question 1 – Water Demand Projections

Johnstown's annexations of surrounding land created opportunities for large subdivisions, leading to high growth rate and corresponding water demand. The median growth rate between 2021 and 2019 was 7.3%. This growth is expected to continue through 2041, with a build-out population near 50,000. The sizing of the WTP expansion must address this high growth rate, and not be undersized and result in the need for another expansion in a handful of years. Our team will use the Town's planning and growth projections to confirm the anticipated future water demands and set reasonable WTP expansion phases.

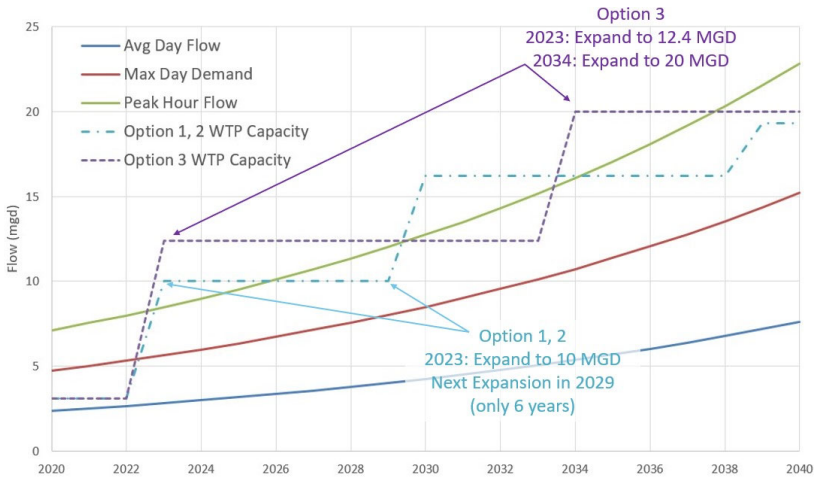



*Figure 2-8. Projected Water Demand vs Potential WTP Phasing Scenario*

Figure 2-8 shows the average day flow (ADF), maximum day demand (MDD) and peak hour flow (PHF) anticipated in Johnstown over the next 20 years. The WTP must provide MDD, with the differences in PHF made up by distribution storage. We will work with the Town to determine an efficient, stepped- approach to expand the WTP, while maximizing the value of the existing infrastructure. An initial expansion that does not address pretreatment capacity will require a second expansion completed within six years.

Therefore, we propose a conversion of the existing DAF system to Suspended Air Flotation (SAF). ***SAF provides a higher hydraulic through-put and solids capture rate within the same basins.*** The existing high-pressure air-saturator and recycle pumps are replaced with a surfactant-based foaming agent and mixer. The resulting anionic bubble improves removal rates by both attracting and lifting suspended solids. This approach provides the opportunity to re-rate pretreatment up to 12.5 MGD or higher, upon additional testing, verification, and acceptance by CDPHE. This SAF approach is anticipated to improve performance at lower operating costs, remove more suspended solids, TOC, Geosmin and MIB and increase the filter run time. ***Improving the percent TOC removed is an operational goal*** to meet the Town's permit requirements.

**Convert DAF & Re-Rate Capacity**

- Remove saturators, air compressors, recycle pumps
- Add surfactant foaming agent generator
- Add emulsion mixer to pump gallery
- Potential to double solids capture and through-put

A phased approach has the benefits of being flexible, to right-size the WTP to changing demand patterns, address critical concerns early, and allows the Town to level out the capital spending. This approach offers time to identify and secure funding or financing, as needed, and reduce the strain on the Town's capital budgets. We will work with the town to establish a practical and flexible expansion plan that has a clear program to meet the next 10 to 20 years of growth.

## Maximize Water Resources

Raw water is sent to the WTP from the Lonetree and Town Lake Pump Stations, with current firm capacities of approximately 4.7 and 5 MGD, respectively. Expansion of the Lonetree Pump Station and its associated pipeline are necessary for the increased WTP capacity but were excluded from the scope by Addendum 1.

The Town owns the water rights to the ***Chapman Reservoir***, but currently has no way to access that water. Chapman Reservoir is susceptible to nutrient loading from agricultural run-off. Even though Chapman Reservoir is not a near term water source, our approach will evaluate suitable treatment trains for your current sources as well as the Chapman Reservoir. This may include provisions to combine with the new pipeline from Lonetree, as well as selecting a WTP robust treatment train that is suited to the high nitrates, TOC, and T&O compounds from Chapman Reservoir. This new source will help the Town ***improve their resiliency*** for water quality events by adding a third source, prepare for drought conditions, and climate change.


*Figure 2-9. Potential Pipeline from Chapman Reservoir*

### Question 2 - Taste & Odor Control

A major objective of the project is to address seasonal T&O issues related to algae growth. Our team is currently working with the Town to identify short-term solutions to address T&O issues for the summer of 2021. However, T&O must be looked at from a long-term, multi-phased approach, to establish a WTP that is robust, resilient, and able to adapt to changing water quality. Burns & McDonnell identified a ***T&O Toolbox*** in collaboration with the Town as part of our on-going study. The toolbox includes multiple options that each contribute toward removal of TOC and T&O odor compounds.

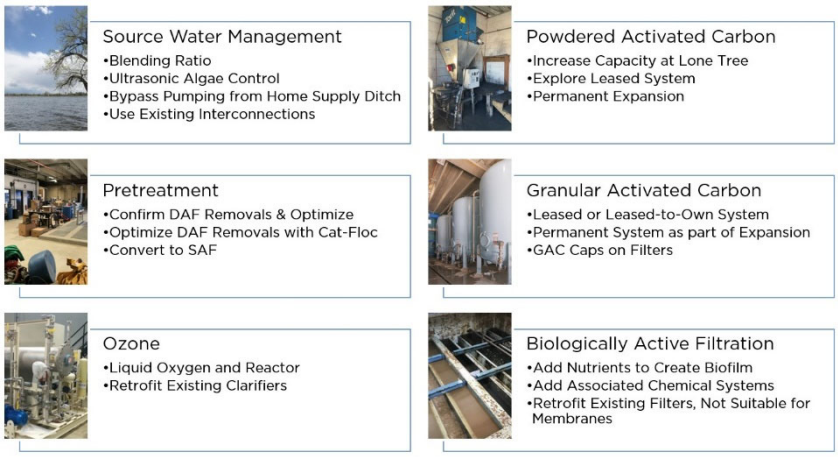



*Figure 2-10. Taste & Odor Control Toolbox*

Each approach has unique operational, maintenance, cost, and efficiency considerations. Some are not applicable with membranes. These will be presented to the Town in a Workshop for collaborative discussion and selection of the preferred strategy. All options must look at extending the Town's investment in their current infrastructure, in particular the existing PAC system at Lonetree and the recently replaced filter media. The Town is likely installing a leased GAC contactor system this year. Our team will work with the GAC vendor to develop a ***lease-to-own option***, where the temporary system can be incorporated into the WTP expansion. No single technology will do it all, so we will provide a flexible system to make it easy for the operators. Our team will perform desktop analysis and jar tests to verify the effectiveness of a given T&O control strategy prior to implementation.

## Question 3 – Filtration Options

Filtration options are discussed above. The selection of the filtration options must consider how the overall WTP will operate as a whole in response to changing water quality, redundancy, ease of operations and life cycle cost. The preferred filtration option will be selected in a collaborative workshop. The basis of our Option 3 approach is a new pressurized membrane system operating in parallel with the existing GMF.

## Questions 4 & 5 – Disinfection & Distribution Pumping

The GST are used for distribution storage, backwash storage and disinfection CT. Operators are challenged to maintain the minimum water levels for CT in the GST during periods of high demand. There is no baffling in the tanks, results in a large volume required to meet disinfection requirements. The GST are 65 and 45 years old and need repairs. The DPS is an underground vault with pumps sending water to the East and West pressure zones. Variable speed drives were installed recently, which has helped better match pumping to the system demand.

The WTP expansion is a great opportunity to reexamine how disinfection, distribution storage and pumping is performed for the long-term instead piecing together a short-term solution that depends on existing infrastructure. Several concepts are presented in the text box.

**CT & DPS Considerations**

- Convert to chloramines to reduce disinfection by-products
- Expand DPS – In Vault or Above Grade
- Rehabilitate aged GST
- Add new DCB with high baffling factor and dedicated backwash volume
- Convert GST's to distribution storage to defer the construction of a new storage tank
- Combine expanded DPS with a dedicated backwash pump station
- Optimize post-treatment chemicals for corrosion control

A new disinfection contact basin (DCB) is an economical way to add CT when a higher baffling factor is used to reduce overall volume. A new DCB creates opportunities to covert the two GST's to distribution storage to meet peak hour demands and ***defer new storage in the distribution system***. A new DCB can be designed for the current CT requirements (GMF- giardia) but be sized for future requirements (membranes – virus). The DCB structure can be sized for ultimate flows with a new at-grade pump station installed above with vertical turbine pumps. Pumps are added, as needed, for future phases. A dedicated backwash wash volume will reduce the

height required in the GST for CT compliance. A dedicated DCB, and improved TOC removals from the upgraded pretreatment system, will help the town reduce the chlorine residual entering the distribution system and contribute to lowering disinfection by-products.

The potential upgrades will increase the initial construction costs but will be easier to operate and improve disinfection compliance. However, examining the disinfection and distribution pumping systems for the long-term may prove this to the be best-value and set the town up for the future. The benefits and challenges of modifications to the GST, DCB and DPS will be discussed in a dedicated Workshop. This task will also examine the finished water quality to determine the corrosion potential in the distribution system and identify the preferred corrosion control solution.

## Question 5 - WTP Siting and Layout

With all the decisions made above, the attention shifts to identifying the preferred location for the WTP expansion and how to optimize the existing site. The existing WTP property has footprint available for the initial expansion, but that may leave little choices for future phases. It may be more economical to expand on an adjacent site (Figure 2-11). Our approach will result in a site master plan that prevents scenarios that are boxed in by the existing site constraints.

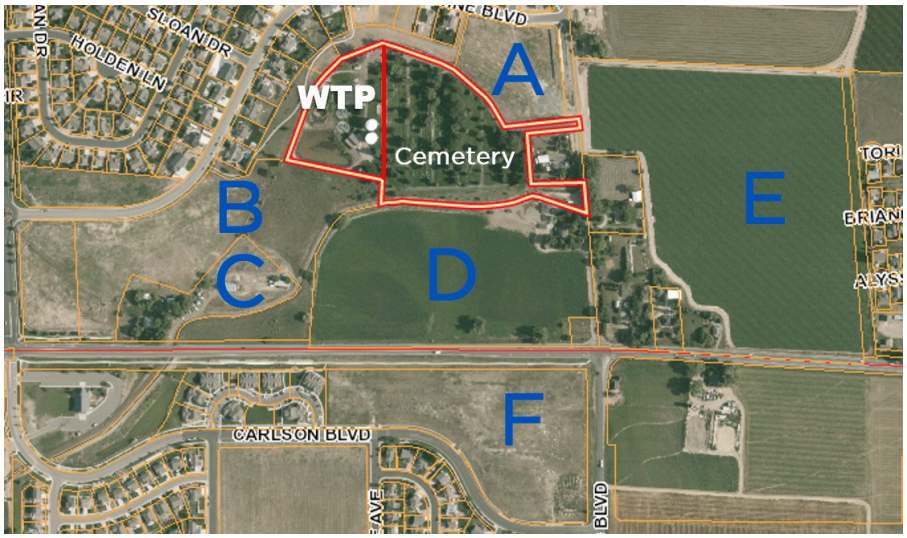



*Figure 2-11. WTP Expansion Property Options*

## Question 6 – Construction Phasing

Our design approach is based on developing a phased sequence of work that meets water demand and water quality issues and prioritizes critical upgrades, while extending the useful life of your existing assets and is a facility that you can afford. Figure 2-12 presents a proposed phasing as an example of a potential solution. The Town must capitalize on recent infrastructure improvements at the Lonetree pump station and filter media. We are also aware of aging structures such as the Filter Building and steel GST that are approaching the end of their useful life. There will likely be more surprises and higher costs trying to reconfigure the Filter Building for a new application while maintaining service. A phased approach creates time to decide if it is worth spending funds to improve an old structure or if it is time to start fresh with a new building. Our comprehensive site master plan approach will form the Basis of Design with a flexible plan to pivot towards your priorities.

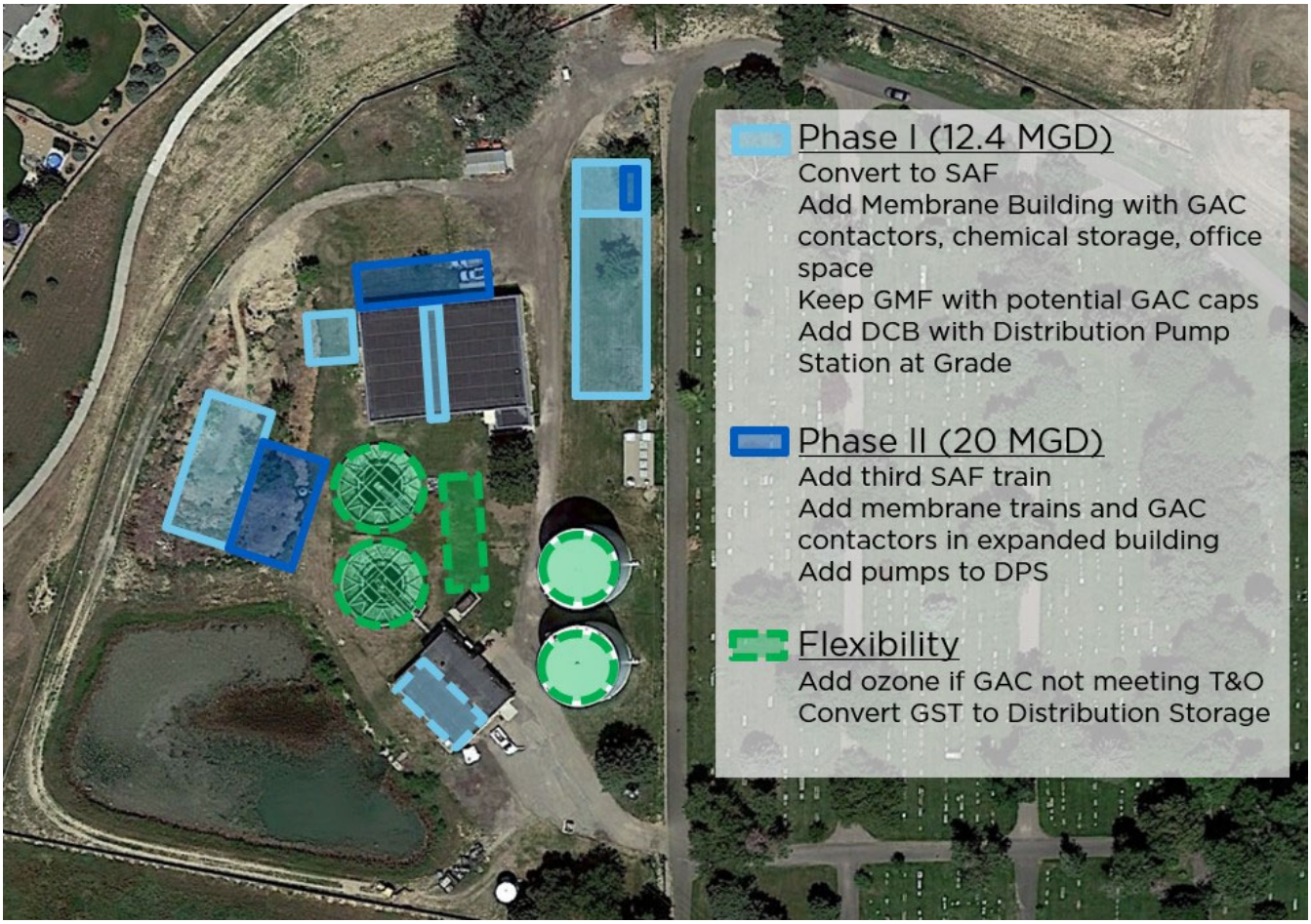



*Figure 2-12. Potential Phasing Plan*

## Plan for Service Interruptions

Construction phasing will be developed as the comprehensive site plan is determined. Construction phasing will also identify when critical work has to happen and identify that WTP service interruptions will occur during periods of low demand. Construction phasing will help to place priority work, such as T&O control, earlier in the sequence such that the Town can benefit during the season they are most needed.

The Town will need to investigate the use of the existing interconnections with Little Thompson Water District, Greeley, and Central Weld County Water District. The Greeley interconnection is only available when the Boyd Lake WTP is running in the summer months as a peaking plant and only available at lower pressure. The Central Weld County Water District interconnection is available at higher pressure but may not have the capacity to meet the town's peak demands. Our construction schedule will identify critical interruptions that may occur in the summer months so the Town can plan ahead. Exercising the interconnections or water rights help with overall system resiliency, being able to react to an event with your backup supplies tested and ready to go, agreements in place.

## Value Added Option: Short Term Relief by Optimizing Operations

The individuals that operate your water facilities will provide critical input to the decisions made during the conceptual design. We will distribute a questionnaire to the operators at the start of the project. Operators will be asked to complete the questionnaire and return it prior to our first operators' workshop. This will help gather a broad opinion of current concerns, challenges, and opportunities. We will ask for each operator's level of comfort with particular technologies to seek their input on improving existing operations and safety.

We offer an ***Operations Optimization task*** series that will start from the project outset, in a parallel with the design progression, to give your staff relief ahead of summer demands of 2021. Our team will focus immediately ***partnering with your operations staff*** to address your current issues that are creating bottlenecks and challenging the operator's ability to meet maximum day demands.

There are many challenges that the operators face in meeting maximum day demands during the irrigation season. This task series includes engaging the operators to identify, develop and implement improvements to better prepare for summer demands. This will be done in parallel with, but also inform, the WTP expansion design for long term needs. Our process technology lead engineer, Karla Kinser, will host ***Workshop 2 – Operations Investigations*** to identify current issues and potential ways to improve them. This workshop is designed to create an itemized list of operational, maintenance, mechanical, electrical or control improvements that can be fast tracked.

Many of these items may be achieved by modifying the current O&M practices. However, some will require additional engineering support, analysis through testing, or consultation with approving authorities to be successfully implemented. Our scope and fee include time to support the Town and its operators with this critical task, through the engineering and assistance with procurement, installation support and start-up consulting.

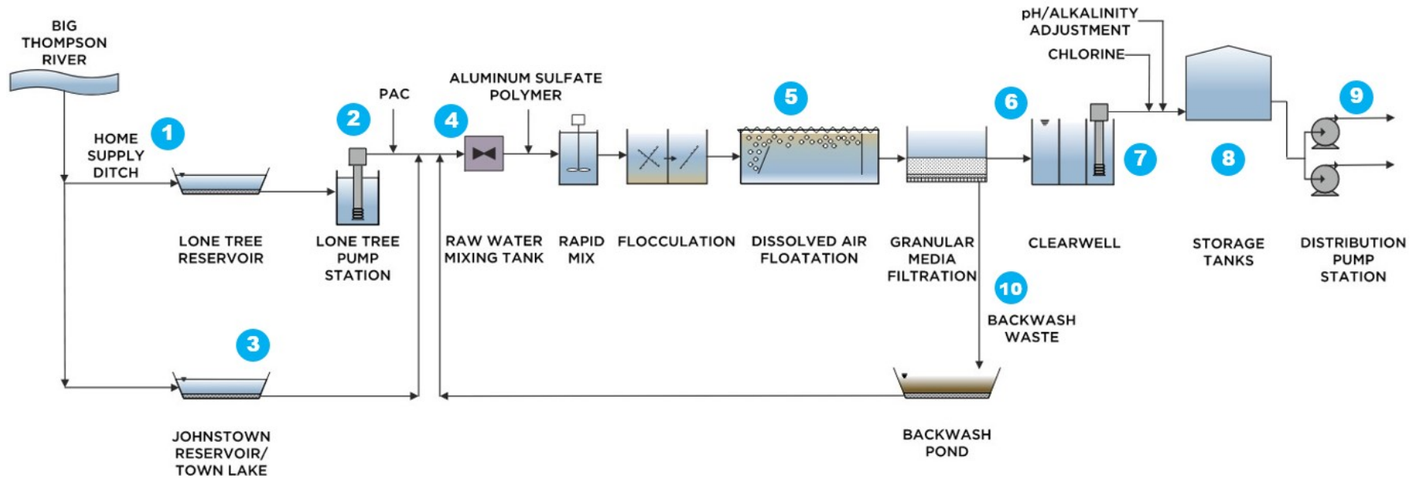



*Figure 2-13. Suggested Remedies for Current Operational Bottlenecks*

**Table 2-3: Short Term Operations Fixes**

| | | |
|---|---|---|
| 1 | Bypass Pumping at Home Supply Ditch | Add temporary pumps in the Ditch to bypass Lonetree Reservoir during T&O events. Send Ditch water to the Lonetree Pump Station even when water levels are high. |
| 2 | PAC | Increase auger capacity at Lonetree for improved T&O control |
| 3 | Town Lake | Install ultrasonic buoy system in Town Lake to limit algae growth |
| 4 | Coagulant | Convert to cationic-polymer based coagulant from alum |
| 5 | Optimize DAF | Conduct testing to optimize TOC and algae removal in the existing DAF, increase solids capture to increase filter run times and reduce backwash water volumes |
| 6 | Filtered Water Header | Add air release valves to prevent air locking |
| 7 | Filtered Water Pumps | Rebuild pumps to increase capacity and avoid cavitation during high flows or replace in a deeper well below the clearwell |
| 8 | Log Removal Credits | Investigate use of baffles in GST to improve baffling and reduce the storage height required, study potential of alternative log removal credits to reduce the contact time required. |
| 9 | Distribution Pumping | Adjust operating setpoints to keep the 0.75 MG storage tank full and buffer peak hour flows out of GST |
| 10 | Backwash | Adjust the time of day for backwashes to where there is lower demand to maintain operating levels in the GST |

# Section 3. Management Approach

**Components of Our Proactive Management Approach to Promote Project Success**

| | | | |
|---|---|---|---|
| Schedule | Cost | Risk | Scope |
| Communications | Quality | Resources | Permitting |

## Project Approach

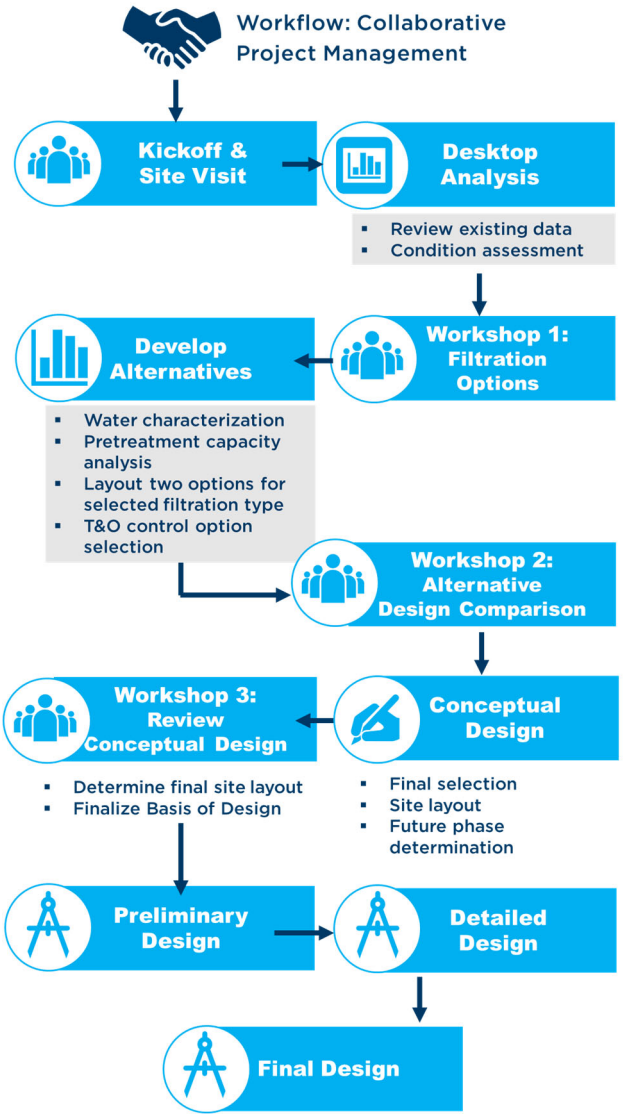
The Burns & McDonnell team has the right experience to plan and design this project for the Town of Johnstown (Town). Making the project successful starts with understanding your specific operational preferences. **Our team's approach is client centric.** We will use an interactive design process that involves your stakeholders every step of the way, making sure that project objectives and expectations are understood and addressed. This ongoing dialogue will be especially important during the early stages of the design process when critical decisions are being made.

## Design Approach

Our approach to design is simple – have the right people available when they are needed. Since we have all design disciplines under one roof in our local office, managing our internal resources is a matter of good planning practices. Our project teams maintain a resource planning database and calendar to forecast our discipline engineers. We use these tools to improve efficiency, manage workloads, and make sure we can meet the deadlines we promise.

Key personnel such as the project manager, design manager, and critical discipline leads typically stay involved with projects continuously during their execution. Discipline engineers may have time gaps between when they are needed to complete tasks. In all cases, our engineers stay with projects from planning through construction so that the engineer who specified a piece of equipment will be reviewing the shop drawing prior to installation.

During the project design phase, our project manager will participate in ***biweekly project meetings*** with the Town. We use these meetings to discuss design elements, project schedule, future milestones, and current progress. We also hold project workshops, as detailed below, at critical design points to discuss alternatives and obtain project feedback.



## Use of 3D Modeling

Our design team uses Autodesk Revit to generate plan sets. It is a great tool for all new treatment facility projects as well as many retrofits depending on the complexity of the project. Some of the benefits of using a 3D model include schedule coordination, conveying the design to the owner, and making conflicts easy to spot. For those who do not regularly look at plan sets, we can create a preliminary model that shows walls, pumps, equipment, and the spacing in the area.

We can also easily create models for a "walk through" to show what the final product will look like, including virtual reality models. It is easy to modify the preliminary model based on the owner's desired changes. This allows us to home in on the final product prior to completing the costlier final engineering calculations.

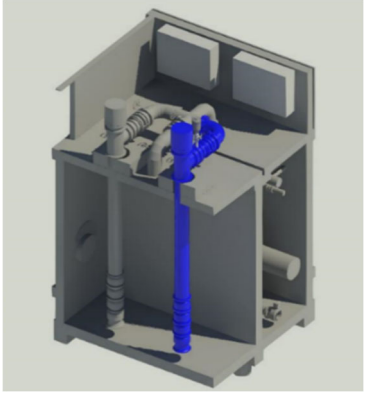


*Figure 3-1. 3-D models showing new pump station at a WTP expansion*

## Focus on Permitting

Understanding that the schedule is often controlled by outside agencies, our team makes **submittals our priority**. We will provide guidance on the regulatory requirements with Town and/or Weld County building inspection, Town building department, fire department, CDPHE and other agencies to develop a Permitting Matrix. This table will identify key project submittal milestones during detailed design and review timelines to avoid unforeseen delays later in the project.

## Preliminary, Detailed and Final Design

Upon determining the Basis of Design, per the Collaborative Workflow shown above, we will advance with detailed design, with submittals at 30%, 60 and 90% and final design (bid-ready documents). The following tables describe the design deliverables by milestone, to show their degree of completeness as the project progresses.

**Table 3-1: Engineering Discipline Percent Complete by Project Milestone**

| Design Milestone: Criteria | 30% | 60% | 90% | Final |
|---|---|---|---|---|
| Treatment Process Layout & Design | 60 | 90 | 100 | 100 |
| Process & Instrumentation Diagrams (P&ID) | 50 | 90 | 100 | 100 |
| Site Civil (Grading, Yard Piping) | 40 | 70 | 100 | 100 |
| Structural | 20 | 70 | 90 | 100 |
| Architectural | 40 | 80 | 90 | 100 |
| Mechanical (Plumbing, heating, ventilation) | 20 | 60 | 90 | 100 |
| Electrical | 10 | 60 | 80 | 100 |
| Instrumentation & SCADA | 20 | 40 | 60 | 100 |
| Phasing and Demolition | 30 | 70 | 90 | 100 |

**Table 3-2: Design Milestone Comparison**

| Design Milestone: Deliverable | 30% | 60% | 90% | Final |
|---|---|---|---|---|
| Specifications | Table of Contents | Draft specs | Div. 00 contracting documents, final technical specs | Sealed by PE |

| Table 3-2: Design Milestone Comparison | | | | |
|---|---|---|---|---|
| **Design Milestone: Deliverable** | **30%** | **60%** | **90%** | **Final** |
| **Drawings** | Sheet Index, preliminary drawings | Plans, sections, details for all buildings and processes. Submit to CDPHE | Complete drawing set, update based on CDPHE feedback | Sealed, suitable for final construction |
| **Process Flow Diagrams** | Schematic for process units | Final | Complete | Complete |
| **P&ID** | Draft | Near final | Final | Complete |
| **Equipment list** | Initial list | Final list with data packages | Equipment specifications finalized | Complete |
| **Hydraulic Profile** | Draft | Final | Complete | Complete |
| **Site Plan** | Structure location and yard piping, surface improvements | Grading, erosion control, survey control | Final surface improvements | Complete |
| **Buildings** | Approximate size and floor plans, code requirements, elevations | Floor plans and sections with piping, | Final details | Complete |
| **Opinion of Probable Construction Costs** | Class 4<br>(-30 to +50%) | Class 2<br>(-15 to +20%)<br>Or by CMAR | Class 1<br>(-10 to +15%)<br>Or by CMAR | Class 1<br>Or updated by CMAR, for any changes post 90% |
| **Constraints** | Key design/ construction constraints identified (floodplain, Geotech, phasing) | | Described in Div. 00 | |
| **Electrical** | Equipment layout, one-line diagram for power distribution | Draft process control narrative (PCN) describing automation, monitoring strategies | Final PCN | Complete |
| **Schedule** | Estimated construction duration, initial sequencing plan | Updated duration, sequencing | Complete | Per bidding |

# Project Schedule & Cost Management

The Burns & McDonnell team uses a portfolio of proven tools and processes to look at both near- and long-term project drivers to determine how they can, should, and will fit into the project to meet both budget and schedule parameters.

We use a well-developed accounting system, EcoSys, to track labor costs, expenses, and billing. Brett Pugh will be responsible for setting and controlling the budgets for your project. As part of the billing process, he will review billed hours, expenses, and costs monthly. He will also use additional tools to track progress and forecast expenditures through the end of the project. As labor hours and costs are recorded through our weekly time sheet process and expense management system, the data becomes available to him through a cloud-based system to analyze current and projected costs for the project.

While the financial systems track costs, the ***most important part of cost control is managing the team***.

We take a focused approach to design, in which our key discipline engineers complete the conceptual design to clearly understand our path forward before we involve the expanded team to complete the final design. This helps us keep each design discipline focused and moving the project forward through managing the sequence of deliverables.

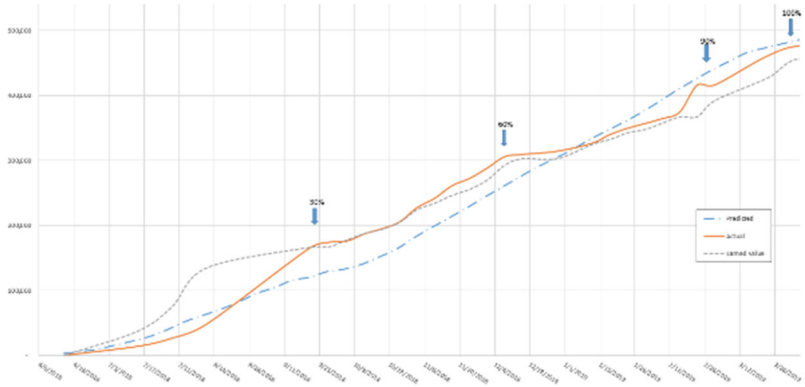



*Figure 3-2. Example design project S-Curve comparing forecast, actual and earned value.*

All invoices will include a one-page status report that identifies work accomplished during the invoiced period, and work planned for the upcoming invoice period and a recap of fund expended/ funds remaining for project.

## Opinions of Probable Cost

Our team is committed to providing you with biddable/ constructible design documents and opinions of probable cost throughout design that you can rely on. Because of our vast history of water plant design and in-house construction experience, we have a library of recent constructed projects and bid prices which will inform the opinions for this project.

We understand that the Town has a target capital cost planned for the upgrades. We will focus on designing the upgrades required at this time, while keeping an overall plan for the facility in mind and making sure those upgrades fit into the overall plan.

### Value Added

Our team does not rely on cost tools or models available on the market to estimate costs for water treatment plants; *we use ground up estimates informed by local market data.*

We also plan to leverage either our internal construction staff or our construction partner, Garney Construction, provide a second check on our estimates and to contribute a larger set of construction cost data.

Maintaining updated cost opinions and life cycle costs is as important as monitoring project financials or updating drawings. As detailed design progresses, concepts are changed, design workshops are held, etc., all impacting the facility cost. Our approach is to prepare updated cost opinions and life cycle costs following milestone completions, such as preliminary design, 60% design, 90% design, and 100% design.

Our estimates will help the Town plan out the capital works that work within your budgets. This defensible approach helps support water rate increases and help the Town set appropriate rates for tap fees.

### Assistance with Funding Sources

Funding the construction of the expansion of the WTP may require a combination of rate increases, bonds, grants, and loans. Loans are available through the State Revolving Fund (SRF) administered through the CDPHE. There also may be other existing federal grants or new loans available due to the change in the federal administration, for example through other avenues such as the Clean Water Fund. Burns & McDonnell has extensive experience assisting our clients in determining all avenues available to obtain grants and loans. We routinely aid in filing applications and administration of the CDPHE SRF. We have included an optional task to assist the Town in obtaining funding for the project once a cost estimate has been prepared and a budget understood.

## Life Cycle Optimization Tool

An understanding of all costs associated with any option considered for the WTP is critical. For example, while the capital cost of a GMF expansion utilizing the existing filters may appear less than a 12.4 MGD expansion using membranes, there may be significant differences in the overall life cycle once a 20 or 50-year life horizon of replacement, maintenance, and all operating costs such as PAC or GAC replacement are considered. Our approach is to present construction (or capital) costs along with chemical, electrical, and estimated labor costs for each option, and any impacts to other facilities in the plant for the predetermined life horizon presented as a net present value so the Town may evaluate each option completely. These costs are utilized in conjunction with non-cost criteria for a formal evaluation of all alternatives so that a best-value selection may be made for the WTP. ***Our life cycle tool is invaluable when considering value engineering options because a deduction in capital costs can results in a large increase in operating costs.***

## Schedule

We will develop a schedule in Microsoft Project at the start of the project with your input incorporated. We will use the schedule to forecast resources, plan the overall project execution, and help define proposed deliverables. The schedule is a living document and will be updated as the project progresses. Typically, it will be updated each month as part of the invoicing cycle and compared against the baseline schedule as the project progresses. Internal accounting software will generate up to date spending reports for Brett to compare against the forecasted spending to monitor and track the project progress.

## Risk Management

Our approach to risk management starts with experienced team leadership. Before responding to an RFP, we determine the correct leadership team to review the agreement, complete the work, and provide quality control. If we do not have the right team for the job, then we will not go after a project.

A large portion of the projects our proposed team works on are executed using alternative delivery methods, such as design-build, construction manager at risk (CMAR), and engineer-procure-construct (EPC). All of these projects go through an in-depth risk review process to confirm design risk, cost risk, construction risk, external risks, schedule risk, etc. This experience improves our ability to identify pitfalls in project alternatives and designs at the earliest stages of planning. While we are not delivering this project through an alternative delivery model, we are already aware of the key project risk and will address risk items in our internal project execution plan. Risk management is enhanced in DB by the integrated project team managing together all components throughout the project delivery (design to construction).

We are already aware of many of the current operational risks and have incorporated those into our Operations Optimization task series described above.

| Table 3-3: Preliminary Risk Matrix | | |
|---|---|---|
| **Risk or Opportunity Description** | **Consequence** | **Mitigation Measure(s)** |
| **Obtaining CDPHE construction approval** | ▸ Delayed schedule | ▸ Burns & McDonnell has an excellent relationship with CDPHE<br>▸ Coordinate early in the design phase |
| **Continued taste & odor issues during design and construction.** | ▸ Unsatisfied customers | ▸ Apply multi-phased approach<br>▸ Investigate proven technologies<br>▸ Share plan with customers |
| **Code compliance for existing structures** | ▸ Add scope late in construction<br>▸ Delayed schedule | ▸ Complete condition assessment at project initiation to identify upgrades |
| **Challenges with connections to existing buried pipelines** | ▸ Size conflicts<br>▸ Location conflicts<br>▸ Material conflicts | ▸ Extensive locates and test holes during design phase |
| **Keeping the existing plant operational and treating water within regulatory standards during construction** | ▸ WTP shut down and unable to treat water<br>▸ WTP unable to meet standards | ▸ Prepare to use available interconnections<br>▸ Develop worst case scenario contingency plans |
| **Maintain water levels in GST for disinfection compliance** | ▸ Fail to comply with operating permit | ▸ Adjust flow set points to smooth plant flows<br>▸ Address mechanical issues with filtered water pumps at project outset<br>▸ Optimize pretreatment to reduce loading on filters |
| **Operating the Lonetree PAC system** | ▸ Recurring T&O complaints | ▸ Upsize existing PAC system capacity<br>▸ Increase staffing presence |

## Communications

Burns & McDonnell has been in business for 123 years and recognizes the importance of coordination and communication between your staff and our project team. This begins at the initial coordination/ kickoff meeting where direct lines of communication, project requirements, project scope, public concerns, design criteria, and critical project issues are established.

| Table 3-4: Typical Kickoff Meeting Discussion Topics: | |
|---|---|
| ▸ Project background and overview | ▸ Project Schedule |
| ▸ Team introductions | ▸ Key action item needs |
| ▸ Subconsultants and their roles (if any) | ▸ Existing data exchange |
| ▸ Chain of command | ▸ Permitting |
| ▸ Project goals and objectives | ▸ Project meeting schedule |
| ▸ Owner preferences and concerns | ▸ Delivery model |
| ▸ Existing asset condition | ▸ Filtration option preference |

Our project management approach stresses communication up front so that we understand the Town's needs and goals prior to fully submerging all staff members into the project. The approach includes a process of keeping you informed about progress of the work and keeping you involved in making key decisions through focused and scheduled meetings.

The goal is to balance the needs and goals of the Town with the project cost and schedule. Our approach to design is centered on understanding the problem to be solved and incorporating the preferences of the Town into that solution. We understand that there are often many ways to complete a design, but ultimately, it will not be successful unless your staff and operators are in support of the design.


*Figure 3-3. Our straightforward approach to design and approach to project management will result in a smoothly executed project.*

## Quality

A major benefit of having all disciplines in the same office and dedicated to specific design services, such as municipal water, is that our work teams are coordinated and consistent. Our team's QA/QC program is mandatory on all projects. We use it to develop project documents that adhere to project requirements. Its purpose is to minimize inconsistencies, gaps, and interferences in the documents.

Specific quality control tasks, shown in figure 3-4, will be budgeted into the project. Our timekeeping and manpower system monitors specific task activities. The process implemented on your project could include up to six distinct quality control review subtasks from the beginning of the project to its completion, as shown in the figure.


*Figure 3-4. Quality Management Plan Steps.*

As the project manager, Brett Pugh will be responsible for organizing all aspects of your project's quality control activities including:

- Scheduling QA/QC reviews
- Assembling review teams
- Overseeing in-house quality reviews
- Coordinating with the Town on QA/QC requirements

Brett will also coordinate with the project team so that the quality control functions are smoothly incorporated into the overall scope.

## Resources

Our team routinely completes multiple projects simultaneously, which is how we are able to support so many in-house engineering disciplines. On a project like yours, discipline engineers complete their part of the design in a sequence that meets the submittal schedule. They do not need to be involved throughout the entire duration of

the design, only when their part of the project is active. Discipline leads will remain available for coordination purposes on an as-needed basis throughout the duration of the project. We use this approach to plan resources and make sure we can meet your desired schedule.

**275 Resources**
In Centennial, CO
**42 Local Staff**
Dedicated to Water Projects

This approach offers efficiencies to our local team, who are often collaborating on multiple projects at any given time. The synergies created by working on multiple projects for a single client will create savings by having a single point of contact, reducing the number of site visits, and discuss multiple issues at once spanning both projects. The natural collaboration of our integrated teams saves time and eliminates the need coordinate with a third party. Executing multiple projects puts our team in the best position to understand priorities and where the money needs to be spent the most between the two projects.

## Bid Phase Support & Project Delivery Option

The Town indicated that they anticipate that the project will be delivered by conventional Design-Bid-Build (DBB) but are interested in Construction Management at Risk (CMAR). Both CMAR and progressive Design-Build (DB) may benefit the project by reducing the overall duration, better controlling costs, and managing/sharing risk.

Our approach can be implemented for any of the delivery methods. An open, collaborative discussion will occur during the preliminary design to determine the optimal solution for the Town. Important considerations include schedule, cost, future phasing, collaboration with the watermain design team, and the Town's comfort level with alternative delivery.

**Table 3-5: Project Delivery Method Options**

| Delivery Model | Benefits | Drawbacks |
|---|---|---|
| **DBB – Design Bid Build** | ▸ Traditional method<br>▸ Owner familiarity<br>▸ Typically award on lowest bid<br>▸ Established price | ▸ Cost unknown until bid (high bids)<br>▸ Must fully define project before bidding<br>▸ Separate contracts for designer and contractor |
| **DB – Design Build** | ▸ Collaboration<br>▸ Early bid packages<br>▸ Open book accounting<br>▸ Reduce schedule by early start of construction<br>▸ Single contract for design-builder<br>▸ Additional value engineering and risk management opportunities. | ▸ Learning curve for some owners<br>▸ Joint venture or prime/sub arrangement between designer and contractor |
| **CMAR – Construction Manager at Risk** | ▸ Collaboration with contractor during design<br>▸ Early bid packages<br>▸ Open book accounting<br>▸ Additional value engineering and risk management opportunities | ▸ Quality based selection, not competitively bid on price alone<br>▸ Separate contracts for designer and contractor |

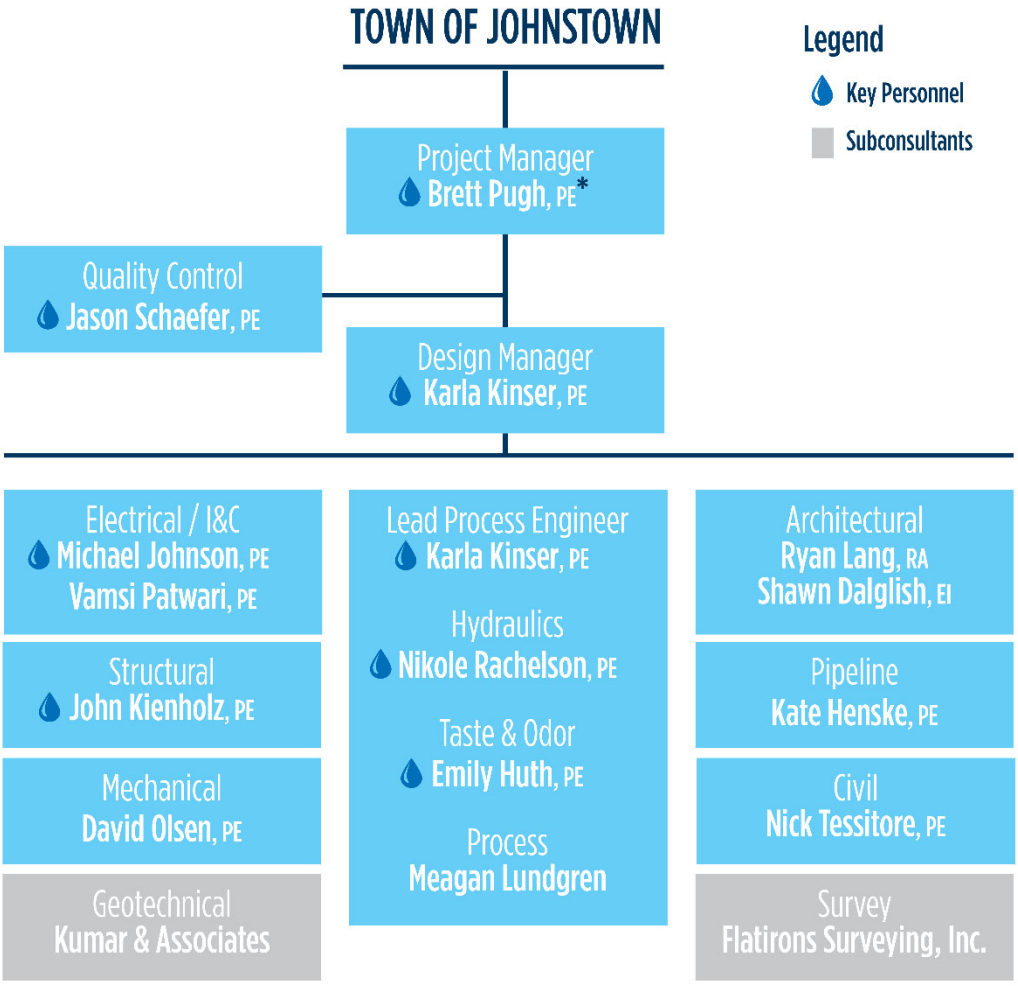
*Please refer to Section 7 in this proposal for more information about delivering this project with a design-build delivery model.*

# Section 4. Staff Qualifications

## Organization Chart

Our design team is 100% located in Centennial, Colorado, providing you with readily available in-person interface and allowing our team members to be on site quickly. Brett Pugh, project manager, will be your primary point of contact, partnering with the Town and managing the project's scope, schedule, budget, and quality objectives. Resumes are provided in Attachment A.

The project manager, project engineer, quality reviewer, and key discipline leads will remain engaged with the project througout construction, providing the Town with seamless support. Our project team organization is set up to seamlessly transition from design only to design-build delivery, should the Town elect to pursue that option.




*** There are many opportunities for synergy between the water treatment and wastewater treatment projects. If the same team executes both projects, there would be efficiencies gained from having the project manager be involved in both projects. We would like to discuss the possibilities with the Town. In addition to shared leadership, there would be benefits in terms of shared meetings, reporting, scheduling, and invoicing, which would further promote cost savings and streamline communications across both projects. Likewise, If the Town selects a design-build delivery model, we could also implement a consistent design-build manager across both projects.**

# Key Team Member Bios & Client References

All key staff will continue to be involved through the construction phase.

## Brett Pugh, PE | Project Manager & Point of Contact in Responsible Charge of Project

License | Professional Engineer: CO (Civil) Location | Centennial, CO

23 years of experience in both water and wastewater treatment facility design, construction, and commissioning, which includes dissolved air flotation, membrane filtration, and granular media filtration optimization. Has been actively involved with collaborative project delivery (DB, progressive DB, CMAR) for more than 20 years. Partners with clients to understand their key project drivers to develop realistic and cost-effective solutions.

| REFERENCES | |
|---|---|
| 1 | Project \| Lynn R. Morgan Water Treatment Plant Expansion (2021) $10.7M<br>Role on Project \| Project Manager<br>Owner & Contact \| Town of Erie, CO<br>Todd Fessenden (303) 926-2895, tfessenden@erieco.gov |
| 2 | Project \| Boxelder WWTP Expansion (2021) $32M<br>Role on Project \| Project Manager<br>Owner & Contact \| Boxelder Sanitation District<br>Brian Zick: (970) 498-0604, brianz@boxeldersanitation.org |
| 3 | Project \| Dodd WTP Hydroelectric Project (2020) $3M<br>Role on Project \| Project Manager<br>Owner & Contact \| Left Hand Water District<br>Chris Smith (303) 530-4200, chrissmith@lefthandwater.org |

## Jason Schaefer, PE | Quality Control/Assurance

License | Professional Engineer: CO (Civil) Location | Centennial, CO

13 years of experience as a senior process design engineer, project manager, and quality reviewer for major water treatment facility retrofits and new plants, using both traditional and collaborative project delivery methods. Extensive experience in pretreatment, treatment process selection, plant optimization, and design-build delivery. Will provide knowledgeable guidance in both project scope development and engineering solutions.

| REFERENCES | |
|---|---|
| 1 | Project \| Dodd WTP Upgrades (2016) $28M<br>Role on Project \| Project Manager / Project Engineer<br>Owner & Contact \| Left Hand Water District<br>Chris Smith, District Manager: (303) 530-4200\| chrissmith@lefthandwater.org |
| 2 | Project \| Thornton WTP Replacement (2020) $100M<br>Role on Project \| Project Manager<br>Owner & Contact \| City of Thornton<br>Dennis Laurita: (303) 538-7649 \| dennis.laurita@thorntoncolorado.gov |
| 3 | Project \| Advanced Treatment at Plum Creek Water Purification Facility (2021) $29M<br>Role on Project \| Project Manager<br>Owner & Contact \| Town of Castle Rock<br>Tim Friday: (720) 733-6030 \| tfriday@crgov.com |

## Karla Kinser, PE | Design Manager/ Lead Process Engineer

License | Professional Engineer: CO (Civil) Location | Centennial, CO

26 years of experience in water treatment, serving as a project engineer, lead process engineer, and filtration specialist. Globally recognized subject matter specialist in membrane treatment. Has led the multi-discipline design effort for large water treatment plant expansions and retrofits nationwide.

REFERENCES

1
Project | TDS Reduction at Cherokee Water Reclamation Facility (2021) $42M
Role on Project | Lead Process Engineer
Owner & Contact | Cherokee Metropolitan District
Jeff Munger: (719) 597-5080 ext. 115 | jmunger@cherokeemetro.org

2
Project | Wes Brown WTP Membrane Analysis and Pilot, Train 8 Mods (2021) $1.2M
Role on Project | Lead Process Engineer
Owner & Contact | City of Thornton
Stacy Roberts: (720) 977-6252 | Stacy.Roberts@thorntoncolorado.gov

3
Project | Lynn R. Morgan Water Treatment Plant Expansion (2021) $10.7M
Role on Project | Membranes Specialist
Owner & Contact | Town of Erie, CO
Todd Fessenden (303) 926-2895, tfessenden@erieco.gov

## Nikole Rachelson, PE | Process Engineer (Hydraulics)

License | Professional Engineer: CO (Civil) Location | Centennial, CO

14 years of experience with both water treatment plant and pump station hydraulics at facilities ranging from 1 to 215 MGD. Experience includes design and analysis of hydraulics to optimize functionality, determine hydraulic capacity, accommodate complicated retrofits without impacting upstream processes, and maximize efficiency.

REFERENCES

1
Project | Interim Compliance at Fountain Valley Authority WTP (2017) $1.1M
Role on Project | Project Manager
Owner & Contact | Colorado Springs Utilities
Jerad Barnett: (719) 688-4546 | jbarnett@csu.org

2
Project | Eaton Pump Station Relocation (2018) $1.8M
Role on Project | Project Manager / Hydraulics Lead
Owner & Contact | City of Westminster
Julie Koehler: (303) 658-2178 | jkoehler@cityofwestminster.us

3
Project | Highlands Booster Pump Station (2016) $700K
Role on Project | Project Manager / Hydraulics Lead
Owner & Contact | Cottonwood Water & Sanitation District
Ron Lambert, Owner's Engineer, Mulhern: (303) 649-9857 | ron@mulhernemre.com

## Emily Huth, PE | Process Engineer (Taste & Odor)

License | Professional Engineer: WY (Civil) Location | Centennial, CO

Six years of experience as a process design engineer and project engineer on water treatment facility projects. Experience includes piloting of filter loading rates, pretreatment, and filtration; and process designs that address taste and odor concerns in variable water sources.

| REFERENCES | |
|---|---|
| 1 | Project \| Thornton WTP Replacement (2020) $100M<br>Role on Project \| Project Engineer<br>Owner & Contact \| City of Thornton<br>Dennis Laurita: (303) 538-7649 \| dennis.laurita@thorntoncolorado.gov |
| 2 | Project \| Wes Brown WTP Membrane Analysis and Pilot, Train 8 Mods (2021) $1.2M<br>Role on Project \| Assistant Project Manager, Process Engineer<br>Owner & Contact \| City of Thornton<br>Stacy Roberts: (720) 977-6252 \| Stacy.Roberts@thorntoncolorado.gov |
| 3 | Project \| Gregory Hill Pump Station (Part of Pressure Zone 3 Expansion)<br>Role on Project \| Project Engineer<br>Owner & Contact \| City of Westminster<br>Julie Koehler: (303) 658-2178 \| jkoehler@cityofwestminster.us |

## John Kienholz, PE | Structural Engineer

License | Professional Engineer: CO (Civil) Location | Centennial, CO

17 years of experience focused in the water industry, designing steel, concrete, and masonry structures and substructures. Has served as the lead structural engineer on some of the largest water treatment and wastewater treatment projects in the Denver Metro area. Also serves as a building information model (BIM) coordinator for these projects, coordinating the design effort across multiple disciplines.

| REFERENCES | |
|---|---|
| 1 | Project \| Advanced Treatment at Plum Creek Water Purification Facility (2021) $29M<br>Role on Project \| Lead Structural Engineer<br>Owner & Contact \| Town of Castle Rock<br>Tim Friday: (720) 733-6030 \| tfriday@crgov.com |
| 2 | Project \| Thornton WTP Replacement (2020) $100M<br>Role on Project \| Structural Engineer<br>Owner & Contact \| City of Thornton<br>Dennis Laurita: (303) 538-7649 \| dennis.laurita@thorntoncolorado.gov |
| 3 | Project \| TDS Reduction at Cherokee Water Reclamation Facility (2021) $42M<br>Role on Project \| Lead Structural Engineer<br>Owner & Contact \| Cherokee Metropolitan District<br>Jeff Munger: (719) 597-5080 ext. 115 \| jmunger@cherokeemetro.org |

## Michael Johnson, PE | Electrical/I&C Engineer

License | Professional Engineer: CO (Electrical) Location | Centennial, CO

20 years as an electrical and controls engineer, with experience in the water industry spanning treatment facility expansions, new treatment facilities, and pump stations.

| REFERENCES | |
|---|---|
| 1 | Project \| Lynn R. Morgan Water Treatment Plant Expansion (2021) $10.7M<br>Role on Project \| Electrical Engineer<br>Owner & Contact \| Town of Erie, CO<br>Todd Fessenden (303) 926-2895, tfessenden@erieco.gov |
| 2 | Project \| Broomfield WTF Expansion (2020) $16M<br>Role on Project \| Electrical Engineer<br>Owner & Contact \| City and County of Broomfield<br>Ronda Jo Ackerman Alford: (303) 464-5807 \| ralford@broomfield.org |
| 3 | Project \| First Creek Lift Station Capacity Improvements (2021) $407K<br>Role on Project \| Electrical Engineer<br>Owner & Contact \| City of Aurora<br>Andrea Long: (720) 859-4346 \| along@auroragov.org |

# Additional Design-Build Resources

*If the Town is interested in design-build, Jason Schaefer will serve as the design-build manager, and Garney Construction will serve as the construction manager.*

## Matt Wampler, DBIA | Construction Manager

Garney Construction Location | Littleton, CO

20 years of construction experience in the water industry with a strong background in design-build. Role includes day to day field operations, client interface, material procurement and approvals, and subcontractor management. Recent experience working with Burns & McDonnell on two large treatment facilities in Colorado using design-build delivery. Select recent experience includes:

- Construction manager, City of Thornton, Thornton WTP Replacement (20 MGD, $100M) (Progressive Design-Build with Burns & McDonnell)
- Construction manager, Cherokee Metropolitan District, TDS Reduction at Cherokee Water Reclamation Facility ($42M) (Progressive Design-Build with Burns & McDonnell)
- Senior project manager, Metro Wastewater Reclamation District, PAR 1088 Northern Treatment Plant ($98M) (Progressive Design-Build)
- Senior project manager, City of Loveland, Wastewater Treatment Plant Improvements ($35M)

# Subconsultants

We often subcontract with topographical surveying and geotechnical firms with local knowledge and relationships. Our team has successfully worked with the firms below on water projects across the Front Range.

- Kumar & Associates provides geotechnical engineering services, environmental sciences, engineering geology, construction observation, and material testing. Their more than 80 professional engineers and geologists, environmental scientists, and engineering technicians have recent water project experience.
- Flatirons Surveying, Inc. has served the Front Range since 1981 as a premier provider of surveying services that include a wide variety of construction surveying and construction layout services. Flatirons has a staff of 50 professionals that includes six licensed surveyors, 10+ field crews, and a complete drafting department.

# Section 5. Related Project Experience

Our project team has extensive experience along the Front Range and into Wyoming and Montana. We selected the following projects with the most relevance to the Town. Details on each project immediately follow.

| Featured Projects<br>*Detailed descriptions are provided on pages 28-32.* | Colorado Project | WTP Retrofit / Expansion | Pretreatment | Granular Media Filtration | Membrane Filtration | Taste & Odor Control | DOVE Compliance | Pumping | Plant Size (MGD) | Year Complete |
|---|---|---|---|---|---|---|---|---|---|---|
| Lynn R. Morgan WTF Expansion | C | • | • | | • | • | • | • | 16 | 2020 |
| Plum Creek WPF Advanced Trmt. | C | • | • | • | • | • | • | • | 6 | 2021 |
| Dodd WTP Upgrades | C | • | • | | • | • | • | • | 16 | 2016 |
| Broomfield WTF Expansion | C | • | • | • | | | • | • | 26 | 2020 |
| Thornton WTP Replacement | C | | • | • | | • | • | • | 20 | 2020 |

## Consistent Project Team

Our project team has worked together on numerous, similar projects in recent years, all in this region. This shared success will benefit the Town by building off our team's relevant local knowledge and we can hit the ground running. Our consistent team will lead to consistent results.

| Consistent Team = Consistent Results<br>Owner \| Project | Brett Pugh | Karla Kinser | Jason Schaefer | Nikole Rachelson | Emily Huth | Meagan Lundgren | Michael Johnson | Nick Tessitore | John Kienholz | David Olsen |
|---|---|---|---|---|---|---|---|---|---|---|
| City of Thornton \| Thornton WTP Replacement | • | • | • | | • | • | • | • | • | • |
| Left Hand Water District \| Dodd WTP Upgrades | | | • | • | • | | | • | • | |
| Town of Erie \| Lynn R. Morgan WTF Expansion | • | • | • | • | | | • | • | • | • |
| Town of Castle Rock \| Plum Creek WPF Advanced Treatment | • | • | • | • | • | • | • | • | • | • |
| City and County of Broomfield \| Broomfield WTF Expansion | • | | • | • | | | • | • | • | • |
| City of Westminster \| Pressure Zone 3 Expansion | | • | • | • | • | | • | • | • | • |
| Colorado Springs Utilities \| Rechlorination at Research & Roxbury Pump Stations | | • | • | • | | | • | • | • | • |
| Denver Water \| Moffat WTP Modifications (DP#7) | • | • | • | • | | | | | • | • |
| Left Hand Water District \| Dodd Hydroelectric Facility | • | | • | • | | | • | • | • | • |
| Mt Carbon Metro District \| Morrison WTP Expansion | • | • | • | • | | | | • | • | • |

# Featured Projects

## Lynn R. Morgan WTF Expansion | Erie, CO

Collaborative Delivery Project with Garney Construction

### CLIENT & REFERENCE

- Town of Erie, Colorado
  Todd Fessenden, Public Works Director - Utilities
  (303) 926-2895
  tfessenden@erieco.gov

### PLANT SIZE

- 16 MGD

### COMPLETION DATES & VALUE

- Design Complete: February 2019
- Construction Complete: 2020
- Design Fee: $1.5 million
- Constructed Value: $12.8 million

### FIRM'S ROLE & SERVICES

- Prime Consultant
- Preliminary Design, Final Design, Construction Phase Support

### KEY STAFF

- Brett Pugh, Project Manager
- Karla Kinser, Membrane Specialist
- Jason Schaefer, Quality Control
- Nick Tessitore, Civil
- David Olsen, Mechanical
- John Kienholz, Structural QC
- Michael Johnson, Electrical

The Town of Erie required an expansion of the Lynn R. Morgan WTF to meet the needs of a growing customer base. Our team provided design and construction phase services to expand the WTF from 9.9 to 16.6 MGD. The expansion includes a micro-turbine facility for hydroelectric generation on their Carter Lake Reservoir supply from the Northern Colorado Water Conservancy District, yard piping modifications, a new pretreatment train consisting of 4-stage flocculation and inclined plate settlers, three new 2.25 MGD submerged membrane trains, a new 4,500 gpm high service pump and a new 30-inch finished water transmission main.

The existing submerged membrane systems included six submerged membrane cells with only three trains populated. The expansion added membrane modules, permeate pumps, piping, valves, and associated instrumentation to the three vacant cells. The entire submerged membrane control system was updated to replace discontinued hardware. The existing ancillary equipment will be maintained to reduce the overall project cost.

The Town of Erie receives its raw water from a blend of Carter Lake, the Boulder Feeder Canal, Erie Lake, and the Thompson Reservoir. The Town was experiencing taste and odor issues attributed to the presence of geosmin in the raw water supply. Burns & McDonnell completed jar testing and prepared a study to identify alternatives to broadcasting an algaecide to its reservoirs. Powdered activated carbon injection, granular activated carbon absorption, ozone, and biologically active filtration were evaluated, with PAC selected as the most cost effective for the anticipated geosmin levels and blending ratios.

The project included a characterization of the raw water sources to identify operational savings based on seasonal variations and combinations of sources. Operations data from both the submerged and pressurized membrane plants were analyzed to identify seasonal trends, assess the efficacy of the current cleaning protocols, and flag opportunities for optimization.

Construction was phased to avoid impacts on operations, with the submerged membrane installation occurring during a seasonal outage during low demand periods. Our team worked with Garney Construction, using a CMAR collaborative delivery method, to procure long-lead equipment early, reducing the overall construction duration by 10 weeks.

## Thornton Water Treatment Plant Replacement | Thornton, CO

The new Thornton Water Treatment Plant (TWTP) was implemented to replace the existing Thornton Treatment Plant (originally constructed in 1955), which was near the end of its useful life. The new TWTP has a firm capacity of 20 MGD and works in concert with the Wes Brown WTP to serve the City's water needs.

Our team performed a six-month pilot that included pre-oxidation, pretreatment, intermediate ozone, and biofiltration. This led to the process train selection of raw water oxidation, pumped rapid mix, flocculation, sedimentation with plate settlers, advanced oxidation with ozone and hydrogen peroxide, biologically active filtration, and chlorine disinfection. The TWTP includes advanced treatment train is designed to accommodate 99.9% taste and odor removal.

### CLIENT & REFERENCE

- City of Thornton, Colorado
  Dennis Laurita
  Contract Administrator
  (303) 538-7649
  dennis.laurita@thorntonco.gov

### PLANT SIZE

- 20 MGD

### COMPLETION DATES & VALUE

- Design Complete: 2018
- Construction Complete: 2020
- Design Fee: $5,079,130
- Constructed Value: $100 million

### FIRM'S ROLE & SERVICES

- Subconsultant to Contractor
- Piloting, Preliminary Design, Final Design, Construction Phase Support

### KEY STAFF

- Jason Schaefer, Project Manager
- Brett Pugh, Quality Control
- Karla Kinser, Quality Control
- Emily Huth, Project Engineer
- John Kienholz, Structural
- Nick Tessitore, Civil
- David Olsen, Mechanical
- Michael Johnson, Electrical

Though the existing plant met all current regulatory standards for water quality, the new TWTP is a much more flexible plant that can adjust to treat several source water conditions and exceed existing water treatment standards. In addition, it was designed with hydraulic capacity for emergency treatment during high-flow periods. The pilot-tested and CDPHE-approved high filter loading rates allows for sustained peak flows during high demands systems. However, the TWTP will be operated at a more conservative filter loading rate.

The TWTP treats water from Thornton's two primary existing surface water sources: Standley Lake and the South Platte River. Water from Standley Lake presents few quality issues, though seasonal fluctuations sometimes create reduced volumes of water available from that source. Water obtained from the South Platte presents chronic challenges with taste and odor, a problem stemming primarily from the presence of organic matter, algae blooms, and other constituents. TWTP can isolate treatment of the respective water sources coming into the plant. This gives operators the flexibility to isolate or blend the two raw water sources as needed, optimizing chemical use, and potentially saving costs. The inclusion of multiple chemical injection points throughout the treatment train also aids in operational flexibility. This feature, combined with strategically placed instrumentation, allows the city to quickly respond to significant variations in water source quality.

> You guys are just fantastic. Great partners... a hell of a team. It is a pleasure to work on projects with you and this project was outstanding. Thanks for all you do.
> - Dennis Laurita, City of Thornton

## Dodd WTP Upgrades | Niwot, CO

### CLIENT

- Left Hand Water District, Colorado
  Chris Smith
  (303) 530-4200
  chrissmith@lefthandwater.org

### COMPLETION DATES & VALUE

- Design Complete: 2015
- Construction Complete: 2016
- Design Fee: $2,040,000
- Constructed Value: $28.8 million

### FIRM'S ROLE & SERVICES

- Design-Build Joint Venture with Garney Construction
- Preliminary Design, Final Design, Construction Phase Support

### KEY STAFF

- Jason Schaefer, Project Manager & Lead Process Engineer
- Nikole Rachelson, Process
- Emily Huth, Process
- Nick Tessitore, Civil
- John Kienholz, Structural

Burns & McDonnell worked as part of a design-build team with Garney Construction to upgrade to the Dodd Water Treatment Plant (DWTP) in Niwot, Colorado. Burns & McDonnell permitted and designed and the upgrades to the DWTP. The DWTP includes conventional pretreatment with high-rate inclined plate settlers, MF/UF membranes, clearwell, and high service pumping to increase capacity from an 8 MGD to 10 MGD with the capability to expand to 16 MGD.

Additional facility components include an administration spaces including a laboratory, control center; chemical storage and feed for a coagulant, sodium permanganate, sodium hypochlorite, hydrochloric acid, hydrofluorosilicic acid, citric acid, powder activated carbon, caustic soda, and sodium bisulfite; and full site development including solids holding ponds, storm drainage, and raw water pipes.

The existing Dodd WTP utilized a soda ash feed system for finished water pH and alkalinity adjustment. The District's preference was to change to a sodium hydroxide feed system, both for consistency with the membrane cleaning chemicals used, as well as reducing their reliance on a dry chemical feed system. To make the transition from soda ash to caustic soda, Burns & McDonnell developed a desktop water quality model to identify the stability of the finished water. This model calculated water quality indices such as the Ryznar index, calcium carbonate precipitation potential, dissolved inorganic carbon, aggressiveness index, and langelier saturation index to determine if changing pH adjustment methods would affect the stability of the water. The desktop model generated the design criteria for the chemical dosing systems, pretreatment with inclined plate settlers in front of the Pall Corporation ultrafiltration membrane system. Our team verified the desktop model chemical dosing rates with a series of jar tests.

The existing disinfection contact basin was abandoned and replaced with a larger basin. Our team worked with CDPHE to develop acceptable CT design criteria at the beginning of the DOVE initiative and was one of the first facilities in the state to meet the criteria.

> We have no doubt that few teams could have met all of our objectives within such a compressed design and construction timeline. And you did it!
> - Christopher Smith, General Manager, Left Hand Water District

## Advanced Treatment at Plum Creek WPF | Castle Rock, CO

### CLIENT & REFERENCE

- Town of Castle Rock, Colorado
  Tim Friday, Engineering Manager
  P: (720) 733-6030
  E: tfriday@crgov.com

### PLANT SIZE

- 6 MGD

### COMPLETION DATES & VALUE

- Design Complete: 2018
- Construction Complete: 2021
- Design Fee: $1,528,086
- Constructed Value: $29 million

### FIRM'S ROLE & SERVICES

- Design-Build Joint Venture with Garney Construction
- Piloting, Preliminary Design, Final Design, Construction Phase Support

### KEY STAFF

- Jason Schaefer, Project Manager
- Emily Huth, Project Engineer
- Karla Kinser, Quality Control
- John Kienholz, Structural
- Nick Tessitore, Civil
- David Olsen, Mechanical

Castle Rock Water is taking a proactive approach to developing a sustainable, long-term water supply for its customers. Part of this approach includes developing a raw water supply and treatment system capable of meeting demands using 75% renewable sources. As the original designer of the Plum Creek Water Purification Facility (WPF), Burns & McDonnell planned for the addition of advanced treatment systems to the facility that will help the Town meet its renewable source goals.

The Town's strategy to meet these goals includes both planned indirect and direct potable reuse sources from the water reclamation facility. The Advanced Treatment Project includes the addition of additional systems to provide additional removal of giardia, viruses, and cryptosporium, while also targeting reductions in contaminants of emerging concern.

Our team provided piloting, design, and full-time construction observation services for the addition of raw water blending, biological filtration, advanced oxidation, UV, granular activated carbon, and residuals handling to the WPF. The facility is currently rated for 6 MGD but has been designed to expand to 12 MGD in the future.

The granular activated carbon system includes eight adsorption vessels, each filled with 40,000 pounds of direct activated GAC. The system targets emerging contaminants such as pharmaceuticals/ personal care products, as well providing a polishing step for total organic carbon.

The project is being completed using the same Guaranteed Maximum Price Construction Management delivery method that was used for the design and construction of the original facility. Like the original facility, the construction of the project has been divided into multiple work packages to expedite the schedule.

## Broomfield WTF Expansion | Broomfield, CO

### CLIENT & REFERENCE

- City & County of Broomfield, Colorado
  Ronda Jo Ackerman Alford
  P: (303) 464-5807
  E: ralford@broomfield.org

### PLANT SIZE

- 26 MGD

### COMPLETION DATES & VALUE

- Design Complete: 2018
- Construction Complete: 2020
- Design Fee: $1,012,884
- Constructed Value: $16 million

### FIRM'S ROLE & SERVICES

- Prime Consultant
- Preliminary Design, Final Design, Construction Phase Support

### KEY STAFF

- Jason Schaefer, Project Manager
- Brett Pugh, Quality Control
- John Kienholz, Structural
- Nick Tessitore, Civil
- David Olsen, Mechanical

Burns & McDonnell provided design services to expand the Broomfield WTF's capacity from 20 MGD to 26 MGD, replace existing equipment at the end of its useful life, and bring the WTF into compliance with certain design criteria that have evolved since its original construction. In many cases the improvements also provide ease of future expansion to the WTF to reach its ultimate build out capacity of 32 MGD.

In addition to preparing construction plans and specifications, our team assisted Broomfield in evaluating potential contractors for CMGC services at the 30% design milestone. We prepared the necessary documentation to obtain all pre-construction related permits including CDPHE permit to construct, City and County of Broomfield (CCoB) building permit, CCoB PUD update, and '20-day letter' environmental clearance.

Improvements included expanding the raw water metering and chemical injection vault, replacing the existing rapid mix equipment, replacing existing vertical flocculators, adding a third stage of flocculation, replacing the existing PVC tube settlers with SST lamella plate settlers, adding three filter cells, and improving the existing solids handling and chemical storage/feed facilities.

The project team developed an early equipment procurement package and the filter building foundation to provide the CMGC contractor the ability to start these elements of the work early and meet CCoB's desired timeline. The existing WTF can only be taken offline for a few days at a time and only during low demand season, so coordinating design and construction activities was critical to the project's success.

The solids handling improvements eliminated a significant maintenance issue with an existing circular (hosed) solids collection system with minor piping improvements and equipment improvements and avoiding costly basin modifications, or addition. The chemical system improvements relocated existing pre-treatment chemicals into a new building, closer to the point of application, provide a permanent home for new PAC feed equipment, and provide space for a future chemical of choice. A new soda ash storage and feed building was added much closer to its injection point, reducing the maintenance previously associated with a long run of feed piping. The existing Aqua Ammonia storage and feed system was replaced by liquid ammonium sulfate, reducing safety concerns for WTF staff. The chemical systems remaining in the existing facility were re-partitioned and their feed equipment separated to further enhance working conditions for WTF staff.

## More Local WTP Expansions & Retrofits Than Any Other Team

The projects shown in the table below presented a wide variety of design and construction challenges as well as extensive permitting requirements. You can be confident that we will mitigate your project's challenges because we have consistently done so on similar projects for local clients. Our approach to design is centered on working with your stakeholders and operators to maximize your budget, and ultimately deliver a facility that will be easy and safe to operate for many years.

### New Water Treatment Facility Designs & Major Expansions

*DB = Design-Build*
*CMAR = Construction Manager at Risk*
*EPC = Engineer-Procure-Construct*

| | Construction Complete (Year) | Size (MGD) | Delivery Method | Constructed Value (Approx. $) | Colorado Project | New Facility | Expansion or Retrofit | Inclined Plate Settler Sedimentation | Membrane Filtration |
|---|---|---|---|---|---|---|---|---|---|
| Thornton Water Treatment Plant Replacement | 2020 | 20 | DB | $100M | ● | ● | | ● | |
| Westminster Northwest WTP | 2002 | 15 | DB | $18M | ● | ● | | ● | ● |
| Westminster Northwest WTP Expansion | 2011 | 20 | DB | $3M | ● | | ● | | ● |
| Westminster Semper WTP Plate Settler Addition | 2006 | 44 | DB | $2M | ● | | ● | ● | |
| TCMWC Maple Grove WTP Residuals Handling | 2020 | 15.6 | EPC | $8.1M | ● | | ● | | ● |
| Castle Rock Plum Creek WPF Advanced Treatment | 2020 | 6 | CMAR | $29M | ● | | ● | | |
| Castle Rock Plum Creek WPF | 2013 | 6 | CMAR | $17M | ● | ● | | ● | ● |
| Left Hand Water District Dodd WTP Upgrades | 2016 | 16 | DB | $29M | ● | | ● | ● | ● |
| Broomfield WTP Expansion | 2020 | 26 | CMAR | $16M | ● | | ● | ● | |
| Mt. Carbon Metro. Dist. Morrison WTP Expansion | 2022 | 1 | EPC | $13M | ● | | ● | ● | ● |
| Cherokee Metro. Dist. WRF TDS Reduction | 2023 | 4.8 | DB | $42M | ● | | ● | | |
| Erie Lynn R. Morgan WTP Exp. (2) | 2020 | 16 | CMAR | $12.8M | ● | | ● | ● | ● |
| Erie Lynn R. Morgan WTP Exp. (1) | 2010 | 9.9 | DB | $13.1M | ● | | ● | ● | ● |
| Erie Lynn R. Morgan WTP Pressure Membrane Expansion | 2014 | 9.9 | EPC | $340K | ● | | ● | | ● |
| Clifton Charles A. Strain WTP Pretreatment Imp. | 2009 | 16 | DB | $6M | ● | | ● | ● | |
| Thornton Wes Brown WTP Exp. | 2006 | 50 | CMAR | $57M | ● | | ● | | ● |
| Colo. Springs Util. FVA WTP TOC Removal | 2017 | 18 | DB | $1M | ● | | ● | | |
| Denver Water Moffat WTP Repurposing | 2022 | 150 | DBB | $12M | ● | | ● | | |
| Denver Water North Complex EI&C Upgrades | 2017 | - | EPC | $6.4M | ● | | ● | | |
| Rapid City, SD Jackson Springs WTP | 2013 | 8 | DBB | $20M | | ● | | ● | ● |
| Gillette, WY Pine Ridge Disinfection Facility | 2016 | 10 | DBB | $5.75M | | ● | | | |
| Billings, MT West End WTP | 2024 | 20 | DBB | $60M | | ● | | | |

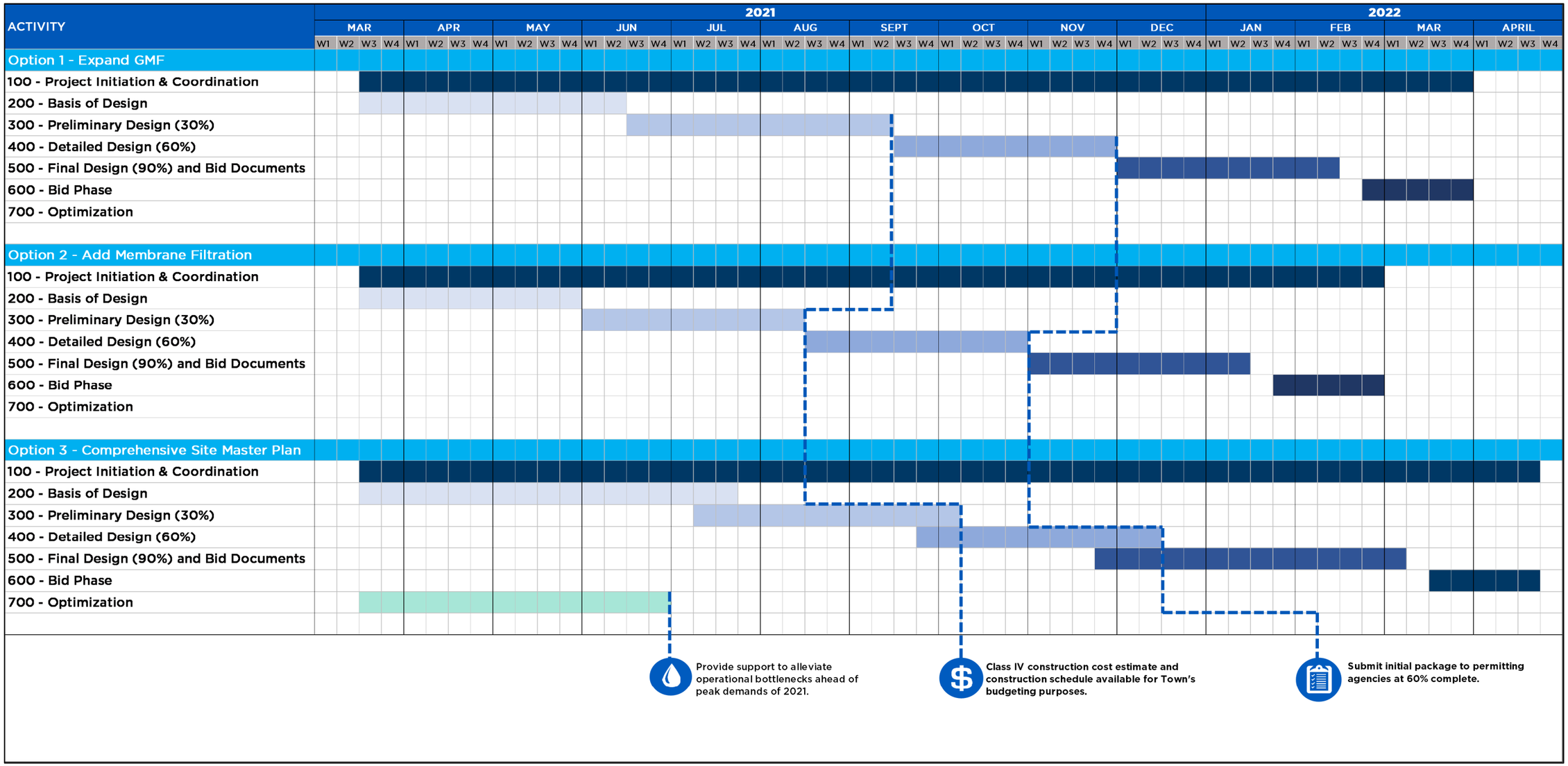
# Section 6. Project Schedule

Three project schedules are included herein for your consideration, based on the options described in Section 4, and summarized below. The level of effort and duration varies based on the scope of each option. Our goal is to complete the basis of design and have a preliminary cost estimate to the Town for the late summer of 2021 for your budgeting purposes. The schedules below compare the duration of the major task series. Initial permitting submittals will occur with the 60% complete design packages. Permitting submittal review and approvals periods will vary by agency (Town, Weld County, CDPHE). Option 3 includes a parallel series of tasks to help give your operators some breathing room for the peak demand season of 2021.

**Table 6.1: Basis of Schedule and Fee Summary**

| Approach | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| **Process Unit** | **Granular Media Filtration Expansion** | **Membrane Filtration Expansion** | **Comprehensive Site Master Plan** |
| **Lonetree Pump Station & Pipeline** | Remain as is | | |
| **Town Lake Pump Station** | Remain as is | | |
| **Raw Water Tank** | Remain as is | | |
| **Chemical Storage** | Remain in existing location | Add storage to the new Membrane Building | |
| **Pretreatment Capacity** | Existing DAF 10 MGD | | Convert to SAF 12.5 MGD |
| **Filtration** | Expand existing Filter Building with 3 new GMF | Add new Membrane Building with 3 trains | |
| **Taste & Odor Control** | Maintain existing PAC system | | Implement multi-phase approach. Lease to own GAC contactors in Membrane Building. Upgrades at Lonetree, Town Lake, and pretreatment. Future flexibility for T&O control. |
| **Disinfection Compliance** | Modify existing GST with baffles | | Add new Disinfection Contact Basin sized for ultimate flows. |
| **Treated Water Storage** | Use existing GST | | Convert GST to distribution storage |
| **Distribution Pump Station** | Add new below ground pump station with 3 pumps. | | New at-grade pump station with vertical turbine pumps above a new DCB |
| **Backwash Supply** | Gravity from existing GST | Backwash from distribution system | |
| **Backwash Waste** | Modify existing pond footprint and recycle pump station for Filter Building expansion | No change | |
| **Best Value Project**<br>Our initial analysis indicates that Options 1 and 2 result in similar estimated construction costs but limit the future flexibility and operational robustness provided by Option 3. | | | |

# Summary Schedule: Options 1, 2, and 3



# Section 7. Alternative Delivery Option

Our fee and scope of work for Options 1, 2, and 3 assume that this project will be executed using traditional design-bid-build delivery. We would like to continue our previous discussions of an integrated Design-Build (DB) delivery with our construction partner, Garney Construction.

Burns & McDonnell executes a large percentage of our projects using DB and other integrated delivery methods because it brings great benefits to projects. We continuously work with local clients looking to meet tight deadlines while realizing cost savings on water projects.

**An integrated delivery model is the most logical for this project because of the schedule savings it offers. This type of delivery also offers the benefit of efficient collaboration by directly aligning the design and construction team in project understanding and expectations.**

## Design-Build Team

As stated previously, our proposal is based on design-bid-build approach, as requested by the Town. **However, we are in a unique position to be able to offer the Town a complete DB proposal at the 60% design milestone.**

If the Town elects to pursue a design-build delivery model, we will complete the project with Garney as our construction partner. Burns & McDonnell will complete the engineering and permitting work with in-house staff, while Garney will act as the general contractor, self-performing critical work and managing subcontracted construction trades.

Our specialty in fast-track, integrated delivery projects is driven by strong project management capabilities and a collaborative approach of working with our client, subcontractors, and contractor from the very beginning, to develop an economical, constructible solution.

The Town will benefit from the added value of having both engineering and construction team members working together from the onset of the design. We gain alignment in purpose and understanding, and together, we work toward meeting the Town's goals. Additionally, we are able to achieve earlier price certainty, reduce costs, and expedite the schedule.

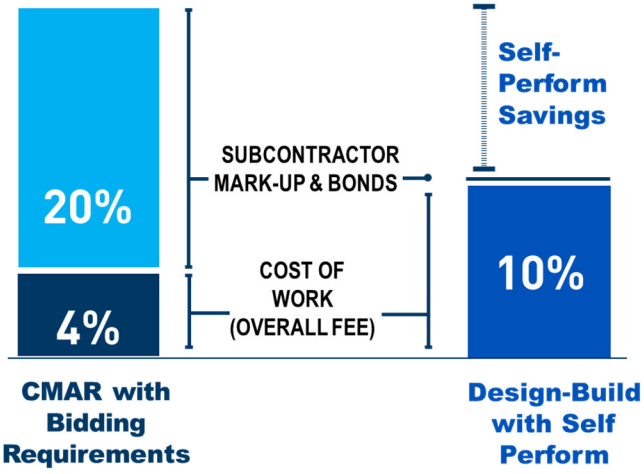
## Benefits to the Town: Design-Build Delivery

**1 One Point of Contact & One Contract**
Streamlined project execution - everyone on the team works toward the project goals

**2 Collaborative Approach**
Design and construction team members work together to solve problems and look for value engineering opportunities

**3 Earlier Price Certainty**
Obtain a Guaranteed Maxium Price (GMP) before the design is complete

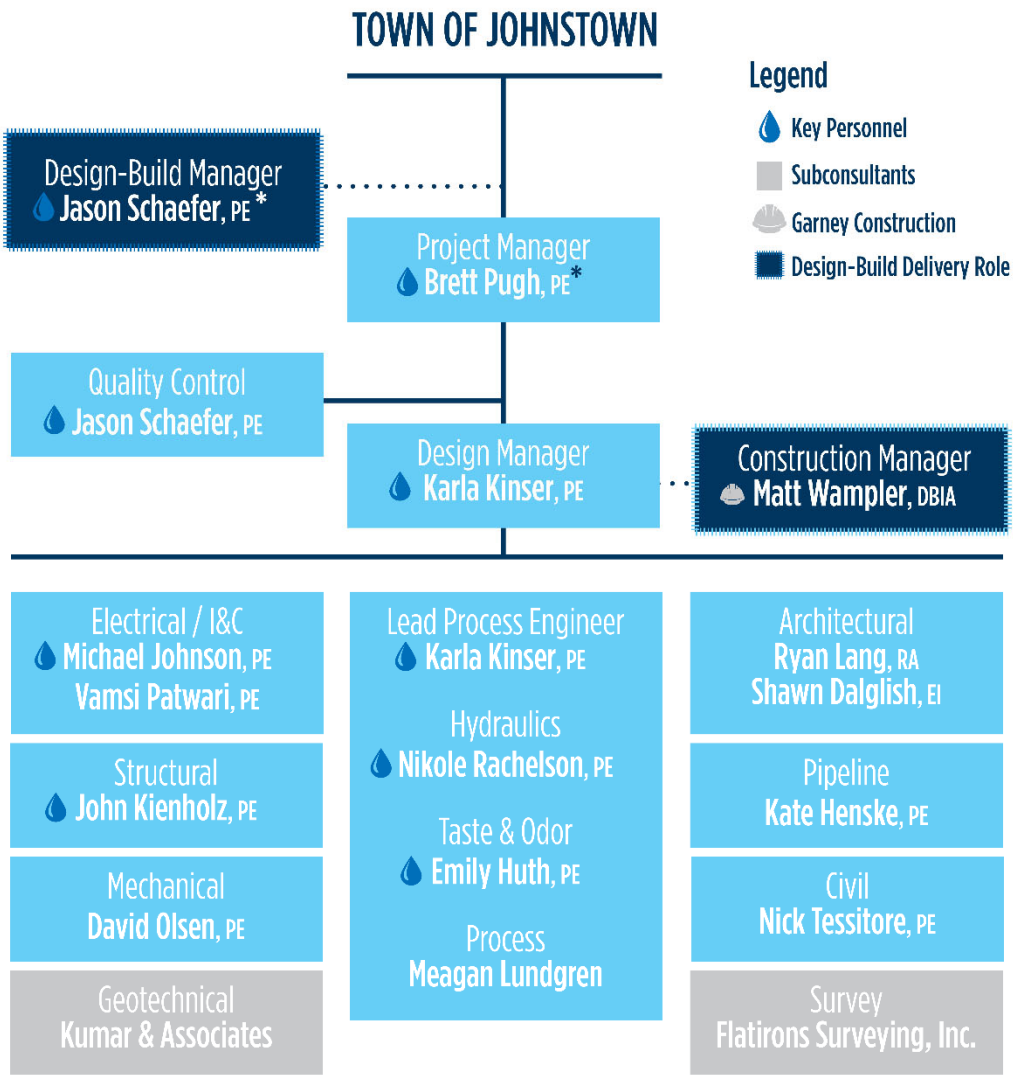
**4 Accelerated Schedule**
Use early work packages and procure long-lead time items before design is complete



## Design-Build Organization

If the Town selects the design-build delivery model, we will transition seamlessly from design into construction, maintaining a consistent staffing structure and adding a design-build manager and construction resources.

You will have a consistent, single point of contact from the beginning of your project through commissioning. We will have one overall design-build manager for the project, a design manager for technical coordination, and a construction manager. We look forward to discussing the specifics and your preferences.




* There are many opportunities for synergy between the water treatment and wastewater treatment projects. If the same team executes both projects, there would be efficiencies gained from having the project manager be involved in both projects. We would like to discuss the possibilities with the Town. In addition to shared leadership, there would be benefits in terms of shared meetings, reporting, scheduling, and invoicing, which would further promote cost savings and streamline communications across both projects. Likewise, If the Town selects a design-build delivery model, we could also implement a consistent design-build manager across both projects.

## Selecting a Delivery Method for Your Project

Our team will host a collaborative discussion with the Town during preliminary design to review project delivery options. The discussion will provide a summary of the benefits and challenges of each delivery method to determine the optimal solution for the Town. Important considerations include schedule, cost, seasonal water demands, and the Town's comfort level with integrated delivery.


*BMcD / Garney Team Experience Summary*

The Town will have the opportunity at the 60% milestone, with the GMP in hand, to select the integrated design-build proposal or just proceed with design and bid the project at final design. If integrated design-build delivery is selected as the path forward, the GMP will include the remaining engineering services and engineering construction services. Our team will be in a strong position to place purchase orders on long-lead time items that were recently bid during the development of the GMP, which will save time.

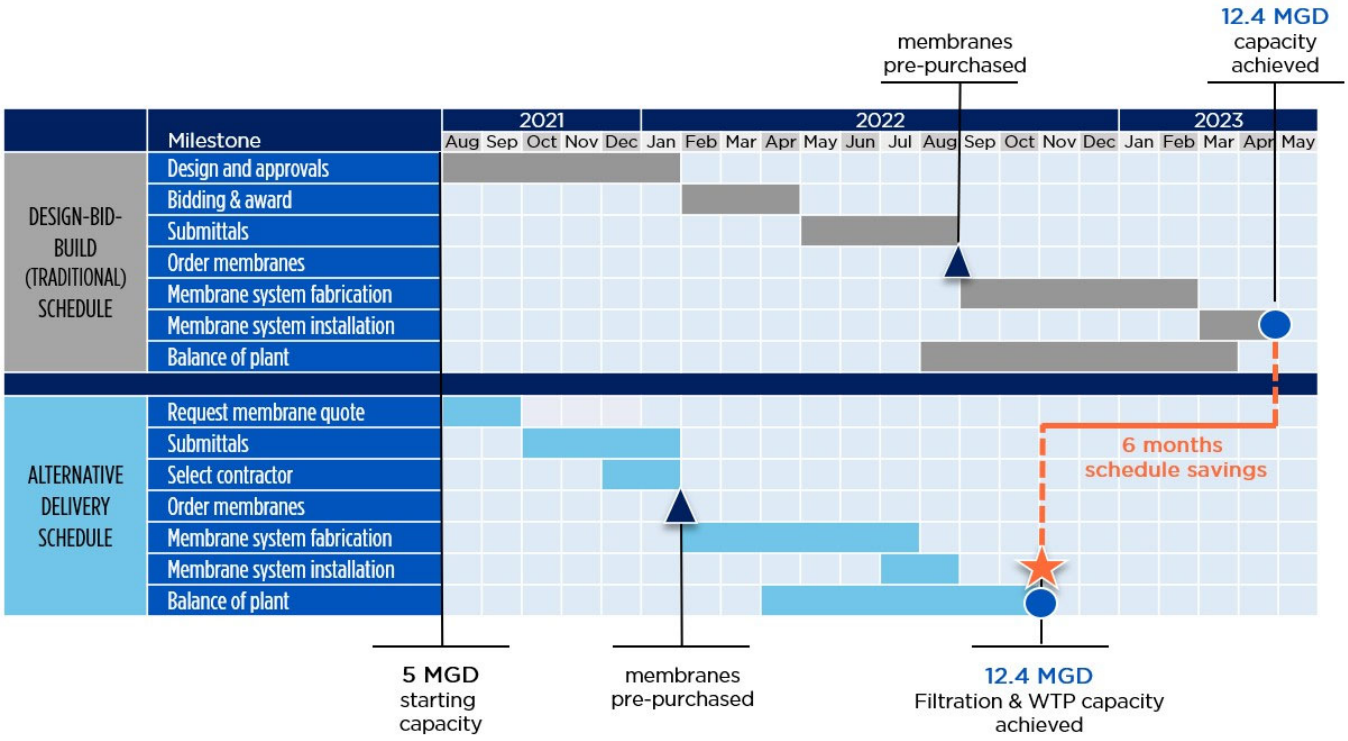



*Figure 7-1. Potential Schedule Savings Resulting from Early Purchase of Long Lead Time Equipment in an Integrated Delivery Model*

Our design-bid-build fee includes engineering services through to the bidding of construction contractors. An integrated design-build delivery fee does not require 90%, final documents or bid phase services.

The following table outlines the progression of the engineer's (Burns & McDonnell) activities from conceptual design to the bid phase, based on delivery method (DBB, Design-Build, and CMAR).

| Table 7-1: Engineer's Role by Delivery Model | | | |
|---|---|---|---|
| **Approach** | **Design-Bid-Build** | **Integrated Design-Build** | **Construction Management at Risk** |
| **Conceptual Design 15%** | Prepare basis of design with Town input. | Evaluate and select best-value delivery model. | Issue request for qualifications (RFQ) for construction firms through public notification. |
| **Preliminary Design 30%** | Select preferred concept with Town. Engineer prepares estimates of construction schedule and costs with available resources. | Contractor engaged to provide pre-construction services - early input on constructability, sequencing, and costs. | Issue request for proposals (RFP) for shortlisted construction firms. Include 30% design for contractors to develop approach, schedule, cost estimate and their fee. |
| **Detailed Design 60%** | Advance design to 60%. Submit initial permitting documents. Update construction cost and schedule estimates. | Provide guaranteed maximum price (GMP) proposal to complete design and construction. Price certainty. ***Engineer's fee does not exceed that listed for 60% design***. | Contractor engaged to provide constructability input, cost estimating, scheduling, alternative evaluation. Request quotes for trades and long-lead time equipment. |
| **Final Design 90%** | Respond to permitting agency comments. Advance design to best and final format. Prepare pre-bid estimate with project fully defined. | Place order long-lead time equipment to reduce schedule. Start early work package. Update GMP, as necessary, for changes between 60% and 90%. | Finalize supplier quotes and place orders |
| **Bid Phase** | Host pre-bid meeting. Respond to first questions from contractors. Comment on received bids. Revise scope or design if bids exceed budget. | Not required. | Not required. |

# ATTACHMENT A
# RESUMES

# BRETT PUGH, PE

## Project Manager

Brett is a senior project manager and professional civil engineer with more than 23 years of experience in project management, design, and construction, collaborative project delivery, and process commissioning. His design experience includes water treatment, wastewater treatment, distribution, and collection. Brett's surface water treatment facility design experience includes new facilities and expansions using a variety of pretreatment and treatment technologies, including (but not limited to) dissolved air floatation, plate settlers, pressure membranes, and submerged membranes. He works with clients to holistically evaluate options for facility expansions based on their water quality goals, taste and odor concerns, redundancy needs, budget, ease of future expansion, and ease of operations/ maintenance.

### EDUCATION

- BS, Civil Engineering

### REGISTRATIONS

- Professional Engineer (CO, TX)

**3** YEARS WITH BURNS & MCDONNELL

**23** YEARS OF EXPERIENCE

### Taste & Odor Project | Town of Johnstown

Johnstown, Colorado

***Project manager*** for study to evaluate taste and odor control performance of the town's existing powdered activated carbon system at the Lone Tree Reservoir. Conducted jar testing to quantity Geosmin and MIB removals. Compared the PAC system performance with the strategies at other nearby water systems. Developed recommendations for multi-phase approach to taste and odor control at Lonetree Reservoir, Town Lake and at the WTP. Support the town with implementing short-term granular activated carbon system in preparation for summer 2021.

### Lynn R. Morgan WTP Expansion | Town of Erie

Erie, Colorado

***Project manager*** for the expansion of the evaluation and design of a 10 MGD WTP upgrade to increase the plant capacity to 17 MGD. The upgrade includes a pretreatment with flocculation and lamella plate sedimentation followed by submerged membrane filtration and a high service pump station expansion. The project included a feasibility study and detailed design of a 80 kW micro-turbine on the existing Northern Colorado Water's SWSP pipeline. Burns & McDonnell assisted the town with securing grant for the feasibility study as well as a matching grant for construction through the Renewable and Clean Energy Challenge program with the Colorado Department of Local Affairs. The project is being executed as a CMAR to expedite the construction and allow for contractor input during design. Construction was completed in July 2020.

### Boxelder WWTP Expansion | Boxelder Sanitation District

Fort Collins, Colorado

***Project manager*** for the expansion of the Boxelder WWTP. The District has seen significant development in their service area which has driven the need for expansion. The project doubles the phased isolation biological nutrient removal BNR secondary treatment process trains and brings the facility capacity to 4.6 MGD and 10,000 lbs of influent organic capacity. The project also includes upgrades to the headworks/grit systems, a new UV disinfection system, and aerobic digestion with slow-speed dewatering. The project is currently in construction using a CMAR delivery model and will be complete in August 2021.

# BRETT PUGH, PE
(continued)

### Dodd WTP Hydroelectric Project | Left Hand Water District

Niwot, Colorado

***Project manager*** for the detailed design and construction administration of a 200 kW micro-turbine addition at the existing 16 MGD Dodd Water Treatment Plant. Left Hand Water District will receive a new raw water supply from Northern Colorado Water's SWSPII pipeline in early 2020. The high pressure in the pipeline made the addition of a micro-turbine feasibility. The generated power will be used at the Dodd WTP to reduce their annual energy bill by providing sustainable energy generation on site. The construction was completed in June 2020.

### Morrison CO WTP Expansion | Mount Carbon Metropolitan District

Morriston, Colorado

***Project manager.*** Mount Carbon Metropolitan District is a special district, responsible for supplying water and wastewater services to the Red Rocks Ranch development from the Town of Morrison's WTP. Raw water is sourced from a blend of Bear Creek and the Cooley Reservoir. The proposed design includes an expansion to the exiting pretreatment building. New pretreatment basins and chemical facilities will be installed. Two additional pressurized membrane trains will be installed for additional capacity and redundancy. The existing chlorine contact basin will remain in service with a new high service pump installed. Project tasks include water modeling, jar testing for iron, manganese and uranium removal and cost estimating.

### Meyer Ranch Water Reuse Facility* | Randolph Todd Company

Near New Braunfels, Comal County, Texas

***Design engineer*** for a 0.39 MGD wastewater treatment plant using a ***membrane bioreactor*** and UV disinfection. TCEQ requires a high-quality effluent because the wastewater facility is in the sensitive Edwards Aquifer Recharge Zone. Included a membrane bioreactor, UV disinfection and storage and distribution of Type I reclaimed water for irrigation. The equalization tank was sized to minimize peak hour and maximum daily flow rates to the MBR system to remain in compliance with TCEQ filtration rates.

### Pottle Lake Water Treatment Plant* | Cape Breton Regional Municipality

North Sydney, Nova Scotia, Canada

***Project manager*** for a $12 million, 8 MGD surface water treatment plant using membrane filtration. The new facility is located next to the existing intake and high service pump station, which were maintained in the new system to reduce overall project cost. A two-stage, ***submerged membrane system*** was used to achieve 99 percent recovery of the raw water, thereby reducing the process wash water load on the nearby capacity limited sanitary sewer.

### Longford Water Treatment Plant* | Northern Midlands Council

Longford, Tasmania, Australia

***Project manager*** for the design-build of a $5M surface water treatment plant for the Town of Longford, Tasmania. The Town of Longford received chlorinated water from a rapidly changing river water supply. Served as the project manager, design lead, and resident construction superintendent on the project. The facility utilizes enhanced coagulation, ***dissolved air flotation*** and gravity filtration. The building exterior includes architectural features to comply with the local historic town, built in the early 1800s.

** Denotes experience prior to Burns & McDonnell*

# JASON SCHAEFER, PE, ENV SP

## Quality Control

Jason is a senior process engineer, project manager, and quality reviewer with experience managing, planning, optimizing, troubleshooting, designing, and constructing conventional and advanced water treatment facilities. He has 13 years of experience focused on major water treatment facility retrofits and new plants, using both traditional and collaborative project delivery methods. He has extensive experience in pretreatment, treatment process selection, plant optimization, and design-build. Jason will provide knowledgeable guidance for taste and odor solutions, project scope development, and project delivery options.

### EDUCATION

- MS, Environmental and Civil Engineering
- BS, Civil Engineering

### REGISTRATIONS

- Envision SP: Professional Engineer (CO, MT, OK, WY, ID)

**13** YEARS WITH BURNS & MCDONNELL

**13** YEARS OF EXPERIENCE

### Dodd Water Treatment Plant Upgrade | Left Hand Water District

Niwot, Colorado

***Project manager and lead process engineer.*** BMcD worked as part of a design-build team with Garney Construction to upgrade to the Dodd Water Treatment Plant (DWTP) in Niwot, Colorado. BMcD permitted and designed and the upgrades to the DWTP. The DWTP includes conventional pretreatment with high-rate inclined plate settlers, MF/UF membranes, clearwell, and high service pumping to increase capacity from an 8 MGD to 10 MGD with the capability to expand to 16 MGD. Responsible for client interface and managing budget, design, inter-discipline coordination and construction phase services. Worked closely with operators to develop the design and to provide training.

### Plum Creek WPF Advanced Treatment Project | Town of Castle Rock

Castle Rock, Colorado

***Project manager.*** Responsible for client interface and managing budget, piloting, detailed design, inter-discipline coordination and construction phase services for this $30M project, which is adding new treatment processes to the existing Plum Creek facility, also designed by our team. This project is being executed using a construction management at risk (CMAR) delivery method. The project includes the addition of multiple treatment processes, including pre-ozonation, biofiltration, advanced oxidation with ozone, GAC adsorption, and UV disinfection.

### Broomfield Water Treatment Plant Expansion | City and County of Broomfield

Broomfield, Colorado

***Project manager .*** Worked on the detailed design to expand Broomfield's water treatment plant from 20 to 26 MGD, with hydraulic capacity for up to 32 MGD. The project includes modifications to the existing pre-treatment system, new chemical feed building, three new filters, solids stream modifications and chemical system upgrades. The project is being delivered using construction management at-risk to facilitate early project completion. The process evaluation included hydraulic profile, process flow diagram, equipment selection, sizing and layout, pipe sizing, chemical dosing, yard piping and operational review.

### Thornton Water Treatment Plant Replacement Project | City of Thornton

Thornton, Colorado

***Project manager.*** Responsible for daily client interface and managing budget, piloting, process design criteria development and confirmation, detailed design, inter-discipline coordination and construction phase services for this $100M project. The

project is being executed as a joint venture with Garney Construction, using a design-build delivery method. The water treatment plant will have an initial capacity of 20 MGD using conventional treatment processes, as well as the ability to treat two water sources, Standley Lake and South Platte River, with provisions for a third source. The process design includes traditional pretreatment, ozone, biofiltration, and disinfection.

### Northwest Water Treatment Facility Expansion | City of Westminster

Westminster, Colorado

***Project engineer.*** Responsible for the ultrafiltration membrane expansion for the City of Westminster's Northwest Water Treatment Facility. The project included the design and construction services for three new membrane filtration trains totaling 5.6 MGD additional capacity. As the process engineer, responsible for process design, periodic construction inspection, and regulatory approval. The project also included replacement of existing filtration piping, addition of filter-to-waste piping and HVAC improvements.

### Plum Creek Water Purification Facility | Town of Castle Rock

Castle Rock, Colorado

***Co-project manager and project engineer.*** Worked on the Town of Castle Rock's new 4.0 MGD Plum Creek Water Purification Facility (PCWPF). This project was completed utilizing a Construction Manager at Risk (CMAR) delivery method. The PCWPF includes aeration, conventional pretreatment with high-rate inclined plate settlers, greensand filtration, MF/UF membranes, chloramine disinfection, clearwell, and high service pumping. The PCWPF's raw water is GWUDI with provisions for future use of a surface water supply. The groundwater source contains high levels of iron and manganese thereby requiring the use of aeration and greensand filtration. Additional facility components include an administration building complete with a laboratory, control center, conference area, and maintenance area; chemical storage and feed; and full site development. Worked closely with operators to develop the design and to provide training.

### Lynn R. Morgan Water Treatment Plant Expansion | Town of Erie

Erie, Colorado

***Quality reviewer.*** Worked on the detailed design to expand the Lynn R. Water Treatment Plant from 9.9 MGD to 17 MGD. The upgrade includes a pretreatment with flocculation and lamella plate sedimentation followed by membrane filtration. The project is being executed as a CMAR to expedite the construction and allow for contractor input during design.

### Wes Brown Water Treatment Plant Taste & Odor Conceptual Study | City of Thornton

Thornton, Colorado

***Project manager and engineer.*** Worked on the optimization of Thornton's existing facility and an evaluation of potential new treatment options for the reduction of taste and odor causing Geosmin and 2-Methylisoborneol. Conducted a series of jar tests to evaluate the effectiveness of current process in reducing taste and odor compounds. The following chemicals were jar tested for taste and odor optimization: chlorine, three types of powder activated carbon, hydrochloric acid, and five types of coagulants. The potential new technologies evaluated included ozone, UV/hydrogen peroxide, and granular activated carbon.

### Lynn R. Morgan Water Treatment Facility Taste & Odor Conceptual Study | Town of Erie

Erie, Colorado

***Project manager and engineer.*** The project included the investigation of taste and odor reduction methods for implementation at the water treatment plant. The technologies evaluated included chlorine, ozone, potassium permanganate, chlorine dioxide, granular activated carbon, powder activated carbon, and UV/hydrogen peroxide. As a result of this study the Town installed a powder activated carbon feed system to reduce taste and odor compounds of their raw water.

# KARLA KINSER, PE

## Design Manager & Lead Process Engineer

Karla has 26 years of experience in water treatment, serving as a project engineer, lead process engineer, and filtration specialist. She has led the multi-discipline design effort for large water treatment plant expansions and retrofits nationwide. Karla specializes in water treatment and reuse with an extensive focus in membrane processes. Her project experience includes bench- and pilot testing, process design, detailed design, startup, to troubleshooting operating plants for low-pressure (MF, UF, MBR) and high-pressure (NF, RO) membranes. She has been a global leader for membranes at three firms and worked for two low pressure membrane companies which has afforded her a unique understanding of operations of facilities and negotiation of warranties.

### EDUCATION

- MS, Engineering
- BS, Civil Engineering
- BS, Natural Resource Management

### REGISTRATIONS

- Professional Engineer: CO, TX

**2** YEARS WITH BURNS & MCDONNELL

**26** YEARS OF EXPERIENCE

### Thornton WTP Replacement | City of Thornton

Thornton, Colorado

***Quality Reviewer.*** This 20 MGD water treatment plant project is being executed as a design-build in partnership with Garney. The water treatment plant will have an initial capacity of 20 MGD using conventional treatment processes, as well as the ability to treat two water sources, Standley Lake and South Platte River, with provisions for a third source. The process design includes pretreatment with lamella plate settlers, ozone, biofiltration, and disinfection.

### Plum Creek Water Purification Facility Advanced Treatment | Town of Castle Rock

Castle Rock, Colorado

***Quality Reviewer***. Provided quality review for the detailed design for this project, which is adding new treatment processes to the existing Plum Creek facility, also designed by our team. This project is being executed using a construction management at risk (CMAR) delivery method. The project includes the addition of multiple treatment processes, including pre-ozonation, biofiltration, advanced oxidation with ozone, GAC adsorption, and UV disinfection.

### Lynn R. Morgan WTP Expansion | Town of Erie

Erie, Colorado

***Treatment Specialist.*** This project included the evaluation and design of a 10 MGD WTP upgrade to increase the plant's treatment capacity to 16 MGD. The design of the plant includes a pretreatment with flocculation and lamella plate sedimentation followed by membrane filtration. The project is being executed as a CMAR to expedite the construction and allow for contractor input during design. Construction of the WTP expansion is 60% complete. The project included a financial analysis and study of installing a micro-turbine for their Northern Water Supply. The Town decided to move forward with the turbine design, which is currently at 60% complete.

### Wes Brown WTP Train 8 Modifications | City of Thornton

Thornton, Colorado

***Project Engineer.*** This project includes the conversion of a backwash recovery filtration train to a full process filter equivalent to Trains 1 through 7. Design, specifications, cost estimates, and a CDPHE permit application were prepared for

# KARLA KINSER, PE
(continued)

the project. The project involved an increase to a filtrate pump, redesign of stainless-steel piping, reconnecting and modification of air scour piping, and electrical modification associated with these changes. The project utilized a shortened milestone delivery method to meet a fast-track schedule. Demolition and new design drawings were utilized to convey the modification to the contractor.

### Council Bluff WTP Expansion* | Council Bluff Water Works

Iowa

***Project engineer.*** This facility treats water from ground water wells near the Missouri River in western Iowa. The original plant was designed to produce 5 MGD, and the building design included space to increase the plant capacity to 10 MGD through the addition of new membrane trains. Due to increases in industrial demands, the capacity was increased in incremental phases to the ultimate 10 MGD capacity. Karla led the procurement and performed a detailed water quality analysis on the pretreatment system to optimize the permanganate addition upstream of the ultrafiltration.

### Ridenour WTP Pilot Study and Plant Design* | City of Jacksonville

Jacksonville, Florida

***Process Engineer.*** Responsible for the pilot testing and process design for the 20 MGD new water treatment plant. As part of the pilot test, multiple treatment trains were evaluated to treat a combination of groundwater and surface water. Processes considered included: ozone, air stripping, lime softening, multiple coagulants with flocculation/sedimentation, dual and mono-media filtration. The pilot was operated for approximately 9 months and led directly into preliminary and final design.

### Claude Dyal Water Treatment Plant* | City of Cocoa

Cocoa, Florida

***Project Engineer.*** Responsible for the pilot testing and subsequent process design of the new 48 MGD water treatment plant treating Taylor Creek Reservoir augmented by groundwater wells. Led the design of the pilot site, operated the pilot plant, and conducted multiple taste/odor tests for City staff. Processes piloted included lime softening, coagulation, floc/sed, dual media filters, ozone, and ultraviolet disinfection. The final design of the plant consisted of coagulation with lime, floc/sed, dual media filtration, and ozone.

### Stevens WTP Plant Optimization* | Corpus Christi Public Utilities

Texas

***Technical Leader.*** This project's objective was to optimize and evaluate multiple conventional processes for the water treatment plant, as well as the impacts on the distribution system water quality. The project involved a year-long pilot study evaluating flocculation, sedimentation, and filtration along with modeling and coupon testing of multiple locations in the distribution system for corrosion control.

### North RO Water Treatment Plant (D-B)* |City of Cape Coral

Florida

***Project Technical Lead.*** Design-Build of a 12 MGD, expandable to 24 MGD water treatment plant. Led 20 engineers on a cross-functional team for preliminary and final design. Provided quality control and technical oversight during construction, final installation, and start-up. Project was completed in three years. Design of facility included well-field raw water supply, sand separators, cartridge filters, reverse osmosis, degasification, high service pumps, cleaning and chemical systems, brine injection wells, and an enhanced SCADA system to integrate with the original water treatment plant.

**Denotes experience prior to joining Burns & McDonnell*

# NIKOLE RACHELSON, PE

## Hydraulics

Nikole is a senior process design engineer with experience in design and construction for a variety of water projects. Her design experience includes conventional treatment process design, pump station design, treatment plant hydraulics modeling and design, distribution system modeling, and other miscellaneous process components at water plants. Nikole has extensive experience with both water treatment plant and pump station hydraulics at facilities ranging from 1 to 215 MGD. Her experience includes design and analysis of hydraulics to optimize functionality, determine hydraulic capacity, accommodate complicated retrofits without impacting upstream processes, and maximize efficiency.

### EDUCATION

- MS, Civil and Environmental Engineering
- BS, Environmental Engineering

### REGISTRATIONS

- Licensed Professional Engineer (CO, AZ)
- Certified Construction Documents Technologist (CDT)

**4** YEARS WITH BURNS & MCDONNELL

**14** YEARS OF EXPERIENCE

### Moffat Rebuild Ralston Evaluation* | Denver Water

Denver, Colorado

***Process design lead*** for assessment of existing treatment plant hydraulics capacity. Responsible for creating a model of the existing treatment plant, performing a model calibration, determining the treatment plant's ultimate capacity, and suggesting areas for hydraulic improvements. Significant client interaction required, including multiple design progress presentations, and a hydraulics modeling/calibration learning session with treatment plant operations staff.

### Soldier Canyon Filter Plant Conditions Assessment* | Soldier Canyon

Fort Collins, Colorado

***Process design lead*** for hydraulics analysis of existing 45 MGD water treatment plant. Created a model of the existing infrastructure and utilized model output to identify the cause of plant flow distribution and capacity issues. Analyzed model output to predict the hydraulic behavior of the plant at increasing flows. Significant client interaction required during model development.

### Moffat Water Treatment Plant Modifications | Denver Water

Lakewood, Colorado

***Hydraulics.*** Moffat improvements include retrofitting the existing headworks facility to reduce incoming pressure and adjust pH and direct NTP supply to clearwells for storage. Moffat's NTP-related improvements are be designed to facilitate construction during scheduled operational outages to minimize the impact on the distribution system. The project included a new sleeve valve, carbon dioxide dosing systems, 1,500 feet of 48-inch yard piping and structural modifications. Nikole performed detailed hydraulic analyses to model the finished water piping performance during a range of operating conditions.

### CSWTP Improvements* | Colorado City Metropolitan District

Colorado City, Colorado

***Process design lead*** responsible for hydraulics modeling and design, as part of detailed design for upgrades to an existing water treatment plant, including raw water pump station, finished water pump station, packaged membranes, RO and clear well disinfection.

### North Complex Electrical, Instrumentation and Controls Upgrade | Denver Water

Denver, Colorado

***Process engineer*** for an engineer-procure-construct (EPC) scope of work to interconnect five existing raw water reservoirs and the South Platte River at the DRWSP North Complex. The project includes a 32 MGD pump station preliminary design,

# NIKOLE RACHELSON, PE
(continued)

an extensive hydraulic analysis to develop and confirm operational scenarios and control strategies for the North Complex system, and various electrical/instrumentation/mechanical upgrades to existing infrastructure. Completed the pump station preliminary design and the hydraulic evaluation.

### Price Park Improvements | City of Longmont
Longmont, Colorado

***Project manager***. The Price Park Improvements Project carries the 2016 study recommendations (also done by BMcD) into design. Phase 1 includes a tank sizing and operation study, which compares the 5 MG tank and pump station recommendations from the study to a larger eight (8) MG tank and upgraded pump station. Hydraulic modeling will determine the operational requirements of the new pump station. The two design alternatives will be evaluated from a design, constructability, and cost perspective to determine the design direction moving forward. Once the storage and pump station requirements are determined, Phase 1 will also include preliminary design. Phase 2 of the project will include detailed design based on the design decisions made in Phase 1.

### Eaton Pump Station | City of Westminster
Thornton, Colorado

***Project manager*** for a design-build pump station and waterline project. Project work included relocating a 5.5 MGD pump station, installing new waterline piping to reconnect pump station suction and discharge to the distribution system, and installing new waterline piping to feed the City's upcoming downtown redevelopment. The project also included a hydraulic analysis of the pump station and surrounding infrastructure to determine its capabilities during various normal and emergency operational scenarios.

### Hydroelectric Project, Lynn R. Morgan WTP | Town of Erie
Erie, Colorado

***Hydraulics and QC*** for the feasibility study, detailed design, and construction administration of an 80 kW micro-turbine addition at the existing 17 MGD Lynn R. Morgan Water Treatment Facility. Erie has received raw water from Northern Colorado Water's SWSP pipeline for nearly 20 years. The potential energy in this pipeline was dissipated through an existing buried sleeve valve vault. The addition of a hydroelectric generator proved feasibility after a study compared applicable turbine technologies, potential installation locations and several financial scenarios.

### Cooley East Pump Station | City of Thornton
Thornton, Colorado

***Lead process engineer*** for the pump station portion of the project, which includes a 9 MGD raw water pump station, approximately 3 miles of 36-inch raw waterline, 3 miles of 42-inch potable waterline, transmission, 1 mile of 8-inch potable and irrigation waterlines, 770 feet of 15-inch sewer relocation and 770 feet of 36-inch storm drain.

### Pump Station Improvements and Irrigation System Master Plan* | Town of Superior
Superior, Colorado

***Project manager and process design lead*** for the hydraulic evaluation of the Superior irrigation system, design of pump station upgrades, and construction following a design/build format. Evaluation included hydraulic modeling and pump performance assessment, followed by recommended pump station upgrades to meet current and future capacity demands. Pump station improvements included design of new high duty and booster pump stations.

**Denotes experience prior to joining Burns & McDonnell*

# EMILY HUTH, PE

## Process Engineer: Taste & Odor

Emily is a process design engineer with six years of experience focused on water treatment facility projects. Her experience includes piloting of filter loading rates, pretreatment, and filtration; and process designs that address taste and odor concerns in variable water sources. Emily's role on projects frequently includes inter-discipline design coordination, direct interface with the client, and collaboration with the contractor. She has recent design-build experience on the Thornton WTP Replacement.

### EDUCATION

- MS, Environmental Engineering,
- BS, Civil Engineering

### REGISTRATIONS

- Professional Engineer (WY)

**5** YEARS WITH BURNS & MCDONNELL

**6** YEARS OF EXPERIENCE

### Thornton Water Treatment Plant Replacement Project | City of Thornton

Thornton, Colorado

***Process design lead.*** Responsible for discipline coordination and assisting in the design of chemical feed systems, ozone system, pretreatment, biological filtration, and process piping. In addition, assisted with data interpretation and experimental planning of a six-month pilot. The project is being executed as a design-build in partnership with Garney. The water treatment plant will have an initial capacity of 20 MGD using conventional treatment processes, as well as the ability to treat two water sources, Standley Lake and South Platte River, with provisions for a third source. The process design includes traditional pretreatment, ozone, biofiltration, and disinfection.

### Dodd Water Treatment Plant Upgrade | Left Hand Water District

Niwot, Colorado

***Process engineer.*** Burns & McDonnell worked as part of a design-build team with Garney Construction to upgrade to the Dodd Water Treatment Plant (DWTP). Designed conventional pre-treatment with a mechanical rapid mixer, horizontal paddle flocculators, high-rate inclined plate settlers, MF/UF membranes, clearwell and high service pumping to increase capacity from an 8 MGD to 10 MGD with the capability to expand to 16 MGD. Additional facility components included administration spaces such as a laboratory, control center; chemical storage and feed; and full site development for solids holding ponds, storm drainage, and raw water pipes. Construction phase service responsibilities included managing and reviewing submittals and RFIs, preparing operator Training materials, and assisting in the design of additional scope items. Start-up responsibilities included performing jar tests and generation of the start-up plan.

### Pressure Zone 3 Expansion: Gregory Hill Pump Station and Tanks | City of Westminster

Westminster, Colorado

***Project engineer.*** Responsible for the design of the Gregory Hill Pump Station and two 3 MG above ground storage tanks. The facility is part of a large pressure zone expansion project that will increase water storage capacity and water pressure within Zone 3 of the City of Westminster's water distribution system. The pump station includes five new VFD controlled pumps to achieve flowrates from 0.5 MGD to 13.8 MGD (with the capability of future expansion to 15.6 MGD) that will allow the City to meet the system's high flow demands and desired low flow outputs. The pump station building includes a separate electrical room, restroom, and the two storage tanks which include hydrodynamic mixing systems. Process design

responsibilities included assistance in the design pump sizing, all pump station, storage tank, and yard process piping and accessories, general pump station and tank sizing, and preparation of drawings and specifications.

### Wes Brown Water Treatment Plant Train 8 Modifications | City of Thornton

Thornton, Colorado

***Process engineer*** who designed modifications to an existing membrane train at the Wes Brown Water Treatment Plant for the City of Thornton. The design converted Train 8 from a secondary recovery train to a forward flow operating train to match the other seven trains in the facility. Design responsibilities included discipline coordination, design of process components (new pump with variable frequency drive, stainless steel pump and blower piping modifications, instrumentation), and preparation of drawings and specifications.

### Alternative Membrane Analysis and Pilot | City of Thornton

Thornton, Colorado

***Process engineer*** who assisted with the evaluation of alternative membrane manufacturers for the Wes Brown Water Treatment Plant. An evaluation of alternative membrane manufacturers was performed to allow competitive bidding and replacement in the future was performed. Our team performed the evaluation, recommended an alternate manufacturer, developed technical specifications and assisted with procurement of membranes from the alternative manufacturer. A full-scale pilot evaluating the new membrane manufacturer with the existing is being performed.

### East Gravel Lakes Pump Station Chemical Upgrades | City of Thornton

Thornton, Colorado

***Assistant project manager*** who designed a sodium permanganate feed system at the East Gravel Lakes #4 Pump Station for the City of Thornton. The existing dry-fee potassium permanganate system was removed and converted to a liquid-feed sodium permanganate system including two chemical storage tanks, chemical metering pumps and accessories, new chemical feed piping and fill station, and an emergency eyewash with water heater. Construction phase service responsibilities included managing and reviewing submittals and RFIs.

### Spurgeon WTP Chlorine Conversion | Left Hand Water District

Niwot, Colorado

***Process engineer*** who designed a safe, cost effective, bulk sodium hypochlorite system to replace the existing chlorine gas system at the Spurgeon Water Treatment Plant. Our design utilized the District's existing chlorine gas building and piping, which reduced project costs and construction duration. The team designed two bulk sodium hypochlorite FRP tanks, which were installed in a newly constructed containment area within the existing chlorine gas room. Design responsibilities included preparing the Preliminary Engineering Report. Construction phase service responsibilities included managing and reviewing submittals and RFIs.

### Wes Brown Water Treatment Plant High Service Pump Station Actuator Replacement | City of Thornton

Thornton, Colorado

***Assistant project manager*** for replacement of valve actuators in the high service pump station in the Wes Brown Water Treatment Plant. The existing hydraulic valve actuators were removed and replaced with electric actuators powered by a separate uninterruptable power supply cabinet. Construction phase responsibilities include managing and reviewing submittals and RFIs.

# MEAGAN LUNDGREN, EI

## Process Engineer

Meagan is an assistant environmental engineer with experience in drinking water and wastewater unit operations design and analysis. Her areas of study have included water quality analysis and testing, field assessment and data collection, environmental chemistry, and contaminant fate and transport. Her role on projects includes assisting in the design of water and wastewater treatment and conveyance systems for municipal applications. Her role includes system design, specification development, creating cost opinions, submittal review and interdisciplinary coordination.

### EDUCATION

- BS, Environmental Engineering

### REGISTRATIONS

- Engineer in Training: CO

**1.5** YEARS WITH BURNS & MCDONNELL

**1.5** YEARS OF EXPERIENCE

### Taste & Odor Project | Town of Johnstown

Johnstown, Colorado

***Process engineer*** for study to evaluate taste and odor control performance of the town's existing powdered activated carbon system at the Lone Tree Reservoir. Conducted jar testing to quantity Geosmin and MIB removals. Compared the PAC system performance with the strategies at other nearby water systems. Developed recommendations for multi-phase approach to taste and odor control at Lonetree Reservoir, Town Lake and at the WTP. Support the town with implementing short-term granular activated carbon system in preparation for summer 2021.

### Plum Creek WPF Advanced Treatment Project | Town of Castle Rock, Colorado

Castle Rock, Colorado

***Assistant process engineer.*** Worked on construction phase services on the renovation of the Plum Creek Water Purification Facility (WPF) Advanced Treatment Project. The project includes the addition of multiple treatment processes, including pre-ozonation, biofiltration, advanced oxidation with ozone, GAC adsorption, and UV disinfection for use in treatment of direct potable reuse. The facility is currently rated for 6 MGD but has been designed to expand to 12 MGD. The responsibilities during the construction phase of the project include interdisciplinary coordination and submittal review.

### Lynn R. Morgan Water Treatment Plant Expansion | Town of Erie, Colorado

Erie, Colorado

***Assistant process engineer.*** Worked on the evaluation of the current performance of the Lynn R. Morgan Water Treatment Facility as well as the evaluation of the facility's source waters. Responsibilities included reviewing performance and operations data to make recommendations on increased efficiency and performance at the plant.

### Thornton Water Treatment Plant Replacement [Design-Build] | City of Thornton

Thornton, Colorado

***Assistant process engineer*** for the replacement of the Thornton Treatment Plant (TTP). The project includes the design and construction of a new 20 MGD treatment plant including traditional pretreatment, ozone, biofiltration, and disinfection. Her responsibilities during the construction phase of this project included submittal review and compilation of a comprehensive operations and maintenance manual for the entire plant.

### Wes Brown Water Treatment Plant Membrane Evaluation | City of Thornton

Thornton, Colorado

***Assistant process engineer*** for the evaluation of the membrane system currently in place at the Wes Brown Treatment Plant. Responsiblities included reviewing performance and operations data to make recommendations on increased efficiency and performance at the plant.

# KATE HENSKE, PE

## Pipeline

Kate is a senior pipeline engineer with the demonstrated ability to not only ask the right questions, but to listen to stakeholders in order to communicate more clearly and concisely, which results in more collaborative, transparent, and successful projects – from start to finish. She has successfully managed a variety of water and wastewater pipeline projects and tasks throughout the Rocky Mountain Region. Kate's water system experience includes design of major water distribution facilities including pipelines from 6 through 54-inches in diameter, pressure reducing valves, control valves, air release valves and master water meters; design of booster and well pump stations; site grading and piping for water storage tanks; and master planning, water alignments, and facility studies for residential and commercial areas including storage tank sizing.

### EDUCATION

- BS, Civil and Environmental Engineering

### REGISTRATIONS

- Professional Engineer (CO, WY, CA, TX)

**15** YEARS WITH BURNS & MCDONNELL

**32** YEARS OF EXPERIENCE

### Pressure Zone 3 Expansion: 88th and 104th Waterline Replacements | City of Westminster

Westminster, Colorado

***Pipeline lead.*** Worked on the conversion of a section of Pressure Zone 1 to Pressure Zone 3 in the vicinity of the Westminster Mall which is being revitalized into the downtown area for the City of Westminster. This work includes the design of multiple waterlines through the Westminster system including 1.5 miles of 16-inch waterline, 1.3 miles of 30-inch waterline, 1.2 miles of 20-inch waterline, and 0.3 miles of fiber optics cable. The waterlines are being replaced due to the higher pressures when the area converts to Pressure Zone 3. The controls are being moved from a tank that is scheduled to be demolished to an existing tank between which the fiber is required. The waterlines and fiber will be placed within existing ROW, through private property and under US 36. Coordination will be required with the City of Westminster, Adams County, Jefferson County and WYDOT. The work included planning, design, alignment selection and evaluation, public relations, material evaluations, and permitting.

### Airport Road to Baron Court Waterline | Town of Erie

Erie, Colorado

***Project manager.*** Worked on approximately 3,000 linear feet of 16 and 12-inch waterline. This waterline replaces the existing aging waterline and provides replacement prior to the streets being resurfaced as a result of a sanitary sewer project along the same alignment. The waterline will be placed within an existing casing, within existing ROW and through an acquired easement. There will be multiple surface reactivations, new fire hydrant installation and existing fire hydrant connections.

### Union Boulevard Water Main Replacement Project | Colorado Springs Utilities

Colorado Springs, Colorado

***Project manager.*** Worked on the design of approximately 8,300 linear feet of 8, 12 and 24-inch waterline in Union Boulevard from Academy Boulevard to Deliverance Drive, fire hydrant replacements, lateral replacement and service reconnections as part of CSU's Water Main Replacement Ahead of Paving Program in conjunction with the City of Colorado Springs' 2C pavement replacement initiative. Union Boulevard is a very busy road which is also congested with many utilities. Design permitting was required from the City of Colorado Springs for traffic control and potholing which took place at night. In additional to the design plans; potholing and erosion control plans were developed.

# KATE HENSKE, PE
(continued)

### Colorado Springs Utilities | Mesa Road Waterline

Colorado Springs, Colorado

***Project manager.*** Managed the design of the replacement of 4,900 linear feet of 18-inch cast iron waterline with 12-inch PVC waterline, fire hydrant replacements, lateral connections, and service connections as part of CSU's Water Main Replacement Ahead of Paving Program in conjunction with the City of Colorado Springs' 2C pavement replacement initiative. This is a quick paced project and construction will be completed through the Construction Manager / General Contractor (CMGC) process for which coordination and assistance with Colorado Springs Utilities and the General Contractor will be required to establishing a guaranteed maximum price. The project also included developing a paired comparison analysis for connection options which include, adding to pressure reducing valves in the existing system, or connecting into the existing 42-inch PCCP main.

### Raw Water Pump Station and Pipeline | Town of Erie

Erie, Colorado

***Project engineer.*** Worked on over 7.5 miles of 30-inch water transmission piping in Boulder County from the Boulder Creek Supply Canal to Erie Lake. The waterline is placed in street right-of-way and there are numerous bores under the roads. The project also has a crossing with the Union Pacific Railroad. The tracks are not being used so it was agreed that the tracks could be removed and replaced during water line installation. Coordination was required with Boulder County, City of Boulder Open Space, CDOT, numerous ditch companies, and Union Pacific Railroad. Alignment was dictated by the Boulder County 1041 process.

### WISE Local Infrastructure Project | Town of Castle Rock

Castle Rock, Colorado

***Pipeline lead.*** Worked on over 5.3 miles of 30 and 36-inch water transmission piping in the Town of Castle Rock and Douglas County. The WISE Local Infrastructure delivers WISE water from Parker's Reuter Hess Reservoir to the Town of Castle Rock's water distribution system. The 5.3-mile pipeline provides a sustainable long-term water supply of the Town and other WISE providers (Dominion Water & Sanitation District). The project alignment is mostly within an existing Xcel energy power line easement, through private property and within Town of Castle Rock property. Special precautions were incorporated into the contract documents due to construction taking place near a high voltage power line. The waterline was designed for steel, ductile iron and PVC to allow for competition during the bidding phase. Coordination was required with the Town of Castle Rock, Xcel Energy, Douglas County, and CDPHE.

### Broomfield Water Treatment Plant Expansion | City and County of Broomfield

Broomfield, Colorado

***Project manager.*** Worked on design and permitting for approximately 1,970 linear feet of 24-inch potable waterline within the City and County of Broomfield. This project provided domestic waterline looping from the treatment plant to an existing 24-inch waterline. The project also included design for a 36-inch bored steel casing under the Farmer Irrigation Company which required extensive permitting.

### Cooley East Pump Station & Pipeline | City of Thornton

Thornton, Colorado

***Project manager*** for the 5 MGD firm capacity pump station and an 18-inch water conveyance pipeline, approximately 2,000 linear feet in length, with discharge structures at the Cooley West Reservoir and the South Platte River. There is a gravity discharge which consists of an overflow structure in the Cooley East Reservoir, 3 -24-inch discharge lines and a discharge structure at the South Platte River.

# NICK TESSITORE, PE, LEED AP BD+C, ENV SP

## Civil Engineer

With almost two decades of civil engineering experience, Nick specializes in site development, pavement design, drainage and stormwater design, project management, master planning, and construction inspection. He excels in preparing development site plans, utility routing, drainage development, and working with municipalities for zoning development and all permitting.

### EDUCATION

- BS, Civil Engineering

### REGISTRATIONS

- Professional Engineer (CO, KY, WY, UT, NM, KS, NV, OR, WA, MT, OK, PA, AL, TX, AZ, MO)
- LEED AP BD+C
- ENV SP

**13** YEARS WITH BURNS & MCDONNELL

**19** YEARS OF EXPERIENCE

### Dodd Water Treatment Plant Upgrade | Left Hand Water District

Niwot, Colorado

***Lead civil engineer*** for the design and construction of the upgrades to the water treatment plant. The project provided upgrades to increase the WTP to a 10 MGD capacity, so the facility can reduce overall operations and maintenance requirements by improving treatment processes. The design consisted of access roads, fencing, grading, drainage, soil evaluation, permitting, erosion control measures, and site mobility. Major earthwork design involved raising and expanding the existing backwash ponds to an elevation above the current groundwater table and installing a geosynthetic clay liner. Other design activities include earthwork, utility coordination, survey, building and foundation placement, and drainage design.

### Plum Creek Water Advanced Treatment Project | Town of Castle Rock

Castle Rock, Colorado

***Lead Civil Engineer*** for the design and construction services for the addition of advanced treatment processes to the existing Plum Creek Water Purification Facility (PCWPF). This project utilized the design/contract-build contracting method to select a general contractor to participate in a collaborative project delivery environment. Design activities required full site development including raw water piping, finished water, electric, natural gas, fiber optic communications, site access, and storm water mitigation. Other design consisted of grading, drainage, pavement design, soil evaluation, erosion control measures, yard piping, utility coordination, survey, and foundation placement.

### Water Treatment Plant Replacement | City of Thornton

Thornton, Colorado

***Lead Civil Engineer*** for the design and construction for the new $90M design-build water treatment facility project. The treatment plant will have an initial capacity of 20 MGD using conventional treatment processes, as well as the ability to treat two water sources, Stanley Lake and South Platte River. The process design includes raw water ozone, rapid mix, flocculation, sedimentation and biologically active filtration. Design activities required full site development including raw water piping, finished water, electric, natural gas, fiber optic communications, site access, yard piping, and storm water mitigation. Other design consisted of grading, drainage, pavement design, soil evaluation, erosion control measures, yard piping, utility coordination, survey, traffic maneuvering, security fencing, landscaping, and foundation placement.

### Plum Creek Water Purification Facility | Town of Castle Rock

Castle Rock, Colorado

***Civil Engineer*** for the design and construction services for the new 4-MGD Plum Creek Water Purification Facility (PCWPF). This project utilized the design/contract-build contracting method to select a general contractor to participate in a

# NICK TESSITORE, PE, LEED AP BD+C, ENV SP
(continued)

collaborative project delivery environment. Design activities required full site development including raw water piping, finished water, electric, natural gas, fiber optic communications, site access, and storm water mitigation. Other design consisted of grading, drainage, pavement design, soil evaluation, erosion control measures, yard piping, utility coordination, survey, and foundation placement.

### North Water Reclamation Facility Capacity Improvements | Town of Erie

Erie, Colorado

***Lead Civil Engineer*** for the improvements to the NWRF plant to include a solids load out system truck containment, a new sulfuric acid tank building, and expansion of the splitter box. Overall design consisted of pavement, grading, drainage, soil evaluation, permitting, erosion control measures, and site mobility. Other design activities include earthwork, utility coordination, building and foundation placement, and storm drainage.

### Stonegate Wastewater Facility Upgrades | Stonegate Village Metropolitan District

Parker, Colorado

***Project Civil Engineer*** for the design of the upgrades to the wastewater treatment plant. The project provided upgrades to handle a 6.5 MGD capacity, so the facility can reliably meet the current permit limits and reduce overall operations and maintenance requirements by improving treatment processes. The design consisted of new access roads, fencing, grading, drainage, soil evaluation, permitting, erosion control measures, and site mobility. Other design activities include earthwork, utility coordination, survey, building and foundation placement, and drainage design.

### Jackson Springs Water Treatment Plant | City of Rapid City

Rapid City, South Dakota

***Project Civil Engineer*** for the construction phase of a new membrane filtration water treatment plant. The project provided a new treatment facility with 8 MGD capacity, a new surface water intake from Rapid Creek, a new raw water pumping station located outside the floodway, rapid mix, flocculation, sedimentation, membrane filtration, clearwell, high service station, and raw and finished water piping. Responsibilities during construction included submittal evaluation, quantity tracking, field coordination, and overall safety operations.

### Wastewater Treatment Plant | Boxelder Sanitation District

Fort Collins, Colorado

***Lead Civil Engineer*** for the design and construction services for the new 3-MGD mechanical wastewater treatment plant. This project utilized the design/contract-build contracting method to select a general contractor to participate in a collaborative project delivery environment. Design activities required full site development including yard piping, electric, natural gas, fiber optic communications, site access, and storm water mitigation. Other design consisted of grading, drainage, pavement design, soil evaluation, erosion control measures, yard piping, utility coordination, survey, and foundation placement.

### Research and Roxbury Pump Station Rechlorination Project | Colorado Springs Utilities

Colorado Springs, Colorado

***Lead civil engineer.*** Worked on the design and retrofit of two new pump stations, one is located at the Research facility and the other is located at the Roxbury location in Colorado Springs, Colorado. Design tasks included the overall site design, grading, chemical truck access, structure excavation and backfill, stormwater design, and underground utility routing. Other design includes soil evaluation, erosion control measures, utility coordination, survey, and building and foundation placement.

# MICHAEL JOHNSON, PE

## Lead Electrical / I&C Engineer

Michael is a senior electrical and controls engineer. He has worked as a field engineer assisting in startup commissioning and system integration of control systems for industrial facilities and as a consulting engineer to develop conceptual designs, detailed designs, and specifications for electrical & control systems for municipal facilities.

### EDUCATION

- BS, Electrical Engineering

### REGISTRATIONS

- Professional Engineer (CO, KS, SD, WY)

**20** YEARS WITH BURNS & MCDONNELL

**20** YEARS OF EXPERIENCE

### Maple Grove WTP Solids Handling Project | The Consolidated Mutual Water Company

Lakewood, Colorado

***Lead electrical/I&C engineer*** responsible for the conceptual design, specifications and detailed design of the 480 VAC 3-phase electrical system including panels and cables for the lighting, mixing tanks, feed pumps, polymer skids and dewatering press skids power distribution. The overall scope of this project is solids handling improvements to an existing water treatment plant based on recommendations our team made during the previous solids study. The solids study included a detailed solids production evaluation, bench scale dewatering testing, pilot testing, and development of design alternatives for converting the existing system from drying beds to mechanical dewatering. Our team designed the plant improvements based on this study and is currently constructing the improvements.

### Ft Lupton WWTP Upgrades | City of Fort Lupton, Colorado

Fort Lupton, Colorado

***Electrical/I&C engineer.*** Provided detailed electrical design documents and construction EPC specifications and construction sequence planning for the upgrade of a single train wastewater facility to add an additional train and include future planning for a third train.

### Pierre Wastewater Treatment Plant Upgrades | City of Pierre

Pierre, South Dakota

***Electrical/I&C engineer.*** Coordinated multiple engineers for the design of Construction Contract documents and specifications for the electrical control system for a wastewater facility. Coordinated the new design to integrate with the existing plant infrastructure.

### Wastewater Treatment Facility Expansion | City of Green River

Green River, Wyoming

***Electrical/I&C engineer.*** Coordinated multiple engineers for the design of Construction Contract documents and specifications for the electrical control system for a wastewater facility. Reviewed the department standard specifications for suitability for the type of contract., Reviewed the department standard specifications for suitability for the type of contract.

### Actuator Replacement at Wes Brown WTP | City of Thornton

Thornton, Colorado

***Electrical/I&C engineer.*** Provided work packages for the replacement of hydraulic actuators to a construction partner. Provided minimal design with sufficient instruction to contractor for critical components to minimize engineering expenses.

# MICHAEL JOHNSON, PE
(continued)

### Plum Creek Wastewater Treatment Facility Expansion | Plum Creek Water Reclamation Authority
Castle Rock, Colorado

***Electrical/I&C engineer.*** Provided project support to the construction contractor for a wastewater treatment facility designed by Burns and McDonnell Water Department. Reviewed and revised the project cable schedule and electrical drawings, responded to Contractor RFI's, worked with Utility and Client to resolve compliance items. While at the same time learning Water Wastewater design criteria and design requirements.

### Dodd WTP Hydroelectric Project | Left Hand Water District
Niwot, Colorado

***Electrical/I&C engineer.*** Revised the electrical design of a hydro turbine located at the base the front range, to meet utility company requirements and performed compliance submittal reviews.

### First Creek Lift Station Improvements | City of Aurora
Denver, Colorado

***Electrical/I&C engineer.*** The First Creek Lift Station will be abandoned once a new interceptor to a new Metro North WWTP is completed. Until that time, the lift station will pump both the Second and First Creek flows to the existing Aurora WWTP. This project increases the capacity of the FCLS to 3.0 MGD to handle the flows from both service areas. This project retrofitted the existing submersible lift station with large pumps, updated controls, new flow meter, and a bypass vault connection. The project also added a new 50' antenna mast and SCADA monitoring that communicates to the City's main monitoring system. Electrical detailed design specifications and drawings, Contract submittal reviews and construction support, answered RFI's, Attended Client Workshop & Factory Acceptance Testing. We were able to create an updated standard set of Burns and McDonnell contract drawings to meet City of Auroras preferred methods and procedures. We were able to incorporate SCADA Design manual and to meet very specific product interface and product testing requirements.

### Skyline Pump Station Interconnect | City of Longmont
Longmont, Colorado

***Electrical/I&C engineer.*** In order to meet emergency indoor water demands, the City of Longmont accepts intermittent water supplies from surrounding districts via interconnects in their system. In order to move this emergency interconnect water throughout their water distribution system, Burns & McDonnell designed an emergency interconnect in an existing pump station consisting of an end suction pump, piping, and associated updates to electrical and HVAC. The Burns & McDonnell team has also assisted the City with construction observations and inspections. Provided construction work package for the City to self perform the work. Addition of a zone to zone variable frequency drive transfer pump. Provided minimal design requirement, with sufficient critical design components.

### Rock Creek Lift Station Odor Control Improvements | City and County of Broomfield, Colorado
Englewood, Colorado

***Electrical/I&C engineer.*** Provide a Construction Contract specifications and detailed design drawings to replace the pump station pumps, MCC and to add odor control equipment. Specifically outlined a Construction sequence for the pump station to stay online while performing the work.

### Cooley East Pump Station | City of Thornton, Colorado
Thornton, Colorado

***Electrical/I&C engineer.*** Revised a pump station design, provided control narrative, specifications and drawing revisions. Answered Construction RFIs, and participated in factory acceptance test, site visits and walkdown.

# VAMSI PATWARI, PE

## Electrical / I&C Engineer

Vamsi is an electrical engineer with six years of experience in electrical design, analysis, and project coordination. He has specialized experience in industrial power and control systems.

### EDUCATION

- MS, Electrical Engineering (Industrial Electrical & Control Systems)
- Bachelor of Technology, Electrical and Electronics Engineering

### REGISTRATIONS

- Professional Engineer (CO, TX)

**1** YEAR WITH BURNS & MCDONNELL

**6** YEARS OF EXPERIENCE

### Zenon PLC Upgrades at Wes Brown WTP | City of Thornton

Thornton, Colorado

***Electrical engineer*** that provided engineering support for the replacement of one of the City's major PLC systems. This project is a conversion of the Zenon PLC at the Wes Brown Water Treatment Plant, including migration of software packages. Developed a design package for the PLC conversion, and coordinated between Suez, system integrator and City. Burns & McDonnell developed record documents after installation and startup of the upgraded PLC was completed.

### Wastewater Treatment Plant Inspection and Engineering | City of Longmont, Colorado

Longmont, Colorado

***Electrical engineer.*** Consulted with the Longmont WWTP regarding service water pressure, modifications to the biological treatment system, and pump design/replacement. Vamsi worked on a study to evaluate the existing emergency generators at both the Nelson Flanders Water Treatment Plant and the Longmont Wastewater Treatment Plant. The evaluation includes increasing the existing generator run times, new ATS/MTS, sectionalizer, and fuel storage. The study involved developing options for emergency power, evaluating each with monetary and non-monetary criteria, recommendations, and developing the design.

### Green River Wastewater Treatment Plant Expansion | City of Green River

Green River, Wyoming

***Electrical engineer and instrumentation/controls*** for expansion to the existing Green River Wastewater Treatment Plant. The project includes the replacement of the existing lagoon system with a 1.5 MGD BNR mechanical plant. The new facility includes a complete treatment process with headworks/grit, BNR secondary process, UV disinfection and aerobic digestion.

### Plum Creek Water Reclamation Facility Expansion | Plum Creek Water Reclamation Authority

Castle Rock, Colorado

***Electrical engineer*** that performed the evaluation and design of the closed transition emergency power system. This project includes the capacity expansion of the Plum Creek WWTP from 6.4 to 9.5 MGD. The primary purpose of the project is the capacity expansion and replacement of the solids stabilization system with an Autothermal Thermophilic Aerobic Digestion process (ATAD) process to create Class A biosolids.

### Dodd WTP Hydroelectric Project | Left Hand Water District

Niwot, Colorado

***Electrical engineer.*** Vamsi worked on a construction phase for a new Hydroelectric Facility. Reviewed shop drawings and design for the construction phase of this project. The overall scope of work included detailed design of a 200 kW micro-turbine at the 10 MGD Dodd Water Treatment Plant. The Dodd WTP receives raw water from Northern Colorado Water Conservation District's Boulder Feeder Canal as well as the new SWSPII. The Dodd micro turbine will take an average of 9

# VAMSI PATWARI, PE
(continued)

cubic feet per second (cfs) of raw water from SWSPII at a pressure range between 85 and 195 psi. The financial analysis provided by BMcD indicates a viable payback for the micro turbine project. An alternative delivery model was selected to reduce the overall project schedule by pre-purchasing long lead time equipment at 30% design.

### Vac Pump Improvements at Wes Brown WTP | City of Thornton
Thornton, Colorado

***Electrical engineer*** for the addition of vacuum pumps to serve the membranes in the Wes Brown Water Treatment Plant. Two 15 horsepower vacuum pumps will be installed to maintain water surface levels in the air/water separation vessels and maintain prime on the membrane permeate pumps. Vacuum pumps will be provided with integral variable frequency drives and controls.

### South Water Reclamation Plant* | Albuquerque Bernalillo County Water Authority
Albuquerque, New Mexico

***Electrical lead engineer*** for electrical medium voltage loop A&B design project. Reconfigured the existing two medium voltage loops throughout the facility to improve safety, reliability, and ease of maintenance by eliminating taps to connect downstream transformers. The two medium voltage loops are connected to existing 15-kV metal enclosed load interrupter switchgears (main-tier-main) via new 15-kV pad mount switchgears (S&C PME style) at various points throughout the facility. The downstream transformers are reconnected to be fed from individual fused switches by retrofitting the existing 15-kV metal enclosed load interrupter switchgears. All the medium voltage switches are configured with kirk keys to prevent from both loops being paralleled. Demolition of a 50 year old existing outdoor 15-kV service entrance switchgear and replacing with a 15-kV arc resistant service entrance switchgear in a new building along with providing medium voltage breaker controls, coordinating interconnection with the power utility for parallel operation and provide recommended relay settings in accordance with IEEE 1547. The design also included describing detailed construction sequence to minimize the outages through the facility while transferring the power to the new configuration.

### West Gravel Lakes Pump Station Electrical Upgrade* | City of Thornton
Thornton, Colorado

***Electrical engineer*** for the replacement of the electrical distribution equipment at the West Gravel Lakes pump station. The existing electrical equipment (indoor and outdoor MCC, disconnect switch and ATS, HP-3 panelboard in KMNO4 building) was identified to be replaced based on the previous arc flash study analysis report. Along with replacing this equipment, the design focused on simplifying the distribution scheme by adding a service entrance switchboard (SWBD-WGL). This also helped in reducing the arc flash energy levels at the MCCs. The design also focused on cost effective solutions in reconnecting HP-1 (Panelboard in PAC building) and HP-3 (Panelboard in KMNO4 building) to generator backup source (MCC-WGL-B).

### Zone 3/4 Pump Station MCC and VFD Upgrades | City of Thornton
Thornton, Colorado

***Project manager and electrical engineer*** that developed the design and specifications for the replacement of two motor control center (MCC) switchboards and the installation of two new variable frequency drives (VFDs) at two existing pumps in the Zone 3/4 Pump Station. The MCCs to be replaced include the existing north Square D MCC and the existing south Cutler Hammer MCC. New VFDs will be installed on pumps 3-2 and 3-3 at the pump station, which do not currently have VFDs.

**denotes experience prior to joining Burns & McDonnell*

# JOHN KIENHOLZ, PE

## Structural Engineer

John is a senior structural engineer with more than 17 years of structural design experience for municipal, commercial, military, power generation, power distribution and industrial clients. His primary responsibilities include the design of steel, concrete, and masonry structures and substructures.

### EDUCATION

- BS, Civil Engineering
- MS, Civil Engineering

### REGISTRATIONS

- Professional Engineer: CO

**14** YEARS WITH BURNS & MCDONNELL

**17** YEARS OF EXPERIENCE

### Advanced Treatment at Plum Creek PWF | Town of Castle Rock

Castle Rock, Colorado

***Lead structural engineer*** for housing equipment responsible for advanced drinking water treatment equipment, capable of treating ground water, surface water, and wastewater treatment plant effluent for drinking water. Largest element consists of a masonry building with precast roof elements crating a 30-ft interior clear height for housing large granular activated carbon tanks. Project consists of a cast-in-place concrete buried vault and a partially buried solids storage tank.

### Lynn R. Morgan Water Treatment Plant Expansion | Town of Erie, Colorado

Erie, Colorado

***Quality review.*** Reviewed the structural design for the expansion of a 10 MGD WTP to increase the plant capacity to 17 MGD. The upgrade includes a pretreatment with flocculation and lamella plate sedimentation followed by membrane filtration and a high service pump station expansion. The project is being executed as a CMAR to expedite the construction and allow for contractor input during design. Construction was completed in July 2020.

### Plum Creek Water Purification Facility | Town of Castle Rock

Castle Rock, Colorado

***Structural engineer*** for new treatment facility housing pretreatment, membrane filtration and chemical storage processes and office space. Plum Creek is a complex building comprised of several wings, four different roof elevations and five structural systems (concrete, masonry, precast, metal joists and wood timbers.)

### Jackson Springs Water Treatment Plant | City of Rapid City

Rapid City, South Dakota

***Structural engineer*** that designed masonry superstructure and precast concrete roof for 113 feet by 226 feet treatment plant. Roof levels varied with bearing heights up to 25 feet and parapets up to 8 feet tall.

### Wastewater Treatment Plant Expansion | Boxelder Sanitation District

Fort Collins, Colorado

***Structural engineer*** that designed the concrete grit basin, anaerobic selector basin, oxidation ditches as well as the masonry building housing several pumps.

# JOHN KIENHOLZ, PE
(continued)

### Wastewater Treatment Plant Expansion | City of Green River
Green River, Wyoming

***Lead structural engineer*** responsible for developing structural drawings and specifications for a new wastewater treatment facility. Structures include administration building, headworks/process building housing, grit separator structure, anaerobic selector basin, oxidation ditches, splitter structure, clarifiers, solids handling building, and UV treatment building.

### North Water Reclamation Facility | Town of Erie
Erie, Colorado

***Structural engineer*** that designed the UV/Dewatering facility for the treatment plant. Design consisted of a masonry building with precast double-tee roof. Concrete foundation was on drilled shafts with basins for the UV process and a structural slab for the dewatering equipment. This project was awarded the 2011 Rocky Mountain Design-Build Institute of America Water/Wastewater Project of the Year. It also received a 2013 ACEC-CO Honor Award (Waste and Storm Water Category).

### Wastewater Treatment Facility | Fairplay Sanitation District
Fairplay, Colorado

***Structural engineer*** that designed masonry building housing blower room, electrical room, and headworks for the new wastewater treatment facility. Operations started in January 2009 and the project was awarded the National Design-Build Institute of America's 2010 Water/Wastewater Project of the Year (<$25M).

### Tucson-Rogers Pump Station | City of Thornton, Colorado
Thornton, Colorado

***OnSite resident engineer and representative.*** Worked on the City of Thornton on an eighteen month, six million-dollar (construction cost) project. Observed contractor activities and construction methods to verify the product delivered to the client met the contract drawings and specifications developed by the Engineer of Record (in this case, not Burns & McDonnell). The project was a pump station that could transfer water in either direction between the South Platte River and the reservoir.

### Moffat WTP Decommissioning (Design Package 7) | Denver Water
Denver, Colorado

***Structural support*** for work towards decommissioning the Moffat Water Treatment Plant and repurposing the finished water clear wells to become water storage tanks in their distribution system. Performed multiple tank inspections and co-authored the evaluation and Basis of Design report.

### West Side Pump Stations [Countryside and Zone 5] | City of Westminster
Westminster, Colorado

***Lead structural engineer.*** Worked on horizontal split-case pump house. Building consisted of a concrete foundation on drilled shafts, masonry walls with architectural elements, and hot-rolled steel roof trusses with metal deck diaphragm.

### Chambers Reservoir Pump Station | Arapahoe County Water and Wastewater Authority
Parker, Colorado

***OnSite engineer.*** Observed and inspected construction. The project consisted of a pump station for irrigation water.

# RYAN LANG, RA, ENV SP

## Lead Architect

With more than 16 years of experience in the field of architecture, Ryan has served as the lead project architect on a variety of municipal, industrial, commercial and public building projects. His involvement includes project management, construction administration, design, fast-tracked design-build, the preparation of the architectural plans and specifications, and 3D design.

### EDUCATION

- BS, Architecture

### REGISTRATIONS

- Envision SP: Registered Architect (AR, CO, FL, GA, IL, KS, LA, MO, NE, OK, SD, TN, TX, WY)

**11** YEARS WITH BURNS & MCDONNELL

**16** YEARS OF EXPERIENCE

### Lynn R. Morgan WTP Expansion | Town of Erie

Erie, Colorado

***Lead architect.*** Worked on the expansion of the Lynn R. Morgan Water Treatment Facility in Erie, Colorado. The project will increase the water treatment plant capacity from 9.9 to 16.7 MGD to serve increasing growth in the town. The project involves design of an additional pretreatment facility, the addition of new filtration membranes, additional yard piping and an increase in pump capacity. Responsibilities included the architectural design of the new pretreatment facility.

### Pressure Zone 3 Expansion | City of Westminster

Westminster, Colorado

***Lead architect.*** Worked on the new Gregory Hill Pump Station as part of the two 3 MG above ground tank and pump station project. The facility is part of a large pressure zone expansion project that will increase water storage capacity and water pressure within Zone 3 of the City of Westminster's water distribution system. Responsibilities included architectural design for the pump station.

### K7/K10 Composite Elevated Water Storage Tanks | Water District No. 1 of Johnson County

Olathe, Kansas

***Lead architect.*** Ryan led the design effort of three proposed water towers to extend the reach of the client. In doing so, the reliability of their water supply is increased. These towers are to be placed at two different sites; one being the intersection of K-7 and K-10, and the other being the intersection of 199th & Lackman. A primary goal of the project is to be unobtrusive to the natural environment, as the site is situated in a lesser populated area.

### Lamar Pump Station Improvements | Water District No. 1 of Johnson County

Overland Park, Kansas

***Lead architect.*** Involved in the design of the improvements to this existing pump station for Water District No. 1 of Johnson County. Improvements included: new louvers, baseboard and door hardware replacement, trolley and hoist replacement, and protective coatings.

# RYAN LANG, RA, ENV SP
(continued)

### Belinder 75th Nall & Brush Creek Pump Station | Johnson County Wastewater
Fairway, Kansas

***Lead architect.*** Provided improvements at three pump stations in Kansas City. Minor architectural improvements were made at all three locations: 75th & Nall, Brush Creek, and Belinder & 57th. These improvements consisted of a door replacement, added windows and window shades, a downspout addition, new coatings, and improvements to a retaining wall. The work done was part of a package of improvements decided upon by the client.

### Ridgway Pump Station Improvements | Water District No. 1 of Johnson County
Overland Park, Kansas

***Architect.*** Involved with the design, bid, and construction phase improvements to this existing pump station for Water District No. 1 of Johnson County. Improvements included: stair replacement, trolley and hoist replacement, new louver installation, cultured stone veneer masonry cladding addition, and protective coatings. The focus of the exterior architecture of this pump station was to make the pump station blend into its surroundings. The interior focused on durability, unmanned longevity, and used high performance coatings to protect piping and electrical conduit.

### Nall Avenue Pumping Station | Water District No. 1 of Johnson County
Leawood, Kansas

***Architect.*** During the construction phase of the new 54 million gallon per day pump station for Water District No. 1 of Johnson County. The Pump Station is a concrete and brick masonry building with steel roof trusses supporting a metal deck roof. The Pump Station was designed to blend in with its upscale surroundings. As a recent win, we will be adding a second planned underground storage tank and associated capacity upgrade.

### 67th Street Pumping Station and Crouthers Pumping Station Improvements | Water District No. 1 of Johnson County
Kansas

***Architect.*** Responsible for the improvements to these existing Pump Stations for Water District No. 1 of Johnson County. Improvements included asbestos and/or lead paint removal and overhead hoist additions/improvements.

### 67th Street Pumping Station and Woodson Pumping Station Improvements | Water District No. 1 of Johnson County
Kansas

***Architect.*** During the construction phase of the new 54 million gallon per day pump station for Nall Avenue. The pump station is a concrete and brick masonry building with steel roof trusses supporting a metal deck roof. The pump station was designed to blend in with its upscale surroundings.

### Lift Station Replacement | City of Olathe
Olathe, Kansas

***Architect.*** Involved with the replacement of the Cedar Lake Lift Station in Olathe, Kansas. Part of Ryan's responsibilities included meeting with vendors to find the best suited materials for the project, as well as making color selections for the stone and roofing to match the existing surrounding Cedar Lake park area.

# SHAWN DALGLISH, EIT

## Architect

Shawn is a civil and structural engineer with five years of experience in water project design and construction. Her project experience varies from project conceptual design, project planning, and detailed design of concrete, masonry, and steel structures. Shawn has worked on several existing facility expansions as well as new facility design and construction. She also has a background in architectural and interior design. Shawn is proficient in several structural and architectural design drafting software applications including RISA 3D, Visual Analysis, Revit, AutoCAD, and Photoshop.

### EDUCATION

- ME, Civil/Structural Engineering
- BS, Civil Engineering

### REGISTRATIONS

- Engineer-in-Training (TX)

**5** YEARS WITH BURNS & MCDONNELL

**5** YEARS OF EXPERIENCE

### Lynn R. Morgan Water Treatment Plant Expansion | Town of Erie

Erie, Colorado

***Structural design engineer and architect.*** Worked on the expansion of the Lynn R. Morgan Water Treatment Facility in Erie, Colorado. The project will increase the water treatment plant capacity from 9.9 to 16.7 MGD to serve increasing growth in the town. The project involves design of an additional pretreatment facility, the addition of new filtration membranes, additional yard piping and an increase in pump capacity. Responsibilities include structural and architectural design of the new pretreatment facility.

### TDS Compliance Project at Water Reclamation Facility | Cherokee Metropolitan District

Colorado Springs, Colorado

***Design Architect*** for the TDS Reduction Facility Project. Performed Code Review and analysis of the new structures on site including the Filter Building, Chemical Building, and Headworks Building. Coordinated building department review with local authorities. Performed Hazardous Materials analysis for the Chemical Building. Worked with the Engineering Project Manager and the client to match the exterior aesthetic of the new buildings to existing buildings at the facility. Reduced the overall construction cost of the project by working with the regional building department to approve two variances from the jurisdiction's stringent energy code requirements.

### Boxelder Wastewater Treatment Facility Expansion | Boxelder Sanitation District

Fort Collins, Colorado

***Structural design engineer and architect.*** Worked on a multi-structure, wastewater treatment facility to increase capacity of the existing wastewater treatment plant. The project involves design of a new headworks facility, oxidation ditch, secondary clarifiers, UV disinfection system, modified river discharge, aerobic digesters, dewatering system, and composting facility. Responsibilities include structural and architectural design of all above ground structures at the facility.

### Plum Creek Wastewater Treatment Facility Expansion | Plum Creek Water Reclamation Authority

Castle Rock, Colorado

***Structural design engineer and architect.*** Worked on the expansion and upgrade of the existing Plum Creek Water Reclamation Facility. The project involved the addition of a new process building which includes a headworks facility, thickening system, pump room, ThermAer tanks, and separate UV disinfection facility. Responsibilities included structural and architectural design of the above and below grade structures for the project.

# SHAWN DALGLISH, EIT
(continued)

### Wastewater Treatment Facility Expansion | City of Green River
Green River, Wyoming

***Structural design engineer and architect.*** Worked on a multi-structure, wastewater treatment facility to replace the existing wastewater treatment plant. Project involves design of a new headworks facility, oxidation ditch, secondary clarifiers, UV disinfection system, modified river discharge, aerobic digesters, dewatering system, and composting facility. Responsibilities include structural and architectural design of all above ground structures at the facility.

### Pierre Wastewater Treatment Plant Upgrades | City of Pierre
Pierre, South Dakota

***Design architect.*** Worked on renovation and upgrades to a multi-structure, wastewater treatment facility in the City of Pierre. Project involves design of a new influent lift station, administration building upgrades, and modifications to an existing headworks facility. Responsibilities include architectural design of all above ground structures at the facility.

### Dodd WTP Hydroelectric Project | Left Hand Water District
Niwot, Colorado

***Structural design engineer.*** Worked on a new hydro turbine facility to be part of the overall water treatment plant capacity increase. The project purpose is to install a new hydro turbine on a new water line to be connected to the DODD Water Treatment Plant. The new hydro turbine will reduce flow into the plant while converting excess pressure into electricity. Responsibilities include foundation design, facility design, and structural design to accommodate vibrations of the turbine.

### Pressure Zone 3 Expansion: Gregory Hill Pump Station and Tanks | City of Westminster
Westminster, Colorado

***Structural design engineer and architect.*** Worked on the new Gregory Hill Pump Station as part of the two 3 MG above ground tank and pump station project. The facility is part of a large pressure zone expansion project that will increase water storage capacity and water pressure within Zone 3 of the City of Westminster's water distribution system. Responsibilities include structural and architectural design and construction phase services for the pump station.

### West Side Pump Stations [Countryside and Zone 5] | City of Westminster
Westminster, Colorado

***Structural design engineer and architect.*** Worked on the new West Side Pump Station as part of the 3 MG water storage tank rehabilitation and pump station project. The facility is part of a large pressure zone expansion project that will increase water storage capacity and water pressure within Zone 3 of the City of Westminster's water distribution system. Responsibilities include structural and architectural design of the pump station as well as construction phase services for the project.

### Erger's Pond Augmentation Stations | City of Brighton
Brighton, Colorado

***Structural design engineer.*** Worked on the Augmentation Station at Erger's Pond. The project will utilize the existing reservoirs in Brighton to augment water supply out and fill with free river water to maximize raw water supply on hand for the surrounding community. The project involves design of a sediment resistant intake structure, augmentation pump station, and required electrical facilities. Responsibilities include structural and design below grade concrete intake structures, wet wells, and vaults and above grade electrical facilities.

# DAVID OLSEN, PE

## Mechanical Engineer

David is a mechanical engineer with 20 years of experience designing HVAC and plumbing systems for a variety of building types. He has recent water treatment plant experience and is currently working on projects for the Town of Castle Rock, City of Thornton and City & County of Broomfield.

### EDUCATION

- BS, Mechanical Engineering

### REGISTRATIONS

- Professional Engineer (CO, WY, MT, SD)

**3** YEARS WITH BURNS & MCDONNELL

**20** YEARS OF EXPERIENCE

### Lynn R. Morgan Water Treatment Plant Expansion | Town of Erie

Erie, Colorado

***Mechanical engineer.*** Designed and construction administration for the mechanical and plumbing for the expansion of this facility from 9.9 to 16 MGD.

### Plum Creek WPF Advanced Treatment Project | Town of Castle Rock, Colorado

Castle Rock, Colorado

***Mechanical engineer.*** Responsible for designing the HVAC and plumbing for a new advanced treatment building at the Plum Creek Water Purification Facility. This included doing building loads, equipment loads and calculating ventilation requirements. Then designing a system to meet these requirements. The plumbing included multiple hot water systems to meet the requirements of the process needs, emergency showers and lab requirements.

### Broomfield Water Treatment Plant Expansion | City and County of Broomfield

Broomfield, Colorado

***Mechanical engineer.*** Responsible for designing the HVAC and plumbing for a new chemical building and remodel of existing water treatment plant including office and lab space at the Broomfield Water Treatment Plant. This included doing building loads, equipment loads and calculating ventilation requirements. Then designing a system to meet these requirements. The plumbing included multiple hot water systems to meet the requirements of the process needs, emergency showers and lab requirements.

### Thornton Water Treatment Plant Replacement Project | City of Thornton

Thornton, Colorado

***Mechanical engineer.*** Design and construction services for a new 20 MGD water treatment plant that includes advanced treatment technologies for taste and odor removal. The facilities include many different types of rooms and equipment to meet the requirements of these rooms. The mechanical design included integration and controls for multiple rtu's and exhaust fans to meet the heating, cooling and ventilation of the various rooms.

### Hydroelectric Project, Lynn R. Morgan Water Treatment Facility | Town of Erie

Erie, Colorado

***Mechanical engineer*** for the detailed design of an 80 kW micro-turbine addition at the existing 17 MGD Lynn R. Morgan Water Treatment Facility. Erie has received raw water from Northern Colorado Water's SWSP pipeline for nearly 20 years. The potential energy in this pipeline was dissipated through an existing buried sleeve valve vault. The addition of a

# DAVID OLSEN, PE
(continued)

hydroelectric generator proved feasibility after a study compared applicable turbine technologies, potential installation locations and several financial scenarios.

### Maple Grove Water Treatment Solids Handling | The Consolidated Mutual Water Company

Lakewood, Colorado

***Mechanical engineer.*** Responsible for design of the HVAC and plumbing for a new solids handling building for the existing water treatment plant. This included doing building loads, equipment loads and calculating ventilation requirements. Then designing a system to meet these requirements. The plumbing included multiple hot water systems to meet the requirements of the process needs and emergency showers.

### TDS Compliance Project | Cherokee Metropolitan District

Colorado Springs, Colorado | Jan 2020 -

***Mechanical engineer.*** Design HVAC and plumbing for 3 new buildings. This project required emergency shower/eye wash for a site that did not have adequate water (both quantity and quality), was able to come up solutions. This project has required multiple redesigns and complex coordination's with a tight timeframe to meet state mandates.

### Boxelder Wastewater Treatment Facility Expansion | Boxelder Sanitation District

Fort Collins, Colorado

***Mechanical engineer.*** Responsible for the equipment selection, system evaluation and design review. The Green River Wastewater Treatment Plant is a $33M design-build project. The facilities include different types of rooms, buildings and equipment to meet the requirements of these rooms, including a Class 1 Div 1 space. The mechanical design included integration and controls for multiple rtu's and exhaust fans to meet the heating, cooling and ventilation of the various rooms.

### Wastewater Treatment Facility Expansion | City of Green River

Green River, Wyoming

***Mechanical engineer.*** Responsible for the equipment selection, system evaluation and design review. The Green River Wastewater Treatment Plant is a $30M design-build project. The facilities include different types of rooms, buildings and equipment to meet the requirements of these rooms, including a Class 1 Div 1 space. The mechanical design included integration and controls for multiple rtu's and exhaust fans to meet the heating, cooling and ventilation of the various rooms.

### Ft Lupton WWTP Upgrades | City of Fort Lupton, Colorado

Fort Lupton, Colorado

***Mechanical engineer.*** Coordinate and design the mechanical and plumbing for the 3 remodeled buildings and 2 new buildings.

### Pierre Wastewater Treatment Plant Upgrades | City of Pierre, South Dakota

Pierre, South Dakota

***Mechanical engineer.*** Design and redesign the HVAC and plumbing for 6 buildings with use and equipment changes.

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