

Jackson Town Council Workshop

March 20, 2023

1:30 PM

Town Council Chambers

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I. ZOOM LINK FOR PUBLIC PARTICIPATION

To join, click the link or copy to your browser: <https://us02web.zoom.us/j/89300397530?pwd=dC9nMlpocTVrTzMOUjN1c2hWVys2QT09>

If the link does not work, join at zoom.com with Webinar ID **893 0039 7530** Password: **83001**

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II. CALL TO ORDER AND ROLL CALL

- A. Employee Introduction - Marinda Elkins, Transit Supervisor/Dispatcher

III. WORKSHOP ITEMS

- A. Willow Street Safe Routes/Bollard Discussion (Brian Schilling, 60 mins)
- B. Waste Water Treatment Plant Capital and Operational Improvements (Floren Poliseo, 40 mins)
- C. Teton County Water Quality Master Plan Update (Tanya Anderson, 20 mins)
- D. Parklet and Flex Plan for Summer 2023 (Aaron Carrillo-Hernandez, 20 mins)

IV. MATTERS FROM MAYOR AND COUNCIL

- A. Liason Reports

V. UPCOMING AGENDA UPDATE

- A. Council Priorities and Upcoming Agendas

VI. ADJOURN

Please note that at any point during the meeting, the Mayor and Council may change the order of items listed on this agenda. In order to ensure that you are present at the time your item of interest is discussed, please join the meeting at the beginning to hear any changes to the schedule or agenda.

Marinda 'Rinda' Elkins
Full-Time Transit Supervisor / Dispatcher

Rinda Elkins was born in Worland, Wyoming and grew up in Alpine, Utah. She has 3 children, a daughter and 2 sons as well as a son-in-law and a beautiful one-year-old granddaughter. Rinda has worked as a nurse for over 20 years and changed careers amid COVID to become a semi-truck driver. She joined the START team in November after moving to Thayne to be with family. She has 2 dogs, loves meeting new people and making friends and loves trying new things and having new experiences.

STAFF REPORT



Meeting Date:	March 20, 2023	Meeting Title:	Workshop
Submitting Department:	Pathways	Presenter:	Brian Schilling
Agenda Item:	Willow Street and Snow King Avenue Safe Routes – 2022 Recap	Public Comment	Yes

Purpose & Policy Considerations.

The purpose is to provide a recap for Council of the 2022 Willow Street and Snow King Avenue Safe Routes project, discuss any desired changes to the program, and to consider continuing the program for 2023.

Requested Action.

Council will be asked to authorize continuing the Willow Street and Snow King Avenue Safe Routes layout in 2023 and beyond.

Recommendations.

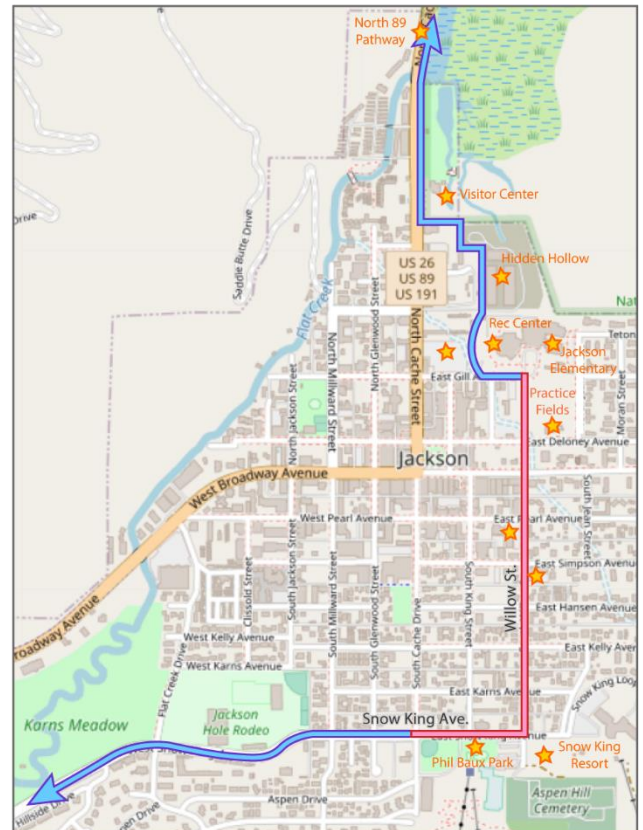
Staff recommends continuing the Willow Street and Snow King Avenue Safe Routes in its current layout and with the same general operational time frame. Staff recommends minor adjustments to striping and signage to help reduce confusion on the two-block stretch of Snow King Avenue between Willow and Cache where there is not a bike lane on the north side of the street.

Background.

The following is a summary of the 2022 Willow Street and Snow King Avenue Safe Routes planning and implementation process, including discussion of background planning, public outreach, implementation, operation, and cost.

• Planning

The Willow Street and Snow King Avenue Safe Routes project was initiated in 2021 by a request from Council to evaluate extending the Snow King Avenue bike route to provide better active transportation access to town destinations. Staff made a presentation on Downtown Bike Lane Connectivity to Town Council on July 19, 2021, with a follow up presentation on August 16, 2021. (See links to the Staff Reports and Meeting Video under “Attachments”). Staff presented an overview of design principles for safe and efficient bicycle networks and a primer on the “Systematic Safety” design approach (a policy approach which has since been adopted by the USDOT). The discussion identified the need to “create a safe, high-quality connection from Snow King Avenue to the North 89 Pathway, with connections to Snow King Resort, Phil Baux Park, Jackson Elementary School, the Rec Center, and downtown” in order to meet mobility needs in the Town of Jackson for cyclists of all ages and abilities. Staff shared information that demonstrated how this goal is consistent with the policies and principles identified in the Jackson/Teton Comprehensive Plan as well as numerous Town of Jackson planning documents.



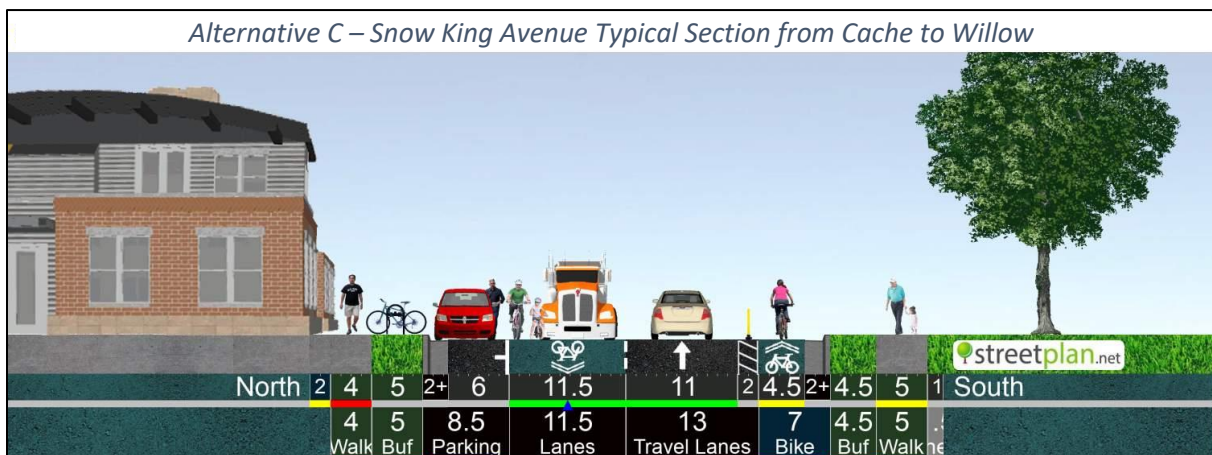
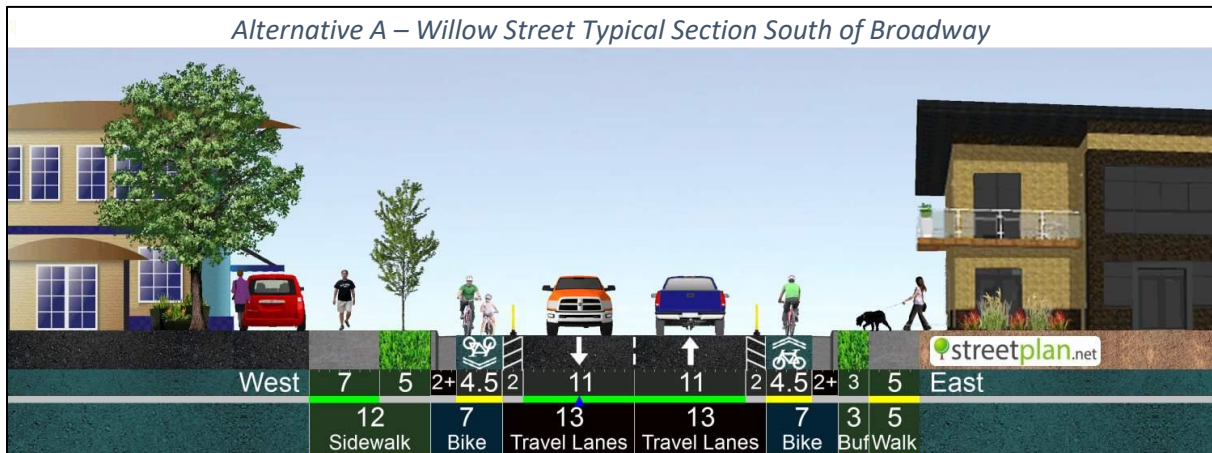
- Existing/In-Progress Bike Network
- Willow Safe Routes Project Area
- ★ Key Destinations

At the August 16th, 2021 meeting, the Town Council unanimously approved a motion to direct staff to “initiate planning of bicycle network improvements on Snow King Avenue and Willow St. between Cache Street and Jackson Elementary School...evaluating a range of concepts for Council consideration.” The project development process proposed by staff included the following steps: (1) draft concept development; (2) public outreach on the draft concepts; (3) design revisions and follow-up; and (4) Council review of the final plan.

Following the direction from Council, staff prepared conceptual plans and conducted public outreach on the draft concepts. A summary of the Public Outreach process is discussed below. The Town held two public Open Houses on December 16th, 2021 to present the recommended option of one-way, bollard-buffered bike lanes on each side of the street (labelled as “Alternative A”) to the community. Based on feedback received at the Open Houses and in discussions with community members, staff developed additional concepts for consideration along the two blocks on Snow King Avenue between Cache Street and Willow Street. These options included Alternative B (a two-way bike lane on the south side of Snow King Avenue with parking on the north side) and Alternative C (a one-way bike lane on the south side only, with parking but no bike lane on the north side).

Staff presented the design options at the March 21, 2022 Town Council meeting. The staff report for this meeting includes extensive discussion on the design alternatives, planning process, public comment, and other items such as studies on the economic impacts of bike lanes on local businesses. The Staff Report and Meeting Video are linked below under “Attachments.” Council approved Alternative A for the Willow Street portion and Alternative C for the Snow King Avenue portion of the Willow Streets Safe Routes project and directed staff to implement the project in spring 2022.

Approved Alternatives



- **Public Outreach**

Staff, with help from internal and external partners, conducted extensive public outreach during the project planning and approval process. See the Community Outreach Summary and the Staff Report for the March 21, 2022, Town Council meeting (p. 3 and pp. 9-123) for a detailed record of the community outreach. Both documents are linked below in “Attachments”. From initial project discussion in July 2021 through project implementation in May 2022, there were:

- 13 local media articles
 - 7 News and Guide articles
 - 6 Buckrail articles
- 3 publicly noticed Town Council meetings
- 2 public Open Houses
- 1 Community Outreach Action Plan
- 2 rounds of flyers distributed to all residences and businesses along project corridor.

Staff coordinated with the Community Engagement Specialist to develop a Community Outreach Action Plan in September 2021. Staff held two public Open Houses in December 2021. Staff met individually with more than a dozen Town Departments, stakeholders, and community members to discuss individual concerns or suggestions for the project. Staff coordinated upwards of 15 public events and media releases between August 2021 and May 2022. Cumulatively, this outreach produced more than 70 letters of public comment to the Jackson Town Council prior to the March 21, 2022, Council meeting when the project was approved.

- **Installation**

Following the conceptual design approval, staff spent considerable time (estimated at more than 100 hours) on project planning and installation from March through May 2022. This included:

- Designing the bollard layout, intersection striping, and signage plan
- Coordinating with Town Streets staff on striping and signage, lane alignments, parking adjustments, etc.
- Coordinating hole drilling contractors and striping contractors
- Procuring bollards, paint, and signs
- Ongoing coordination with project partners, stakeholders, Town staff, and community members
- Field work to mark locations for bollards, striping, and signposts
- Prep, coordination, and field work to install bollards

On May 26th, a team consisting of Town Pathways staff, Parks and Rec staff, and volunteers from Friends of Pathways installed approximately 230 bollards in under 6 hours. The full implementation, including striping and signage, was not completed until later in the summer. This lag between bollard installation and project completion was due to several factors, including contractor availability (striping and signpost installation), material availability (paint delivery and sign fabrication), and weather conditions. (It is typical for street striping in Jackson to be performed as late as early July due to unfavorable or unreliable springtime weather conditions.)

- **Operation**

Over the course of the summer, staff spent additional time (estimated at 40 hours) performing ongoing observations on bike lane usage, cyclist behavior, motorist behavior, and on other tasks including:

- Collecting user count data.
- Coordination with residents and Town staff to relocate several bollards.
- Monitoring parking usage on Willow and on cross-streets.
- Meeting with stakeholders and members of the public on operational concerns and suggestions

- **Cost**

The costs for the 2022 installation listed below cover invoiced expenses but do not include staff time, items covered in-house, or volunteer work (including all Pathways Coordinator staff time, Public Works staff time for planning, layout, and some sign installation, Parks and Rec staff time for striping/bollard layout and installation, and volunteer time for striping/bollard layout and installation). Initial installation of bollards and signs is considered a one-time capital cost. Replacement of damaged signs and bollards is an ongoing maintenance cost. Striping is an annually recurring cost.

2022 Willow Street and Snow King Avenue Safe Routes Project Costs

Item	Description	Cost
Bollards	Purchase Bollards and Materials, Labor for Drilling Holes	\$ 39,995
Striping	Labor and Materials for Crosswalks and Line Striping	\$ 12,200
Signs	Purchase Signs and Posts, Labor for Drilling Holes	\$ 3,357
	Total	\$ 55,732

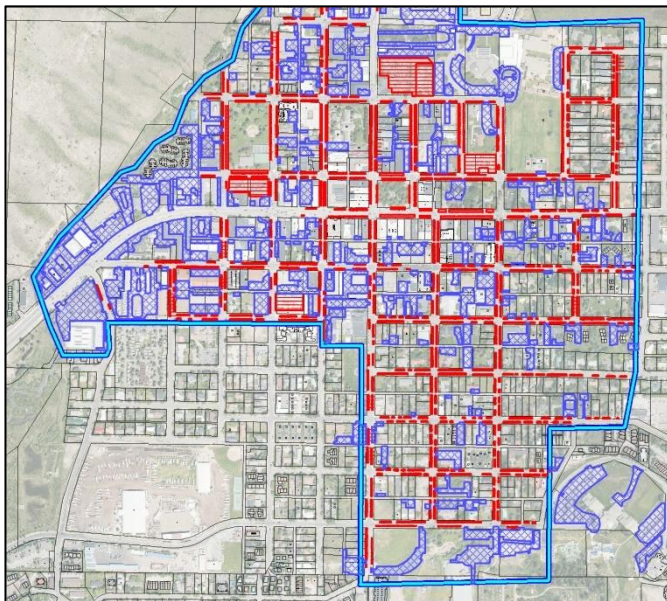
Analysis.

The following is a summary of selected observations and discussion items from the 2022 Project.

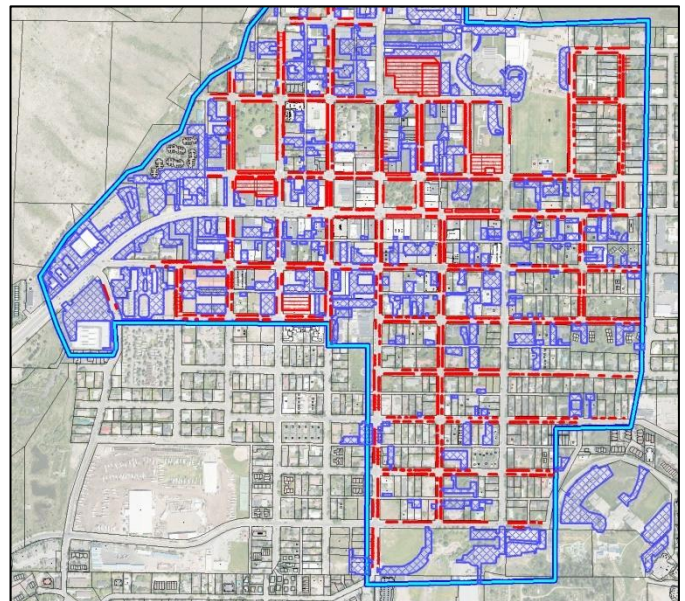
- **Parking**

The main complaint expressed by opponents of the Willow Street and Snow King Avenue Safe Routes project was the reallocation of public street space from one use (free on-street storage for vehicles) to a different use (bicycle travel lanes) on eight blocks of Willow and on one side of Snow King Avenue for two blocks. Across the whole project area there are approximately 194 parking spaces—48 on Snow King Avenue between Cache and Willow, and 146 on Willow Street between Snow King and Gill. The bike lanes approved in the 2022 plan did replace a significant portion of the on-street parking but retained 41 spaces—28 on Snow King and 13 on Willow—and did not affect any off-street parking. All side and cross streets continued to prioritize vehicular access and parking, as did the streets for 100% of the rest of the town not on Willow Street and the one side of Snow King Avenue. There are approximately 1091 parking spaces within a 2-minute walk of Willow (cross streets and parallel streets up to one street away) and 1665 spots within a 4-minute walk of Willow (up to two streets away) that were not affected by the project.

Parking Supply Before and After Project Implementation (Red = On-Street Parking, Blue = Off-Street)



Pre-Project



Post-Project

Observations made during the summer suggest that the primary challenge is not so much the amount of free on-street parking, but the management of the parking supply and in providing better directions to users to find the parking spaces that are available. To help with the high-turnover parking needs at the County Administrative offices, staff placed signs on Willow at the County Admin Building informing drivers of the free parking in the off-street lot behind the building and designated additional spots in the lot for customer parking. Staff made daily visits to the lot to monitor usage, and while staff did receive reports that the lot was parked to full capacity at some points during the summer, there were always multiple spaces available when staff visited.

Staff also made daily trips to observe parking usage on the side streets off Willow and on King St. (one block over from Willow). Generally, the streets closer to the Town Square (Broadway, Pearl, and Simpson) had relatively high parking usage (maybe only one or two available parking spots per block at busier times), while the areas further south (Hansen, Kelly, and Karns) saw relatively light parking usage with multiple available spaces on each block face at all times. Overall, the parking monitoring showed that there was at least one parking space available on every block during every daily observation. This suggests that, while there may be a perception of a lack of parking, there actually is sufficient parking supply and what is needed is better management of the public space and better wayfinding to help drivers find the many available places to store their cars while they're not being used.

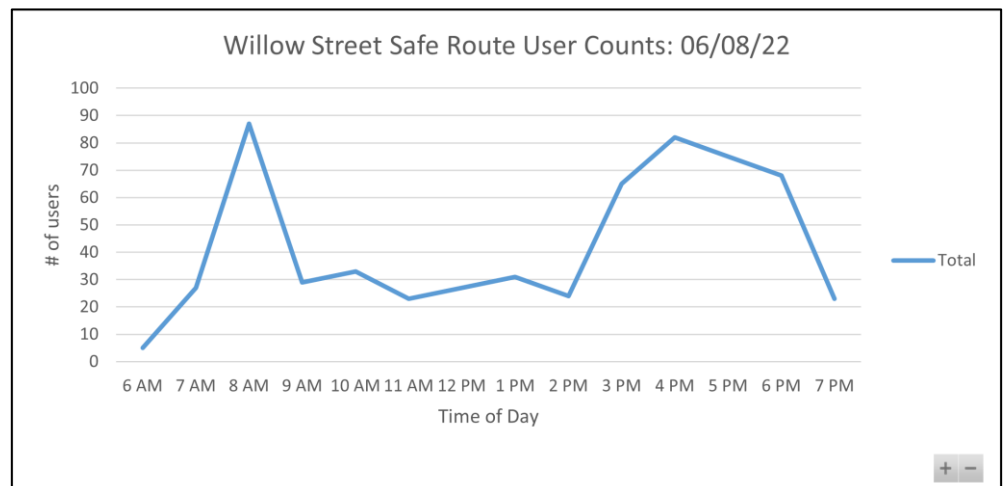
Drivers occasionally were confused with the parking arrangement along the Jackson Elementary School ballfields, but the situation seemed to improve over the course of the summer as drivers got used to the layout. This is discussed further below.

- **User counts**

User counts showed more than 600 daily bike trips at the intersection of Willow and Simpson. Staff installed a time-lapse camera at the intersection of Willow and Simpson to collect user data between 6:00 AM and 8:00 PM over ten days in June and July, and three days at Broadway and Willow in September. Staff has compiled data for June 8th and July 7th, noting the following elements: number of riders; direction of travel; turning movements; notes and miscellaneous observations such as cargo bikes, people carrying kids, contraflow riding, horses, dogs, vehicle types other than bicycles, and other interesting or unique items.

Date	6/8/2022	7/7/2022
Weather	Cloudy/windy in afternoon	Cloudy morning, sunny later
Total # through intersection	599	628
Total # on Willow	523	550
Total # on Willow north of Simpson	484	487
Total # on Willow south of Simpson	429	505

Similar to other in-town count locations, the count distribution profile follows the trend of a morning peak around 8:00 AM and a longer peak during late afternoon/early evening. The photo data indicates that relatively few trips on Willow were overtly recreational (i.e. road cyclists dressed in Lycra)—the vast majority appeared to be simply people going about their daily business who were dressed accordingly.



- **Vehicle Idling**

Idling vehicles are a common problem on Town of Jackson streets. Areas where the problem is particularly prevalent include businesses and destinations where people “run in for just a minute” (such as the Post Office or “grab and go” restaurants), and pick-up/drop off zones outside public destinations (such as the Center for the Arts, public schools, the Library, parks, and ball fields). It is also very common to see people browsing on their phones while sitting in their parked, running cars. Along the Willow Safe Routes corridor, the worst areas for idling vehicles have historically been the Teton County Administration building, the ball fields by Jackson Elementary, and on Snow King Ave. near Phil Baux Park.

Observations by Pathways staff over the course of the summer (Memorial Day through Labor Day) indicated an estimated 99% reduction in the frequency of idling vehicles on Willow Street at the County Administration building, on the west side of Willow at the Jackson Elementary School ball fields, and on the south side of Snow King Avenue along Phil Baux Park. Where parking was still available at the County Admin building (along Simpson Avenue and in the parking lot behind the Admin building), there was no noticeable reduction in idling vehicles. Similarly, there was no reduction in idling observed on the east side of Willow Street at the ball fields or on the north side of Snow King Avenue or in the off-street parking lot at the base of Snow King.

- **Illegal Parking/Cars Blocking the Bike Lane**

A common problem observed during the project was drivers illegally blocking the bike lane with their parked vehicles. Per Town of Jackson ordinance 10.04.205, it is unlawful to park in any designated on-street bicycle lane identified by appropriate signage or pavement markings, except in certain circumstances such as emergencies or if directed by a law enforcement officer. The issue was particularly prevalent during the initial phases of the project, although it appeared to abate over the course of the summer.

Initially, after the bollards were installed but before permanent “No Parking” signs were installed, staff placed temporary “No Parking” signs on orange delineators along the curb edge to indicate that parking in the bike lane was not permitted. Despite this clear striping and signage, there were still a handful of people daily who blocked the bike lane with their vehicles. Several weeks into the project, staff removed the temporary “No Parking” signs but, due to delays with sign fabrication and contractor availability, did not install the permanent “No Parking” signs until several weeks after that. As predicted by the Town Streets Manager, the problem of people parking in the bike lane became significantly worse during this interim period despite the presence of striped bike lanes and bollards at thirty-foot spacing. Following the installation of the permanent “No Parking” signs along the route, the incidence of vehicles illegally blocking the bike lane dropped significantly, but there were still occasional violations.



Illegally parked cars blocking the bike lane were a common problem throughout the project.

- **Shared Lanes on Snow King Avenue and at the Willow/Deloney Intersection**

The asymmetrical layout on Snow King Avenue between Cache Street and Willow Street contributed to a high rate of contraflow (wrong way) riding for the two-block section where there is a buffered bike lane on the south side of the street but no bike lane on the north side. Based on reports and informal staff observations over the summer, there were more instances of contraflow riding (cyclists travelling westbound in the south side buffered bike lane) than on other sections of the project corridor.

In some cases, staff observed riders who seemed unfamiliar with the project layout and were confused when, after travelling south on Willow in the buffered bike lane, they arrived at the intersection of Willow and Snow King. The riders could see bollards on the far (south) side of the street but no bollards on the near (north) side and were unsure of the correct way to proceed west on Snow King. It was common to observe these riders choose to cross the street to use the bollard buffered bike lanes instead of using the shared travel lane on the north side of the street, which was technically the correct option.

In other cases, staff observed riders (often kids) leaving Phil Baux Park and heading west. Instead of crossing Snow King Avenue mid-block or at King Street (where there is no stop sign) and riding west in the shared travel lane on the north side of the street, the riders would ride contraflow in the south side buffered bike lane to the Cache/Snow King intersection and then cross the street at the stop sign to then continue west in the north side buffered bike lane.

Based on these observations, staff recommends additional signage and striping at the Willow/Snow King Ave. intersection to provide better direction for cyclists who may be unfamiliar with the project. Staff also recommends signage along Snow King Avenue to discourage contraflow riding from Phil Baux Park, although staff feels this signage is unlikely to be very effective.

At the intersection of Willow and Deloney, the existing street width and curb bulbouts required that cyclists share the lane with cars for a short distance. This was not ideal for safety—especially considering that it was a block from Jackson Elementary School and used by many small kids—but it was the best layout for the situation. Green markings were used to highlight the bike lanes approaching and through the intersection. Fortunately, (as far as staff is aware) there were not any conflicts or incidents here.

- **Lane Width**

A common complaint received about the project was the perceived narrowing of the street and travel lanes. The lanes were not narrowed. In fact, the effective lane width was slightly greater *after* the bollards were installed.

Prior to installing the bollards, the actual lane widths averaged approximately 10.5 to 11 feet wide with cars parked on either side of the street. In some cases, lane widths were restricted to less than 10 feet when there was a particularly large vehicle parked along the curb. With the bollards, the lanes are a consistent 11 feet wide from centerline to fog line and an additional 7" to the face of the bollards, resulting in a total lane width of 11'7".

As can be seen in the photos below that show a parked vehicle in relation to the placement of the fog line (white dashed line) and the bollards (orange dot), ***parked vehicles occupy more of the street space than the bollards do.*** Despite the fact that the bollards take up less space in the travel lanes than parked vehicles, staff observed that some drivers chose to run over bollards. This raises the question of whether this behavior is perhaps intentional, given that drivers seemed to have no problem avoiding parked cars along the street prior to the project installation.



Location of vehicle parked along curb in relation to edge of travel lane (white dashed line) and bollard location (orange dot).

Additionally, engineering and design standards for travel lanes on a 25-mph street recommend a minimum width as narrow as 9 feet and up to 12 feet wide, which places an 11-foot travel lane at the more generous end of the allowed range. Numerous studies have shown that narrowing lanes in slower speed settings (such as local residential and commercial streets) actually results in fewer crashes rather than more crashes as many commenters suggested it would. Narrowing travel lane width to discourage speeding is a recommended practice for improving safety on local streets.

- **Traffic Flow**

One of the benefits of dedicated bike lanes (buffered or striped) is that they improve traffic flow by repositioning people on bikes out of the vehicular travel lane into the dedicated bike lane. Cyclists typically move at slower speeds than vehicles. When there are cars parked along the curb and cyclists must use the travel lane (which was a frequently-encountered scenario on Willow prior to the Safe Routes project), it generally means that all traffic must travel at the speed of the slowest user—usually the cyclist. With the bike lanes, cyclists are no longer in the vehicle lane so vehicles can more easily travel at their desired speed.

The bike lanes also improved emergency vehicle access. When there are cars parked along both sides of the street, it can be difficult to pull over to allow an emergency vehicle to pass. With the bike lanes, there were no vehicles parked in the way and it was very easy to pull over into the bike lanes and allow emergency vehicles to proceed.

The vehicle lane alignment on the block from Deloney to Gill introduced a lateral shift to accommodate the parking and bike lane along the Jackson Elementary School ball fields. Initially, staff was concerned that this would be confusing for drivers. However, drivers seemed to handle this better than expected and staff was not aware of any major problems.

- **Visibility at Intersections**

Many users noted that visibility all along the route, and especially at intersections, was significantly improved by removing the parked vehicles close to intersections, and this made them feel safer riding and walking on Willow. A common problem

with on-street parking is when vehicles, particularly large SUVs and trucks, block sight lines when they are parked too close to a cross-street or driveway. This makes it very difficult to see cross traffic on the side streets when approaching the intersection—even for adults. For a child who may be significantly shorter



With no parked cars blocking the view at the intersection, small kids on bikes have no problem seeing cross traffic clearly at intersections, and the cross-traffic drivers will have no trouble seeing the kids.

than the height of the hood of these oversized vehicles, it is nearly impossible to see cross traffic. It is equally difficult for the drivers on the cross streets to see people on bikes, especially kids, travelling toward and through the intersection.

This significant safety concern was effectively eliminated by removing parked vehicles which provides clear sight lines at the intersections. This also improves visibility for pedestrians and disabled users crossing the street.

- **General usage**

The time lapse photos, field observations, and public feedback showed that the public generally used the bike lanes as intended. There was high compliance and relatively little contraflow riding on the main corridor, although there was a higher rate of contraflow riding on the Snow King Avenue portion as discussed above. Other than the issue of parking in the bike lanes and the expected behavior of hitting bollards, vehicle drivers did not seem to have significant problems or experience unnecessary delays using the corridor.

The three areas listed below seemed less intuitive to users than the rest of the corridor, so staff will continue to explore ideas to facilitate proper usage at these locations.

- The shared travel lane on the north side of Snow King Ave. which resulted in higher rates of contraflow riding on the south side of Snow King.
- The intersection at Willow and Broadway. Following the “desired” path through the intersection requires users to interpret gaps in the bollards and follow the green intersection markings—this can be confusing for cyclists who are not familiar with this type of intersection layout.
- The parking arrangement on the east side of Willow from Deloney to Gill along the Jackson Elementary ball fields, which involved a lane shift, parking offset from the curb, and some sections of shared travel lane. Cyclists were able to easily follow the alignment of striping and bollards, but drivers seemed confused initially that parking was permitted on this block. With the help of directional signage it seemed that the public figured it out after a short while, and when one person parked correctly, others would typically follow suit.

- **Public feedback**

Staff and the Town Council received extensive feedback via email, public meetings, and in-person from both proponents and opponents of the project. There was also much discussion of the project on social media. Most of the comments opposed to the project focused on the reallocation of public space from one use (parking) to another (bike lanes) and was concentrated on the northern portion of the project. There were other negative comments that covered various categories such as: the danger posed by bollards, questions on whether bike lanes are necessary outside of school session or at all, opposition to green space and sidewalk buffers, opposition to people riding bikes with their kids, observations that not everyone rides a bike, suggestion that there needs to be a “balance” in the approach to streets, assertions that streets are only for cars, that cyclists should be licensed/taxed/insured, that it is unsafe and not practical to park in surrounding residential areas, that people can ride bikes somewhere else, and others.

Commenters who supported the project mentioned items such as: feeling safer riding on Willow, feeling safer riding with kids, kids being able to ride safely to school, daycare, and summer camps, using the lanes for commuting, appreciating the lanes for their bike rental customers, appreciating being able to have a choice in how they get around town in the summer (i.e. not having to drive all the time), using the lanes to ride downtown to shop at local businesses, go to the People’s Market, the Farmers Market, and Old Bills, talking to friends and neighbors while riding on the route, and others.

Some commenters provided constructive feedback with ideas on how to improve the project (many of which have been covered above).

- **Summary**

The Willow Street and Snow King Avenue Safe Routes Project significantly improved safety and comfort for bicyclists, based on staff experience and public feedback. It also created controversy among some drivers and downtown business owners with regards to parking and perceived impacts to driving on Willow and Snow King.

The buffered bike lanes successfully achieved four of the five principles of efficient bicycle networks that were stated as project goals during the planning process, including cohesion, directness, safety, and comfort. The lanes partially met

the goal of attractiveness in that Willow Street is a pleasant and relatively low traffic street, but the relative aesthetic appeal of parked cars (before) vs. bollards (after) is debatable and likely highly subjective.

In its current format of using bollards to create buffered bike lanes, the project is a short-term, temporary version of concepts that can be implemented much better with permanent infrastructure in a long-term project. There are design improvements that could be considered to increase the safety, comfort, attractiveness, and overall functionality of the corridor in serving as a bike route that is safe and accessible for people of all ages and abilities, and staff recommends that these be considered for the long-term design and implementation of the multi-modal network in this corridor.

Overall, the Willow Street and Snow King Avenue Safe Routes Project achieved the goal, albeit in a short-term, temporary manner, of creating a safe, high-quality multi-modal corridor from Snow King to JES and improving safety for bicyclists and pedestrians of all ages and abilities.

Possible Alternatives.

Alternatives for 2023:

- Removal
 - This would restore Willow Street and Snow King Avenue to pre-project conditions. It would eliminate the buffered bike lanes and abandon the effort to provide a safe bike route connecting to Snow King Resort, Phil Baux Park, Jackson Elementary School, the Rec Center, and to the North 89 Pathway.
- No Change
 - The same implementation as in 2022 (proposed).
- Alternative One-Way Traffic + One-Side Parking
 - Staff presented this option during the initial planning discussions. This layout would retain parking on portions of Willow by converting Willow to a one-way, eliminating a travel lane and keeping parking on one-side of the street. It was rejected primarily because it was felt that the one-way travel lane for part of Willow Street would be too disruptive and the implications of converting Willow to one-way were not fully understood.

Comprehensive Plan & Priority Alignment.

The Willow Street and Snow King Avenue Safe Routes Project goal to create a safe, connected bicycle network in the Town of Jackson is directly in line with the foundational principle of the Comprehensive Plan's transportation policy (Section 7), which reads:

Travel by walk, bike, carpool, or transit will be more convenient than travel by single-occupancy vehicle.

Principle 7.1 states that the community will "Meet future transportation demand with walk, bike, carpool, transit, and micro-mobility infrastructure." This will be accomplished by creating a transportation network that is an "interconnection of walking, biking, carpool, and transit infrastructure that makes the single-occupancy vehicle the least convenient mode of travel" and includes a network of complete streets that "prioritize the movement of pedestrians [and] bicyclists."

Principle 7.2 states the goal to "Reduce greenhouse gases from vehicles to below 2012 levels," and that "cleaner vehicles, fewer trips, and trips that move more people will be prioritized over strategies focused on reducing congestion." This will be accomplished by discouraging the use of single-occupancy vehicles (Policy 7.2.b) and exploring and piloting innovative transportation solutions (Policy 7.2.c).

The plan also goes on to state:

The community's transportation vision is to create a multimodal transportation system by enhancing the current automobile-oriented system to include a network of complete streets, transit, and pathways system accessible by residents and visitors of all ages and abilities. By pursuing this vision the community will ensure all users of the public right-of-way, including: pedestrians, bicyclists, automobile drivers, trucks and transit riders can do so safely and efficiently.

The Comprehensive Plan even speaks directly on the concept of Safe Routes to School as part of a TDM strategy, stating as a goal to “Encourage or require students in all grades to use active modes of transportation rather than driving or being driven to school.”

The Comprehensive Plan provides very clear direction that the community will prioritize safe, connected networks that promote the use of alternative (active) transportation modes over a system that focuses solely on single-occupancy vehicle usage. It emphasizes numerous times the concepts of connectivity, safety, and accessibility for users of all ages and abilities, which are all critical components for bicycle networks and are directly related to this discussion item.

The project directly addresses several core principles in the Comprehensive Plan and other Town planning documents such as the Pathways Master Plan and the Town of Jackson Bicycle Network Plan. It also addresses comments received in recent public input from the Teton Mobility Project regarding the need to provide improved safety and options for people on bikes trying to get to Phil Baux Park, Snow King Resort, Jackson Elementary School, the Rec Center, and the North 89 Pathway. The overarching issue that this project addresses is providing safe and connected bicycle and pedestrian facilities for all ages and abilities, with a focus on creating Safe Routes to Schools and other public destinations.

Fiscal Impact.

Installation and operational fiscal impacts for 2023 include redrilling and reinstalling bollards for Simpson to Broadway (this section was repaved last fall and the bollards need to be reinstalled).

- Bollards – 50 cups @ \$17.25 each + epoxy + 10 replacements: \$3,312
- Hole Drilling – 50 @ \$25 each + mobilization: \$2,130
- Signs – 8 posts, 2 new signs @ \$42, 8 holes @ \$150 each: \$2,884
- Striping – est. \$15,000
- Total (FY23): \$23,326

Staff Impact.

Installation tasks for 2023 include: redrilling holes and gluing cups/bollards for Simpson to Broadway, reinstalling bollards on the remainder of the corridor, additional signage installation, and annual striping. Operational tasks include counts and data collection and bollard maintenance.

- 1-2 hours to re-mark bollard hole locations from Simpson to Broadway
- 5 hours (5 people for 1 hour) to epoxy new bollards from Simpson to Broadway
- 15 hours (5 people for 3 hours) to reinstall bollards in existing holes
- 2-4 hours to design additional striping layouts
- 10 hours to mark intersections and lanes, manage striping contractor
- 4-8 hours to install additional signage
- 4 hours to set up data collection devices. 10-20 hours to process data (video) or 1 hour (automated).

Attachments or Links.

1. Town Council Workshop – July 19, 2021
 - a. Meeting Agenda: <http://jacksonwy.civicclerk.com/Web/Player.aspx?id=1549&key=-1&mod=-1&mk=-1&nov=0>
 - b. Meeting Video: <http://jacksonwy.swagit.com/play/07192021-648/>
2. Town Council Workshop – August 16, 2021
 - a. Meeting Agenda: <http://jacksonwy.civicclerk.com/Web/Player.aspx?id=1550&key=-1&mod=-1&mk=-1&nov=0>
 - b. Meeting Video: <https://jacksonwy.swagit.com/play/08162021-544>
3. Town Council Meeting – March 21, 2022
 - a. Meeting Agenda: <http://jacksonwy.civicclerk.com/Web/Player.aspx?id=1646&key=-1&mod=-1&mk=-1&nov=0>
 - b. Meeting Video: <https://jacksonwy.swagit.com/play/03222022-828>
4. Community Outreach Summary – 4 pages

Suggested Motion.

I move to approve the Willow Street and Snow King Avenue Safe Routes Project for 2023 in the same layout as 2022.

Willow Street Safe Routes Community Outreach Summary

Outreach – Prior Planning

Pre-2021

There was significant planning work and public outreach conducted on the Willow Street corridor prior to the initiation of the Willow Street Safe Routes project in 2021. The corridor was previously identified as a priority route in the Town bicycle network in the 2007 Pathways Master Plan and the 2012 Town of Jackson Bicycle Network Plan. Both of these processes involved significant public outreach and public comment. There was substantial comment in favor of the project (and in support of the existing bollards on Snow King) received during the Teton Mobility Project outreach conducted in 2020.

Public Meeting – Town Council Workshop

July 19, 2021

Staff presents to Council on effective bicycle networks and proposes concept of extending the Town bike network on Snow King Ave. and Willow Street.

Media – Newspaper Article and Social Media Post

August 14, 2021: Council to discuss downtown bike corridor

Jackson Hole Daily article published in print and online

- 10,000 copies a day
- 45,000 followers on Facebook

Media – Newspaper Article

August 15, 2021: Downtown Bike Lanes on Monday's Agenda

Jackson Hole Daily article published in print and online

Public Meeting – Town Council Workshop

August 16, 2021

Council unanimously votes to “initiate planning of bicycle network improvements on Snow King Avenue and Willow Street between Cache Street and Jackson Elementary School...evaluating a range of concepts for Council consideration.”

Media – Newspaper Article and Social Media Post

August 18, 2021: Town Moves ahead with E. Jackson bike plan

JH News and Guide article published in print and later online

- 7,000 copies a week
- 45,000 followers on Facebook

Media – Social Media Post/News Article

August 20, 2021: Town staff ready to plan bike lane connectivity, council continues discussion

Buckrail article

- 12,000 daily readers
- 45,000+ Facebook followers

Outreach Planning

September 2021

Friends of Pathways works with Town staff to develop a Community Engagement Plan, which includes testing the route during FOP's annual iWalk/iBike/iBus to School with pop-up bike lanes.

- Ahead of event, FOP hand delivered information about the pop-up bike lanes to every residence and business along the route using door hangers
- Pop-up bike lanes were installed along the route for 48 hours
- FOP created a video during the event
- Photos were taken of the event

Media – Newspaper Article

Sept 11, 2021: Students take to pathways next week

Jackson Hole Daily published in print and online

Media – Social Media Post/News Article

Sept. 14: Temporary protected bike lanes to appear on Snow King Avenue, Willow Street

Buckrail article

Event

September 15, 2021 – iWalk/iBike/iBus to School (Jackson Elementary)

Willow Street iWalk/iBike/iBus to School Video

1,600 views on Facebook

454 views on Instagram

94 views on Vimeo

At least 2,148 people have viewed the video of the proposed route

Media – Social Media Post/News Article

Dec. 7, 2021: Community engagement meetings to discuss Willow Street Safe Routes Project

Buckrail article

Media – Newspaper Article and Social Media Post

Dec. 13, 2021: Willow Bike Path Aims for Improvements

Jackson Hole Daily article published in print and online

Outreach – In-person and online

Week of December 13, 2021

- FOP and Town Staff created a one-page project description and invitation to the Dec. 16 Community Engagement project meeting. FOP staff hand delivered to all residences and businesses in the project corridor.
- Town staff distributed the one-pager electronically to the Town of Jackson email list – **4,000 people**
- FOP distributed to its email list of – **3,500 people**
- FOP created a [landing page](#) with the video, photos, a map of route, and a link to comment to town council

- Sandwich boards posted along the route informing anyone traveling on Willow Street about the upcoming Community Engagement meeting.

Event – Community Engagement meetings

December 16, 2021 – Zoom and In-Person Open House

Staff held a publicly noticed Open House to present background and design options to the public on the Willow Street Safe Route project as directed by Council. Public comment was taken. Twenty-seven attendees from the public and seven Town staff attended the lunchtime in-person meeting, and six people from the public attended the Zoom meeting that evening.

Outreach – In-person

December 2021 – February 2022

Following the community engagement meeting, Brian Schilling conducted individual in-person and phone meetings to follow up with several business owners and Snow King Resort to discuss proposed design revisions and respond to specific concerns about on-street parking.

Stakeholders

Other key stake holders who were contacted during the Willow Street Safe Routes initial planning stages:

- Willow Street property owners, residents, and businesses
 - o Snow King Resort
 - o StillWest Brewing and FRX coffee shop
- Jackson Elementary School
 - o Tracy Poduska
- Teton County School District transportation director
 - o Colby Stevens
- Town and County Departments
 - o Teton County Parks and Recreation
 - o Public Works
 - o JH Police Department
 - o START Bus
 - o Fire/EMS
 - o Legal
- Jackson Hole Ski Club
 - o Ali Sehnert
- Housing Trust
 - o Anne Cresswell
- Voices JH
 - o Jordan Rich
- Camina Conmigo (Walk with Me)
 - o Miriam Morillon

Cumulatively, this outreach produced more than 70 letters of public comment to the Jackson Town Council.

Public Meeting – Town Council Meeting

March 21, 2022

Council approves extending the seasonal buffered bike lanes on Snow King Avenue and Willow Street and to install the project in spring 2022.

Media – Social Media Post/News Article

March 22, 2022 – Willow Street Safe Routes gets approval from council

Buckrail article

Media – Newspaper Article and Social Media Post

March 29, 2022: Council approves safer bike lanes, bollards for Willow St. and Snow King Ave

News and Guide article published in print and online

Media – Social Media Post/News Article

April 25, 2022: Protected Bike lanes back this week

Buckrail article

Media – Newspaper Article and Social Media Post

May 2, 2022: Snow King Bollards being installed, New Lanes come to Willow Street

News and Guide article published in print and online

Media – Social Media Post/News Article

May 23, 2022: Crews Install Willow Street protected bike lane this week

Buckrail article

Event – Project Implementation

May 26, 2022

Willow Street Safe Routes installation

- 13 total local media articles
 - 7 News and Guide articles
 - 6 Buckrail articles
- 3 publicly noticed Town Council meetings
- 2 rounds of flyers distributed to all residences and businesses along project corridor.

STAFF REPORT



Meeting Date:	20 March 2023	Meeting Title:	Town Council Workshop
Submitting Department:	Public Works	Presenter:	Floren Poliseo
Agenda Item:	Wastewater Treatment Plant Capital and Operational Improvements	Public Comment:	yes

Purpose & Policy Considerations.

This item provides more information to Council for consideration and discussion regarding the proposed alternatives for capital and operational improvements to the Town's Wastewater Treatment Plant (WWTP).

Requested Action.

No action is needed unless Council wants to provide direction on desired priority objectives and/or timelines for evaluating or implementing any of the options provided.

Recommendations.

As this analysis was based on anticipated growth in the WWTP's current service areas only, staff recommends that Council allow staff to consider the findings and recommendations of the County's Water Quality Master Plan (WQMP) (also on this workshop agenda) that may suggest significant expansion of current service areas before recommending implementation of any large-scale capital improvements.

Background.

TECHNICAL REVIEW

The Town solicited a third-party expert WWTP Technical Review in 2021 to conduct a comprehensive data-driven analysis to evaluate the water quality and energy/emissions impacts of the WWTP's discharge and operations, and provide recommendations for potential capital and operational improvements that align the Town's WWTP operations with community priorities including:

1. Protecting the region's water quality and ecosystem by achieving better than the DEQ discharge permitting standards.
2. Maintaining a cost-effective and high level of service to the Town of Jackson's rate-paying customers.
3. Reducing energy consumption in wastewater treatment through use of energy efficient treatment methods.
4. Aligning with the recent update to the Jackson/Teton County Comprehensive Plan.

This project was focused on modifications at the WWTP that would reduce impacts and address future capacity needs of current service areas. Simultaneously, the County is working on a Water Quality Master Plan (WQMP) to evaluate current issues and identify opportunities to improve water quality. The County WQMP scope is broader, related to drinking water, wastewater, and snow/stormwater. Staff anticipates that longer-term County WQMP recommendations will include projects that present significant increases in resources for the Town WWTP (including possible expanded service areas) and other Town services and operations.

At the Regular Town Council Meeting held October 4, 2021, Council approved a contract with Trihydro to conduct the Town WWTP analysis. The project considered the Town's current operations, infrastructure condition, permit requirements, priorities for the facility, and stakeholder input to make recommendations for appropriate and cost-effective improvements that will ensure future success.

A Steering Committee was involved throughout this project, for assistance in writing the Request for Qualifications and selecting the consultant team, to developing the criteria and weighting for the project

alternatives Decision Matrix, to providing input during the consultant's analysis and comments on the final report. Steering Committee members were:

- American Rivers, Northern Rockies
- Ducks Unlimited
- Protect Our Water Jackson Hole
- Snake River Fund
- Teton Conservation District
- Wyoming Game and Fish Department (WGFD)

Trihydro provided a final report (Report) for this project, attached, which includes the following options/alternatives:

- Aeration Modification
- Clarifier
- Bioreactor
- Mechanical Plant
- Water Reuse
- On-Site Sludge Disposal
- Off-Site Sludge Disposal

Additionally, Trihydro provided short-term recommendations as less costly interim measures to improve water quality by using existing equipment in different configurations. While short-term recommendations may not be as efficient/effective as the long-term recommendations, most of the changes can be done with in-house labor and do not require Wyoming Pollutant Discharge Elimination System (WYPDES) Permit changes or Permits to Construct.

OTHER CONSIDERATIONS

Two other drivers that play an important role in capital planning for the WWTP are:

1. regulatory requirements, and
2. potential capacity impacts driven by regional wastewater planning efforts.

The Town's WWTP WYPDES Permit mandates regulatory obligations, administered by the Wyoming Department of Environmental Quality (DEQ), for the water quality of the treated effluent that leaves the WWTP and ultimately discharges to the Snake River. Our WWTP WYPDES Permit is on a 5-year renewal cycle. At each renewal, DEQ may revise the permit requirements, subject to a public review and comment period. The current permit was scheduled to expire on August 31, 2022, and DEQ published the draft renewal permit for public comment on September 16, 2022. The draft permit included new requirements for testing contaminants of which we are not currently required, as well as greater frequency of certain sampling requirements. These more stringent requirements have operating budget impacts and may have capital budget and staffing impacts too. Staff provided comments on the draft renewal permit for DEQ consideration. Staff also answered follow-up questions from DEQ in mid-November and again in early February, as DEQ continues to review and revise the renewal permit. The Town's permit in place continues until a renewal permit is effective. Staff will come back to Council with this permit update in a future Town Managers Report or meeting agenda item, depending on the nature and complexity of any new requirements. DEQ indicated we may imminently have the opportunity to view the final draft prior to issuance, and we do not have a clear sense of when that will be.

The County WQMP effort began due to the updated Jackson-Teton County Comprehensive Plan and as a response to a range of water quality issues. One aspect of this project is wastewater management throughout the County, and several ideas have been proposed related to the Town's WWTP as a contributing solution for current and anticipated wastewater management problems in the County. Town staff expects the WQMP to propose some form(s) of increased capacity (expanded service areas) to be accommodated by the Town's WWTP beyond its current service areas, which will impact capital improvement, planning and budgeting, and possibly staffing. The County anticipates this project will be completed in the first quarter of 2024. Sewer connections outside the Town of Jackson already take considerable time by Town Public Works and Legal staff, and the proposed recommendations from the County WQMP will require additional Town staff time. As these two projects move forward, the Town will want to consider how the Town and County plans align with the Town's 2-year workplan and consider impacts on Town staffing, capital planning, and priorities.

Analysis & Key Policy Questions.

COUNCIL OBJECTIVES

The four priorities, or goals, of the WWTP Technical Review (numbered in the Background section of this staff report) were:

- Protecting water quality;
- Remaining cost-effective for customers;
- Reducing energy consumption; and
- Aligning with the Comprehensive Plan.

Staff is interested in knowing whether Council has more specific or different objectives for the resulting benefits of any WWTP improvement projects. Council may provide additional direction on water quality, cost, and energy consumption goals, as current operations meet these priorities broadly, but may fall short if more specific targets are desired. For example, rather than simply stating that we want to protect water quality by performing better than our regulatory requirement standards (which we already do), Council could direct staff to determine a specific, self-imposed nutrient content limit. As another example, Council could state a different preferred outcome such as increasing the WWTP capacity by a certain amount, or to be able to manage all County properties of certain established zoning or development types. Or Council could direct staff to explore a zero-discharge option by identifying reuse opportunities, or net-zero operating energy use. Should Council direct staff to establish more specific objectives, it may require additional stakeholder engagement and consultant assistance, which is not currently accounted for in staff's workplan or budgets.

- **Key Question: Does Council agree with staff narrowing project alternatives for further analysis based on the four stated goals of the WWTP while allowing for the development of more specific goals/outcomes in the future?**

TECHNICAL REVIEW CONSIDERATION

Based on input from staff and the Steering Committee, Trihydro developed a Decision Matrix that weights 10 different criteria based on importance/priority. The 10 criteria and their weighting are:

1. Water quality (21%)
2. Energy demands (15%)
3. Operations & maintenance costs (14%)
4. Capital costs (11%)
5. Expandability (10%)
6. Public perception (7%)

7. Footprint (6%)
8. Odor & noise (6%)
9. Training & licensing (5%)
10. Permitting requirements (5%)

The goal of the Decision Matrix was for the Steering Committee to establish criteria prior to Trihydro developing potential improvements/alternatives. The pre-selected criteria are meant to align with the above project goals and specific items important to stakeholders and decision makers.

Then, for each recommended project Alternative, staff and each member of the Steering Committee assigned a value to each criterion based on the project's effectiveness in addressing it (scale 1-5 with 5 being the most favorable). Next, applying the weightings to each criteria score produced an overall score for each Alternative (again, higher numbers being more favorable). Trihydro compiled staff and all Committee scores received to produce final Decision Matrix results, shown in Figure 7-1 in the attached Report (page 77 of 114 in the PDF). For more detailed information on the improvement project opportunity alternatives, refer to the Potential Improvements and Decision Matrix Results sections (sections 6 and 7, pages 31-35 and 36-39 of 114 in the PDF). The short-term recommendations are presented in section 8.2 (pages 41-42 of 114 in the PDF)

At the September 19, 2022 Regular Town Council Meeting, staff provided some initial thoughts on implementation recommendations. Staff has subsequently gathered and considered additional information and factors related to the various project alternatives, which has slightly changed our recommended path forward:

1. Additional environmental impacts – the Decision Matrix that scored each of the project alternatives included water quality and energy/emissions as the highest weighted (priority) factors. Data and discussions throughout the County's WQMP efforts have raised awareness of other environmental considerations such as local geographic area vulnerability to groundwater and surface water, and contextual (neighboring) influences such as ranch land and wildlife refuge/habitat.
2. Greater community/regional water quality issues – some areas of Teton County are in much greater critical need to preserve water resources and effectively treat or reduce water quality impacts. Some areas of the County do not currently meet recommended water quality standards, either for permitted discharges or for drinking water. The Town has and continues to maintain a compliant wastewater treatment facility that performs better than the current DEQ permit levels.
3. New permit requirements – the initially proposed draft renewal permit from DEQ included monitoring of Flat Creek, which would present staffing and legal impacts separate from and additional to our water quality obligations related to the WWTP discharge. The final renewal permit requirements that become effective and legally enforceable may necessitate budgetary, staffing, and operational adjustments even without implementing any of the proposed changes to current WWTP infrastructure and operational practices.
4. Ambient data collection and analysis – Town has requested FY24 support from Teton Conservation District through the Memorandum of Agreement annual funding partnership program to monitor water quality at the wetlands on the property adjacent to the WWTP. These wetlands provide post-treatment to the Town's regulated WWTP effluent. Wetlands are known to remove, or "uptake" nutrients such as nitrogen and phosphorus to support plant life and ecosystem value. With the recent expansion of these wetlands, we are interested in understanding the effectiveness of this uptake. Knowing how much nutrient removal may be occurring after the Town's treatment and prior to its ultimate discharge to the Snake River would help inform the Town's decisions about which capital

improvement alternatives would provide the most water quality improvement benefit based on the post-WWTP improvements that are already occurring.

As staff continues to gather new information, we are assessing the alternatives based on the Decision Matrix priorities, as well as new information and analyses as they continue to become available. Council may align on a “short-list” set of priorities, among the 10 criteria presented in the Decision Matrix and the 4 other considerations staff is considering (listed above), or any other factors that Council identifies. Staff intends to narrow the project alternatives and conduct further analysis to make recommendations to Council on which to pursue for implementation. Should Council provide its own direction on certain factors most important, it may result in a different set of alternatives to be further evaluated. For example, if water quality is the primary or only concern, then the recommended option would likely be different than if ongoing cost burden to citizens was the highest priority.

- **Key Question: Does Council agree with the considerations and weighting presented, and potentially adding additional considerations as other studies and analyses are completed?**

RATIONALE FOR STAFF RECOMMENDATION

Staff believes we are holding true to the original intent of the Technical Review, but now would like to view it more holistically in context with broader community objectives. Staff’s recommendation is to await completion of the County WQMP to coordinate programmatic, operational, and capital improvements at the Town WWTP in the context of this larger study. Once both studies are complete, Council will be able to consider what priorities and policies the Town would like to pursue. As the County completes its WQMP, and once DEQ issues the WWTP renewal permit, staff believes the necessary coordination efforts to consider potential improvements to the WWTP would be best determined in context with the added information these two important documents will provide. This delay in making capital improvements has multiple benefits:

- It will prevent the Town from budgeting and managing large expenditures that become obsolete if they end up being replaced with other capital improvements that are recommended as a result of the County’s WQMP.
- It will ensure that any improvements meet (or go beyond) the new permit requirements, rather than addressing issues that are not mandated using resources that should first be put into ensuring regulatory compliance.
- It will incorporate the broader community’s priorities and needs, and weigh other possible alternatives for mutual benefit that were beyond the scope of this Review .
- It will take a more holistic and better coordinated view of the Town’s role and reasonable contributions to the greater watersheds and ecosystems, similar to how the Jackson-Teton County Comprehensive Plan addresses collective and connected development and urban impacts more regionally.

- **Key Question: Does Council agree with this approach, or prefer more immediate action?**

Possible Alternatives.

Alternatives to staff’s recommendation include:

1. Council may propose different or more specific objectives or outcomes for the WWTP.
2. Council may direct staff to prioritize certain criteria differently than presented.
3. Council may direct staff to implement a project alternative in advance of County completion of the WQMP.

Comprehensive Plan & Priority Alignment.

This project supports the Town Comprehensive Plan under Common Value #1- Ecosystem Stewardship.

- *Principle 1.2: Preserve and Enhance Water and Air Quality*
 - o Policy 1.2.c: Monitor and maintain water quality

This project supports the Town Comprehensive Plan under Common Value #3- Quality of Life.

- *Principle 6.1:* Measure prosperity in natural and economic capital
 - Policy 6.1.b: Promote eco-tourism
- *Principle 8.1:* Maintain current, coordinated service delivery
 - Policy 8.1.a: Maintain current, coordinated plans for delivery of desired service levels
- *Principle 8.2:* Coordinate the provision of infrastructure and facilities needed for service delivery
 - Policy 8.2.c: Require mitigation of the impacts of growth on service levels

Fiscal Impact.

Fiscal impact will depend on Council's direction. If Council accepts staff's recommendation, there is no fiscal impact at this time and Town WWTP capital improvements planning would begin after key policy decisions related to the County's WQMP are made. If Council directs staff to prioritize any considerations differently than as presented, staff would provide a scoping document for future Council consideration based on the directives.

Staff Impact.

Staff has contributed approximately 75 hours to this project, plus an additional approximately 60 hours in reviewing the Report, learning about technology options, analyzing the results, discussing and coordinating with stakeholders, and forming the recommendations presented at the prior Council update and herein. Staff has budgeted workplan hours to continue coordinating with the County and other stakeholders throughout the remainder of the County WQMP process, currently anticipated to be complete early calendar year 2024.

Staff proposes coming back to Council with recommendations following high-level analysis of County WQMP solutions presented, possibly summer/fall 2024. Depending on the WQMP proposed solutions and policy decisions needed, County and Town staff may sponsor a joint elected official discussion.

At this time, based on staff's recommendation, no staff hours are budgeted in the Public Works workplan to implement capital projects at the WWTP. Rough estimates of staff time commitments for each project option are presented in the Report. Should Council direct staff to consider implementation of one or more project in advance of County WQMP completion, staff would further assess impact and present them to Council in a scoping document for Council consideration, possibly as early as summer 2023 but with actual timing heavily dependent upon the direction given.

Attachments or Links.

Technical Review Final Report: PDF attached

Recording of public presentation (26 July 2022):

https://us02web.zoom.us/rec/play/qLcfxLZ3grb_wjSwsPEE6V2Z1JQb3CsvlQIDmYHeePgRNecqQqa4e55ZyU7aHPlfE12gBeBil77bPhm8.Lie1-btWN28LpGya?startTime=1658879770000

Suggested Motion. *Council always has the option to adopt, approve with conditions, continue, or deny items.*

If Council agrees with current approaches and staff recommendation:

No motion is necessary.

If Council has alternative priorities or project implementation timeline:

I move to direct staff to consider Council's *[priority objectives and/or capital project implementation timelines]* as discussed in this meeting and provide a scoping report and/or implementation recommendations at a future Council meeting.



TECHNICAL REVIEW REPORT
2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

November 18, 2022

Project #: 80F-001-001

SUBMITTED BY: Trihydro Corporation

1252 Commerce Drive, Laramie, WY 82070

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- 2-2. Permit Limits and Monitoring Requirements, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-1. Historic Sludge Measurements, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-2. 2017 and 2019 Contractor Estimated Sludge Volumes, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-3. 2021 Contractor Estimated Sludge Volumes, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 4-1. Final Decision Matrix Criteria and Weighting, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 5-1. Potential Improvements Modeled Effluent Water Quality, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 7-1. Final Decision Matrix Results, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming

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- 1-1. Site Location Map, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 2-1. Site Plan and Wastewater Flow Path, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 2-2. Energy Demands vs. Flow Rates, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-1. Influent CBOD Loading Rate (Current, Design, and Future), Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-2. Influent Ammonia Loading Rate (Current, Design, and Future), Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-3. Effluent CBOD Loading Rate (Current, Design, and Future), Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
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- 3-5. CBOD % Reduction, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-6. Ammonia % Reduction, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 3-7. Cell 1 Sludge Accumulation, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
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- 3-9. Cell 3A Sludge Accumulation, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-1A. Aeration Modifications, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming

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- 6-1B. Aeration Modifications Biowin® Modeling Results, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-2A. Clarifier, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-2B. Clarifier Biowin® Modeling Results, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-3A. Bioreactor, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-3B. Bioreactor Biowin® Modeling Results, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-4A. Mechanical Plant, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-4B. Mechanical Plant Biowin® Modeling Results, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-5. Water Reuse, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-6. On-Site Sludge Holding Pond, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 6-7. Sludge Wetlands, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming
- 7-1. Decision Matrix Results, Technical Review Report, 2021 Wastewater Treatment Plant Technical Review, Town of Jackson, Wyoming

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List of Acronyms

CBOD	carbonaceous biochemical oxygen demand
hp	horsepower
lbs	pounds
mg/L	milligrams per liter
MG	million gallons
MGD	million gallons per day
O&M	operation and maintenance
TSS	total suspended solids
UV	Ultraviolet
WDEQ	Wyoming Department of Environmental Quality
WQD	Water Quality Division
WWTP	Wastewater Treatment Plant
WYPDES	Wyoming Pollutant Discharge Elimination System

1.0 INTRODUCTION

Trihydro Corporation (Trihydro) prepared this Technical Review Report (Report) for the Town of Jackson, Wyoming's (Town) 2021 Wastewater Treatment Plant (WWTP) Technical Review project (Project). This Report summarizes Trihydro's existing WWTP condition assessment, potential system improvements, and the process used to evaluate potential system improvements. Potential improvements are structured to align with the Town's WWTP priorities, which include:

- Protecting the region's water quality and ecosystem by achieving better than the Wyoming Department of Environmental Quality (WDEQ) discharge permit standards.
- Maintaining a cost-effective and high level of service to rate-paying customers.
- Reducing energy consumption in wastewater treatment through use of energy efficient treatment methods.
- Aligning treatment objectives with the recently updated Jackson/Teton County Comprehensive Plan.

The Town partnered with a Steering Committee to complete this project. Steering Committee activities included providing oversight and direction, attending project meetings, reviewing and commenting on project memorandums and reports, assisting with developing the Decision Matrix (including criteria, weighting system, and potential improvement alternatives scoring), identifying Stakeholder members, and participating in a Public Engagement session. Steering Committee members are:

- American Rivers, Northern Rockies
- Ducks Unlimited
- Protect Our Water Jackson Hole
- Snake River Fund
- Teton Conservation District
- Wyoming Game and Fish Department (WGFD)

Stakeholder members were identified to participate in the project Technical Discussions. The Town and Steering Committee nominated local water quality experts as well as individuals they felt could provide insight on WWTP perception, operations, water quality, and potential improvements. Ten Stakeholders were identified to participate in project meetings and provide feedback for additional consideration as the Town and Steering Committee worked through the potential improvement evaluation process.

Trihydro led two Technical Discussion meetings with the Town, Steering Committee, and Stakeholders. The first meeting focused on describing current WWTP operations and summarizing background information. Potential improvements were not presented during the first meeting. The second meeting discussed the proposed Decision Matrix and potential improvements. Trihydro presented these items emphasizing participant input on additional considerations that may not have been included. The Decision Matrix and potential improvements are summarized in Sections 4.0 and 6.0, respectively.

1.1 PROJECT OBJECTIVES

The Town initiated this Technical Review to better understand current WWTP operations and define short- and long-term wastewater treatment and effluent water quality monitoring and discharge improvements. The Town has made sustainability commitments to its citizens and stakeholders to achieve WDEQ discharge standards, protect the ecosystem, and provide cost-effective utility services. Figure 1-1 shows the WWTP location in relation to the Town.

This project evaluated existing WWTP data, including influent and effluent water quality and energy consumption. The Town and Steering Committee wanted to understand how the WWTP system currently operates and identify potential improvement areas. The Town prides itself in achieving current WDEQ Water Quality Division (WQD) Wyoming Pollutant Discharge Eliminations System (WYPDES) permit water quality limits and maintaining WWTP operations. The Town currently achieves WYPDES permit water quality requirements and continuously evaluates WWTP improvements to decrease energy demands while achieving effluent permit requirements.

Once the current system evaluation was completed, Trihydro prepared potential improvement alternatives for evaluation and discussion with the Town, Steering Committee, and Stakeholders. These potential improvement alternatives were aligned to not only achieve the current discharge requirements but to continue improving effluent water quality where possible. Through collaboration with the Town, Steering Committee, and Stakeholders, Trihydro prepared high-level cost estimates.

Short-term and long-term potential improvement alternatives are provided in Section 6.0. These improvements incorporated current operation and discharge requirements into the results. The Town will have the opportunity to select the improvement to best meet their priorities and goals.

2.0 CURRENT WWTP OPERATIONS

The WWTP effluent water quality requirements are permitted under WDEQ/WQD WYPDES Permit WY0021458 (Permit). The Town has historically produced effluent water quality better than the Permit requirements by discharging concentrations less than the Permit limits. Under current conditions, the WWTP will continue to operate below Permit limits; however, the community's desire to produce a higher-quality effluent and service area growth may require WWTP modifications or operational changes.

The WWTP was originally constructed as a facultative lagoon system in the late 1970s. Upgrades were made to the WWTP in 1995 to construct the Preliminary Treatment Building (Headworks Building), Ultraviolet (UV) Disinfection Building, a Blower Building, and the Intermediate Pump Station (Vista 2021). The facultative ponds, currently Cells 1 and 2, were modified to operate as aerated cells during the 1995 upgrade. Figure 2-1 shows the existing WWTP site plan, wastewater flow path, and cell design parameters.

2.1 PROCESS DESCRIPTION AND FLOW

Wastewater flow enters the WWTP from a 30-inch pipeline which splits into a multi-line siphon and is then conveyed into a flow diversion structure on the Preliminary Treatment Building's north side. Grit is removed prior to the mechanical bar screen, which, itself, removes debris and trash before wastewater enters the Influent Pump Station. The Influent Pump Station has five 20-horsepower (hp) pumps with a 6.5-million-gallon-per-day (MGD) total capacity (Vista 2021). The pump station conveys flow equally to Cells 1 and 2 which are the largest and deepest cells. Each of Cell 1 and Cell 2's design volume is approximately 35 million gallons (MG), and their design depth is approximately 16 feet. Together, Cells 1 and 2 provide most of the WWTP's carbonaceous biochemical oxygen demand (CBOD) reduction. The ammonia reduction process also begins in Cells 1 and 2. Natural sludge digestion occurs as sludge settles to the cell bottoms. A large amount of the sludge settles in Cells 1 and 2 with the remaining sludge being conveyed into the subsequent cells as wastewater moves through the system. Aeration and mixing are provided by seven Triton mechanical aerators and six Grid Bee mixers spaced throughout each cell. An estimated oxygen capacity of 1,680 pounds (lbs) per hour can be supplied to Cells 1 and 2 with the mechanical aerators (Vista 2021). However, to reduce energy usage under current operations, not all Triton aerators are being used since CBOD reduction is achieved without the need for additional aeration.

Cells 1 and 2 operate in parallel followed by a series of smaller lagoon cells. Wastewater from Cells 1 and 2 discharges to Cells 3A, 3B1, and 3B2. Cells 3A, 3B1, and 3B2 have retention volumes of 12.4, 15.8 and 12.4 MG, respectively,

and design depths average 15 feet. Cell 3A has four Triton mechanical aerators while Cells 3B1 and 3B2 each have two Triton mechanical aerators and one Grid Bee mixer.

Cells 4A, 4B, 4C, and 4D are next in series. Their design volumes range from 6.1 to 9.1 MG each and design depths are 10 to 13 feet. Coarse-bubble diffused air is provided by a single 150-hp HSI (Atlas Copco) air bearing blower. Aeration can also be provided by two Lamson 250-hp multistage blowers. The Lamson blowers have a much higher energy demand, therefore, are only used as needed.

Cell 5 is the final lagoon cell. Cell 5 has a design volume of 16.4 MG and is approximately 10-feet deep. The blowers used for Cells 4A, 4B, 4C, and 4D can also aerate Cell 5; however, Cell 5 is typically not aerated. Cell 5 provides final effluent polishing prior to UV disinfection and WYPDES Permit compliance sampling.

Cell 5 effluent flows to the Intermediate Pump Station. The Intermediate Pump Station has three 50-hp pumps and one 25-hp jockey pump with a 6.5-MGD total capacity (Vista 2021). Treated effluent is pumped via force main to the UV Disinfection Building (Figure 2-1). The UV system water-level control weir provides final flow measurement. Permit compliance sampling is performed following UV disinfection just before the water-level control weir. Once disinfection is complete, treated effluent gravity flows to the Barrow Pond where it is blended with flow from a natural stream. Flow then travels through a series of three WGFD-constructed wetlands. WWTP effluent is the primary wetland water source in the dry season which serves as habitat for migratory waterfowl.

2.1.1 WETLAND EXPANSION

The WGFD, in collaboration with Ducks Unlimited and the Town, is currently expanding the wetlands system south of the WWTP. These new wetlands will provide additional habitat for waterfowl and other species, as well as provide additional WWTP effluent nutrient reduction. The Town does not own or operate the wetlands and they have no impact on Permit compliance, but the wetlands do reduce nutrients before the effluent is discharged into the Snake River.

2.2 ENERGY USAGE

WWTP energy demands include aeration, mixing, and UV disinfection. Improvements have been made to reduce energy demands by installing high-efficiency aerators and mixers and performing seasonal operational changes. WWTP pumps are equipped with variable frequency drives for partial operation (Ameresco 2009). Cells 4A, 4B, 4C, 4D and 5 are aerated by centrifugal blowers and static tube diffusers. To further reduce energy consumption, only the single 150-hp turbo blower is typically used for Cells 4A, 4B, 4C, 4D, and 5 while the two 250-hp multi-stage blowers

are on standby to meet additional aeration demands, as necessary. A series of solar panel installations (2008, 2010, 2015, and 2018) have also offset WWTP grid energy demands by approximately 13% monthly.

The Town provided Trihydro energy usage and solar panel energy generation data for 9 years through June 2021. WWTP operators prepared the Energy Workbooks to monitor energy usage, solar energy generation, and monthly energy costs. Trihydro used energy data to evaluate the WWTP's energy usage and identify possible improvement areas.

The Town uses energy monitoring software to monitor all WWTP energy usage. The Preliminary Treatment Building, Intermediate Pump Station, and UV Disinfection Building each have energy monitoring software. Based on the energy data readings, the Preliminary Treatment Building requires the highest energy demand. The Preliminary Treatment Building energy usage includes the Influent Lift Station, headworks, blower building, and aerators and mixers for all cells. These processes require high energy demands that the Town continuously works to optimize and reduce.

Trihydro also evaluated solar installation energy generation and its influence on reducing grid energy usage (Town of Jackson 2013-2021). The solar installations generally offset grid energy by approximately 13%. The actual offset varies by WWTP energy demands and seasonal fluctuations (Table 2-1).

Based on 2017 to 2021 usage data, WWTP energy demands generally reach their highest levels in May and June, which coincides with the highest influent flow rates (Figure 2-2). Energy demands directly correlate to aeration and mixing. As WWTP influent flow increases, additional aeration and mixing are required to meet effluent water quality permit requirements.

2.3 GROWTH CONSIDERATIONS

The WWTP currently operates under Phase II of a three-phase design with a 5.0-MGD design flow rate. Phase III allows the plant capacity to increase to 6.5 MGD. Several of the plant's major components are already sized for the Phase III flows. The Town's most recent Capacity Study, *Town of Jackson Water and Sewer Systems Evaluation Report* (Capacity Study), evaluated the current system and potential impacts as system wastewater contributions increase (Vista 2021). Approximately 10,000 permanent residents live in the Town and an additional 10,000 residents are within Teton County. In addition to the year-round population, the Town sees approximately four million visitors per year. The WWTP not only receives flow from the Town, but also several satellite districts in Teton County.

The Capacity Study determined the current WWTP 5.0-MGD capacity will be exceeded in approximately 30 years. If the Town expands current WWTP operations to the maximum 6.5-MGD design capacity, it is anticipated the capacity will be met in the next 45-50 years (Vista 2021). Additional growth considerations for the WWTP are discussed in Section 3.5.3 below and are estimated from predicted population growth within the WWTP's service area. The WWTP is the largest regional facility in Teton County and may continue to be pressed to receive flows from new development and areas where groundwater issues necessitate conversions from septic systems to a municipal sewer collection system. The impacts of adding new collection areas in Teton County to the WWTP collection system were not considered in the Capacity Study. This Technical Review Report evaluated potential improvements that can be expanded to accommodate additional influent flows from population growth and/or additional collection areas.

2.4 REGULATORY REQUIREMENTS (WYPDES PERMIT LIMITS)

The WWTP permitted effluent discharge flow is 5.0 MGD. The Permit stipulates effluent limits and monitoring requirements (Table 2-2), and includes the following technology-based limits:

- Carbonaceous Biochemical Oxygen Demand (CBOD) - 25 milligrams per liter (mg/L) maximum monthly average
- Total suspended solids (TSS) - 300 mg/L daily maximum
- pH between 6.5 and 9.0 standard units

The Permit also requires an 85% CBOD reduction and includes E. coli and total residual chlorine limits. Since UV disinfection is used, chlorine disinfection is not required. The Permit does not currently include ammonia or phosphorus limits, although monthly monitoring and reporting are required. The Town submits discharge monitoring reports to the WDEQ monthly, quarterly, and annually.

WDEQ did not establish a permitted ammonia limit due to preexisting nitrogen levels in the Snake River and the high level of dilution immediately downstream of the outfall. A waste load allocation was calculated using historical water quality records and a mixing zone study completed in 2013 on the Snake River. The mixing zone study concluded the WWTP discharge flow rate is a small component of total Snake River flows. At the permitted discharge flow rate, WWTP discharge ammonia levels would need to be much higher than typical wastewater levels to noticeably impact Snake River ammonia levels.

2.4.1 FUTURE PERMIT MODIFICATIONS

The Town's current Permit expired August 31, 2022 but remains in effect until the renewal Permit is executed with an effective date. WDEQ distributed the draft Permit renewal for review in early August 2022. Initial draft Permit review did not identify substantial effluent water quality or monitoring changes. Trihydro evaluated potential improvements in consideration of more stringent monitoring requirements and to achieve the community's best-suited solution. Lagoon systems require the least amount of power for treatment but are typically incapable of meeting higher water quality standards, especially lower nutrient limits. However, there are operational changes and selective improvements that can increase the nitrification and denitrification processes. Potential improvements to reduce final effluent nutrient levels are discussed in Section 6.0.

Biochemical Oxygen Demand (BOD) is the amount of dissolved oxygen consumed during the microbial biochemical reaction that breaks down biodegradable organic matter in wastewater. The standard 5-day BOD (BOD_5) measurement of water quality is used widely as a design parameter for wastewater treatment plants. This measurement usually includes a nitrogenous oxygen demand (NOD) component that can cause oversizing of biological processes and under-evaluation of the true plant process capacity. CBOD (or $CBOD_5$) more closely represents the oxygen demand associated with organic biodegradation in wastewater than does BOD_5 . Therefore, CBOD is used as a basis for sizing aerobic treatment processes. The higher the BOD/CBOD, the more oxygen stripping capacity effluent has when discharged into receiving waters, which can potentially increase damage to biological life in those waters.

Ammonia and phosphorus limits are notable water quality nutrients because of their impact on downstream plants, fish, and other aquatic life. Plants need a balance of carbon, phosphorus, and nitrogen to grow. Carbon is supplied as plants convert carbon dioxide in the air and soil into oxygen. Phosphorus is measured as total phosphorus and ortho-phosphate (the form required by plants). In most fresh waters, the phosphorus concentration available to plants is low enough they cannot grow at their maximum rate. In water bodies where human activities add phosphorus, increased aquatic plant growth can occur. Large duckweed and algal blooms can result from excess phosphorus.

Nitrogen, the other major nutrient supporting plant growth, is measured in its various forms as nitrate and ammonia. Nitrate and ammonia are readily absorbed by plants and incorporated into proteins, amino acids, nucleic acids, and other molecules. Like phosphorous, most aquatic plant growth in rivers is limited by the availability of nitrogen in the water. While ammonia can be readily used by plants, high ammonia concentrations are toxic to fish and other aquatic life and can lead to algal blooms.

Some algae, such as blue-green algae produce toxins harmful to fish and people. The name is misleading as blue-green algae is neither plants nor algae. They are often called algae because they are free-floating and grow in large colonies,

but in reality, blue-green algae are cyanobacteria. Cyanobacteria are found all over the world, on both land and water. They are microscopic but can be seen as a colony or bloom. As the bacteria die, they release toxins in the water. Large cyanobacteria, duckweed, and algal blooms can block sunlight available to submergent vegetation reducing natural habitat and food sources. A second effect of increased ammonia occurs when bacteria oxidize ammonia to nitrate through nitrification. The nitrification process consumes four atoms of oxygen for every atom of nitrogen converted which can dramatically lower dissolved oxygen in the water leading to fish kills. While ammonia and phosphorus are important water quality parameters to evaluate, future Permit modifications and water quality conversations may include additional natural and manmade constituents of concern yet to be regulated by the United States Environmental Protection Agency (USEPA) and WDEQ.

3.0 WWTP CONDITION ASSESSMENT

Trihydro conducted an onsite condition assessment on November 8 and 9, 2021. The condition assessment included reviewing existing WWTP design plans, permits, previous reports, operations, influent and effluent water quality data, and cell sludge accumulation information. The condition assessment included a field inspection of key WWTP equipment and interviews with WWTP operations staff and managers. The condition assessment was based on visual inspection and, therefore, limited to conditions that could be readily observed at the time of the visit.

Through experience conducting multiple condition assessments, Trihydro has developed a rating system to generally capture current equipment and process conditions in a clear and understandable presentation. The rating scale is defined as:

Rating	Description
Excellent	Normal maintenance required
Good	Minor defects
Fair	Moderate maintenance required
Poor	Significant deterioration, attention needed
Unserviceable	Requires immediate attention or replacement

The ratings considered the following observations:

- Equipment age
- Observed physical condition
- Operational efficiency
- Ability to meet desired function
- Repair history
- Operator input

Operational data and equipment maintenance history were reviewed to determine performance and reliability.

Appendix A includes the existing WWTP condition assessment.

This condition assessment was used to identify processes and equipment requiring improvements. Overall, Trihydro found the WWTP to be in good condition and well maintained. The final effluent water quality is typically better than what is expected for lagoon systems of similar size and loading. However, lagoon systems by design are not capable of

reducing ammonia and phosphorus during winter conditions as the water temperature drops. Significant operational and process modifications are required to meet more stringent nutrient limits.

3.1 OVERALL TREATMENT PROCESS CONDITION

The WWTP condition and operations were found to generally be in good operating condition. No portions of the treatment process or equipment required immediate repairs or replacement. The WWTP is currently designed to treat 5.0 MGD with current average influent flows in the range of 1.5 to 2.5 MGD. While the influent flow rate is well below the design flow rate, influent waste loadings often exceed the original design criteria. The waste loading is a calculation of the concentration of the permitted parameters such as CBOD, TSS, ammonia, and phosphorous in relation to the influent flow given in pounds per day (lbs/day). For example, a plant can receive wastewater with low concentrations during high flows or low flows with high concentration and the resulting wastewater loading can be the same. The WWTP is currently experiencing the latter condition. Influent loadings exceeding the design criteria can lead to upset conditions and permit exceedances. Trihydro's review of the WWTP's operating history examined how the plant reacts to these higher loading rates with respect to the final effluent limits. The WWTP operator interviews also provided overall treatment process and proposed improvement area details. No operating deficiencies were observed during the condition assessment.

The Town records WWTP wastewater characteristics throughout the facility in annual spreadsheets (Data Workbooks). These Data Workbooks were provided to review influent to effluent reductions and WWTP operations. These Data Workbooks were used to identify WWTP trends, flow characteristics, and system limitations.

3.2 TRENDS

The most effective way to review WWTP loading rates is in terms of lbs/day. This method considers flow and waste concentration variations. Design loading rates are estimated to initially size a WWTP including basin volumes, pumps, aeration systems, disinfection system, piping, valves, and other structures. Loading rates differ from the effluent permit limits in that they serve more as guidelines and are not hard limits. Trihydro used the Town's Data Workbooks to evaluate treatment trends and estimate future conditions (Town of Jackson 2012-2021). Trends were developed to better understand the WWTP's current treatment efficiency. Current system operations were compared to the WWTP's design capacities and permit limits to determine potential future limitations. Design capacities were taken from the WWTP's record drawings (Engineering Associates 1998).

Based on a 5.0-MGD influent flow rate, the WWTP is designed to treat influent CBOD and ammonia concentrations of 211 milligrams per liter (mg/L) and 29 mg/L, respectively. These maximum design concentrations were used to

calculate the WWTP's maximum CBOD and ammonia design loading rates (Figures 3-1 and 3-2, respectively). Loading rates were calculated by multiplying the design flow rate (5.0 MGD) by the design influent concentration to determine the lbs/day CBOD and ammonia the WWTP was designed to treat (Equation 3-1).

$$LR_{max} = Q_{max} \times C_{max} \times 8.3454 \quad \text{Equation 3-1}$$

where,

LR_{max} = maximum loading rate, lbs/day

Q_{max} = maximum flow rate, MGD

C_{max} = maximum concentration, mg/L

8.3454 = conversion factor, $lb \cdot L / MG \cdot mg$

Maximum CBOD and ammonia effluent concentrations were also calculated (Figures 3-3 and 3-4, respectively). These calculations were performed to estimate the potential future effluent concentrations if the flow rate reaches 5.0 MGD. Trihydro further calculated the difference between influent and effluent CBOD and ammonia concentrations to determine percent reduction through the treatment process (Figures 3-5 and 3-6, respectively). At the full 5.0-MGD capacity, the WWTP design specifications identified a 30-day total plant detention time; however, since 2018, the WWTP has operated between 1.23 MGD and 3.19 MGD. The percent reduction between influent and effluent concentrations was offset by 60 days to account for the average WWTP detention time.

3.3 TEMPERATURE/NUTRIENT CHARACTERISTICS

Lagoon system treatment efficiency is dependent on seasonal water temperature changes (Figures 3-3 through 3-6). The Town tracks weekly water temperatures in the Data Workbooks. The water temperatures used in Figures 3-3 through 3-6 were measured in Cell 1. Cell 1 data were used because Cells 1 and 2 are where most CBOD and ammonia reduction takes place. Water temperature impacts on treatment efficiency can be seen in the effluent CBOD and ammonia concentrations (Figures 3-5 and 3-6, respectively).

Certain bacteria are responsible for removing different nutrients. The bacteria that remove CBOD are known as heterotrophs, and they are more dominant than the bacteria that remove ammonia, known as nitrifiers. The ammonia removal process requires two types of nitrifying bacteria – ammonia-oxidizing bacteria followed by nitrite-oxidizing bacteria. Nitrifying bacteria become almost dormant at temperatures below 15 degrees Celsius (°C) so ammonia reduction is greater during warmer summer conditions than in the winter due to increased microbial activity (bacteria growth and reproduction). Lagoon systems struggle to remove ammonia in the winter due to the following reasons:

- If lagoons freeze over, access to atmospheric oxygen is cut off, which is needed by nitrifying bacteria.
- Nitrifying bacteria require a surface to grow on, which is not plentiful in lagoon systems.
- The heterotrophic bacteria that consume CBOD tend to dominate nitrifying bacteria. CBOD levels need to drop below 25 mg/L before nitrification can begin in earnest. Cold temperatures slow the heterotroph metabolism. More lagoon retention time is required for CBOD removal, reducing the available hydraulic retention time for nitrification.
- Both the reproduction rate and the metabolism of the nitrifiers themselves slow as the water temperature drops. The low reproduction rate means that new biomass does not form quickly enough to make up for the reduced consumption of ammonia that occurs due to the lower metabolism and temperature.

As discussed in Section 3.2 above, a 60-day detention time offset was used to evaluate treatment efficiency. Even with the 60-day detention time offset, the percent CBOD and ammonia reduction in both Figures 3-5 and 3-6 do not correlate precisely. However, the direct correlation between temperature and percent reduction is shown clearly. Ammonia more closely follows the temperature trend compared to CBOD due to the rate that ammonia reducing organisms grow with temperature.

3.4 SLUDGE ACCUMULATION

Lagoon treatment systems do not include a means for solids (i.e., sludge) removal. Over time, solids begin to accumulate and must be removed manually. Sludge build-up reduces the available treatment volume within the cells and more TSS carries over into downstream cells and eventually to the outfall. As cell volumes decrease so does the WWTP efficiency resulting in increased effluent concentrations. Cells 1 and 2 are deeper than the other lagoon cells and are designed as the primary sludge collection and storage cells. Settled sludge accumulates and decays by anaerobic digestion at the basin's bottom. The remaining inert solids cannot be reduced further and build up in the basins.

The Town annually measures the sludge accumulation in Cells 1, 2 and 3A (Town of Jackson 1993-2016). The Town divided each of the three cells into a grid where sludge depths are generally measured. Measurements are taken using a sludge judge and ultrasonic bottom sounding. The annual measurements were reviewed and data compiled to estimate an average cell sludge thickness (Table 3-1).

The Town also worked with outside sources to measure sludge thicknesses using different techniques. Keller Associates, Inc. (Keller Associates) completed two bathymetric surveys of Cells 1, 2, and 3A during 2017 and 2019 (Keller Associates 2017, Keller Associates 2019). The surveys used a remote-controlled watercraft equipped with an

echosounder and survey-grade robotic total station prism (Keller Associates 2019). A total of 89 thickness measurements were captured during the 2017 and 2019 surveys each. Based on the average sludge thicknesses, a percent of volume occupied by sludge was calculated (Table 3-2).

H&S Environmental (H&S Environmental, L.L.C., 2021) also performed a survey in September 2021 to estimate sludge volumes in Cells 1, 2, and 3A. A sludge blanket profile was performed to estimate the sludge volume and mass by collecting sludge depth measurements and sludge core samples. A total of 146 depths were measured across the three cells. H&S Environmental prepared estimated sludge volumes using different methods accounting for cell side slopes. Average sludge thicknesses and percent volumes from the H&S Environmental survey are provided in Table 3-3.

Estimated volumes between Keller Associates and H&S Environmental show a decrease in sludge volume between 2019 to 2021. Because each measurement is completed manually with a margin of error in where the thickness is measured, it leads to variation in the thickness measurements. Trihydro applied a line of best fit to the average sludge depths to determine a general increase over time and profile the estimated percent of volume occupied by sludge for Cells 1, 2, and 3A:

- Cell 1 – 24.8%
- Cell 2 – 16.7%
- Cell 3A – 19.7%

Based on Trihydro's experience with similar lagoon systems, the sludge removal zone is a depth when the sludge volume in each cell accumulates between 30% and 50% (Figures 3-7 through 3-9). As sludge accumulation reaches the high end of the sludge removal zone (50%), cell capacity and WWTP efficiency is reduced. This sludge accumulation range aids the Town in starting the sludge-removal planning process. As the service area grows, WWTP contributions will increase and more sludge will accumulate in the cells over a shorter duration. Trihydro recommends a Sludge Monitoring and Management Plan be developed and implemented. This is discussed in more detail in Section 8.0.

3.5 SYSTEM LIMITATIONS

Lagoon systems have limitations with expansion, energy demands, sludge removal, and nutrient removal that can reduce performance. Lagoon systems require large footprints of land to produce effluent concentrations that meet their permit limits. Several lagoon cells may be needed to maintain retention time, or additional lagoon cells may be required to accommodate flow rate increases. Lagoons have a limited ability to reduce nutrients due to seasonal

temperature fluctuations and will retain TSS as wastewater is conveyed through the treatment system. Nutrients released to the receiving stream may cause algae blooms that can degrade fish populations, and TSS may also accumulate downstream. As these solids continue to naturally decay after discharge, stream oxygen levels are reduced, and additional nutrients are released. System limitations are discussed in more detail below.

3.5.1 SEASONAL CHANGES

WWTP operations fluctuate seasonally due to temperature changes and influent volume fluctuations. These seasonal changes impact effluent characteristics such as CBOD, ammonia, and TSS concentrations. Temperature increases largely improve ammonia reduction while CBOD and TSS also see concentration reductions.

Trihydro performed WWTP modeling to evaluate current seasonal treatment fluctuations. Modeling is discussed in Section 5.0. Appendix B presents model outputs of existing system operational information during both winter and summer months, including temperature impacts on effluent water quality. In addition to the lower water temperature effects on biological activity, cell surfaces freeze during the winter reducing natural oxygen transfer rates. Aeration and mixing help prevent surface icing.

3.5.2 SYSTEM FLOW

The WWTP influent flow varies with seasonal precipitation rates and tourism. The Town can see as many as four million visitors per year. Peak flows are observed during the summer months, historically with the highest flows in June and July. This coincides with inflow and infiltration from high groundwater and flood irrigation as well as the large tourist influx. Average summer flow rates are approximately 2.5 MGD and average winter flow rates are approximately 1.7 MGD. The highest flow rate observed in the past 5 years was 3.5 MGD in June 2017.

WWTP influent flow rates are expected to increase with population growth. The WWTP currently receives wastewater flow from several satellite districts that will likely expand to meet population growth demands. Additionally, there are many residences within Teton County maintaining septic systems. Teton County is currently evaluating water quality and preparing a Water Quality Master Plan, anticipated to be completed in August 2023. This Water Quality Master Plan will holistically evaluate trends and correlations between surface water, groundwater, septic systems, and water/sanitary sewer districts. Since the WWTP serves as a regional wastewater treatment provider, additional satellite districts may consider connecting to the Town's WWTP, further increasing influent flow rates and loading.

3.5.3 INFLUENT/EFFLUENT LOADING

The WWTP design influent nutrient loading is based on a 5.0-MGD flow rate. Influent design concentrations are not permitted but are the basis for the WWTP's overall design and basin sizing. The WWTP receives influent concentrations much higher than the original design concentrations. However, because the WWTP does not receive 5.0 MGD, the actual loading rate does not exceed the design loading rate. As WWTP system demands increase, the higher loading rates will likely limit the WWTP's hydraulic capacity to a flow rate less than the designed and permitted 5.0 MGD flow rate.

The WWTP's CBOD design loading rate is 8,798 lbs/day (Engineering Associates 1998). The WWTP is operating below the design loading rate limits based on current flow and CBOD concentration data. If the WWTP flow rate were to increase to the 5.0-MGD design capacity and the CBOD concentrations remain the same, the WWTP may exceed the original CBOD design loading (Figure 3-1). High influent CBOD levels may lead to system overloading and shock conditions.

The WYPDES Permit stipulates a 25 mg/L monthly average CBOD discharge limit. Between 2019 and 2021, the WWTP's effluent CBOD averaged 3.9 mg/L in the summer and 9.2 mg/L in the winter. Based on current process operations and projected future use, it is anticipated the WWTP can still achieve its WYPDES Permit limits even if the flow rate increases to 5.0 MGD (Figure 3-3). Additionally, the WYPDES Permit also requires a minimum 85% CBOD reduction between influent and effluent concentrations (Equation 3-2). Current operations have achieved over 95% CBOD reduction over the past 3 years, even though the 310 mg/L average influent CBOD concentration is approximately 47% higher than the 211 mg/L design concentration (Figure 3-5).

$$\%_{reduction} = \frac{C_{influent} - C_{effluent}}{C_{influent}} \times 100\% \quad \text{Equation 3-2}$$

where,

$\%_{reduction}$ = Percent Reduction

$C_{influent}$ = Influent Concentration, mg/L

$C_{effluent}$ = Effluent Concentration, mg/L

Ammonia influent and effluent concentrations were also evaluated. The WYPDES Permit does not currently stipulate ammonia discharge limits, but effluent limits may be added in future WYPDES Permit renewals. Current influent ammonia loadings are below the 1,193 lbs/day design loadings. However, similar to CBOD, if the WWTP flow rate increases to 5.0 MGD, influent ammonia loadings are projected to surpass design loadings (Figure 3-2).

4.0 DECISION MATRIX PREPARATION

A Decision Matrix was prepared in collaboration with the Town and Steering Committee. A Decision Matrix provides an objective view of the WWTP potential improvement alternatives. The goal of the Decision Matrix is to establish pre-selected criteria prior to developing potential improvements/alternatives. The pre-selected criteria are meant to align with project goals and specific items important to decision makers. Once pre-selected criteria are established, a weight is applied to each criteria. The criteria weight signifies the importance of that specific criteria in meeting project goals. The final weight summation equals 100%. Once the criteria weights are designated, each potential improvement alternative is ranked from 1 to 5 (least to most favorable) on the various criteria. This provides a mechanism for recommendations and prioritizing alternatives.

Trihydro worked with the Town and Steering Committee to develop Decision Matrix criteria. The criteria were selected to support a specific area of the treatment process and are intended to be mutually exclusive. The goal is that none of the criteria overlap to avoid “double dipping” when scoring the alternatives. The final Decision Matrix Criteria included:

- Water Quality
- Energy Demands
- Capital Costs
- Operation and Maintenance (O&M) Costs
- Training and Licensing
- Odor and Noise
- Footprint
- Public Perception
- Expandability
- Permitting Requirements

The Town and Steering Committee members evaluated the criteria and provided weighting recommendations. The Town and Steering Committee members’ weighting recommendations were averaged for each criteria to determine the final criteria weights.

Similar to the criteria weighting evaluation, the Town and Steering Committee members evaluated each of the potential improvement alternatives to score the alternative per the criteria. The Town and Steering Committee members' scoring recommendations were averaged for each criteria to determine the final scores. The final Decision Matrix criteria and weighting is provided as Table 4-1.

A summary of the criteria and final weights are provided in the following sections and the Decision Matrix results are presented in Section 7.0.

4.1 WATER QUALITY

The Permit establishes effluent water quality monitoring and limits. The water quality criteria were developed to meet the Town's desire to continue producing effluent quality concentrations lower than the Permit requirements. The water quality goal is to not only continue maintaining discharge concentrations below the Permit requirements but to meet future water quality expectations. Each alternative was evaluated for its ability to meet or exceed this goal.

Potential improvements were compared to each other to determine which technology can provide the best effluent quality. This criteria focused on effluent water quality, and no additional considerations were included with this criteria.

Water quality was identified to be the most impactful criteria. Water quality is weighted at 21%.

4.2 ENERGY DEMANDS

Lagoon systems traditionally have lower energy demands than mechanical wastewater treatment plants. However, the lagoon system treatment process is limited due to natural biological constraints and seasonal fluctuations. The goal for the energy demands criteria is to understand how the various alternatives affect and reduce energy demands. Higher nutrient removal will likely increase energy demands. Mechanical plants have a much higher energy demand than lagoon systems but also have more potential to reduce nutrients. Potential improvement alternatives were compared with each other to determine scoring.

This criteria was determined to be the second most important by the Town and Steering Committee. The weight was calculated to be 15%.

4.3 CAPITAL COST

WWTP improvements will likely require capital costs. Capital costs are the initial costs for a potential improvement's design and construction. More efficient or reliable alternatives tend to have higher capital costs but over their lifecycle (e.g., 20 to 30 years) they tend to have lower O&M costs. Higher efficiency, reliability, and energy efficiency generally come with a higher capital cost. Maintaining the existing lagoon system and adjusting the operation of existing equipment or installing smaller processes to aid discharge concentrations may have a lower capital cost.

The Town has historically used self-funded enterprises to complete WWTP upgrades. Funding opportunities and rate impacts should be evaluated as capital cost is considered.

This criteria was calculated to be 11%. The Town can apply for federal and state grants or loans to help fund capital costs. Outside funding mechanisms were not considered in the overall scoring for each improvement. The capital costs per each potential improvement alternative were compared against each other for scoring.

4.4 OPERATION AND MAINTENANCE COSTS

In addition to capital costs, potential improvements will likely increase WWTP O&M costs. O&M costs include power, chemicals, parts, and labor. Alternatives having higher reliability, leading to lower O&M (e.g., repairs or replacement) were considered. Funding opportunities and rate impacts should be evaluated as O&M costs are considered.

This criteria was calculated to be 14%. The O&M costs were determined to have a greater weight than capital costs. O&M costs are recurring and will have long-term impacts to the Town and WWTP service area. Similar to capital costs, the O&M costs per each potential improvement alternative were compared against each other for scoring.

4.5 TRAINING AND LICENSING

The State of Wyoming has operator licensing and training levels based on WWTP operations, size, and complexity. More advanced treatment alternatives require additional training and may require licensing upgrades. This scoring accounted for current operator licenses and training and additional requirements to upgrade licensing to accommodate expanded WWTP operations.

This criteria was calculated to be 5%. The Town and Steering Committee members recognized additional licensing and training may be required depending on the selected improvements and is committed to maintaining these requirements.

4.6 ODOR AND NOISE

Unsatisfactory odors and noises can be associated with a WWTP. There are certain processes that can increase odor such as anaerobic digestion, which produces hydrogen sulfide to break down sludge. Noise can increase with additional blower and aerator installations which may be required for some potential improvements. Trihydro considered odor and noise changes from potential improvements as compared to current operations.

This criteria was calculated to be 6%. The Town and Steering Committee selected a lower weight due to the WWTP's proximity to nearby residences and businesses as the large amount of Town-owned property around the WWTP helps create a buffer for noise and odor. Considerations could include sound dampening appurtenances to reduce impact to adjoining residents.

4.7 FOOTPRINT

Potential improvements may increase the existing WWTP footprint. The Town owns approximately 143 acres at the WWTP site, while the WWTP itself is approximately 30 acres. Trihydro considered how potential improvements could fit within the current operations footprint and WWTP site. Additional considerations include lay-down areas, equipment assembly areas, and contractor access. A level of master planning may be necessary to account for the future required footprint of phased improvements. Also, there may be rules regarding land use based on natural constraints (e.g., floodplains, wetlands, animal habitat and natural resources).

This criteria was calculated to be 6%. The Town owns a sizeable property which is available for expansion to accommodate potential improvements.

4.8 PUBLIC PERCEPTION

Potential improvements were prepared based on widely accepted treatment processes. The Town's Community Engagement Specialist participated in meetings to understand the potential improvements selection process, Decision Matrix, weightings, and scorings to help educate the community. Potential improvements were evaluated based on how they may be perceived by the community.

This criteria was calculated to be 7%. Trihydro, in coordination with the Town, Steering Committee, and Stakeholders, held a Public Engagement meeting to review current WWTP operations, discuss potential improvements, and provide insight to the project.

4.9 EXPANDABILITY

The expandability criteria differs from the footprint criteria in that expandability focuses on how an alternative can grow to accommodate future demands. Recent studies indicate the WWTP will reach capacity in approximately 45-50 years as influent contributions increase (Vista 2021). These studies did not evaluate additional contributions from satellite sanitary sewer districts being added to the WWTP service area, which could result in WWTP capacity being met sooner. Potential improvements were assessed for expandability to accommodate future flow rates. Expandability included considering modular alternatives that match potential improvements and allow integration without system upset.

This criteria was calculated to be 10%. Expandability was an important consideration to ensure future demands are met and the WWTP does not overload.

4.10 PERMITTING REQUIREMENTS

New treatment processes will likely require Permit modifications. Furthermore, construction activities (e.g., expansion) will likely require additional permits through the WDEQ, such as a Permit to Construct. Permit modifications and additions were evaluated for potential improvements.

This criteria was calculated to be 5%. The Town is committed to addressing permit requirements necessary to implement potential improvements.

5.0 MODEL DEVELOPMENT

Trihydro developed a site-specific WWTP model using the software BioWin®. BioWin®, a wastewater process simulation software, incorporates biological, chemical, and physical process models to provide wholistic insight into WWTP operations. BioWin® is used to design, upgrade, and optimize WWTPs, and the software allows the user to input operational data to accurately model a WWTP.

Trihydro used water quality data from the Town's Data Workbooks to define influent and effluent stream flow and chemical characteristics. The 1995 WWTP record drawings were provided for system review and model development (Engineering Associates 1995). The 1995 record drawings were used to input cell dimensions into the model. The process model was calibrated using existing operational data to develop an accurate system representation.

The model was used to help confirm potential improvement validity based on current WWTP characteristics. The model is a high-level representation of WWTP effluent results if the Town were to implement changes and improvements.

5.1 EXISTING SYSTEM

The existing system model was created using influent flow characteristics and the built-in BioWin® software design parameters. The modeling process was calibrated using effluent data from 2018 through 2021 including temperature, pH, CBOD, ammonia, and TSS. Model calibration works by adjusting preset kinetic parameters to reflect site conditions. The initial calibration parameters included water temperatures and dissolved oxygen levels from the Town's Data Workbooks. These parameters affect CBOD and ammonia reduction rates throughout the WWTP process. Trihydro modeled average flow characteristics during both winter months (December, January, and February) and summer months (July, August, and September) to further calibrate operations during seasonal changes. Winter and summer operating scenarios were created based on current operating data. The existing system model was prepared to understand the WWTP's baseline operations and seasonal treatment fluctuations. Model results were used to determine system limitations and possible improvement areas.

5.2 POTENTIAL IMPROVEMENTS

Once the existing system model was calibrated, the model was then used to evaluate potential improvement alternatives and their effluent impacts. The modeling results were then applied specifically to the Decision Matrix Water Quality criteria for a high-level comparison of potential improvements' effluent quality. Modeled effluent water quality is summarized in Table 5-1 and compared to current effluent concentrations.

The Biowin® software was developed primarily for mechanical wastewater treatment plants. Trihydro modeled the WWTP to understand general operating conditions and evaluate potential operational adjustments and potential improvements. A margin of error can be introduced when modeling lagoon systems; however, the results provide guidance for preparing conceptual-level designs. As long as these limitations are considered, the model provides a consistent means to compare potential improvement alternatives. An example is the mechanical plant ammonia and CBOD effluent concentrations shown in Table 5-1 are higher than the aeration modifications, clarifier, and bioreactor results. Most likely, the mechanical plant would produce higher quality effluent year-round than the other alternatives. Water reuse and sludge removal add-ons were not modeled; however, if implemented, they will noticeably improve effluent water quality. Projected potential improvement effluent water quality benefits are discussed in Section 6.0 below.

6.0 POTENTIAL IMPROVEMENTS

Potential improvements were developed based on the Town's priorities and goals. Each approach was presented to the Town, Steering Committee, and Stakeholders during meetings over the course of the evaluation. These are high-level, conceptual alternatives, and final layouts and operation will need to be evaluated in the future as part of a preliminary design review. The Decision Matrix was used to evaluate each potential improvement based on the established criteria. Several add-on options were also considered, and these options can be combined with each of the proposed improvements. These add-ons were also scored using the Decision Matrix. Decision Matrix results are discussed in Section 7.0. Appendix C includes supporting information used to help evaluate the Decision Matrix criteria for each potential improvement. Trihydro provided the Town and Steering Committee initial Decision Matrix scoring as an example based on the system evaluation. However, Trihydro's scores were not used in the final analysis which only included the Town and Steering Committee scores. The supporting information incorporated high-level discussion on potential improvement capital and O&M costs, effluent water quality expectations, estimated energy demands, required training and licensing, odor and noise impacts, footprint modifications, public perception, expandability potential, and permitting requirements.

Winter operating conditions were used to evaluate potential improvements. Winter conditions were used as the worst-case scenario since biological activity changes seasonally and curtails during colder winter months. After completing the initial modeling results Trihydro presented several operational ideas to the Town in December 2021 for improved winter season operations. These suggestions included:

- Partially reducing aeration and mixing in Cells 1 and 2 to increase anoxic ammonia reduction. Anoxic conditions increase the conversion of ammonia to nitrate.
- Restore aeration in Cell 5 to strip nitrogen from the water.
- Create a recycle flow from Cell 5 to the WWTP head by tapping the effluent line to the UV Disinfection Building and diverting some flow into Cell 2. This would increase WWTP detention time and nitrate reduction.
- Increase the water levels in the cells prior to the onset of colder weather. Once the cells freeze and ice is approximately 12-inches thick, reduce the water level. The gap between the water and ice will allow for improved oxygen transfer and forms an insulating layer over the cells.

The wastewater model was used to develop and verify a series of more permanent solutions all with the goal of reducing nutrients in the final effluent. The proposed improvements can be implemented in a phased approach,

allowing the Town time to plan for proposed improvements incrementally rather than all at one time. The potential improvements discussed below are based on the 5.0-MGD design flow.

6.1 AERATION MODIFICATIONS

Trihydro modeled the existing WWTP with modifications to current aeration supply and upgrades to Cells 1 through 3B2. These proposed improvements would provide better control of aeration and dissolved oxygen in the upstream cells and increase mixing.

Before the last major plant upgrade Cells 1 and 2 were unaerated facultative lagoons. Their primary purpose was to catch and store incoming solids. After the plant upgrades, aeration was installed in Cells 1 and 2. This improved CBOD reduction but allowed more sludge to transfer into the downstream basins. One scenario would partially restore the solids settling capacity in Cells 1 and 2 by only aerating half of each cell. This modeling scenario divides Cells 1 and 2 into two halves of equal size to create anoxic (without air) and aerobic (with air) zones. This alternative also recommends installing a turbidity curtain across Cells 1 and 2. A turbidity curtain is a semipermeable membrane that would lay across the center of Cells 1 and 2. The curtain is porous so water can flow through it, but sludge remains on the upstream side. If installed in Cells 1 and 2, the anoxic and aerobic environments would be separated by the turbidity curtain (Figure 6-1A).

The initial anoxic zone would allow sludge to settle and expedite the conversion of ammonia into nitrate. Mixers and aerators would be removed from the anoxic zone and relocated downstream to increase the oxygen transfer rate in the aerobic zone. Removing the anoxic zone aeration and mixing will provide increased ammonia reduction (Figure 6-1B). The model indicates that TSS and CBOD reduction levels remain unchanged in this scenario. This scenario assumes higher dissolved oxygen levels and full mixing within the aerated zone. Sludge removal should be considered with this proposed improvement.

Trihydro recommends a centralized blower and an air distribution system be installed to increase dissolved oxygen levels in the aerated portions of Cells 1 and 2 through Cell 3B2. Instrumentation, electrical, and supervisory control and data acquisition (SCADA) improvements should also be implemented. A blower building, similar to the one used for Cells 4A through 4D, is also recommended to protect and house new equipment.

6.2 CLARIFIER

The clarifier installation alternative proposes installing two 25-foot clarifiers in Cell 5. The remainder of Cell 5 could potentially be used as a sludge storage wetland to store accumulated sludge from Cells 1 and 2 and the waste sludge

from the clarifiers (Figure 6-2A). The clarifier waste sludge may also be returned to the head of the plant depending on the selected alternatives. This alternative also requires the previously discussed aeration modifications to be fully effective. The aeration modifications improve the overall reduction of BOD and ammonia while the clarifiers improve TSS removal. This scenario also creates a hybrid treatment system similar to mechanical treatment processes.

Chemical additions (polymer, coagulants) are required to increase solids collection. The sludge collected in Cell 5 could be naturally dewatered and stabilized by wetland vegetation. Plants such as reeds and cattails naturally dewater and breakdown sludge over time. A sludge wetland could also be placed elsewhere within the Town's property. The BioWin® model shows this alternative reduces both ammonia and total nitrogen in the final effluent (Figure 6-2B). The chemical additives could also help remove TSS and phosphorus in the effluent.

6.3 BIOREACTOR

Trihydro modeled a bioreactor to reduce ammonia effluent concentrations by converting ammonia to nitrate and nitrite. The bioreactor would be installed in a series of modules facilitating expandability as influent flow increases.

The bioreactor functions as an attached growth system which is preferred by nitrifying bacteria. This attached growth bacteria convert ammonia to nitrate which is less toxic to fish. The bioreactor design is modular and would allow the Town to expand to meet future demands. The bioreactor system has a relatively small footprint and could potentially be placed in the western side of Cell 5. The remainder of Cell 5 could operate as a finishing pond following treatment through the bioreactor system (Figure 6-3A). One bioreactor system limitation is that it reduces ammonia, but not total nitrogen. The remaining portion of Cell 5 would still be required as a finishing pond downstream of the bioreactor system, as the anoxic zone aids to reduce total nitrogen (Figure 6-3B). The removal of sludge accumulated in Cell 5 would be required in this scenario.

6.4 MECHANICAL PLANT

The mechanical plant alternative has a much smaller footprint and can be expanded as wastewater demands increase (Figure 6-4A). The mechanical plant considered during this evaluation is an Aero-Mod Sequox system. The system has the ability to reduce dissolved oxygen levels to meet demands, thus reducing aeration and power. Installations in cold weather climates have demonstrated the ability to reduce ammonia to below 1 mg/L, total nitrogen to 3 mg/L and phosphorus to 1 mg/L even in the winter (Figure 6-4B). While the Aero-Mod system is one of many packaged mechanical treatment systems, its design has no moving parts in the aeration basins or clarifiers which reduces maintenance and increases reliability. Compared to other types of mechanical treatment systems, the Aero-Mod

Sequox is highly efficient. However, all mechanical treatment plants use drastically more energy than the current lagoon system and have a high initial capital cost to install.

The mechanical treatment plant also includes effluent filtration to potentially produce Class A reuse quality water. The mechanical treatment system has a high capital cost for construction but consistently removes both nitrogen and phosphorous from the effluent stream year-around.

Cells 1 and 2 could be converted to sludge storage ponds from the mechanical plant. The Town would not need to remove current sludge accumulation in Cells 1 and 2.

6.5 ADD-ONS

In addition to the abovementioned alternatives, Trihydro considered add-ons that can be combined with each of the potential improvements. Trihydro proposed these add-ons to enhance the treatment process rather than replace the potential improvements.

6.5.1 WATER REUSE

Water reuse is the concept of beneficially reusing highly treated effluent for irrigation on nearby properties. Water reuse would reduce the nutrient loading to the Snake River because the total volume of water discharged to the river is reduced. The add-on can be combined with all the alternatives discussed above. It includes pumps, a distribution system, and effluent filtration (Figure 6-5). Permitting modifications are required to distribute reuse water on public and private lands. The filtration system would reduce TSS in the effluent. Consideration items for this add-on include identifying property on which to reuse treated effluent, designing and constructing a distribution system, permitting, and operation.

To achieve reused water quality requirements, a filtration system should be installed prior to UV disinfection. The filter would remove solids which will increase UV disinfection efficiency and reduce energy demands. A filter could also be added to the current WWTP or in conjunction with any of the abovementioned alternatives.

6.5.2 SLUDGE REMOVAL

Sludge removal is eventually required as a part of all lagoon wastewater treatment system operations. Based on WWTP sludge measurements, Trihydro recommends the Town develop a Sludge Monitoring and Management Plan (Plan) to evaluate sludge composition and remove accumulated sludge in Cells 1 and 2. The Town has measured sludge using three different methods with varying results. The Plan would outline a sludge composition sampling

strategy and a consistent sludge measurement method, providing a coherent annual accumulation comparison. Future sludge removal can be completed in a phased approach and will be necessary to maintain and improve WWTP operations. The Plan allows the Town to operationally and fiscally prepare for this event. As the sludge volumes in Cell 1 and Cell 2 increase, there is a higher possibility of sludge entering the remaining cells and ultimately discharging. Additionally, the abovementioned potential improvement alternatives, other than the mechanical plant, will all require sludge removal to operate efficiently.

On-site and off-site sludge disposal was considered during this evaluation. Sludge removed from the lagoon system cells will need to be dewatered and treated before its final placement (on-site or off-site). Lime application is a common treatment process to reduce water content and stabilize sludge volumes. The stabilized sludge will have reduced organic and pathogenic content. The two sludge removal disposal options are discussed in detail below.

6.5.2.1 ON-SITE SLUDGE DISPOSAL

On-site sludge removal involves constructing a sludge holding pond or possibly using a portion of an existing basin depending on the potential improvement alternative selected (Figure 6-6). A contractor dredges and partially dewateres the collected sludge which is then placed in the basin. The basin could potentially be converted to a sludge wetland where plants will naturally reduce the sludge volume over time. Permitting is required if a separate sludge holding pond is constructed. On-site sludge disposal is less costly than off-site sludge removal. This option may not impact WYPDES discharge compliance as the on-site sludge holding pond would be separate from the discharge compliance point. The on-site sludge holding pond would need to meet WDEQ requirements including lining and groundwater protection.

Alternatively, the Town could consider constructing a sludge wetland for disposal (Figure 6-7). This type of wetland would reduce odors and promote growth of organisms and bacteria.

6.5.2.2 OFF-SITE SLUDGE DISPOSAL

Off-site sludge disposal involves the same sludge removal steps discussed above except the sludge is hauled off-site and disposed of by a contractor. Transport and sludge disposal fees significantly increase off-site disposal cost as compared to on-site disposal costs. The sludge removal contractor is responsible for locating and permitting land application sites or landfills that are permitted to accept lagoon sludge. This relieves the Town from the responsibility and liability of sludge removal and disposal but comes at an increased cost.

7.0 DECISION MATRIX RESULTS

Several different tools were used to provide the Town with potential WWTP improvements. These tools included BioWin® model results, the Decision Matrix evaluation and results, and several Technical Discussion meetings. The Decision Matrix results are discussed below.

As previously discussed, Trihydro provided the Town and Steering Committee the initial scoring weights and Decision Matrix scores as an example. However, Trihydro's scores were not included in the final scoring averages which only includes the Town and Steering Committee scores. The Town and Steering Committee members provided scores for each potential Decision Matrix improvement based on ten previously weighted criteria. Their scores were averaged and are shown in Table 7-1.

Each alternative was compared to both the criteria and each other and scored from one (low) to five (high). The overall scores provided by the Town and Steering Committee were generally similar and indicated a consensus of opinions on most alternatives and add-ons. Appendix D includes a summary of the contributors' results and reasonings.

The Decision Matrix results indicate how the potential improvements considered each benefit the Town's primary goals, but in different ways. The Town will need to evaluate these alternatives based on the WWTP priorities listed in Section 1.0. Potential improvement benefits and limitations as well as final Decision Matrix scoring are discussed below. The Decision Matrix scoring summary is also presented graphically in Figure 7-1.

An evaluation of the alternatives specific to the WWTP priorities (i.e., capital costs, O&M costs, and energy demand) is presented graphically in Figure 7-2. This figure was developed to focus on the Town's priorities that have been communicated to the public and are identified as the key components for improvements.

7.1 AERATION MODIFICATIONS

Aeration modifications can reduce WWTP effluent ammonia concentrations. This modification focuses on adjusting dissolved oxygen concentrations throughout the WWTP process to allow for anoxic and aerobic zones to target different nutrients in the treatment stream.

The aeration modifications will increase energy demands and require operator manipulation or programmable logic controller (PLC) SCADA as concentration demands change. TSS and CBOD concentrations generally remain

unchanged with this alternative. A limitation to this alternative is it will still require sludge removal in Cells 1 and 2, which is an additional cost. Aeration modifications scored 3.4 out of 5.

7.2 CLARIFIER

The clarifier installation was proposed to reduce final effluent ammonia and total nitrogen. This potential improvement would also reduce effluent TSS and phosphorous through chemical additives.

One limitation to this alternative is the need for the aeration modifications and sludge removal from Cells 1 and 2, which are additional costs. The improvement could be installed in a phased approach beginning with the aeration modification. Sludge could potentially remain on-site in a portion of Cell 5, creating a sludge wetland, or disposed off-site. Winter operational improvements are most notable as compared to the current lagoon system. Clarifier installation scored 3.3 out of 5.

7.3 BIOREACTOR

The bioreactor functions as an attached growth system to facilitate nitrifying bacteria growth. The bioreactor can be constructed modularly, allowing the Town to expand the system to meet future demands. Similar to a clarifier, the bioreactor system could potentially be placed in a portion of Cell 5 with the remainder of Cell 5 operating as a finishing pond.

A limitation is the system reduces ammonia but not total nitrogen. This proposed improvement continues to use Cell 5 as a finishing pond (anoxic basin) to further reduce total nitrogen. Sludge removal in Cells 1 and 2 needs to be considered, which is an additional cost. The bioreactor scored 3.4 out of 5.

7.4 MECHANICAL PLANT

The mechanical plant is able to meet the WWTP's growth demands through modular construction and operates consistently, independent of seasonal changes. A mechanical plant could also meet additional demands from water and sewer districts. The small footprint could allow the remaining land to be evaluated for other uses (e.g., open space, solar energy, leasing opportunities, etc.). This alternative also provides the best opportunity to consistently reduce nutrient discharge to the Snake River.

A mechanical plant has the highest capital costs and requires more energy than current WWTP operations or other potential improvements. Steering Committee members suggested installing additional solar arrays or a micro-

hydroelectric facility at the WWTP compliance point to offset electricity demands. No sludge removal from Cells 1 and 2 would be required. The mechanical plant scored 3.4 out of 5.

7.5 WATER REUSE

Water reuse involves pumping WWTP effluent through a distribution system for local irrigation. Effluent would need to be filtered prior to pumping to meet WDEQ water quality human contact standards. The reuse water distribution system would be sized to accommodate a portion of the effluent flow rate depending on available irrigatable land area. Additionally, the pumping system can be configured with variable frequency drives to account for varying flow rates or additional future flow rates. The pumping system can also be phased by adding new pumps as needed to meet future demands. This alternative will reduce total nutrient loading to the Snake River because much of the effluent is diverted from the Snake River for beneficial water reuse for irrigation. The effluent would be filtered prior to UV disinfection and a portion of effluent flow will be redirected for irrigation purposes. Water reuse can be combined with any potential improvements or installed as a standalone system.

Water reuse will require more energy than current WWTP demands to operate the pumping system. This alternative will have a high capital cost to purchase and install the filtration unit, pumps, electrical, SCADA, and distribution piping; however, O&M costs will be relatively low. The pumping system would be largely automated and would require routine maintenance. The Town would need to coordinate with local landowners to identify irrigatable property and the WYPDES Permit would need to be modified for treated domestic wastewater reuse. Water reuse scored 4.4 out of 5.

7.6 ON-SITE SLUDGE DISPOSAL

Sludge removed from Cells 1 and 2 could be disposed within the existing WWTP property in a sludge holding pond. The holding pond will need to meet WDEQ lining and groundwater protection requirements. This alternative will have relatively low capital costs compared to other potential improvements, and O&M costs and energy demands will be largely non-existent. Capital costs will be largely generated from contracted sludge removal and holding pond construction. However, once the sludge is removed and stored in the holding pond, it can remain undisturbed with minimal, if any, O&M and energy costs. Sludge removal will also increase overall WWTP efficiency, improving effluent water quality.

The sludge holding pond will require a larger footprint than other potential improvements. Expandability will be limited; however, future sludge removal will likely not be required for several decades. Potential odor and noise

concerns could occur during removal operations but would be temporary. This alternative can supplement other potential improvements but can also operate independently. On-site sludge disposal scored 4.5 out of 5.

7.7 OFF-SITE SLUDGE DISPOSAL

Rather than constructing an on-site sludge holding pond, sludge removed from Cells 1 and 2 could be hauled off-site to a landfill or other handling facility. Prior to hauling and disposal, sludge will need to be stabilized per WDEQ requirements. Capital costs will be noticeably higher than on-site disposal due to transportation, stabilization, and landfill fees; however, once the stabilized sludge is hauled off-site, there will be no further O&M costs or energy demands.

Off-site sludge disposal will have no impact on the WWTP footprint. Similar to on-site disposal, odor and noise will likely increase during removal operations but will cease after removal is completed. This alternative will enhance other potential improvements but can also be completed independently. Off-site sludge disposal scored 3.9 out of 5.

8.0 CONCLUSIONS

The primary goals of this Technical Review Report are to provide a better understanding and alignment of current WWTP operations with priorities in the community including:

1. Protecting the region's water quality and ecosystem by achieving better than the Wyoming Department of Environmental Quality discharge permitting standards.
2. Maintaining a cost-effective and high level of service to the Town of Jackson's rate-paying customers.
3. Reducing energy consumption in wastewater treatment through use of energy efficient treatment methods.
4. Aligning with the recent update to the Jackson/Teton County Comprehensive Plan.

Through this study, the Town has made substantial commitment to its citizens and stakeholders to achieve these goals for a more sustainable future. The Town prides itself in achieving current WYPDES Permit water quality limits and maintaining superior WWTP operations. WWTP discharge water quality is currently better than WYPDES Permit requirements, and the Town continuously evaluates possible improvements to decrease energy demands while achieving effluent permit requirements.

Trihydro was contracted to evaluate existing WWTP influent and effluent water quality data, energy consumption, operations and maintenance, and sludge accumulation in the various treatment cells. In the process of developing this report, Trihydro provided the Town and Steering Committee members with a greater understanding of how the WWTP operates and identified potential improvement areas.

Once the current system evaluation was completed, Trihydro thoroughly reviewed WWTP operations and modeled the current treatment process. The model was calibrated using existing influent and effluent water quality results. The calibrated model was then used to develop potential improvements that would improve the WWTP's ability to reduce effluent nutrients that can affect river water quality and aquatic life. Several potential improvement alternatives were prepared by Trihydro for evaluation and discussion with the Town, Steering Committee, and Stakeholders. Each alternative was considered to not only achieve the current discharge requirements but to continue improving effluent water quality where possible in the future.

These improvements, discussed in detail in Section 6.0, incorporated current operational and discharge requirements into results that were compared in a weighted Decision Matrix. The Town and Steering Committee were provided an

opportunity to weigh the pros and cons of each alternative based on ten specifically selected criteria on how each improvement might best meet the community's priorities and goals.

8.1 TREATMENT FACILITY REVIEW

Trihydro conducted a thorough site visit, reviewed several years of WWTP data, design plans, previous reports, and conducted staff interviews as part of the condition assessment. Trihydro found the WWTP to be well maintained and performing at a level that exceeds expectations when compared to other large lagoon treatment systems. The WWTP continually achieves water quality below permitted requirements for discharging into the Snake River. Trihydro understands influent flows will likely increase with population growth and the potential to add satellite sanitary sewer districts as part of Teton County's regionalization goals.

The Town submitted a renewal application for its WDEQ/WQD WYPDES Permit that expired August 31, 2022. WDEQ distributed the draft Permit renewal for review in early August 2022. Initial draft Permit review did not identify substantial effluent water quality or monitoring changes. However, future Permit renewals and USEPA requirements could impose more restrictive or new effluent water quality limits for natural and manmade constituents. To this end, this Technical Review Report considered discharge limits based on the current permit limits as well as possible future permit limits on nutrients such as ammonia and phosphorus.

Additionally, future WWTP operations may be impacted by agreements between the Town and new satellite areas within Teton County which continue to grow beyond these area's ability for sustainable on-site (septic tank) treatment. Possible wastewater treatment regionalization issues will be addressed as part of the Teton County Water Quality Master Plan.

8.2 SHORT-TERM RECOMMENDATIONS

Trihydro developed several short-term recommendations the Town could implement in the near future. Short-term recommendations were developed prior to Decision Matrix results but provide less costly interim measures to improve water quality by using existing equipment in different configurations. While short-term recommendations may not be as efficient as the long-term recommendations, most of the changes can be done with inhouse labor and do not require WYPDES Permit changes or Permits to Construct. After completing the initial modeling results Trihydro presented several operational ideas to the Town in December 2021 for improved winter seasonal operations. Biological activity changes seasonally and curtails during colder winter months. Trihydro's suggested short-term measures include:

- Partially reducing aeration and mixing in Cells 1 and 2 to increase anoxic ammonia reduction. Anoxic conditions increase the conversion of ammonia to nitrate.

- Restore aeration in Cell 5 to strip nitrogen from the water.
- Create a recycle flow from Cell 5 to the head of the WWTP by tapping the effluent line to the UV Disinfection Building and diverting some flow into Cell 2. This increases WWTP detention time and nitrate reduction.
- Increase the water levels in the cells prior to the onset of colder weather. Once the cells freeze and ice is approximately 12-inches thick, reduce the water level. The gap between the water and ice will allow for improved oxygen transfer and forms an insulating layer over the cells.

8.3 LONG-TERM CONSIDERATIONS

The Town and surrounding areas continue to grow, which will ultimately impact WWTP operations. Additionally, potential wastewater regionalization in Teton County may contribute to increased demands on the WWTP. As the Town considers long-term treatment, there are several factors that will impact decision-making:

- New Permit requirements may play a role in system improvements or adjustments. As noted previously, each of the potential improvement alternatives would benefit the existing system in different ways but all of them address the likelihood of a more nutrient-restrictive permit (e.g., ammonia and phosphorous limits). Future permit requirements may steer the Town's decision in a more definitive direction.
- The Town prides itself on operating well below current Permit limits. The Town proactively makes system modifications to keep the WWTP operating efficiently. In an effort to provide the best effluent water quality (i.e., the gold standard), Trihydro recommends the Town continue to engage the community and develop what this water quality standard should be and what costs are acceptable to the community. Once specific criteria are established, this will guide decision making for future WWTP improvements.
- Teton County is currently evaluating and preparing a County-wide Water Quality Master Plan, in which the Town is a stakeholder. Results from this master-planning effort will likely impact future WWTP operations, to the extent the Town accepts the regional WWTP initiative. Regionalization will increase flows conveyed through the system as well as impact influent water quality and the overall treatment processes.
- The Town should develop a Sludge Management Plan that coincides with any new Permit requirements and the potential improvement selected as most favorable to meet the future treatment goals. Sludge removal was listed as an "Add-On" measure because the course of action selected is directly impacted by specific process changes. For example, if the mechanical plant were selected, sludge could remain in the cells and be abandoned in place. This saves money in sludge disposal costs which would act like a credit towards a new mechanical plant.

9.0 REFERENCES

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TABLES

TABLE 2-1. ENERGY USAGE AND SOLAR GENERATION
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

	Electricity Used	Solar Generated	Grid Energy	% Solar	% Grid
Jul-17	212,130	35,966	176,164	17.0%	83.0%
Aug-17	209,809	45,874	163,935	21.9%	78.1%
Sep-17	174,023	39,923	134,100	22.9%	77.1%
Oct-17	128,927	19,936	108,991	15.5%	84.5%
Nov-17	124,880	24,384	100,496	19.5%	80.5%
Dec-17	183,118	15,672	167,446	8.6%	91.4%
Feb-18	166,284	18,495	147,789	11.1%	88.9%
Mar-18	185,353	28,922	156,431	15.6%	84.4%
Apr-18	182,444	33,533	148,911	18.4%	81.6%
May-18	175,536	39,837	135,699	22.7%	77.3%
Jun-18	254,924	45,708	209,216	17.9%	82.1%
Jul-18	224,448	42,119	182,329	18.8%	81.2%
Aug-18	238,707	39,332	199,375	16.5%	83.5%
Sep-18	191,265	36,985	154,280	19.3%	80.7%
Oct-18	178,982	27,644	151,338	15.4%	84.6%
Nov-18	178,805	17,521	161,284	9.8%	90.2%
Dec-18	169,077	6,451	162,626	3.8%	96.2%
Jan-19	187,863	13,822	174,041	7.4%	92.6%
Feb-19	173,733	11,187	162,546	6.4%	93.6%
Mar-19	183,053	26,465	156,588	14.5%	85.5%
Apr-19	235,343	28,674	206,669	12.2%	87.8%
May-19	243,001	32,604	210,397	13.4%	86.6%
Jun-19	210,974	28,730	182,244	13.6%	86.4%
Jul-19	220,247	34,855	185,392	15.8%	84.2%
Aug-19	212,258	42,833	169,425	20.2%	79.8%
Sep-19	193,755	34,476	159,279	17.8%	82.2%
Oct-19	212,256	20,567	191,689	9.7%	90.3%
Nov-19	167,371	9,905	157,466	5.9%	94.1%
Dec-19	200,766	11,114	189,652	5.5%	94.5%
Jan-20	230,908	13,541	217,367	5.9%	94.1%
Feb-20	182,440	19,923	162,517	10.9%	89.1%
Mar-20	192,215	27,974	164,241	14.6%	85.4%
Apr-20	191,470	27,910	163,560	14.6%	85.4%
May-20	206,871	13,925	192,946	6.7%	93.3%
Jun-20	278,060	28,810	249,250	10.4%	89.6%
Jul-20	267,795	35,778	232,017	13.4%	86.6%
Aug-20	237,159	39,161	197,998	16.5%	83.5%
Sep-20	242,547	39,065	203,482	16.1%	83.9%
Oct-20	261,552	32,909	228,643	12.6%	87.4%
Nov-20	176,165	22,766	153,399	12.9%	87.1%
Dec-20	175,151	22,100	153,051	12.6%	87.4%
Jan-21	226,321	24,852	201,469	11.0%	89.0%
Feb-21	180,920	18,731	162,189	10.4%	89.6%
Mar-21	196,605	37,254	159,351	18.9%	81.1%
Apr-21	249,891	23,991	225,900	9.6%	90.4%
May-21	244,219	20,905	223,314	8.6%	91.4%
Jun-21	246,797	23,441	223,356	9.5%	90.5%

TABLE 2-2. PERMIT LIMITS AND MONITORING REQUIREMENTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

	Monthly Average (mg/L)	Weekly Average (mg/L)	Daily Maximum (mg/L)	% Removal
CBOD5	25	40	80	85%
TSS	100	150	300	
Discharge	5.0 MGD			
pH	6.5-9			
E.Coli (May-Sep)*	126/100 mL			
E.Coli (Oct-Apr)	630/100 mL			
Total res. Cl	0.011 mg/L			
Annual Measurements (no limits)				
Ammonia				
DO				
Nitrate/Nitrite				
TKN				
Oil and Grease				
Total P				
TDS				

Notes

*Monthly average. Daily max based on Chapter 1, WWQ Rules and Regs

CBOD5 = Carbonaceous Biochemical Oxygen Demand

DO = dissolved oxygen

mg/L = milligrams per liter

MGD = million gallons per day

mL = milliliters

P = Phosphorus

res. Cl = residual Chloride

TKN = total Kjeldahl nitrogen

TDS = total dissolved solids

TSS = total suspended solids

TABLE 3-1. HISTORIC SLUDGE MEASUREMENTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Year	Cell 1	Cell 2	Cell 3A
1993	11.2	NM	NM
1994	12.5	NM	NM
1995	11.6	5.1	NM
2000	NM	13.9	NM
2004	NM	15.0	NM
2005	15.3	NM	NM
2006	12.8	NM	11.6
2007	16.9	18.9	17.9
2012	20.2	14.2	14.8
2013	21.3	18.1	12.9
2014	23.3	18.0	35.9
2015	44.4	27.5	50.4
2016	29.4	16.9	27.8
2017	46.0	37.6	43.1
2019	55.7	50.4	48.8
2021	49.1	34.0	40.2

Notes:

Years not shown had no available data

Thicknesses shown in inches

NM - not measured

Measurements taken by Town personnel using a sludge
judge and ultrasonic bottom sounding

**TABLE 3-2. 2017 AND 2019 CONTRACTOR ESTIMATED SLUDGE VOLUMES
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING**

Cell No.	Cell Depth	2017 Average Sludge Thickness	2017 Percent Full	2019 Average Sludge Thickness	2019 Percent Full
Cell 1	198	46	23.20%	55.7	28.10%
Cell 2	204	37.6	18.40%	50.4	24.70%
Cell 3A	204	43.1	21.10%	48.8	24.00%

Notes:

Thicknesses and cell depth shown in inches

Measurements taken from Keller Associates 2017 and 2019 bathymetric surveys.

**TABLE 3-3. 2021 CONTRACTOR ESTIMATED SLUDGE VOLUMES
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING**

Cell No.	Cell Depth	2021 Average Sludge Thickness	2021 Percent Full
Cell 1	198	49.1	24.80%
Cell 2	204	34	16.70%
Cell 3A	204	40.2	19.70%

Notes:

Thicknesses and cell depth shown in inches

Measurements taken from H&S Environmental Survey, 2021.

TABLE 4-1. FINAL DECISION MATRIX CRITERIA AND WEIGHTING
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Criteria	Description	Weights
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%
Capital Cost	Consider the capital cost compared to the other recommendations.	11%
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%
Footprint	How well does the recommendation fit in the current operations footprint on available ToJ property?	6%
Public Perception	How will the recommendation impact public perception?	7%
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%
		100%

**TABLE 5-1. POTENTIAL IMPROVEMENTS MODELED EFFLUENT WATER QUALITY
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING**

Nutrient	Current Effluent Concentration*	Potential Improvement Alternative				Add-On	
		Aeration Modifications	Clarifier	Bioreactor	Mechanical Plant	Water Reuse**	Sludge Removal**
Ammonia	29.37	0.07	0.02	0.01	1.00	N/A	N/A
Total Nitrogen	34.04	10.55	2.43	10.41	5.00	N/A	N/A
Total Phosphorus	4.50	8.00	5.17	8.00	1.00	N/A	N/A
CBOD	9.36	7.91	1.65	6.23	10.00	N/A	N/A

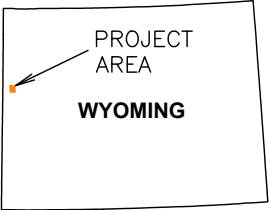
Notes:

The model results shown provide guidance for preparing conceptual-level designs. Actual results will need to be determined through preliminary engineering, full-scale modeling, and final design.

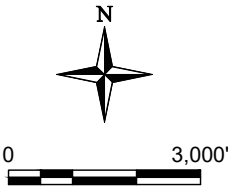
TABLE 7-1. FINAL DECISION MATRIX RESULTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Criteria	Description	Weights	Final Results						
			Potential Improvement Alternative				Add-Ons		
							Water Reuse	Sludge Removal	
			Aeration Modifications	Clarifier	Bioreactor	Mechanical Plant		On-Site Disposal	Off-Site Disposal
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%	2.3	4.0	2.3	5.0	5.0	5.0	4.5
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%	3.0	2.8	2.8	1.5	4.8	4.5	4.0
Capital Cost	Consider the capital cost compared to the other recommendations.	11%	3.8	3.0	3.5	1.8	4.0	4.3	2.3
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%	4.8	3.0	4.0	2.3	4.8	5.0	4.5
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%	4.3	3.0	3.8	2.8	4.0	5.0	5.0
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%	3.5	4.3	5.0	3.5	5.0	2.0	2.0
Footprint	How well does the recommendation fit in the current operations footprint on available ToJ property?	6%	4.8	4.8	4.3	5.0	1.8	4.0	3.5
Public Perception	How will the recommendation impact public perception?	7%	2.3	2.3	2.8	4.5	4.8	4.8	3.5
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%	3.5	3.0	4.8	5.0	5.0	5.0	5.0
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%	4.8	3.3	3.8	2.8	1.5	4.0	3.0
		100%	3.4	3.3	3.4	3.4	4.4	4.5	3.9

FIGURES



QUADRANGLE LOCATION





Trihydro
CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 1-1

SITE LOCATION MAP

TECHNICAL REVIEW REPORT
2021 WASTEWATER TREATMENT PLANT TECHNICAL
REVIEW, TOWN OF JACKSON, WYOMING

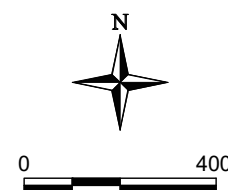
E:\TRIHEDRO\TOWN OF JACKSON - DOCUMENTS\CADD_BASEMAPS\80f-JK-WWTP-SITEPLAN



Cell No.	Water Surface Area (acres)	Water Depth (feet)	Retention Volume (MG)
Cell No. 1	8.0	16.5	35.2
Cell No. 2	8.4	15.8	36.2
Cell No. 3A	3.2	17.0	12.3
Cell No. 3B1	3.5	15.0	15.8
Cell No. 3B2	2.5	13.0	12.4
Cell No. 4A	1.9	10.0	6.1
Cell No. 4B	1.8	12.0	6.6
Cell No. 4C	2.2	13.0	9.1
Cell No. 4D	2.0	11.0	6.7
Cell No. 5	5.2	10.0	16.3

EXPLANATION

← WASTEWATER FLOW FROM INFLUENT TO OUTFALL





1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 2-1

SITE PLAN AND WASTEWATER FLOW PATH

TECHNICAL REVIEW REPORT

2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW, TOWN OF JACKSON, WYOMING

Drawn By: JH	Checked By: CF	Scale: 1" = 400'	Date: 10/25/2022	File: 80f-JK-WWTP-SitePlan
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FIGURE 2-2. ENERGY DEMANDS VS. FLOW RATES
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

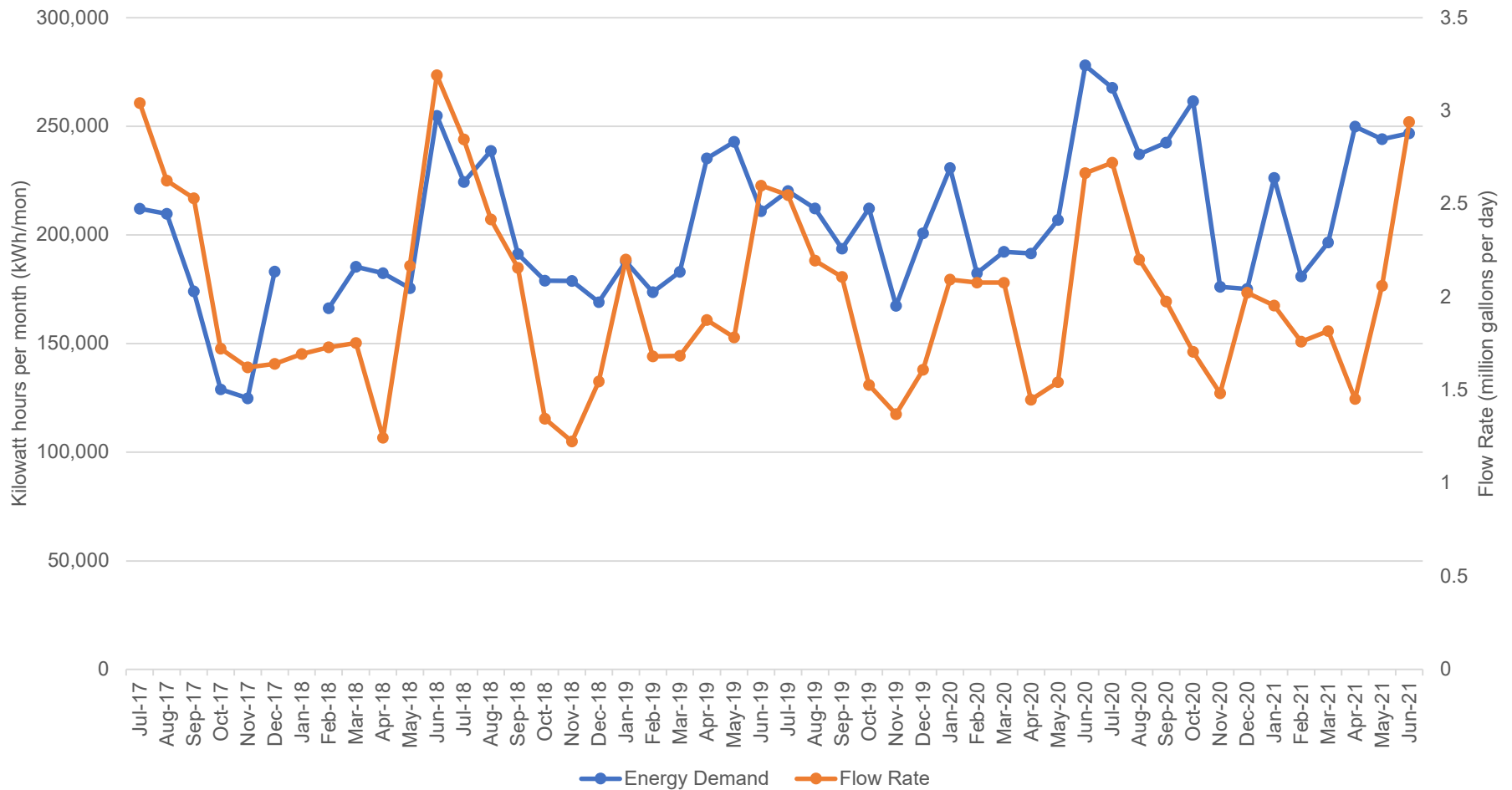
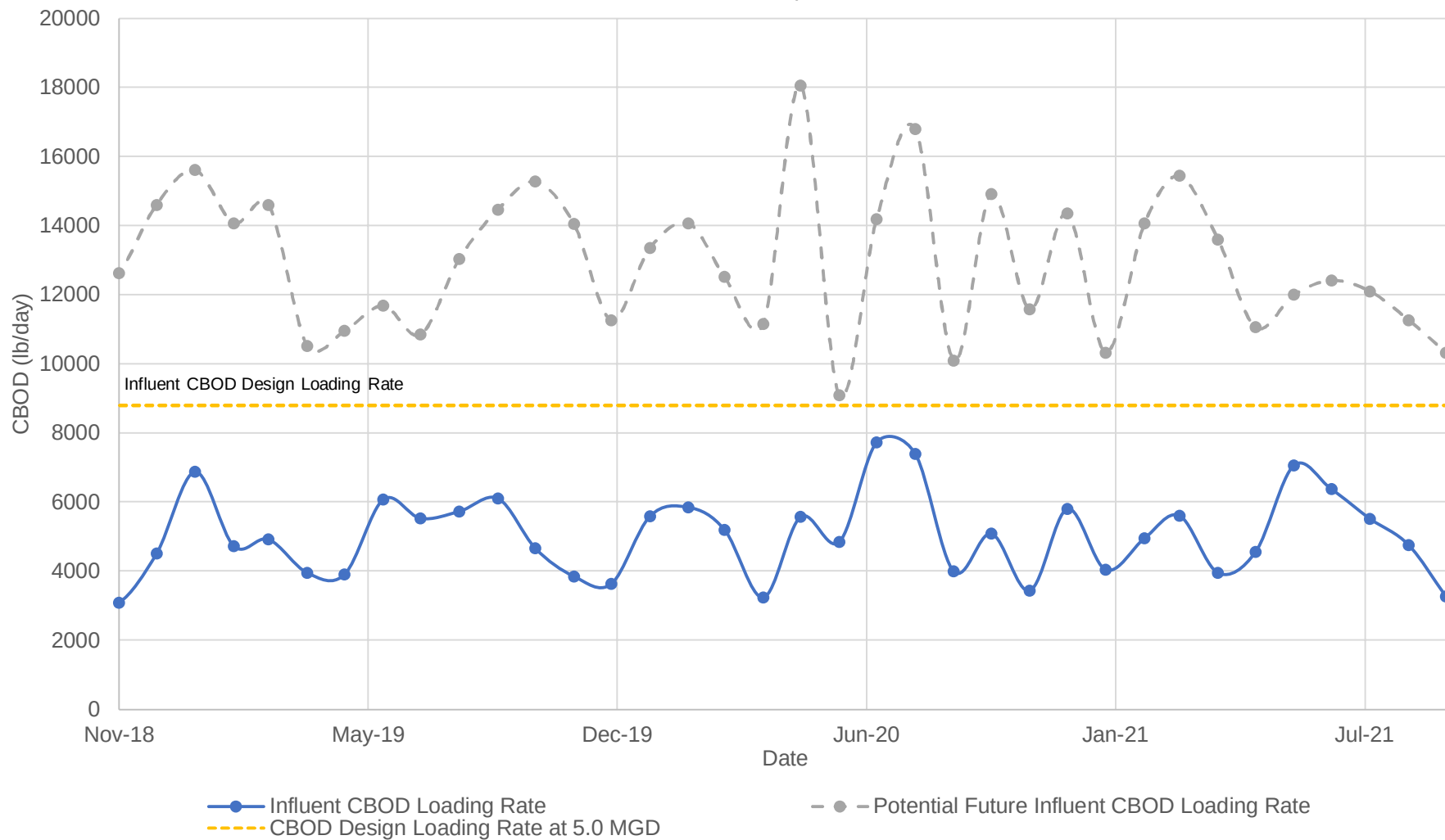


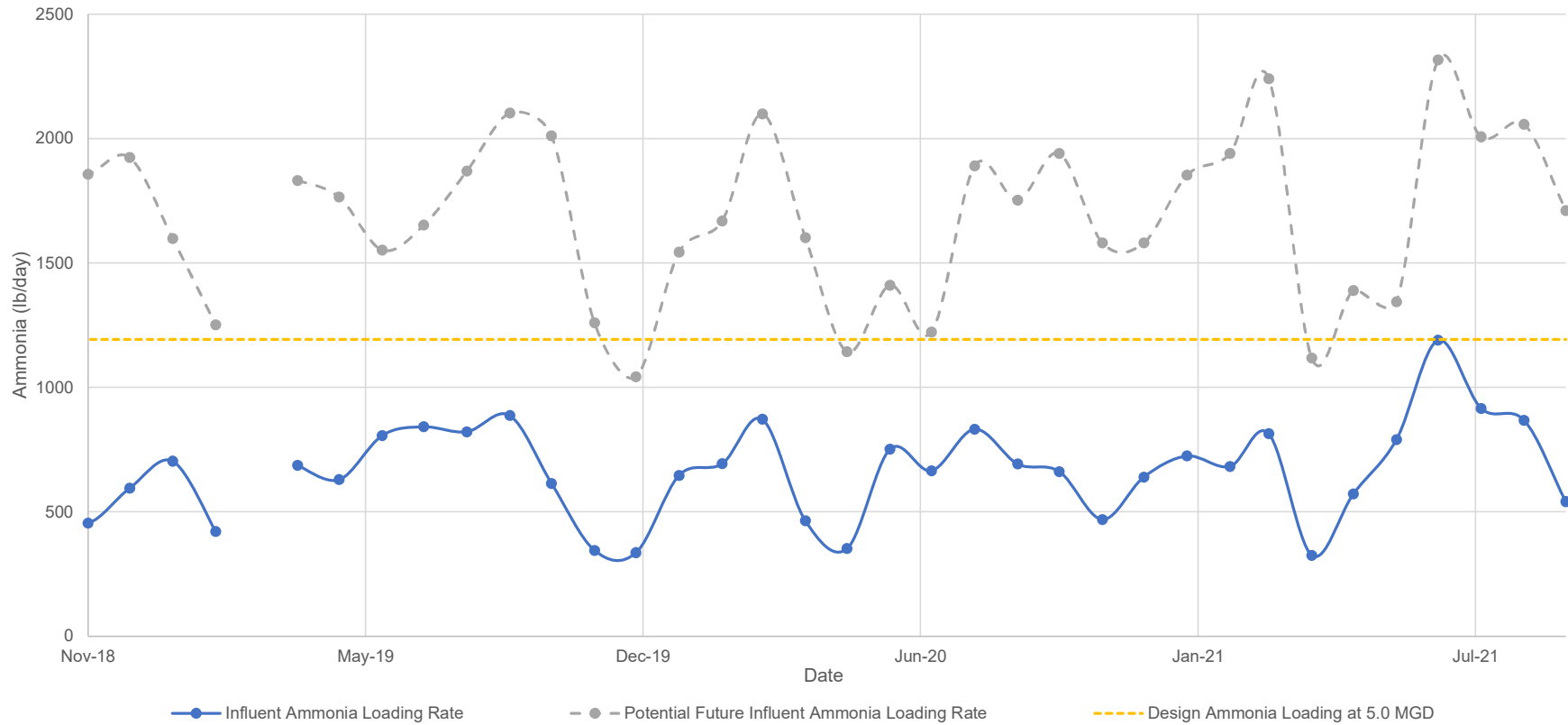
FIGURE 3-1. INFLUENT CBOD LOADING RATE (CURRENT, DESIGN, AND FUTURE)
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



Notes:

Potential Future Influent CBOD Loading Rate is calculated using current influent concentrations and the design flow rate of the WWTP (5.0 MGD)
 CBOD Design Loading Rate at 5.0 MGD is from the WWTP's CBOD Design Capacity (211 mg/L) and maximum flow rate (5.0 MGD)

**FIGURE 3-2. INFLUENT AMMONIA LOADING RATE (CURRENT, DESIGN, AND FUTURE)
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING**

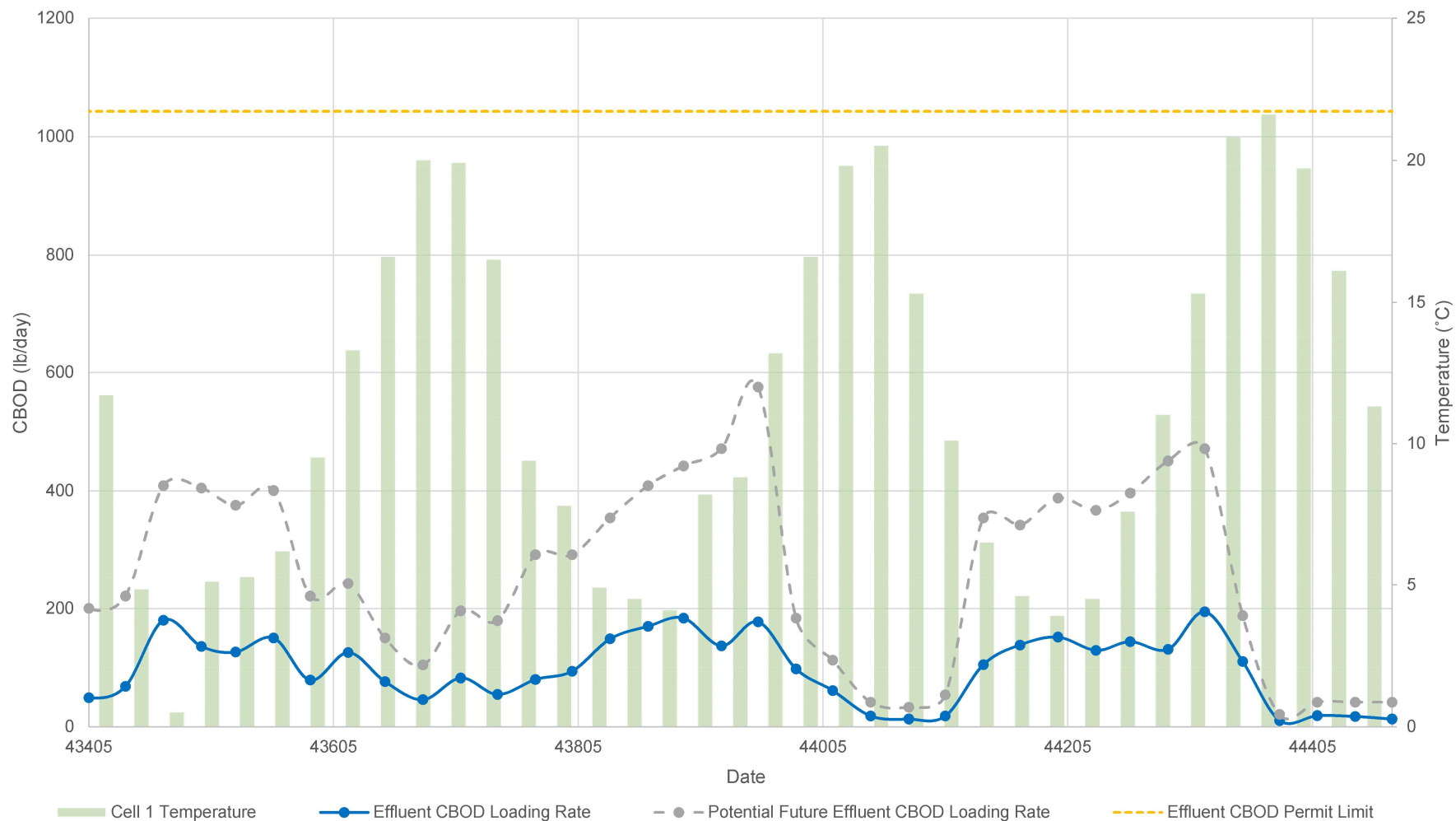


Notes:

Potential Future Influent Ammonia Loading Rate is calculated using current influent concentrations and the design flow rate of the WWTP (5.0 MGD)

Ammonia Design Loading Rate at 5.0 MGD is from the WWTP's Ammonia Design Capacity (29 mg/L) and maximum flow rate (5.0 MGD)

FIGURE 3-3. EFFLUENT CBOD LOADING RATE (CURRENT, DESIGN, AND FUTURE)
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

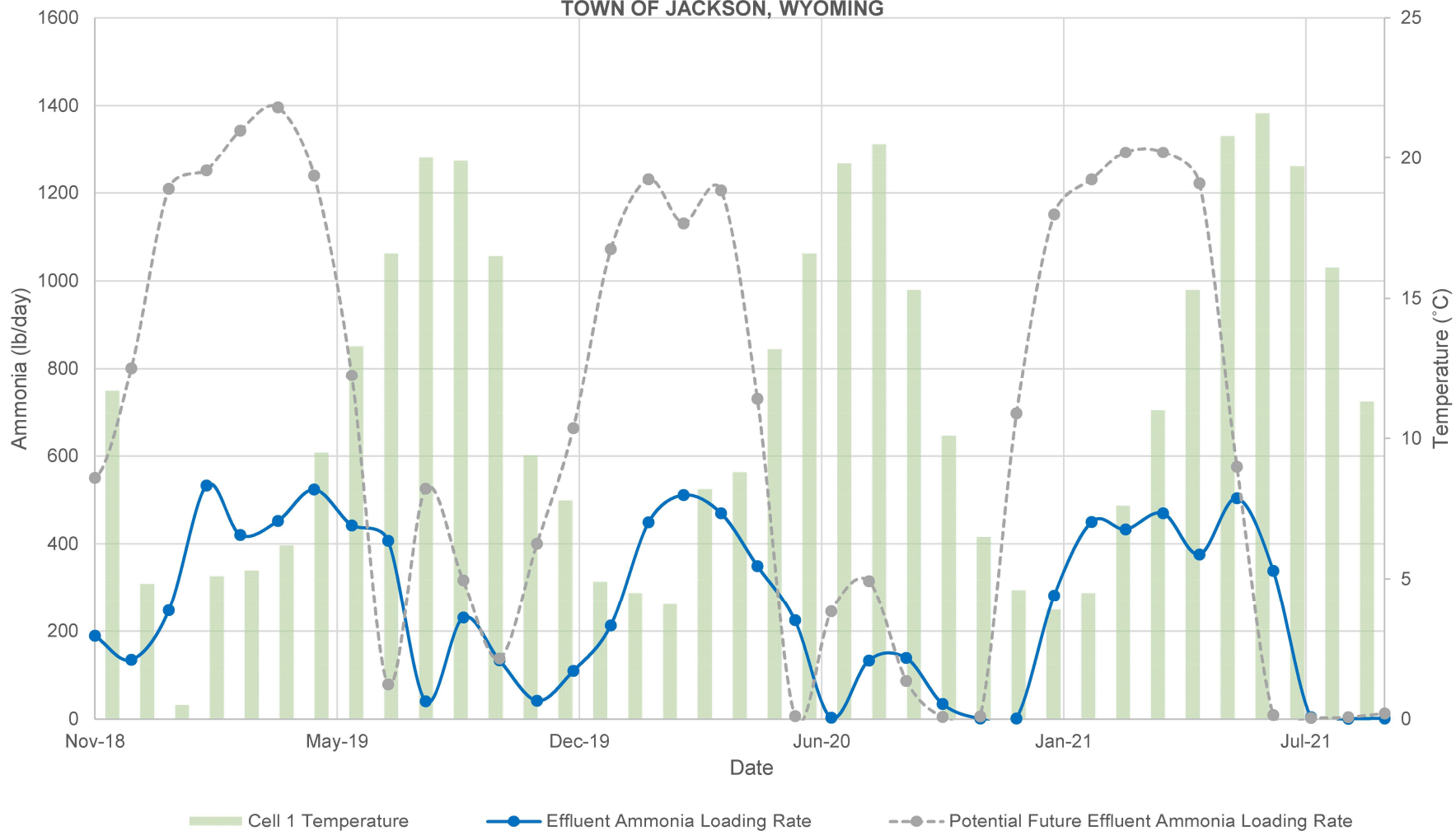


Notes:

Potential Future Effluent CBOD Loading Rate is calculated using current effluent concentrations and the design flow rate of the WWTP (5.0 MGD)

Effluent CBOD Permit Limit calculated using design flow rate of WWTP (5.0 MGD) and CBOD permit limit (25 mg/L)

FIGURE 3-4. EFFLUENT AMMONIA LOADING RATE (CURRENT, DESIGN, AND FUTURE)
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

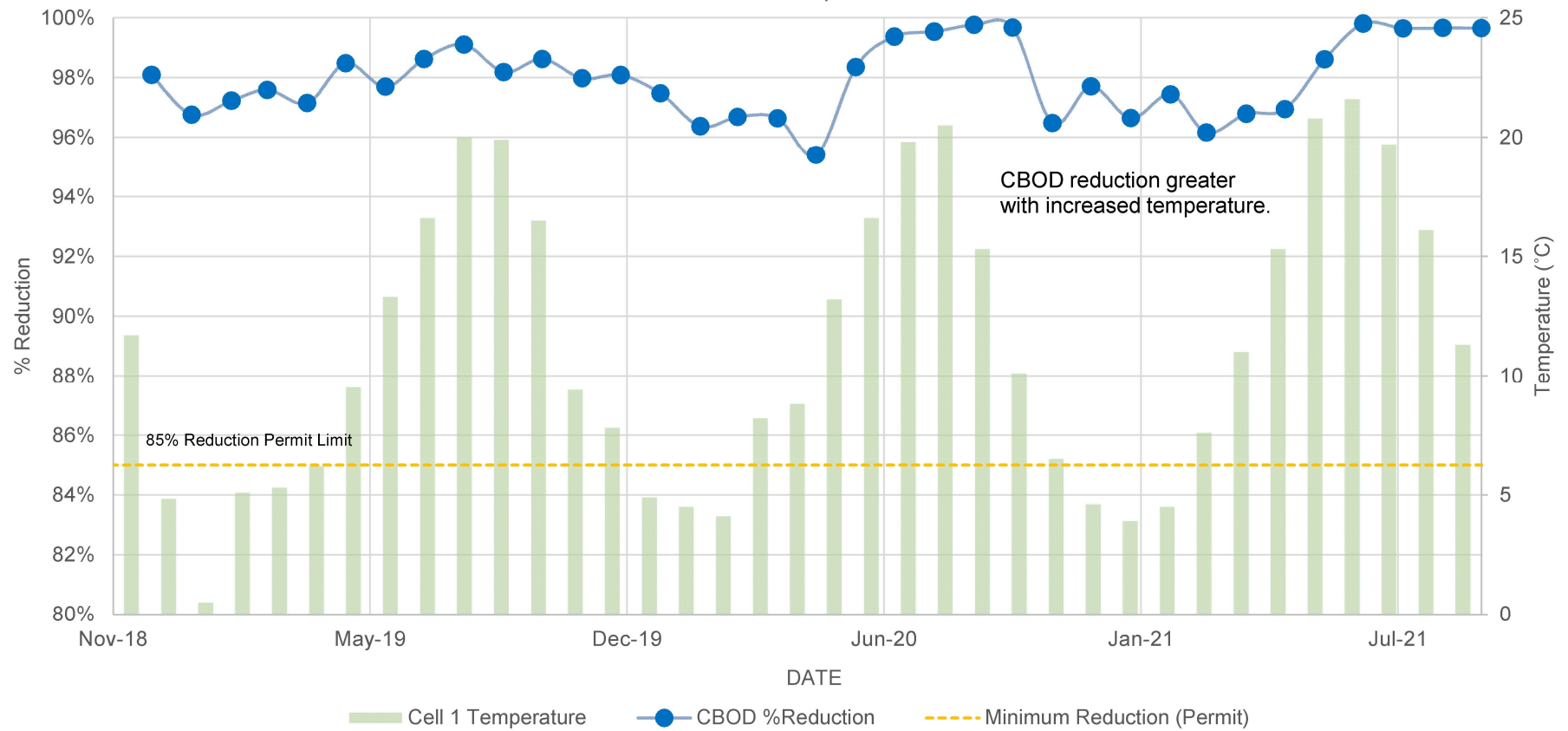


Notes:

Potential Future Ammonia Loading Rate is calculated using current effluent concentrations and the design flow rate of the WWTP (5.0 MGD)

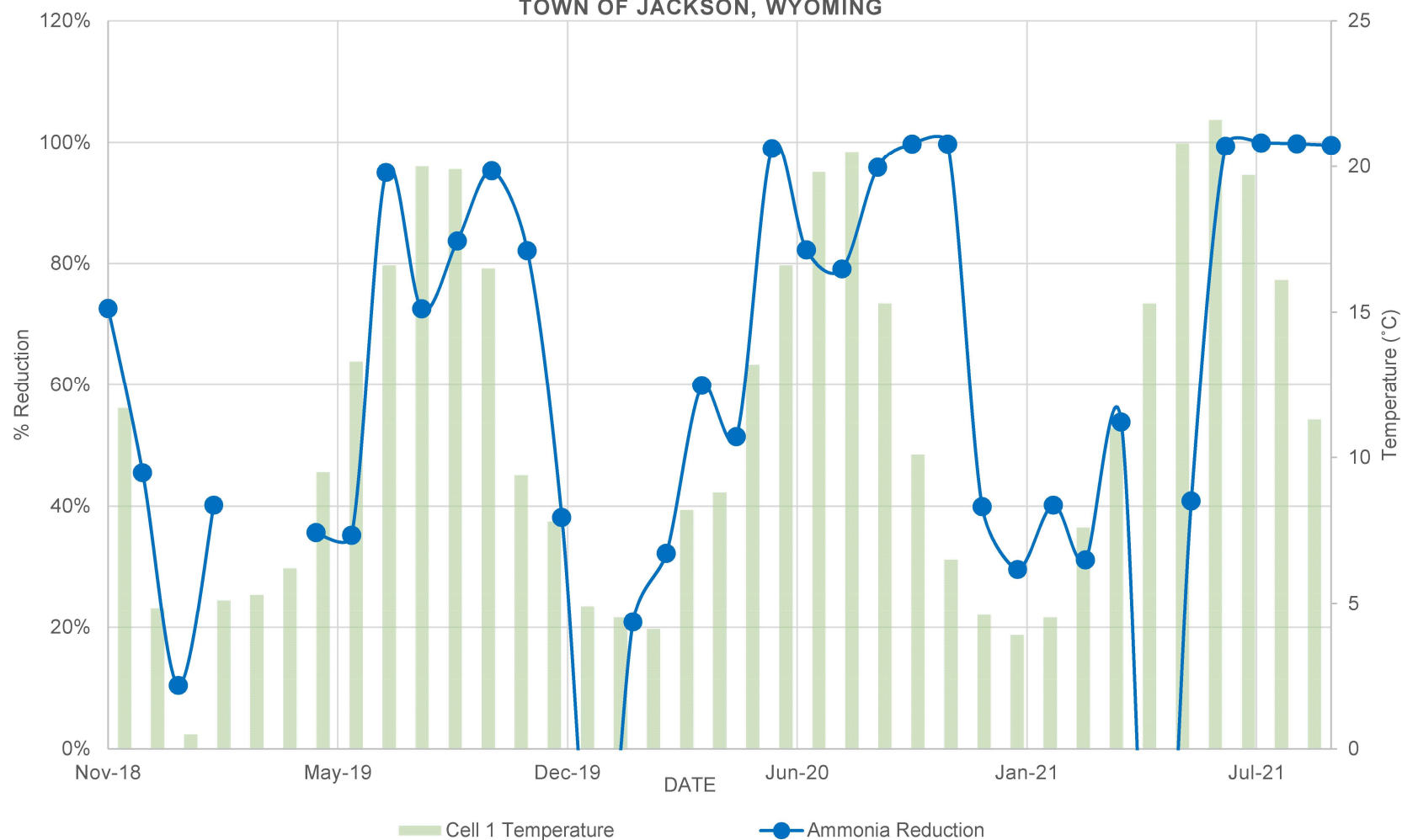
No permit limits exist for ammonia discharge

FIGURE 3-5. CBOD % REDUCTION
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



Notes:
 CBOD % reduction calculated using influent and effluent CBOD loading. The effluent CBOD loading is shifted by 60 days to account for average detention time.
 Cell 1 temperature used to account for area in WWTP where most of the reduction takes place.

FIGURE 3-6. AMMONIA % REDUCTION
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



Notes:

Ammonia % reduction calculated using influent and effluent ammonia loading. The effluent ammonia loading is shifted by 60 days to account for average detention time.
 Cell 1 temperature used to account for area in WWTP where most of the reduction takes place.

FIGURE 3-7. CELL 1 SLUDGE ACCUMULATION
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

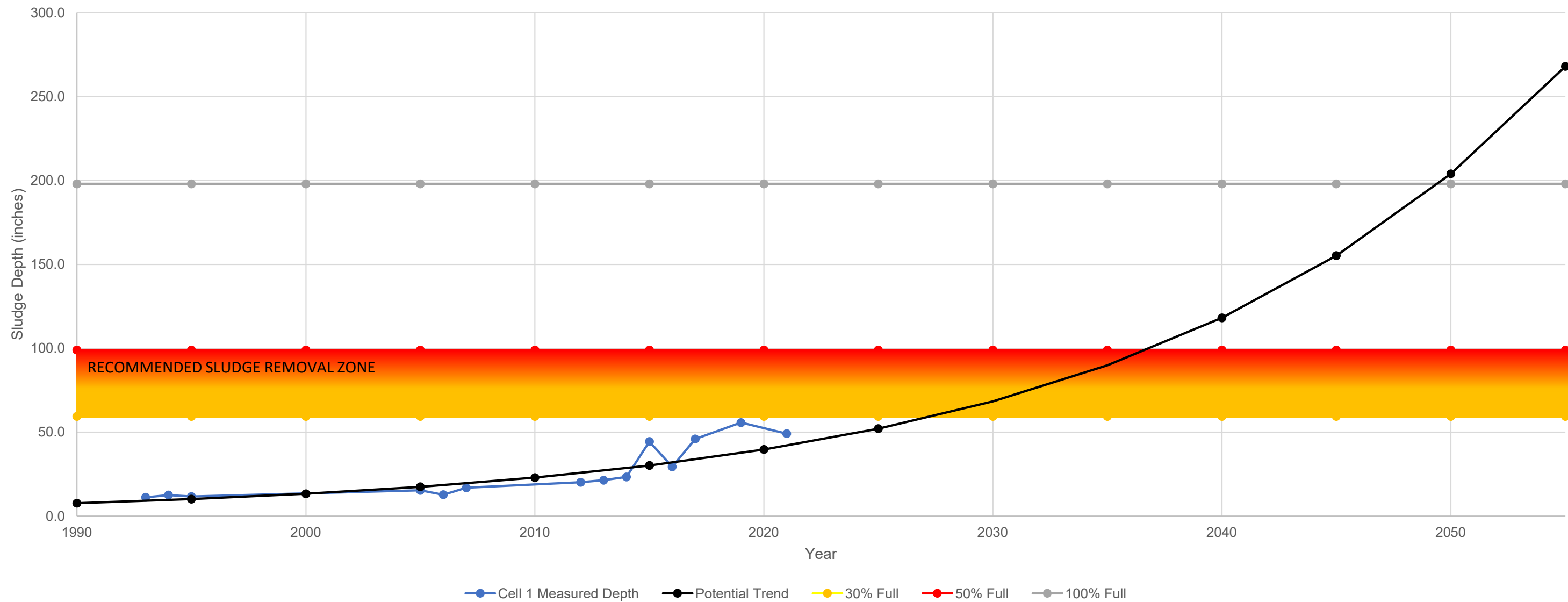


FIGURE 3-8. CELL 2 SLUDGE ACCUMULATION
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

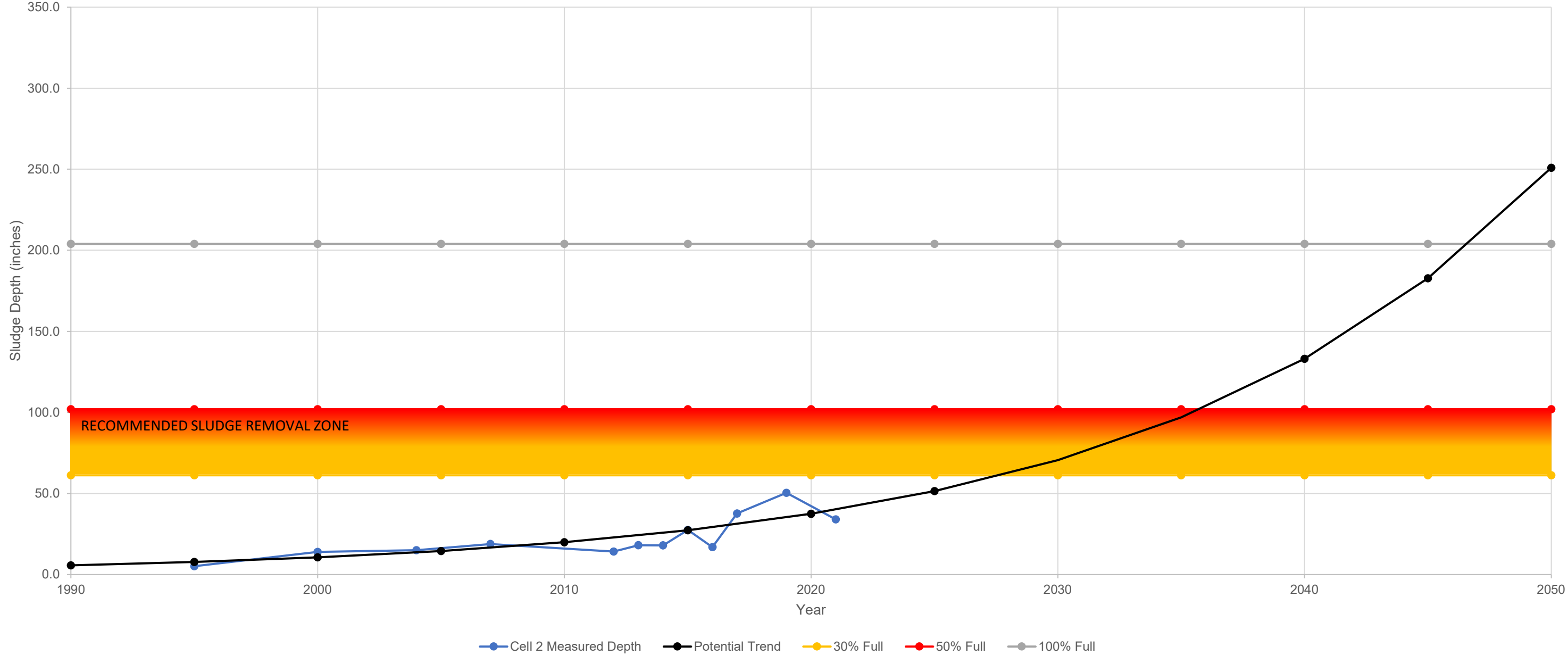


FIGURE 3-9. CELL 3A SLUDGE ACCUMULATION
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

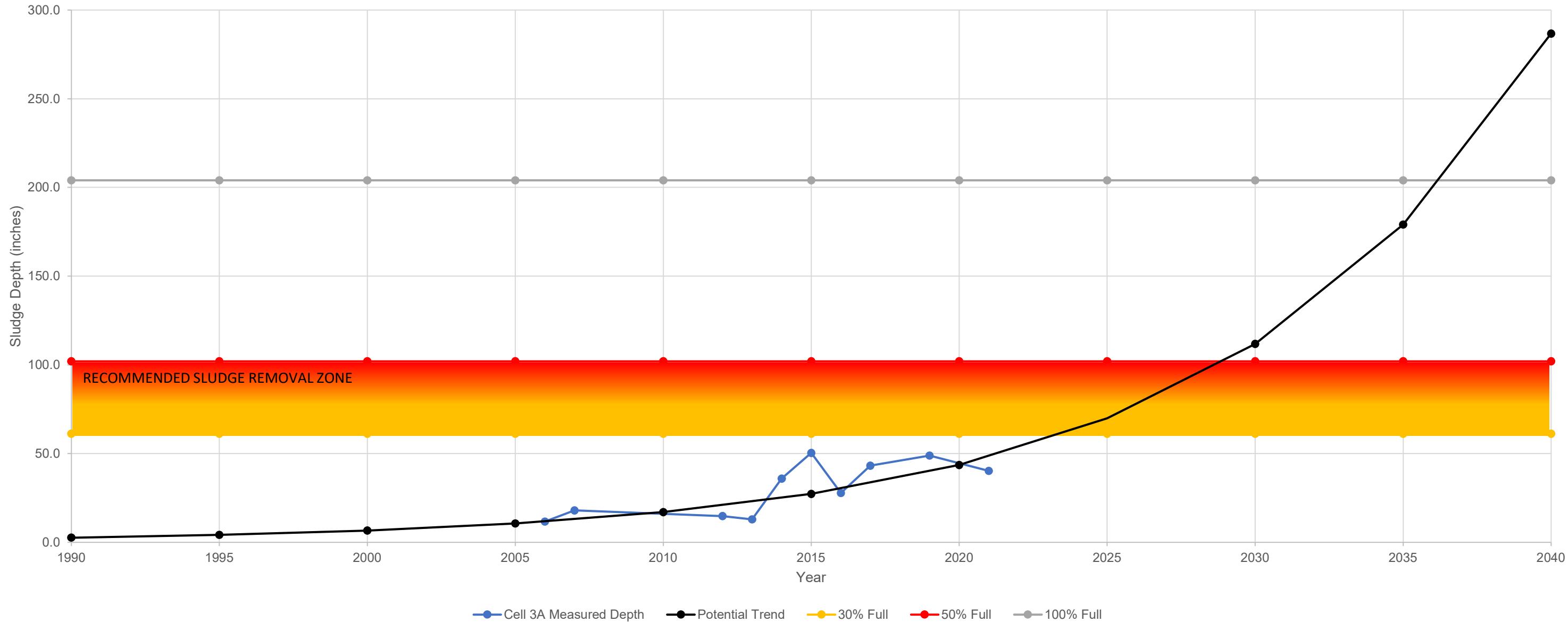
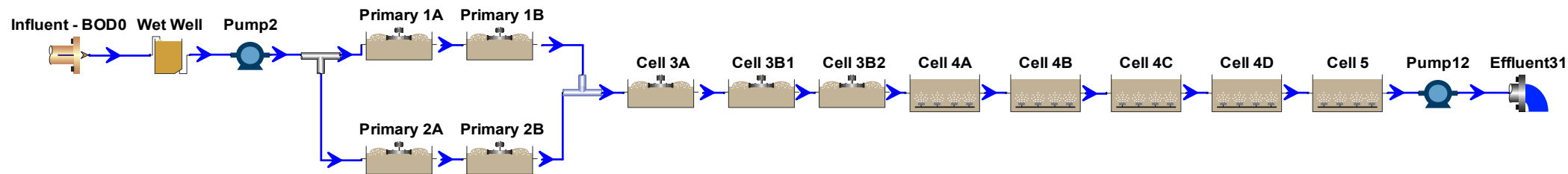


FIGURE 6-1A. AERATION MODIFICATIONS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



FIGURE 6-1B. AERATION MODIFICATIONS BIOWIN MODELING RESULTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Aeration Basins	Primary 1A	Primary 1A	Primary 1B	Primary 2B	Cell 3A	Cell 3B1	Cell 3B2	Cell 4A	Cell 4B	Cell 4C	Cell 4D	Cell 5
DO setup point (mg/l)	0	1	0	1	1.5	2	1.5	1	0	1	2	0



Influent Characteristics

Flow	5.00 mgd
COD - Total	713.69 mg/L
N - Total Kjeldahl Nitrogen	46.10 mgN/L
P - Total P	8.00 mgP/L
ISS Total	45.30 mg/L
S - Total S	8.00 mg/L
Volatile suspended solids	167.00 mg/L
Total suspended solids	212.30 mg/L
BOD - Total Carbonaceous	350.00 mg/L
pH	8.50

Effluent Characteristics

Flow	5.00 mgd
N - Ammonia	0.07 mgN/L
N - Nitrate	0.00 mgN/L
N - Nitrite	0.00 mgN/L
N - Filtered TKN	1.46 mgN/L
N - Total N	10.55 mgN/L
P - Soluble phosphate	5.13 mgP/L
P - Total P	8.00 mgP/L
Total suspended solids	171.12 mg/L
COD - Total	212.83 mg/L
BOD - Total Carbonaceous	7.91 mg/L
pH	7.79

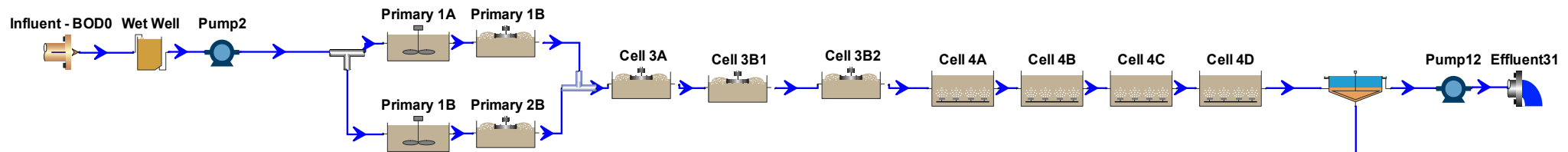
Note: The model results shown provide guidance for preparing conceptual-level designs. Actual results will need to be determined through preliminary engineering, full-scale modeling, and final design.

FIGURE 6-2A. CLARIFIER
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



FIGURE 6-2B. CLARIFIER BIOWIN MODELING RESULTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Aeration Basins	Primary 1A	Primary 1A	Primary 2B	Primary 2B	Cell 3A	Cell 3B1	Cell 3B2	Cell 4A	Cell 4B	Cell 4C	Cell 4D	Cell 5 as sludge digester
DO setup point (mg/l)	0	1.25	0	1.25	1.25	1.25	0	1.25	1.25	1.25	1.25	1.5



Influent Characteristics

Flow	5.00 mgd
COD - Total	713.69 mg/L
N - Total Kjeldahl Nitrogen	46.10 mgN/L
P - Total P	8.00 mgP/L
ISS Total	45.30 mg/L
S - Total S	8.00 mg/L
Volatile suspended solids	167.00 mg/L
Total suspended solids	212.30 mg/L
BOD - Total Carbonaceous	350.00 mg/L
pH	8.50

Effluent Characteristics

Flow	4.95 mgd
N - Ammonia	0.02 mgN/L
N - Nitrate	0.01 mgN/L
N - Nitrite	0.17 mgN/L
N - Filtered TKN	1.78 mgN/L
N - Total N	2.43 mgN/L
P - Soluble phosphate	5.02 mgP/L
P - Total P	5.17 mgP/L
Total suspended solids	8.84 mg/L
COD - Total	46.53 mg/L
BOD - Total Carbonaceous	1.65 mg/L
pH	7.61

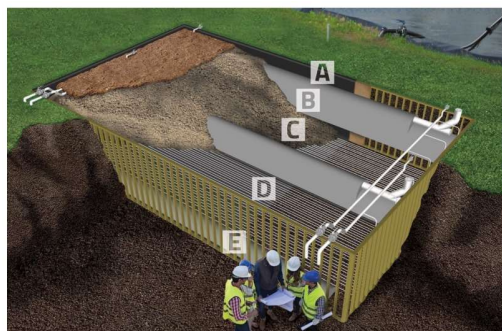
Sludge Wasting

Flow	0.05 mgd
Total suspended solids	1.7 %
VSS as % of TSS	71.03 %
N as % of TSS	5.42 %
P as % of TSS	1.74 %
pH	7.47
Volatile suspended solids	4915.98 lb/d
Total suspended solids	6921.20 lb/d

Sludge Cell 5

Note: The model results shown provide guidance for preparing conceptual-level designs. Actual results will need to be determined through preliminary engineering, full-scale modeling, and final design.

FIGURE 6-3A. BIOREACTOR
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



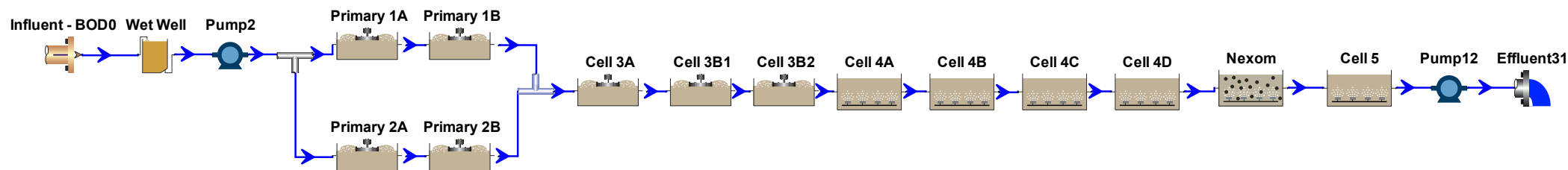
LEGEND

- A. HDPE LINER
- B. INFLUENT DISTRIBUTION CHAMBER
- C. CLEAN STONE MEDIA
- D. AERATION SYSTEM
- E. EFFLUENT COLLECTION CHAMBER



FIGURE 6-3B. BIOREACTOR BIOWIN MODELING RESULTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Aeration Basins	Primary 1A	Primary 1A	Primary 1B	Primary 2B	Cell 3A	Cell 3B1	Cell 3B2	Cell 4A	Cell 4B	Cell 4C	Cell 4D	Nexom	Cell 5
DO setup point (mg/l)	0	1	0	1	1.5	2	1.5	1	0	1	3	0	1.25



Influent Characteristics

Flow	5.00 mgd
COD - Total	713.69 mg/L
N - Total Kjeldahl Nitrogen	46.10 mgN/L
P - Total P	8.00 mgP/L
ISS Total	45.30 mg/L
S - Total S	8.00 mg/L
Volatile suspended solids	167.00 mg/L
Total suspended solids	212.30 mg/L
BOD - Total Carbonaceous	350.00 mg/L
pH	8.50

Effluent Characteristics

Flow	5.00 mgd
N - Ammonia	0.01 mgN/L
N - Nitrate	0.00 mgN/L
N - Nitrite	0.03 mgN/L
N - Filtered TKN	1.55 mgN/L
N - Total N	10.41 mgN/L
P - Soluble phosphate	5.21 mgP/L
P - Total P	8.00 mgP/L
Total suspended solids	168.27 mg/L
COD - Total	210.25 mg/L
BOD - Total Carbonaceous	6.23 mg/L
pH	7.87

Note: The model results shown provide guidance for preparing conceptual-level designs. Actual results will need to be determined through preliminary engineering, full-scale modeling, and final design.

FIGURE 6-4A. MECHANICAL PLANT
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

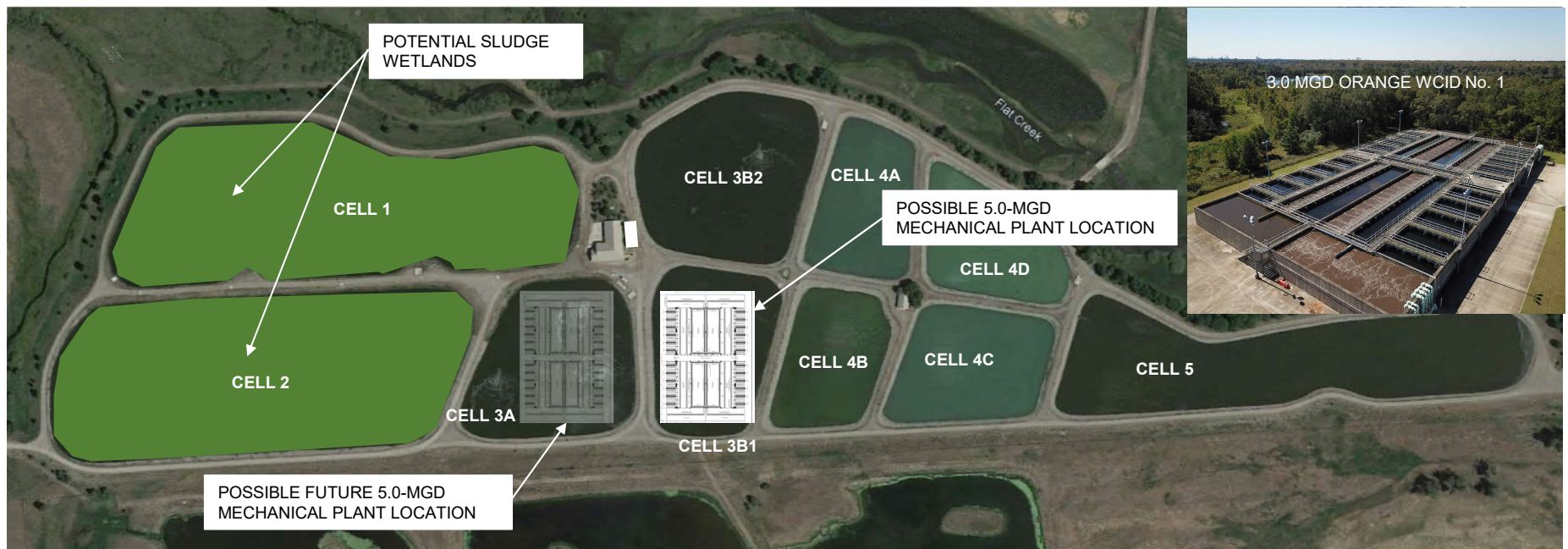
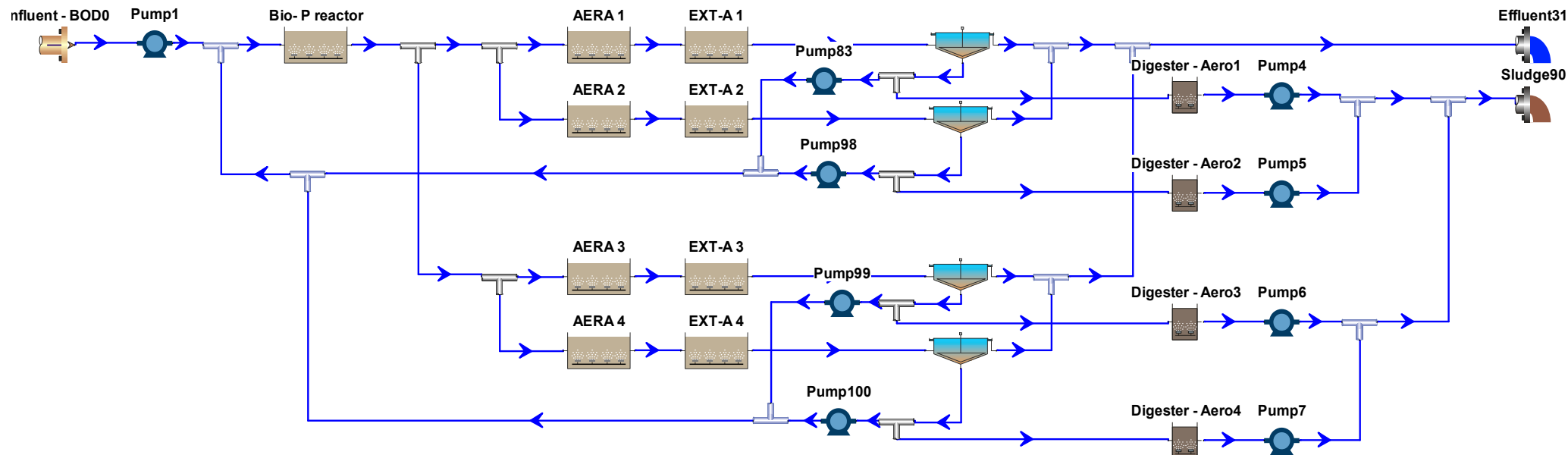


FIGURE 6-4B. MECHANICAL PLANT BIOWIN MODELING RESULTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



Influent Characteristics

Flow	5.00 mgd
COD - Total	713.69 mg/L
N - Total Kjeldahl Nitrogen	50.00 mgN/L
P - Total P	8.00 mgP/L
ISS Total	67.50 mg/L
S - Total S	8.00 mg/L
Volatile suspended solids	182.50 mg/L
Total suspended solids	250.00 mg/L
BOD - Total Carbonaceous	350.00 mg/L
pH	8.50

Effluent Characteristics

Flow	5.00 mgd
N - Ammonia	1.00 mgN/L
N - Nitrate	2.61 mgN/L
N - Nitrite	0.23 mgN/L
N - Filtered TKN	2.16 mgN/L
N - Total N	5.00 mgN/L
P - Soluble phosphate	2.77 mgP/L
P - Total P	1.00 mgP/L
Total suspended solids	7.43 mg/L
COD - Total	44.37 mg/L
BOD - Total Carbonaceous	10.0 mg/L
pH	8.18

Sludge Wasting

Flow	0.31 mgd
Total suspended solids	0.4 %
VSS as % of TSS	67.02 %
N as % of TSS	7.65 %
P as % of TSS	2.33 %
pH	8.21
Volatile suspended solids	6313.79 lb/d
Total suspended solids	9420.14 lb/d

Note: The model results shown provide guidance for preparing conceptual-level designs. Actual results will need to be determined through preliminary engineering, full-scale modeling, and final design.

**FIGURE 6-5. WATER REUSE
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING**

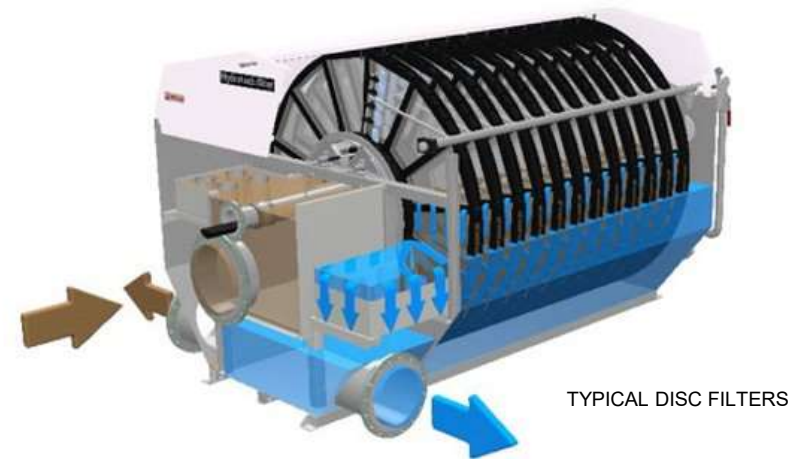
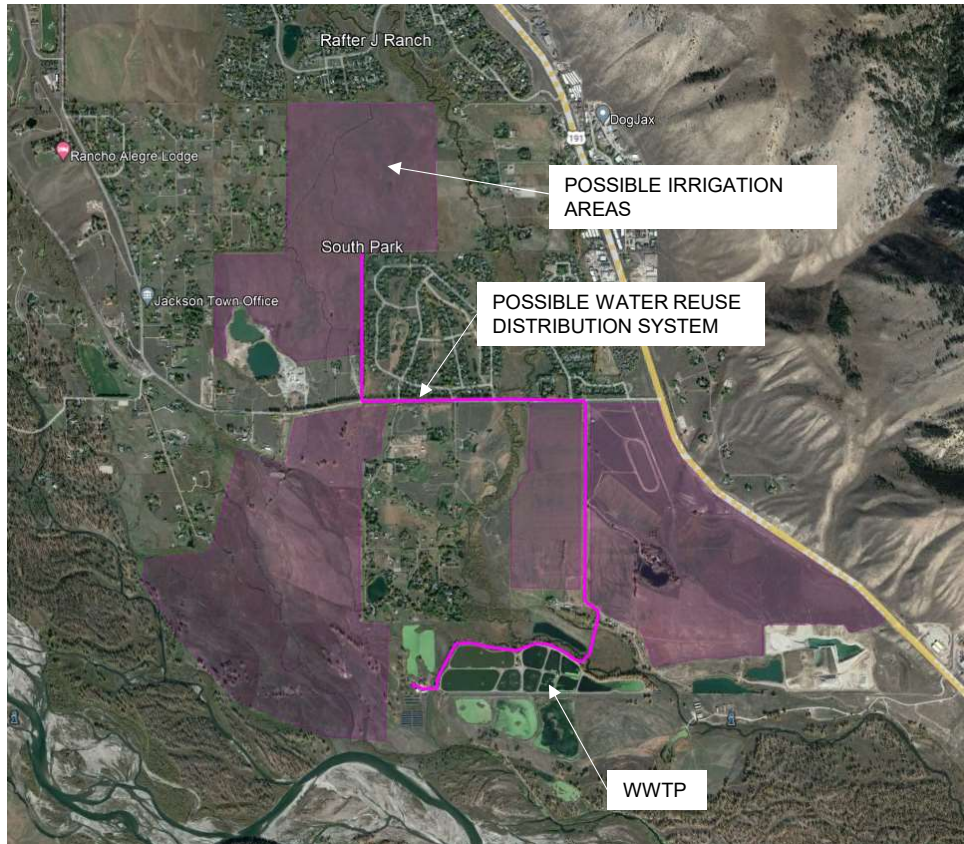


FIGURE 6-6. ON-SITE SLUDGE HOLDING POND
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING



FIGURE 6-7. SLUDGE WETLANDS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

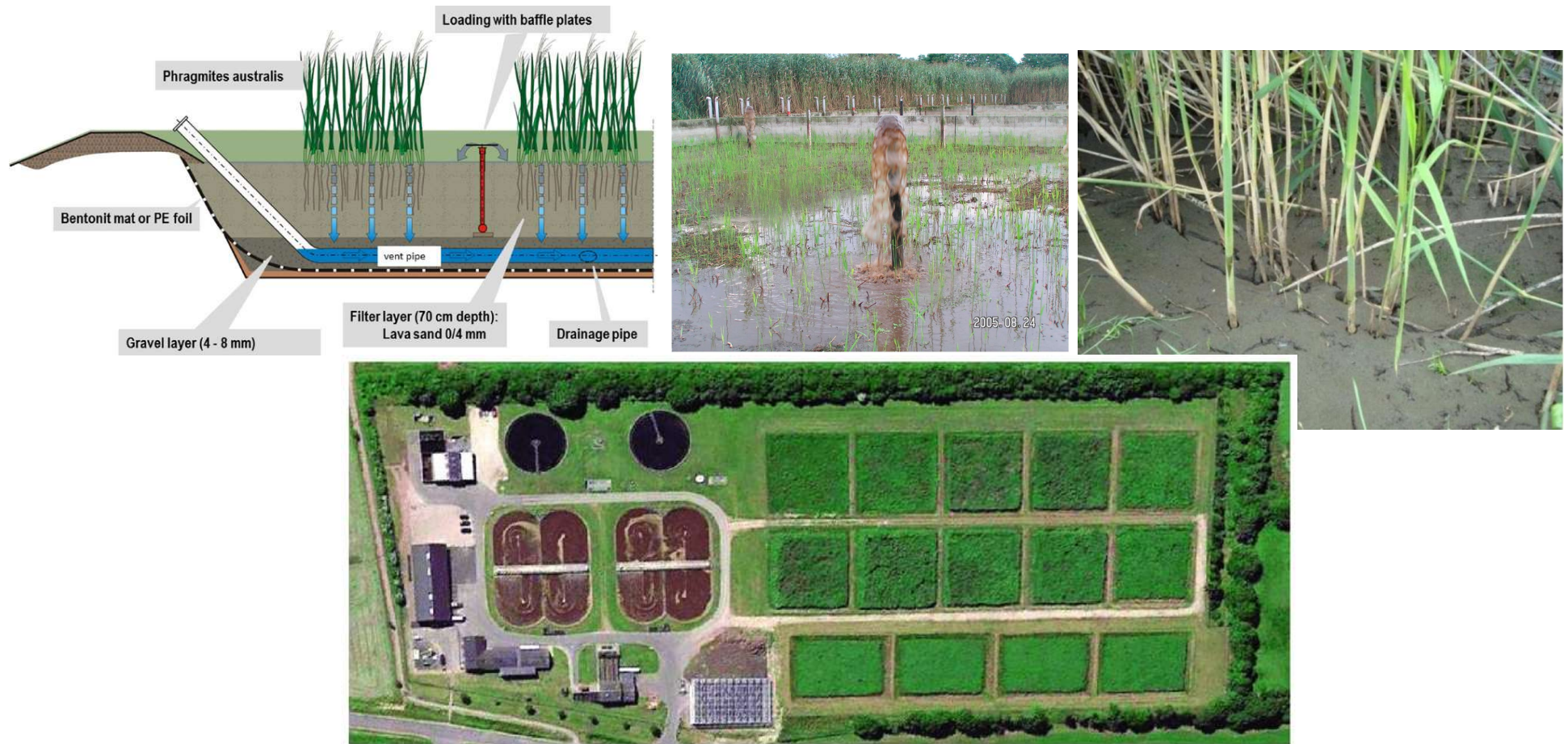


FIGURE 7-1. DECISION MATRIX RESULTS
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW, TOWN OF JACSON, WYOMING

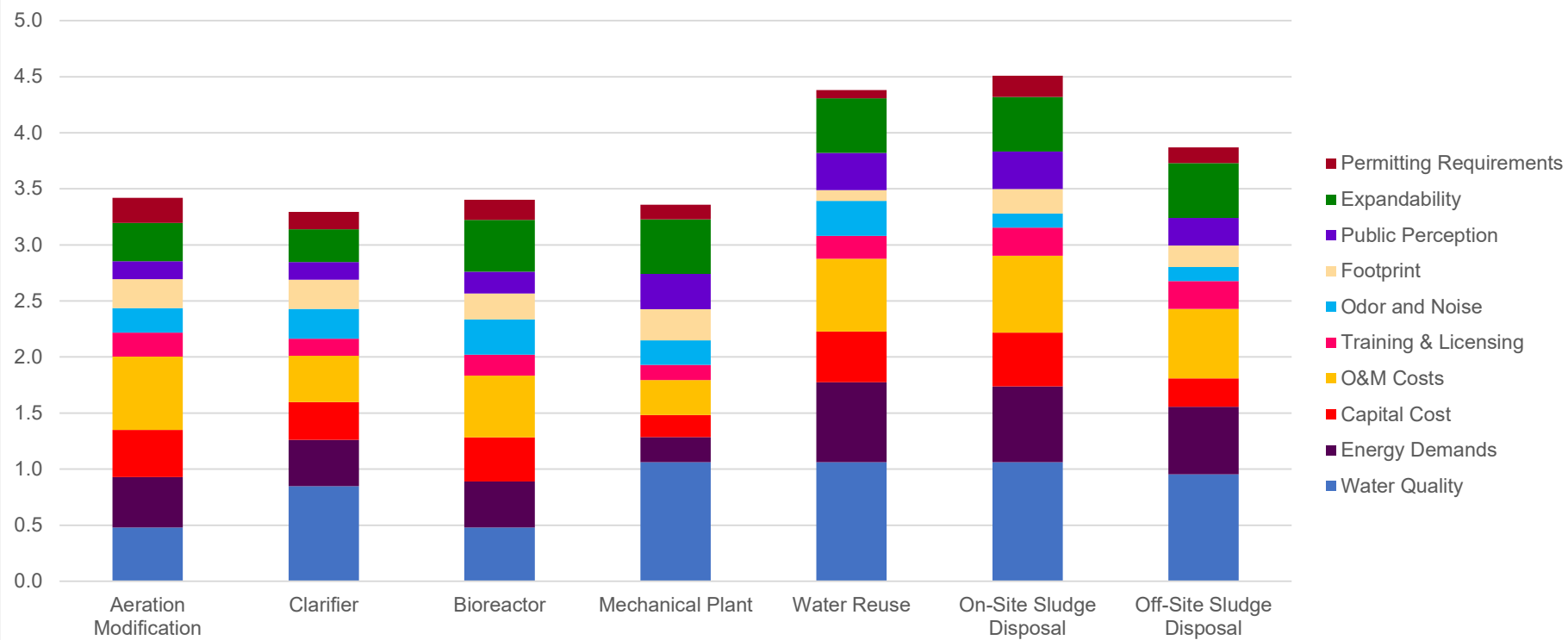
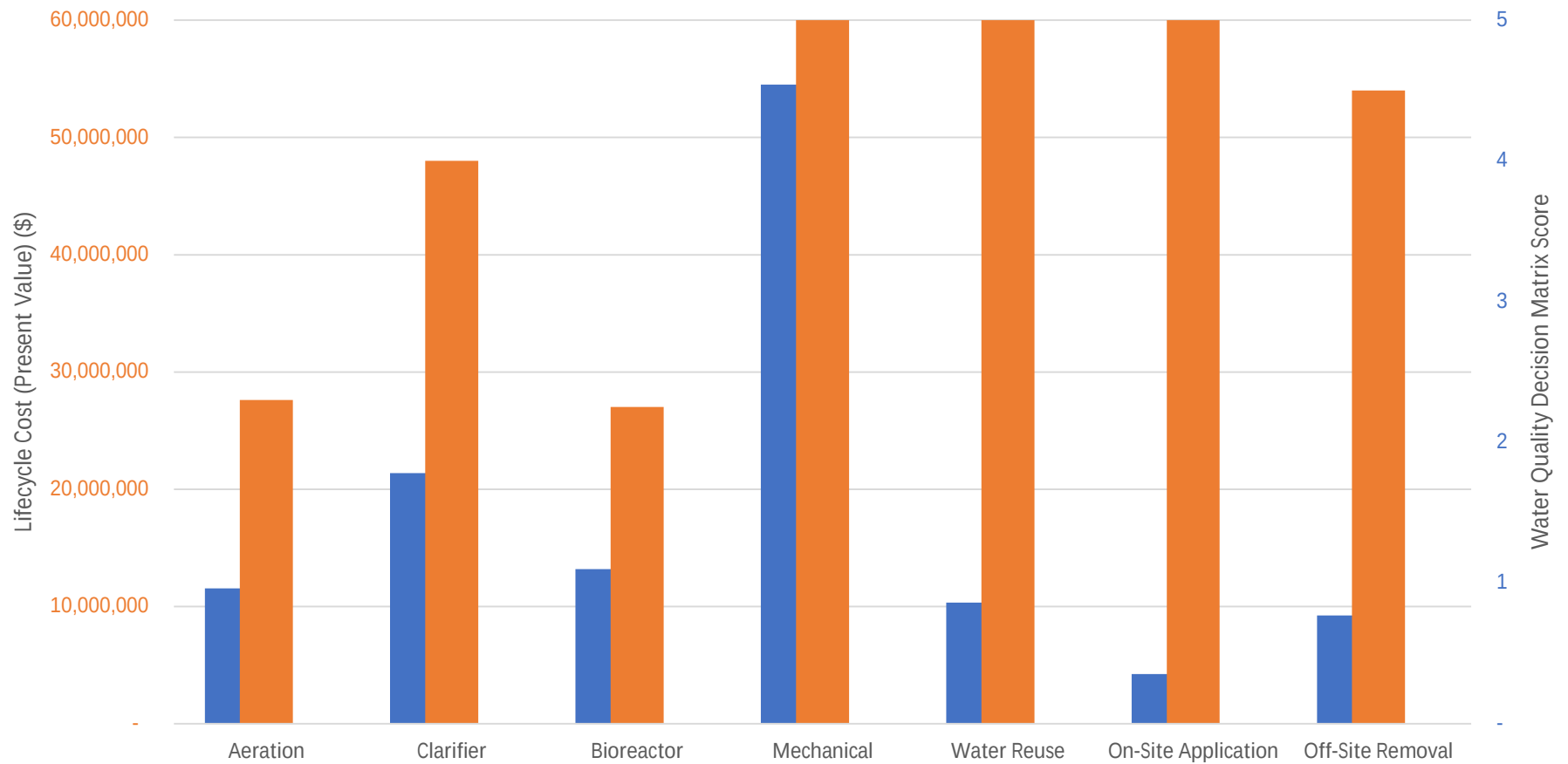


FIGURE 7-2. WWTP PRIORITIES
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW, TOWN OF JACKSON, WYOMING



APPENDIX A

TOWN OF JACKSON – WASTEWATER TREATMENT PLANT CONDITION ASSESSMENT

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Influent Water Control Structure

Wastewater flow from the Town congregates into the wastewater treatment plant's (WWTP) influent lift station before entering the Headworks Building. Trihydro did not note any deficiencies or excessive concrete corrosion and the structure was in generally good condition.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Influent Water Control Structure	Structure	Civil	Excellent	Excellent
	Function	Civil	Excellent	Excellent
	Pipes & Valves	Valves	Good	Good



Photo 1.1. Influent Structure

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Headworks

The headworks process includes the grit chamber, mechanical bar screen and washer/compactor. The piping, troughs and equipment had minor deficiencies due to normal age and wear, but the processes were operating as designed and noted to be in good condition. Debris and trash are collected in a dumpster stored in the Headworks Building. No major deficiencies were noted during the assessment.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Headworks	Structure	Civil	Good	Good
	Equipment	Mechanical	Good	Good
	Electrical & Controls	Electrical	Good	Good
	Pipes & Valves	Valves	Good	Good

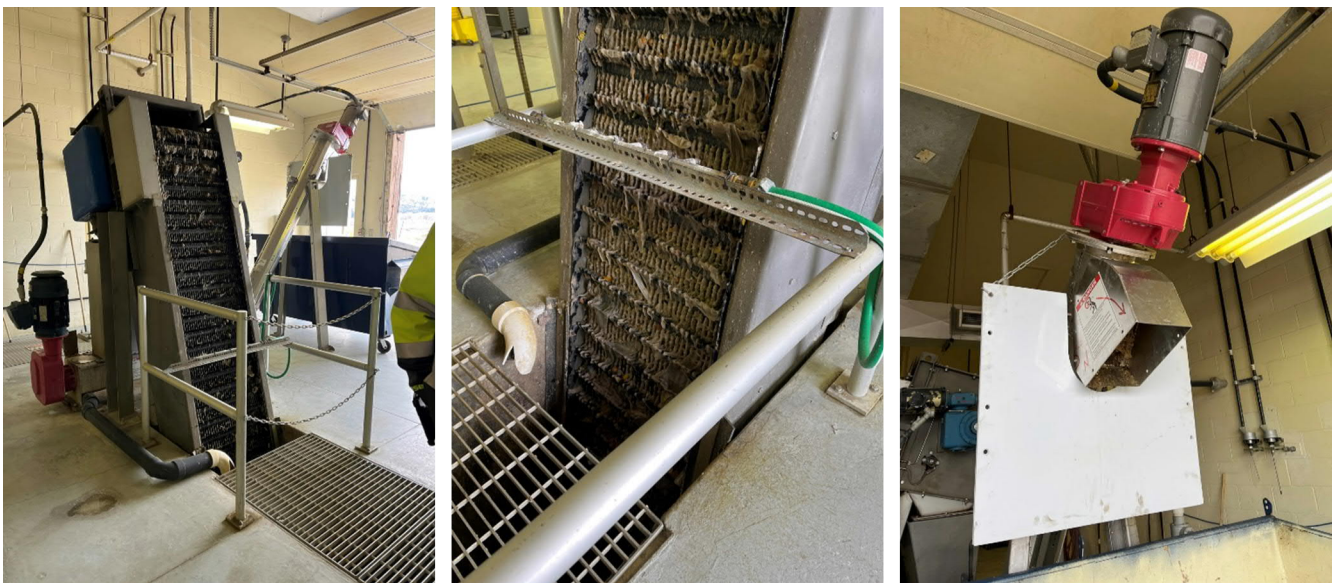


Photo 1.2. Headworks/Grit Chamber

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Lagoons and Levees

The WWTP consists of ten cells with various operating characteristics. Equipment assessed with the lagoon cells included aerators/mixers (evaluated separately), levees, water control structures (evaluated separately), and piping and valves. The dissolved air (DO) probes were not directly assessed but staff reports them to be in good working order. The lagoons were generally in good condition with some erosion of the banks noted. Trihydro recommends staff check levees quarterly and make repairs as needed to avoid more serious issues.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Lagoon System	Structure	Civil	Good	Good
	Function	Civil	Good	Good
	Pipes & Valves	Valves	Good	Good

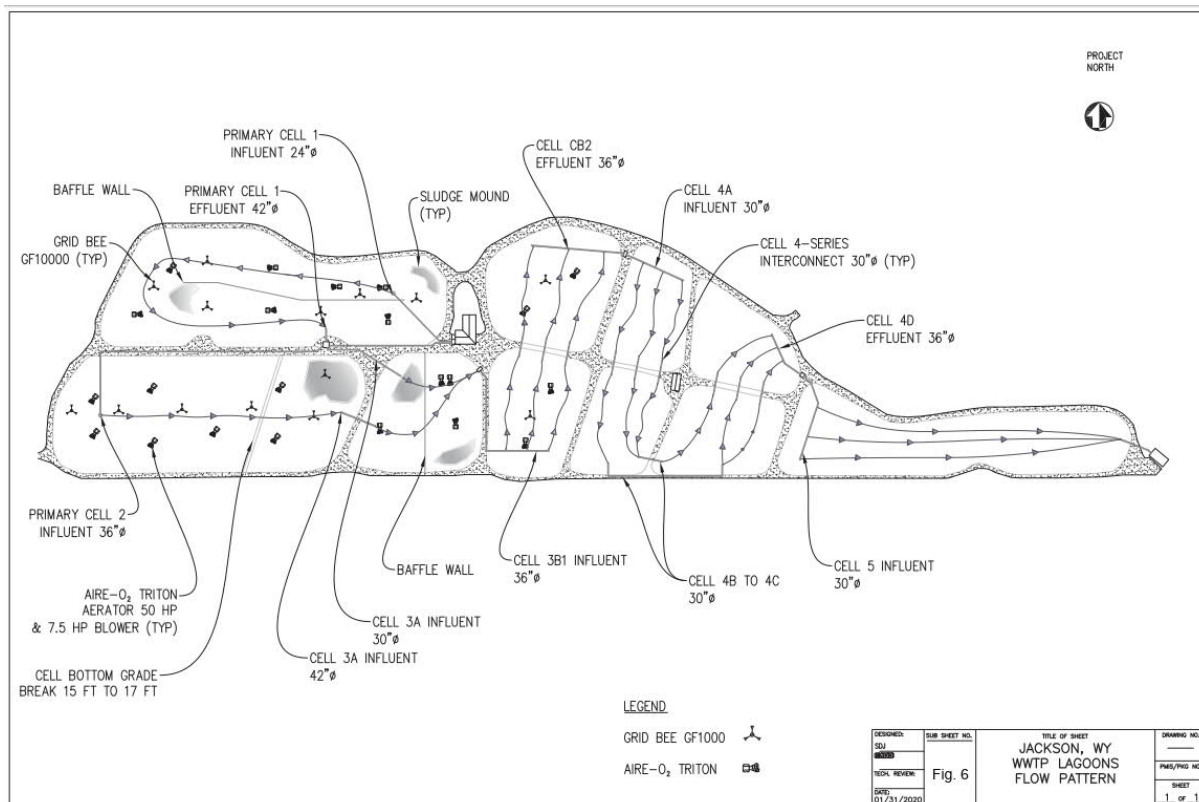


Photo 1.3. Lagoons Flow Path
Vista Engineering L.L.C. 2021. Town of Jackson Water and Sewer Systems Evaluation Report.

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Aerators, Mixers and Diffusers

All lagoon cells in the WWTP have the ability to be aerated and mixed. Equipment associated with aeration and mixing including the Grid Bee Mixers and Triton aerators in Cells 1 through 3B2 and static tube diffusers in the remaining cells (Vista 2021). The Triton aerators are noted as fair because of their limitations to aerate and mix the cells. They have no adjustment to the mixing angle and tend to scour the bottom of Cells 1 and 2 preventing sludge to settle and digest. This also causes sludge to resuspend and transfer into Cell 3A. The Triton aerator's performance was rated as fair because they must be tilted out of the water in the winter if not in use to protect the ceramic bearing from permanent damaged by ice if left submerged while not in operation.

The operator noted many of the air distribution valves to Cells 4A, 4B, 4C and 4D may not be operable and should be replaced. This limits the staff's ability to distribute air as needed each cell.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Aeration	Aerators	Mechanical	Good	Fair
	Mixers	Mechanical	Good	Good
	Power & Controls	Electrical	Good	Good



Photo 1.4. Cell 1



Photo 1.5. Cell 2

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.6. Cell 3A



Photo 1.7. Cell 3B1



Photo 1.8. Cell 3B2



Photo 1.9. Cell 4A

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.10. Cell 4B



Photo 1.11. Cell 4C



Photo 1.12. Cell 4D



Photo 1.13. Cell 5

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.14. Grid Bee Aerator



Photo 1.15. Grid Bee Aerator

Town of Jackson – Wastewater Treatment Plant Condition Assessment

UV Disinfection System

The Ultraviolet (UV) Disinfection Building is located on the west side of the plant, opposite from Cell 5, near the Barrow Pond. Trihydro visually observed the system and noted it to be in excellent condition. Flow measurement and effluent sampling occurs at the end of the UV channel. Permits for lagoon treatment systems allow for higher effluent TSS. High TSS results in more turbid water which effects transmittance of the UV disinfection. More energy is therefore required.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
UV Disinfection	Structure	Civil	Good	Excellent
	Function	Civil	Good	Good
	Power & Controls	Electrical	Excellent	Excellent



Photo 1.16. UV Disinfection

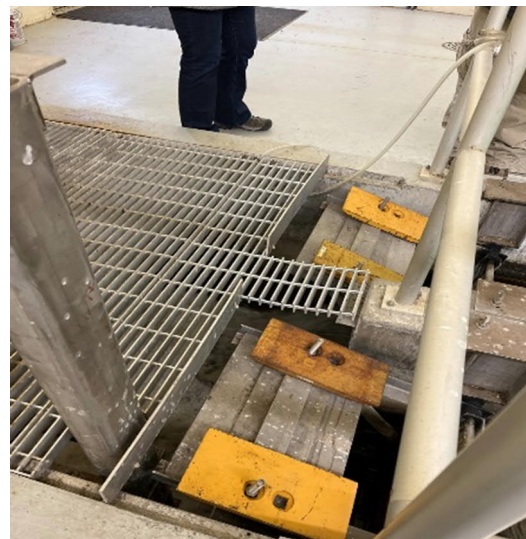


Photo 1.17. UV Disinfection

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Barrow Pond and Tertiary Wetland Ponds

Following UV disinfection, the final plant effluent flows to the Barrow Pond where it is blended with water from a creek and discharged to three constructed wetland ponds. The wetland ponds are owned and maintained by Wyoming Game and Fish Department (WGFD). WGFD has partnered with Ducks Unlimited to build additional constructed wetlands (anticipated construction 2022) to increase the waterfowl habitat along the Snake River. Trihydro was only able to observe the wetlands from a distance during our assessment. There appeared to be large areas of algae and duckweed floating on the downwind sides of the ponds. This is an indication of an overabundance of nutrients (ammonia and phosphorous) that may be present. The overgrowth of floating vegetation prevents sunlight from penetrating the water and limits the growth of submergent vegetation. This reduces the treatment capabilities and habitat of the wetlands due to the overgrowth of vegetation.

The Barrow Pond provides mostly blending of the plant effluent with a natural creek. There is little polishing of water quality occurring.

The flow through the Tertiary Wetland Ponds appears to short circuit via a central channel from inlet to outfall. This limits their effective detention time. The sustained high-water depth and the amount of floating vegetation (duckweed), limits the growth of both emergent and submergent vegetation, thus reducing effectiveness.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Barrow Pond	Structure	Civil	Good	Good
	Function	Civil	Good	Fair
Tertiary Wetland Ponds	Structure	Civil	Good	Good
	Function	Civil	Good	Fair

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.18. Barrow Pond



Photo 1.19. Wetland 1



Photo 1.20. Wetland 2



Photo 1.21. Wetland 3

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Receiving Stream Characterization

The permitted outfall immediately follows the UV disinfection system, then treated wastewater flows into the Barrow Pond. The final outfall is from the last of the three tertiary wetland ponds and flows into the Snake River. Trihydro did not visually observe the wetland outfall or the condition of the Snake River as part of the assessment. Trihydro was not provided with river characteristics to review at the time of the assessment.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Snake River Outfall	Structure	Civil	Good	Good
	Function	Civil	Good	Good



Photo 1.22. Barrow Pond Diversion to Wetlands



Photo 1.23. Snake River Outfall

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Water Control Structures, Gates, Valves, and Transfer Piping

There were several water control structures (WCS) observed by Trihydro between the cells. These structures ranged from fair to good condition. The WCS are original to the WWTP. While still functional, wood covers and concrete has deteriorated. Trihydro recommends cleaning and lubricating valves and gates to extend their life and improve operability.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Influent Water Control Structure	Structure	Civil	Excellent	Excellent
	Function	Civil	Excellent	Excellent
	Pipes & Valves	Valves	Good	Good
Cell 1 and 2 Control Structure	Structure	Civil	Fair	Good
	Function	Civil	Good	Good
	Pipes & Valves	Valves	Good	Good
Cell 3A Control Structure	Structure	Civil	Good	Good
	Function	Civil	Good	Good
	Pipes & Valves	Valves	Good	Good
Cell 4 Control Structure	Structure	Civil	Good	Good
	Function	Civil	Good	Good
	Pipes & Valves	Valves	Good	Good
Cell 5 Control Structure	Structure	Civil	Good	Good
	Function	Civil	Good	Good
	Pipes & Valves	Valves	Good	Good

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.24. Influent Water Control Structure



Photo 1.25. Cell 1 and 2 Water Control Structure



Photo 1.26. Cell 3A Water Control Structure



Photo 1.27. Cell 4 Water Control Structure



Photo 1.28. Cell 5 Water Control Structure

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Motor and Pump Control Centers

Trihydro observed the three main pump stations and motor and control centers associated with the WWTP. The pumps appeared to generally be in good condition and the Town did not note any issues or deficiencies. Trihydro observed several SCADA-instrumentation panels and controls throughout the WWTP. Based on discussions with staff, the equipment appeared to be generally in excellent condition. The Town did not note any issues or concerns with their current operations.

The two Lamsom multi-stage blowers are 250 horsepower each. The blowers are rated as fair because they are inefficient to operate and therefore rarely used. They are maintained in good condition in case they are needed.

The single HIS high-speed turbo blower is in excellent condition but is run continuously. Its capacity is rated as fair because there is no redundancy to this blower.

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
Influent Pumps	Structure	Civil	Good	Good
	Power & Controls	Electrical	Good	Good
	Pumps	Mechanical	Good	Good
	Pipes & Valves	Valves	Good	Good
	Capacity	Mechanical	Good	Good
Intermediate Pumps	Structure	Civil	Good	Good
	Power & Controls	Electrical	Good	Good
	Pumps	Mechanical	Good	Good
	Pipes & Valves	Valves	Good	Good
	Capacity	Mechanical	Good	Good
UV Effluent Pumps	Structure	Civil	Good	Good
	Power & Controls	Electrical	Good	Good

Town of Jackson – Wastewater Treatment Plant Condition Assessment

Asset	Asset Type	Asset Class	Condition Rating	Current Performance
	Pumps	Mechanical	Good	Good
	Pipes & Valves	Valves	Good	Good
	Capacity	Mechanical	Good	Good
Lampson Blowers	Structure	Civil	Good	Good
	Power & Controls	Electrical	Good	Good
	Blowers	Mechanical	Good	Fair
	Pipes & Valves	Valves	Good	Good
	Capacity	Mechanical	Good	Good
HSI Blower	Structure	Civil	Good	Good
	Power & Controls	Electrical	Good	Good
	Blowers	Mechanical	Good	Good
	Pipes & Valves	Valves	Good	Good
	Capacity	Mechanical	Good	Fair
Generators	Structure	Civil	Good	Good
	Power & Controls	Electrical	Good	Good
	Genset	Mechanical	Good	Good
	Pipes & Valves	Valves	Good	Good
	Capacity	Mechanical	Good	Good

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.29. Influent Pumps



Photo 1.30. Influent Pumps SCADA

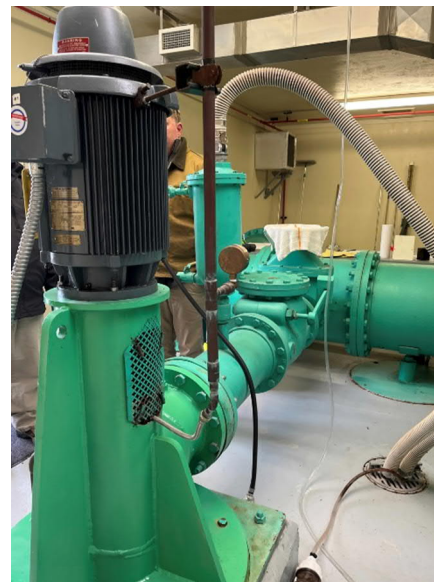


Photo 1.31. UV Pumps

Town of Jackson – Wastewater Treatment Plant Condition Assessment



Photo 1.32. UV SCADA



Photo 1.33. Lamson Blower



Photo 1.34. HSI Blower



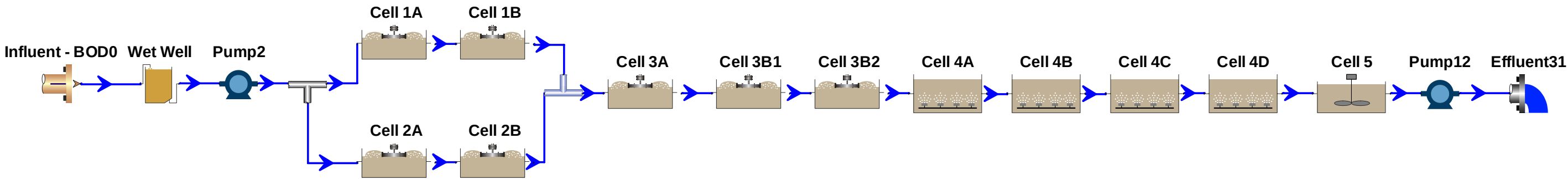
Photo 1.35. UV Generator

APPENDIX B

TOWN OF JACKSON – WASTEWATER TREATMENT PLANT CURRENT CONDITIONS BIOWIN® MODELING RESULTS

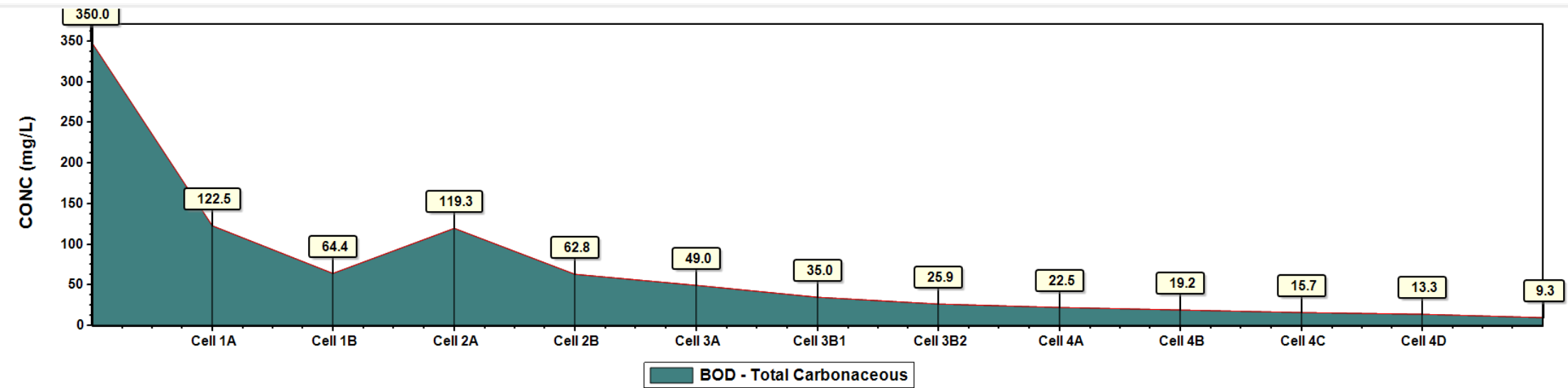
TOWN OF JACKSON
WASTEWATER TREATMENT PLANT

CONDITION: Winter, Existing Conditions, All Cells Aerated and Mixed except
Cell 5



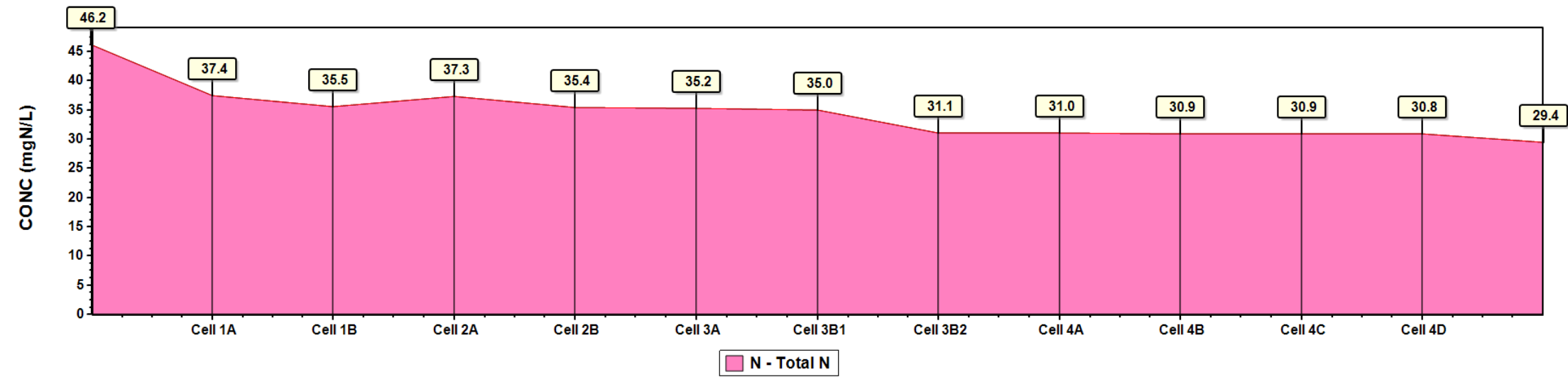
Influent Characteristics

Flow	2.50 mgd
COD - Total	713.69 mg/L
N - Total Kjeldahl Nitrogen	46.10 mgN/L
P - Total P	8.00 mgP/L
ISS Total	45.30 mg/L
S - Total S	8.00 mg/L
Volatile suspended solids	167.00 mg/L
Total suspended solids	212.30 mg/L
BOD - Total Carbonaceous	350.00 mg/L
pH	8.50



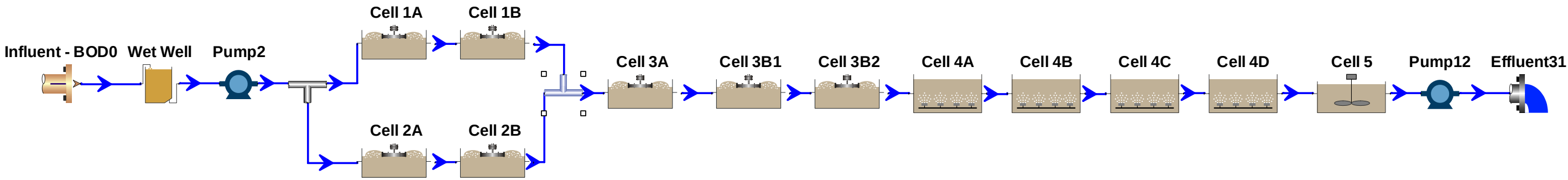
Effluent Characteristics

Flow	2.50 mgd
N - Ammonia	0.48 mgN/L
N - Nitrate	17.89 mgN/L
N - Nitrite	0.10 mgN/L
N - Filtered TKN	1.59 mgN/L
N - Total N	29.38 mgN/L
P - Soluble phosphate	4.92 mgP/L
P - Total P	8.00 mgP/L
Total suspended solids	179.13 mg/L
COD - Total	222.61 mg/L
BOD - Total Carbonaceous	9.27 mg/L
pH	8.27



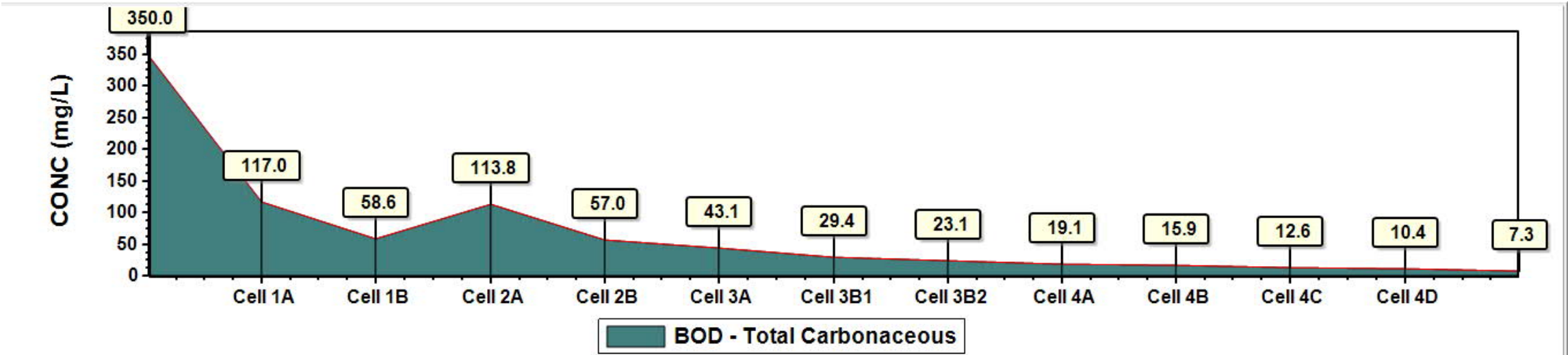
TOWN OF JACKSON
WASTEWATER TREATMENT PLANT

CONDITION: Summer, Existing Conditions, All Cells Aerated and Mixed except
Cell 5



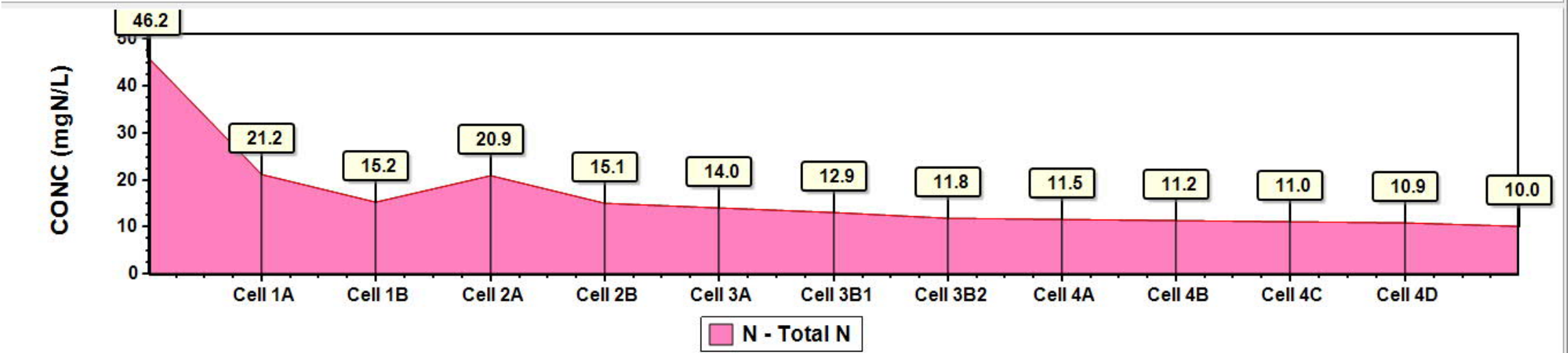
Influent Characteristics

Flow	2.50 mgd
COD - Total	713.69 mg/L
N - Total Kjeldahl Nitrogen	46.10 mgN/L
P - Total P	8.00 mgP/L
ISS Total	45.30 mg/L
S - Total S	8.00 mg/L
Volatile suspended solids	167.00 mg/L
Total suspended solids	212.30 mg/L
BOD - Total Carbonaceous	350.00 mg/L
pH	8.50



Effluent Characteristics

Flow	2.50 mgd
N - Ammonia	0.14 mgN/L
N - Nitrate	0.01 mgN/L
N - Nitrite	0.00 mgN/L
N - Filtered TKN	1.15 mgN/L
N - Total N	9.97 mgN/L
P - Soluble phosphate	5.23 mgP/L
P - Total P	8.00 mgP/L
Total suspended solids	167.92 mg/L
COD - Total	208.10 mg/L
BOD - Total Carbonaceous	7.32 mg/L
pH	8.55



APPENDIX C

DECISION MATRIX SCORING SUPPORTING INFORMATION

Alternative - Aeration Modifications

Capital Cost Estimate				Score
<u>Tasks and Activities</u>				
1. Engineering Costs				\$ 700,000
2. Equipment Modifications and Contingency				\$ 5,005,000
<u>Assumptions</u>				
Total Cost				\$ 5,705,000
Engineering Costs				
<u>Tasks and Activities</u>			<u>Tasks and Activities</u>	
- Project management			Engineering and Design	\$ 400,000
- Design and project coordination			Permitting	\$ 40,000
- Bid phase services			Bid Documents	\$ 10,000
- Construction oversight (RPR) and startup			Construction Oversight	\$ 250,000
Engineering Cost				\$ 700,000
Equipment Modifications and Contingency				
<u>Description</u>		<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>
High Efficiency Turbo Blowers, 200 HP		5	EA	\$ 200,000
Air Headers		1	EA	\$ 1,000,000
Air Diffuser		1	EA	\$ 1,000,000
Electrical		1	LS	\$ 500,000
SCADA		1	LS	\$ 200,000
Blower Building		1	LS	\$ 150,000
30% Contingency				\$ 1,155,000
Equipment Cost				\$ 5,005,000

Note: Costs based on 2022 (current) costs

Annual Operating and Maintenance Cost Estimate				Score
<u>Tasks and Activities</u>				
Operations and Maintenance				\$ 30,000
Electrical Demands				\$ 156,776
Chemical Additives				\$ -
25% Contingency				\$ 46,694
Total Cost				\$ 233,470

Water Quality Expectations		Score
Water quality will improve for Total Nitrogen; however, TSS and BOD will remain relatively stable.		

Energy Demands Estimate						Score
New aeration demands and equipment installation will increase energy demands. Blowers would be high efficiency and there is a possibility some current equipment may be replaced.						
Equipment	HP	Loading	KW/hr/Yr	\$ KW/hr	Annual Power	
5	200	60%	3,919,399	\$ 0.04	\$ 156,776	

Training and Licensing Requirements		Score
Minimal training will be required.		

Odor and Noise Impacts		Score
Addition of new equipment could result in increased noise. There is a possibility for odor development as well as the system is fine tuned.		

Footprint Modifications		Score
There will be no footprint modification.		

Public Perception		Score
Public perception will likely not change much due to lack of understanding.		

Expandability Potential		Score
The aeration system is expandable to accommodate future WWTP expansion.		

Permitting Requirements		Score
There are no additional permitting requirements or modifications.		

Alternative - Clarifier

Capital Cost Estimate				Score
<u>Tasks and Activities</u>				
1. Engineering and Contingency Costs				\$ 195,000
2. Clarifier Construction				\$ 2,424,500
<u>Assumptions</u>				
Aeration improvements will be required				\$ 5,705,000
Activity	Description	Total Cost	\$ 8,324,500	
Engineering and Contingency Costs				
<u>Tasks and Activities</u>		<u>Tasks and Activities</u>		
- Project management		Engineering and Design	\$	75,000
- Design and project coordination		Bid Documents	\$	15,000
- Bid phase services		Certification Report	\$	5,000
- Construction oversight (RPR) and startup		Construction Oversight	\$	100,000
Engineering Cost			\$	195,000
Clarifier Construction				
Description	Estimated Quantity	Unit	Unit Price	Extended Price
Clarifiers	2	EA	\$ 175,000	\$ 350,000
Equipment Installation	2	EA	\$ 270,000	\$ 540,000
Waste Activated Sludge Pumps, 100 HP	1	LS	\$ 175,000	\$ 175,000
Return Piping - Estimated 12" diameter	3,000	LF	\$ 150	\$ 450,000
Excavation and Fill	1	LS	\$ 250,000	\$ 250,000
Electrical and Instrumentation	1	LS	\$ 100,000	\$ 100,000
30% Contingency				\$ 559,500
Equipment Cost			\$	2,424,500

Note: Costs based on 2022 (current) costs

Annual Operating and Maintenance Cost Estimate				Score
<u>Tasks and Activities</u> Operations and Maintenance Electrical Demands Chemical Additives 25% Contingency				\$ 10,000 \$ 20,903 \$ 200,000 \$ 57,726
Aeration Operations and Maintenance				\$ 233,470
Total Cost				\$ 522,099

Water Quality Expectations		Score
This will improve water quality as Total Nitrogen, TSS, and CBOD will all be decreased.		

Energy Demands Estimate							Score
There are very little energy demands associated with this system. A small pump will be installed to move the waste activated sludge. Energy demands will largely be increased from the aeration modifications.							
Equipment	HP	Loading	KW/hr/Yr	\$ KW/hr	Annual Power	Clarifier	
1	100	80%	522,587	\$ 0.04	\$ 20,903		
Equipment	HP	Loading	KW/hr/Yr	\$ KW/hr	Annual Power	Aeration Modifications	
5	200	60%	3,919,399	\$ 0.04	\$ 156,776		

Training and Licensing Requirements		Score
Training will be necessary for system operations and maintenance required for a new clarifier.		

Odor and Noise Impacts		Score
No long-term odor or noise would be added with this system.		

Footprint Modifications		Score
No footprint modification is anticipated. The clarifier system is assumed to be contained within Cell 5.		

Public Perception		Score
Public perception may be negatively impacted with this modification due to lack of education and understanding. Cell 5 would potentially be used as a sludge holding basin which could cause confusion since sludge has been perceived as being discharged into the Snake River. As sludge accumulates in the final basin, the community may think it has been discharged		

Expandability Potential		Score
The clarifier could be expanded; however, it won't necessarily improve discharge with population growth.		

Permitting Requirements		Score
Permitting would likely be required for the sludge holding pond and clarifier operation. A Wyoming Department of Environmental Quality/Water Quality Division Permit to Construct would be required for construction.		

Alternative - Bioreactor

Capital Cost Estimate				Score
<u>Tasks and Activities</u> 1. Engineering and Contingency Costs 2. Bioreactor Construction				\$ 700,000 \$ 5,657,600
<u>Assumptions</u>				
Activity	Description	Total Cost	\$ 6,357,600	
Engineering and Contingency Costs				
<u>Tasks and Activities</u> - Project management - Design and project coordination - Bid phase services - Construction oversight (RPR) and startup	<u>Tasks and Activities</u> Engineering and Design Permitting Bid Documents Construction Oversight		\$ 400,000 \$ 40,000 \$ 10,000 \$ 250,000	
Engineering Cost				\$ 700,000
SAGR Bioreactor Construction				
<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extended Price</u>
Rock Media	41,300	TON	\$ 40	\$ 1,652,000
High Efficiency Turbo Blowers, 200 HP	6	EA	\$ 200,000	\$ 1,200,000
Aeration System	6	EA	\$ 75,000	\$ 450,000
Walls and Liner of Bioreactor	6	EA	\$ 75,000	\$ 450,000
Excavation and Fill	1	LS	\$ 100,000	\$ 100,000
Piping and Valves	1	LS	\$ 225,000	\$ 225,000
Electrical and Instrumentation	1	LS	\$ 275,000	\$ 275,000
30% Contingency				\$ 1,305,600
Note: Costs based on 2022 (current) costs				Equipment Cost \$ 5,657,600

Annual Operating and Maintenance Cost Estimate			Score
<u>Tasks and Activities</u> Operations and Maintenance Electrical Demands Chemical Additives 25% Contingency			\$ 30,000 \$ 188,131 \$ - \$ 54,533
Total Cost			\$ 272,664

Water Quality Expectations	Score
Water quality will improve for Ammonia but Total Nitrogen will remain similar.	

Energy Demands Estimate						Score
Because of the new aeration demands and installation of equipment, energy demands will go up slightly. The blowers would be high efficiency and there is a possibility it will replace some of the current equipment.						
Equipment	HP	Loading	KW/hr/Yr	\$ KW/hr	Annual Power	
6	200	60%	4,703,279	\$ 0.04	\$ 188,131	

Training and Licensing Requirements	Score
Minimal training will be required.	

Odor and Noise Impacts	Score
There will be no long-term odor or noise impacts.	

Footprint Modifications	Score
No footprint modifications should be encountered with the exception of new piping for the system.	

Public Perception	Score
The bioreactor should not negatively impact public perception.	

Expandability Potential	Score
The bioreactor will be installed in a series of modules. Additions can be made as expansion is required.	

Permitting Requirements	Score
There will be some permitting requirements for this improvement, including, a permit to construct and changes to the current WYPDES discharge permit.	

Alternative - Mechanical Plant

Capital Cost Estimate				Score
<u>Tasks and Activities</u> 1. Engineering and Contingency Costs 2. 5 MGD Mechanical Plant				\$ 3,120,000 \$ 29,055,000
<u>Assumptions</u>				
Activity	Description	Total Cost	\$ 32,175,000	
Engineering and Contingency Costs				
<u>Tasks and Activities</u> - Project management - Design and project coordination - Bid phase services - Construction oversight (RPR) and startup	<u>Tasks and Activities</u> Engineering and Design Permitting Bid Documents Construction Oversight		\$ 2,000,000 \$ 100,000 \$ 20,000 \$ 1,000,000	
			Engineering Cost	\$ 3,120,000
5 MGD Mechanical Plant Construction				
<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extended Price</u>
Mechanical BNR Equipment	1	LS	\$ 9,000,000	\$ 9,000,000
Concrete Basins	1	LS	\$ 8,000,000	\$ 8,000,000
Piping and Valves	1	LS	\$ 1,500,000	\$ 1,500,000
Filtration	1	LS	\$ 2,000,000	\$ 2,000,000
Pumps	1	LS	\$ 900,000	\$ 900,000
Electrical	1	LS	\$ 500,000	\$ 500,000
SCADA	1	LS	\$ 200,000	\$ 200,000
Excavation and Backfill	1	LS	\$ 250,000	\$ 250,000
30% Contingency				\$ 6,705,000
Note: Costs based on 2022 (current) costs			Equipment Cost	\$ 29,055,000

Annual Operating and Maintenance Cost Estimate		Score
<u>Tasks and Activities</u> Operations and Maintenance Electrical Demands Chemical Additives 25% Contingency		\$ 75,000 \$ 640,169 \$ - \$ 178,792
Total Cost		\$ 893,961

Water Quality Expectations	Score
A mechanical plant has the ability to achieve the lowest consistent effluent concentrations.	

Energy Demands Estimate						Score
Energy demands will increase with a mechanical plant. This will include aeration of the new basins, the aerobic digesters, and operation of the sludge wasting pumps.						
Equipment	HP	Loading	KW/hr/Yr	\$ KW/hr	Annual Power	
1	3,500	70%	16,004,213	\$ 0.04	\$ 640,169	

Training and Licensing Requirements	Score
A mechanical plant would require additional training and licensing to operate.	

Odor and Noise Impacts	Score
Noise would likely increase with the improvement. Odor could also occur with the digester operation.	

Footprint Modifications	Score
No footprint modifications are required. The mechanical plant can fit within current Cell 3B1.	

Public Perception	Score
Mechanical plants are widely used around the country. However, capital costs, operations and maintenance costs, and energy useage will significantly increase.	

Expandability Potential	Score
The mechanical plant can be expanded with module additions to meet future demands.	

Permitting Requirements	Score
The mechanical plant would require a new WYPDES Permit and a Permit to Construct.	

Add On - Water Reuse

Capital Cost Estimate					Score
<u>Tasks and Activities</u> 1. Engineering and Contingency Costs 2. Equipment Additions					\$ 620,000 \$ 5,596,500
<u>Assumptions</u>					
Total Cost					\$ 6,216,500
Engineering and Contingency Costs					
<u>Tasks and Activities</u> - Project management - Design and project coordination - Bid phase services - Construction oversight (RPR) and startup			<u>Tasks and Activities</u> Engineering and Design Permitting Bid Documents Construction Oversight		
			\$ 300,000 \$ 60,000 \$ 10,000 \$ 250,000		
Engineering Cost					\$ 620,000
Equipment Additions					
	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extended Price</u>
	Filtration System	1	EA	\$ 2,000,000	\$ 2,000,000
	High Service Pumps	1	LS	\$ 100,000	\$ 100,000
	Distribution Piping - Estimated 12" diameter	15,000	LF	\$ 130	\$ 1,950,000
	Pneumatic Tank, 5,000 gallons	1	EA	\$ 30,000	\$ 30,000
	Electrical	1	LS	\$ 150,000	\$ 150,000
	SCADA	1	LS	\$ 75,000	\$ 75,000
	30% Contingency				\$ 1,291,500
Note: Costs based on 2022 (current) costs					Equipment Cost \$ 5,596,500

Annual Operating and Maintenance Cost Estimate					Score
<u>Tasks and Activities</u> Operations and Maintenance Electrical Demands Chemical Additives (Sodium Hypochlorite for increased disinfection) 25% Contingency					\$ 20,000 \$ 36,581 \$ 75,000 \$ 32,895
Total Cost					\$ 164,476

Water Quality Expectations		Score
Higher quality filtered effluent would discharge to the Snake River (if any). Filtration removes solids and improves water quality.		

Energy Demands Estimate						Score
Some additional energy would be required to pump the water through the distribution piping.						
Equipment	HP	Loading	KW/hr/Yr	\$ KW/hr	Annual Power	
1	200	70%	914,526	\$ 0.04	\$ 36,581	

Training and Licensing Requirements		Score
Some level of training will be required to operate the high service pumps and filtration system.		

Odor and Noise Impacts		Score
There would be no change in odor and noise.		

Footprint Modifications		Score
Piping would need to be installed outside the current WWTP footprint to where reuse water would be discharged.		

Public Perception		Score
Water reuse could improve public perception. There would be less discharge to the Snake River.		

Expandability Potential		Score
As more water enters the WWTP, more water can be discharged for reuse.		

Permitting Requirements		Score
Water reuse would require changes to the WYPDES permit.		

Add-On - On-site Sludge Disposal

Capital Cost Estimate				Score
<u>Tasks and Activities</u>				
1. Engineering and Contingency Costs				\$ 323,000
2. Removal Costs				\$ 3,905,000
<u>Assumptions</u>				
Activity	Description	Total Cost	\$ 4,228,000	
Engineering and Contingency Costs				
<u>Tasks and Activities</u>		<u>Tasks and Activities</u>		
- Project management	Engineering and Design	\$	125,000	
- Design and project coordination	Permitting	\$	40,000	
- Bid phase services	Bid Documents	\$	8,000	
- Construction oversight (RPR) and startup	Construction Oversight	\$	150,000	
		Engineering Cost	\$	323,000
Sludge Removal Costs				
<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extended Price</u>
Dredge, Dewater, Landfill Application Cell 1	32,000	CY	\$ 25	\$ 800,000
Dredge, Dewater, Landfill Application Cell 2	30,000	CY	\$ 25	\$ 750,000
Dredge, Dewater, Landfill Application Cell 3A	12,000	CY	\$ 25	\$ 300,000
Sludge Disposal Pond (8 acres)	1	EA	\$ 1,500,000	\$ 1,500,000
30% Contingency				\$ 555,000
Note: Costs based on 2022 (current) costs		Equipment Cost	\$	3,905,000

Annual Operating and Maintenance Cost Estimate			Score
<u>Tasks and Activities</u> Operations and Maintenance Electrical Demands Chemical Additives 25% Contingency			\$ - \$ - \$ - \$ -
			\$0.00 \$ -

Water Quality Expectations		Score
Removing the sludge will increase overall WWTP efficiency.		

Energy Demands Estimate		Score
No energy would be associated with this improvement.		

Training and Licensing Requirements		Score
No training or licensing would be required.		

Odor and Noise Impacts		Score
There would be noise increases during sludge removal. Odor could also be an issue as sludge moved.		

Footprint Modifications		Score
There would need to be some modification to the current footprint to construct a sludge disposal pond.		

Public Perception		Score
The Town is getting rid of the sludge which could improve public perception.		

Expandability Potential		Score
There would be no need for expandability. It will, however, improve current operations as influent flow increases.		

Permitting Requirements		Score
Some permitting may be required to apply the sludge on-site.		

Add-On - Off-site Sludge Disposal

Capital Cost Estimate				Score
<u>Tasks and Activities</u> 1. Engineering and Contingency Costs 2. Removal Costs				\$ 86,000 \$ 9,139,000
<u>Assumptions</u>				
Activity	Description	Total Cost	\$ 9,225,000	
Engineering and Contingency Costs				
<u>Tasks and Activities</u> - Project management - Design and project coordination - Bid phase services - Construction oversight (RPR) and startup	<u>Tasks and Activities</u> Engineering and Design Permitting Bid Documents Construction Oversight	\$ 50,000 \$ 30,000 \$ 6,000 \$ -		
Engineering Cost			\$	86,000
Sludge Removal Costs				
<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extended Price</u>
Dredge, Dewater, Landfill Application Cell 1	32,000	CY	\$ 95	\$ 3,040,000
Dredge, Dewater, Landfill Application Cell 2	30,000	CY	\$ 95	\$ 2,850,000
Dredge, Dewater, Landfill Application Cell 3A	12,000	CY	\$ 95	\$ 1,140,000
30% Contingency				\$ 2,109,000
Note: Costs based on 2022 (current) costs			Equipment Cost	\$ 9,139,000

Annual Operating and Maintenance Cost Estimate			Score
<u>Tasks and Activities</u> Operations and Maintenance Electrical Demands Chemical Additives 25% Contingency			\$ - \$ - \$ - \$ -
			\$0.00 \$ -

Water Quality Expectations		Score
Removing the sludge will increase overall WWTP efficiency.		

Energy Demands Estimate		Score
No energy would be associated with this improvement.		

Training and Licensing Requirements		Score
No training or licensing would be required.		

Odor and Noise Impacts		Score
There would be noise increases during sludge removal. Odor could also be an issue as sludge is moved.		

Footprint Modifications		Score
The collected sludge would be removed off-site. A footprint would need to be accounted for to place the removed sludge.		

Public Perception		Score
The Town is getting rid of the sludge which could improve public perception.		

Expandability Potential		Score
There would be no need for expandability. It will, however, improve current operations as influent flow increases.		

Permitting Requirements		Score
Permitting will be required to apply the sludge at a landfill offsite.		

APPENDIX D

TOWN OF JACKSON – 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW, DECISION MATRIX SCORING SUMMARY

**TOWN OF JACKSON - 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
DECISION MATRIX SCORING SUMMARY
TOWN OF JACKSON, WYOMING**

Trihydro received 2021 Wastewater Treatment Plant Technical Review Decision Matrix criteria/alternative scoring recommendations from the Town of Jackson (Town) and three Steering Committee members: Protect Our Water Jackson Hole (POWJH), American Rivers, and Teton Conservation District.

Trihydro provided the Town and Steering Committee example scoring and supporting documents for reference. The Town and Steering Committee provided scores for each alternative based on the ten criteria. The Decision Matrix was populated with the Town- and Steering Committee-provided scoring and results averaged to determine final scoring. Trihydro's example scoring was not averaged into the final scoring. A summary of the contributors' results and reasonings are discussed below.

As has been discussed, all alternatives can be implemented in a phased approach. Trihydro recommends evaluating funding opportunities and rate impacts as the Town and Steering Committee consider a path forward.

ALTERNATIVES

Aeration Modifications

The aeration modifications scores ranged from 2.5 to 4.1 with a final average score of 3.4. The Water Quality, Public Perception, and Expandability criterion had the broadest scoring ranges.

Steering Committee consideration items:

- Sludge removal (on-site or off-site) would be an additional cost.

Clarifier System

The clarifier system scores ranged from 2.9 to 3.8 with a final average score of 3.3. Water Quality had the broadest scoring range.

The aeration modification would be required with the clarifier system alternative, which could be completed in a phased approach. The clarifier system alternative will require sludge disposal as an additional cost.

The clarifier system has the ability to reduce effluent nutrients year-round.

Steering Committee consideration items:

- The clarifier system has the ability to reduce ammonia, phosphorus, and nitrate concentrations in the effluent. Winter improvements are the most notable improvements over the current lagoon system.
- Sludge removal (on-site or off-site) would be an additional cost.

Bioreactor

The bioreactor scores ranged from 2.9 to 3.9 with a final average score of 3.4.

Steering Committee consideration items:

- Sludge removal (on-site or off-site) would be an additional cost.

**TOWN OF JACKSON - 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
DECISION MATRIX SCORING SUMMARY
TOWN OF JACKSON, WYOMING**

Mechanical Wastewater Treatment Plant

The mechanical wastewater treatment plant scores ranged from 3.0 to 3.7 with a final average score of 3.4. The Permitting Requirements and Public Perception criterion had the broadest scoring ranges.

This alternative will produce stable effluent concentrations year-round. The water quality improvements would most likely yield the highest improvements annually.

Steering Committee members consideration items:

- Consider additional solar arrays to offset electricity demands
- Install a micro-hydro facility at the outfall to address increased energy demands
- Mechanical plant operation and maintenance (O&M) costs are high
- Increased electrical demands
- No sludge disposal (on-site or off-site) required
- A long-term, expandable solution with the ability to meet future demands including connections from surrounding water and sewer districts
- The small footprint allows for evaluating using the remaining land for other beneficial use (i.e., open space, solar energy, etc.)
- Land could potentially be leased to help offset the mechanical plant capital costs
- Mechanical treatment plant provides best opportunity to reduce nutrients to the Snake River

ADD-ONS

Water Reuse

The water reuse alternative scores ranged from 4.0 to 4.5 with a final average score of 4.4. Scores were generally the same between the four contributors.

Sludge Removal - On-Site Application

Sludge removal for on-site application scores ranged from 4.4 to 4.6 with a final average score of 4.5. Scores were generally the same between the four contributors.

Sludge Removal – Off-Site Disposal

Sludge removal with off-site disposal scores ranged from 2.9 to 4.5 with a final average score of 3.9. Public Perception had the broadest scoring range (1 to 5).

TABLE 1. FINAL DECISION MATRIX
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

TOWN									
Criteria	Description	Weights	Alternatives				Add-Ons		
			Aeration Modifications	Clarifier System	Bioreactor	Mechanical WWTP	Water Reuse	On-Site Application	Off-Site Removal
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%	3	5	3	5	5	5	5
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%	4	3	3	1	4	5	5
Capital Cost	Consider the capital cost compared to the other recommendations.	11%	5	3	4	1	4	5	3
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%	5	3	4	2	4	5	5
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%	5	3	4	2	4	5	5
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%	4	4	5	3	5	2	3
Footprint	How well does the recommendation fit in the current operations footprint on available ToI property?	6%	5	5	5	5	1	4	3
Public Perception	How will the recommendation impact public perception?	7%	4	2	5	3	4	4	3
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%	4	3	5	5	5	5	5
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%	4	3	4	2	1	4	3
		100%	4.1	3.5	3.9	3.0	4.0	4.6	4.3
PROTECT OUR WATER JACKSON HOLE									
Criteria	Description	Weights	Alternatives				Add-Ons		
			Aeration Modifications	Clarifier System	Bioreactor	Mechanical WWTP	Water Reuse	On-Site Application	Off-Site Removal
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%	1	3	2	5	5	5	3
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%	2	2	2	2	5	4	3
Capital Cost	Consider the capital cost compared to the other recommendations.	11%	2	2	2	2	4	4	1
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%	4	3	4	3	5	5	4
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%	4	3	3	3	4	5	5
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%	4	5	5	4	5	2	1
Footprint	How well does the recommendation fit in the current operations footprint on available ToI property?	6%	4	4	4	5	2	4	3
Public Perception	How will the recommendation impact public perception?	7%	1	2	2	5	5	5	1
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%	2	3	4	5	5	5	5
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%	5	4	4	4	1	4	3
		100%	2.5	2.9	2.9	3.7	4.5	4.4	2.9

TABLE 1. FINAL DECISION MATRIX
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

		AMERICAN RIVERS							
Criteria	Description	Weights	Alternatives				Add-Ons		
			Aeration Modifications	Clarifier System	Bioreactor	Mechanical WWTP	Water Reuse	Sludge Removal	
							On-Site Application	Off-Site Removal	
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%	2	3	2	5	5	5	5
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%	3	3	3	2	5	4	3
Capital Cost	Consider the capital cost compared to the other recommendations.	11%	4	3	4	2	4	4	2
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%	5	3	4	2	5	5	4
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%	4	3	4	3	4	5	5
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%	2	3	5	3	5	2	2
Footprint	How well does the recommendation fit in the current operations footprint on available ToJ property?	6%	5	5	4	5	2	4	3
Public Perception	How will the recommendation impact public perception?	7%	2	2	2	5	5	5	5
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%	4	3	5	5	5	5	5
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%	5	3	3	3	2	4	3
		100%	3.4	3.0	3.4	3.5	4.5	4.4	3.8
		TETON CONSERVATION							
Criteria	Description	Weights	Alternatives				Add-Ons		
			Aeration Modifications	Clarifier System	Bioreactor	Mechanical WWTP	Water Reuse	Sludge Removal	
							On-Site Application	Off-Site Removal	
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%	3	5	2	5	5	5	5
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%	3	3	3	1	5	5	5
Capital Cost	Consider the capital cost compared to the other recommendations.	11%	4	4	4	2	4	4	3
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%	5	3	4	2	5	5	5
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%	4	3	4	3	4	5	5
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%	4	5	5	4	5	2	2
Footprint	How well does the recommendation fit in the current operations footprint on available ToJ property?	6%	5	5	4	5	2	4	5
Public Perception	How will the recommendation impact public perception?	7%	2	3	2	5	5	5	5
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%	4	3	5	5	5	5	5
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%	5	3	4	2	2	4	3
		100%	3.7	3.8	3.4	3.3	4.5	4.6	4.5

TABLE 1. FINAL DECISION MATRIX
TECHNICAL REVIEW REPORT, 2021 WASTEWATER TREATMENT PLANT TECHNICAL REVIEW
TOWN OF JACKSON, WYOMING

Criteria	Description	Weights	Final Results						
			Alternatives				Add-Ons		
			Aeration Modifications	Clarifier System	Bioreactor	Mechanical WWTP	Water Reuse	Sludge Removal On-Site Application	Off-Site Removal
Water Quality	How will the recommendation help meet the Town of Jackson's goal of exceeding effluent water quality expectations?	21%	2.3	4.0	2.3	5.0	5.0	5.0	4.5
Energy Demands	How will the recommendation help meet the Town of Jackson's priority of reducing net energy demands?	15%	3.0	2.8	2.8	1.5	4.8	4.5	4.0
Capital Cost	Consider the capital cost compared to the other recommendations.	11%	3.8	3.0	3.5	1.8	4.0	4.3	2.3
O&M Costs	Consider the annual O&M costs compared to the other recommendations.	14%	4.8	3.0	4.0	2.3	4.8	5.0	4.5
Training & Licensing	What level of operator training and licensing is required with the recommendation compared to the current training and licensing?	5%	4.3	3.0	3.8	2.8	4.0	5.0	5.0
Odor and Noise	How will the recommendation impact the potential for odors and noise?	6%	3.5	4.3	5.0	3.5	5.0	2.0	2.0
Footprint	How well does the recommendation fit in the current operations footprint on available ToJ property?	6%	4.8	4.8	4.3	5.0	1.8	4.0	3.5
Public Perception	How will the recommendation impact public perception?	7%	2.3	2.3	2.8	4.5	4.8	4.8	3.5
Expandability	How well does the recommendation allow for expansion to accommodate future demands?	10%	3.5	3.0	4.8	5.0	5.0	5.0	5.0
Permitting Requirements	What level of permitting will be required to implement the recommendation?	5%	4.8	3.3	3.8	2.8	1.5	4.0	3.0
		100%	3.4	3.3	3.4	3.4	4.4	4.5	3.9

STAFF REPORT



Meeting Date:	March 20, 2023	Meeting Title:	Workshop
Submitting Department:	Community Development	Presenter:	Tanya Anderson
Agenda Item:	Teton County Water Quality Master Plan updates and recommendations	Public Comment:	Yes

Purpose & Policy Considerations. Discuss water quality short-term mitigation measures recommended by consultants (Trihydro) for the Teton County Water Quality Master Plan (WQMP) as they relate to Town of Jackson operations.

Requested Action. This report is purely informational, and staff are not asking for any decisions.

Recommendations. N/A.

Background. Four organizations serve as project partners in the Water Quality Master Plan (WQMP) planning process: Teton County, Teton Conservation District, Protect Our Water Jackson Hole, and the Town of Jackson, along with consultants Trihydro and Flitner Strategies, Inc. While the Town of Jackson is not a funding partner like the other three organizations, the Town is considered a project partner because its wastewater, stormwater, drinking water and transportation infrastructure plays an important role when evaluating water quality within Teton County. The planning process is a two-year effort that began in January of 2022; however, as directed by the Board of County Commissioners (BCC), County staff and consultant brought a list of short-term mitigation measures that could be reasonably implemented or commenced before the WQMP is completed (est. Jan. 2024).

While some of the short-term mitigation measures are specific to the County, others would require coordination with the Town of Jackson. The list of short-term mitigation measures being recommended by the Project Team include:

1. RV dump station(s)
2. County ownership of sewer line extensions
3. New snow storage areas
4. Residential septic replacement and sewer connection program
5. Future development considerations for areas with water quality concerns
6. Modifications to the LDR subdivision review process
7. Water quality monitoring program

County staff presented these measures, along with recommendations for further actions, on February 13, 2023 to the BCC. The Trihydro assessment of these measures is attached. County staff will present an overview of the report and outcomes of the BCC presentation to Council at the workshop.

At their meeting the BCC, had significant discussion on these 7 measures, with some that are actionable and can be achieved in the coming year while others are in preparation for future discussions and will require coordination with Town staff and Town Council to allow for long term WQMP recommendations to be developed.

Upon completion of the WQMP in 2024, Town staff predicts that there will be numerous recommendations that will require the dedication of more Town staff time or financial resources than the short-term measures discussed in this report. Town staff recommends holding off on decision making about wastewater treatment plant upgrades also on today's agenda until the full scope of recommendations from the County WQMP are available; however, there is no need to postpone discussions or actions regarding the short-term mitigation measures presented in this report.

Analysis.

The following is an overview of the short-term mitigation measures and County staff's understanding of the BCC priorities and reactions when they were presented to the BCC on February 13, 2023. Where applicable Town staff have also included potential impacts or coordination required with the Town for each effort.

1. RV Dump Station

Access to RV dump stations is inadequate for the amount of RV tourism in our community. Sewage has reportedly been dumped illegally on National Forest land and within the Town of Jackson, potentially contributing to contamination of surface waters.

The BCC seemed to prioritize this action with unanimous support. Next steps:

- County staff will prioritize this in their 2024 budget proposal and pursue locations to secure a future RV dump station. There could be redundancy in these systems if we have multiple options.
- County staff will continue the discussions that have been initiated with landowners, WYDOT, BLM and the Town of Jackson.

2. County Ownership of Sewer Extensions

This measure, in which the county would pursue ownership of sewer line infrastructure to connect areas of the community with water quality concerns to sewage treatment seems to have broad support of Commissioners. The discussion seemed to favor a conceptual approach that would be prioritized through the Water Quality Management Planning process. This process will require close cooperation with the Town of Jackson and private sewer districts. Next steps:

- Short-term - There are two locations that County staff heard clear direction on.
 - Look at options to extend the Adams Canyon sewer main to service areas in the South Park service center that have impacted water quality.
 - Clear direction was given to place a project for North 89 on the State Revolving Fund Intended Use Plan (IUP). After the Feb. 13 workshop, County staff worked with the county's consultant and the engineering firms currently involved in designing wastewater systems for the area private businesses (Flat Creek Inn and Elk Refuge Inn) to develop a project to add to this list. A project was proposed for a \$2.69 M sewer line extension on the IUP (see attachment). Future conversations with the affected stakeholders, National Elk Refuge, WYDOT, and the Town of Jackson, will determine how the actual application for funding would proceed with specific plans, agreements, and discussions on who would own and operate a sewer line. County staff heard from the

Commission that they should prioritize this action and a willingness to own and operate this sewer main and others in the future.

- Long-term – County staff will work with partners on the WQMP to convene the sewer districts in the County to begin to identify other priority areas.

Capacity at the wastewater treatment plant (WWTP) will need to be considered by the Town.

3. New Snow Storage Areas

The Town of Jackson has adequate snow storage for our plowing operations at the rodeo grounds, where snowmelt is treated by the artificial wetlands in Karns Meadow. However, there are many businesses in the Town and County that do not have adequate space to store snow. Some snow is removed at a high cost to the business owner, while others store snow in locations that drain directly into Flat Creek or other water bodies without any treatment. For this measure, new suitable snow storage locations would need to be identified.

There was little short-term interest in this action by the BCC. It will likely be included in the final WQMP plan, in which all the mitigation options brought to the table during the stakeholder process will be prioritized.

4. Residential Septic Replacement and Sewer Connection Program

This measure would involve determining how to prioritize locations for septic replacement vs. sewer connection. Through the consultant, an overlay could be developed that prioritizes locations and reduces the uncertainty of future sewer connections, saving time for both applicants and Town staff. This could be in the form of a GIS layer in the map server. This measure would require significant coordination with Town staff.

This measure had support from the Commission, who directed staff to begin developing a program. County staff foresees going to the Commission during a future meeting with specific action items to bring this to fruition. The BCC discussed potential for a future program for sewer connections and septic replacements, and that both are valuable in a site-specific context. County staff understood this as recognition that well-designed septic systems are going to continue to be part of the sewage management and water quality efforts in the community. Next steps:

- Many additional meetings with project partners at the Town of Jackson and Teton Conservation District will be necessary to develop a prioritized list of locations within the County for connection to sewer or septic replacement. The County has heard interest in pursuing agreements with the Town to pre-authorize connection opportunities. While the BCC directed staff to move forward with this mitigation measure, doing so will require support from and cooperation with the Town of Jackson.
- Sewer connections in the County already require significant time by Town Public Works and Legal. This effort may have significant additional impact on the Town department. There will also be significant time added in the Legal department with Connection and Use Agreements. However, a more formalized structure for sewer connections may save Town staff time in the future.
- Funding for this program has not been determined; County staff will seek funding opportunities that exist and have been used in other communities. The hiring of additional Town staff should be included in this analysis.

5. Future Development Considerations in Areas with Water Quality Concerns

This measure would consider development density and permitting in relation to water quality. County staff heard from the BCC that this measure could be handled on a site-by-site basis and that the Board isn't interested in a broad policy at this time. County staff anticipates that a complete list of LDR recommendations will come out of the WQMP process, which may address future development requirements in areas with water quality concerns.

6. Modify LDR Subdivision Review Process

The direction heard from the BCC on this topic is to work with the Planning Department to incorporate the LDR subdivision review process into future workplan discussion, but that this is not an immediate priority. County staff will seek Planning's guidance if this should occur in an LDR update, or through the more comprehensive LDR modifications for water quality. County staff's interpretation of the discussion is that there is greater interest in more comprehensive water quality LDRs that will be an outcome of the WQMP process.

7. Water Quality Monitoring Program

This measure involves committing staff time and resources to creating a systematic and standardized water quality monitoring program. The goal is to produce publicly available data and data monitoring protocols that are consistent spatially and temporally throughout the county. The BCC prioritized this measure, directing staff to complement and coordinate with other ongoing efforts within the County. This mitigation measure has overlap with the Ecosystem Stewardship Administrator's work developing environmental health indicators.

Summary

In summary, County staff appreciates the opportunity to brief the Town Council on their progress and discuss these short-term water quality actions. Importantly, many of the mitigation items that were identified as priorities will require close cooperation and coordination with the Town of Jackson. There are elements of these short-term mitigation actions that the Town of Jackson may have their own interest in pursuing, such as the RV dump station or Snow Storage actions. County staff also recognizes the Town's management and operations of the wastewater treatment plant as being critical to water quality management throughout the entire community and appreciates the Town's support of the WQMP efforts and assistance in developing and implementing these mitigation outcomes priorities.

Town staff recommends Council consider how these projects fit into its two-year priorities and how it will fund and manage any additional workload. Additionally, Town staff recommends Council request that the County seek input from the Town prior to the adoption of a plan that may have significant impacts on Town staff in the Public Works and Legal departments.

Possible Alternatives.

N/A

Comprehensive Plan & Priority Alignment.

1.2.S.3: Develop a water quality enhancement plan that includes consideration of additional County funding for water quality and commits to joint Town and County coordination.

1.2.S.3: Develop a water quality enhancement plan that includes consideration of additional County funding for water quality and commits to joint Town and County coordination. The plan should include a water quality monitoring program. The plan should also incorporate or complement existing and future source water assessments, source water protection plans, river and lake management plans, watershed management plans, and other water quality protection efforts. Additionally, in partnership with the Teton Conservation District and other applicable partners, develop with all due dispatch a comprehensive wastewater management plan.

Fiscal Impact.

N/A

Staff Impact.

Public Works staff and the Ecosystem Stewardship Administrator are project partners on the WQMP effort and are involved in reviewing recommendations and development of the WQMP. Town staff have spent approximately 100 hours contributing to this work thus far. It is estimated that staff will spend another 100 hours on this project in the next year. The possible mitigation actions coming out of the plan will require an analysis of staff capacity.

Attachments or Links.

Trihydro Memo regarding Teton County Water Quality Short-term Mitigation Measures.

Suggested Motion. *Council always has the option to adopt, approve with conditions, continue, or deny items.*

N/A.



memorandum

To: Mr. Chris Colligan, Project Manager
From: Mr. Travis Evans, P.E.
cc: Ms. Heather Overholser, Ms. Amy Ramage, P.E.
Date: February 3, 2023
Re: Teton Water Quality Master Plan (WQMP)
Short-term Mitigation Measures

Project Team members from Teton County, Teton Conservation District, Protect Our Water Jackson Hole, Town of Jackson, and Trihydro have been working on the Water Quality Master Plan (WQMP) project since January 2022. The planning process is a two-year effort; however, as directed by the Board of County Commissioners the project team has identified several short-term mitigation measures that could be reasonably implemented or commenced before the WQMP is completed. These short-term mitigation measures will be presented to the Teton County Board of County Commissioners to inform them of possible measures for which implementation could begin before the WQMP is finalized and adopted, and provide County staff and/or the WQMP Project Team direction on how to proceed. Short-term mitigation measures being recommended by the Project Team include:

- RV Dump Station (Attachment A)
- County Ownership of Sewer Extensions (Attachment B)
- New Snow Storage Areas (Attachment C)
- Residential Septic Replacement and Sewer Connection Program (Attachment D)
- Future Development Considerations in Areas with Water Quality Concerns (Attachment E)
- Modify LDR Subdivision Review Process (Attachment F)
- Water Quality Monitoring Program (Attachment G)

Descriptions of each mitigation measure, as well as benefits, challenges, and costs (if applicable) for each mitigation measure, are provided as Attachments A through G.

803-003-001

ATTACHMENT A

RV DUMP STATION(S)

ATTACHMENT A. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING

MITIGATION MEASURE: RV Dump Station

DESCRIPTION

Increased visitation to Teton County and surrounding national parks has resulted in increased recreational vehicles (RV) passing through the area. Based on correspondence with the Grand Teton National Park (GTNP) Superintendent, local law enforcement, and others, an RV dump station is an immediate need for the area.

GTNP has three dump stations located at the Gros Ventre, Shadow Mountain, and Spread Creek campgrounds. The Gros Ventre Campground RV dump station has been overused due to increased camping on US Forest Service lands (Gros Ventre, Shadow Mountain, Spread Creek, etc.), and GTNP has had to limit use of the dump station to only those staying at the Gros Ventre Campground. Furthermore, replacement of the leachfield is only in the design phase. Illegal dumping of RV wastewater is a concern as local law enforcement agencies have shared that there is a significant population of visitors and residents residing in RVs or personal vehicles throughout the County.

There is one RV dump station available in the Town of Jackson, but its operating hours are not reliable and access is challenging.

The WQMP Project Team met with representatives from the Town of Pinedale. The Town of Pinedale constructed an RV dump station that does not require full-time management, and has proven to be successful in reducing illegal discharges of wastewater.

BENEFITS	CHALLENGES
1. A convenient dump station will encourage RV users to properly dispose of wastewater and reduce illegal dumping countywide, thus reducing potential impacts to water quality. 2. A dump station will reduce load on the GTNP RV dump stations. 3. The dump station will generate revenue to help offset capital and operating costs.	1. Identifying a suitable location that provides adequate space to accommodate turning radii of large RVs 2. Identifying an available sanitary sewer connection 3. Estimating monthly wastewater fees paid to the Town of Jackson 4. Determining the best site location and anticipated frequency of use will be challenging because RV traffic patterns and numbers are not known.

ESTIMATED COST \$400,000 - \$600,000

COST NOTES

Dump station technology is relatively inexpensive. A majority of the cost is associated with site improvements. Cost estimate does not include cost of land.

SUGGESTED NEXT STEPS

The following next steps are recommended if Teton County elects to consider this mitigation measure:

1. Prepare a feasibility study to:
 - a. Evaluate RV traffic patterns during the summer months
 - b. Estimate the number of RVs or other vehicles parked in public areas
 - c. Identify and evaluate potential dump station locations
 - d. Select a preferred site
 - e. Estimate probable engineering and site development costs
 - d. Evaluate estimated annual revenues and operating costs
2. Engineering design and permitting through appropriate agencies
3. Construction of dump station

ATTACHMENT B

COUNTY OWNERSHIP OF SEWER EXTENSIONS

ATTACHMENT B. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING

MITIGATION MEASURE

County Ownership of Sewer Extensions

DESCRIPTION

Recent discussions by the Project Team with three entities (Flat Creek Inn, Elk Refuge Inn, and WYDOT) has led the Project Team to consider if it would be feasible for Teton County to own sanitary sewer extensions. This could operate similarly to Adams Canyon, would generate revenue to covers operating costs and could potentially be operated as an enterprise fund. The general idea is are there locations within the County that the County should be involved in facilitating better wastewater treatment by assisting in extending new or existing sewer connections.

One example includes the Flat Creek and Elk Refuge Inns, which are currently in the process of designing advanced treatment systems to serve their respective properties. Both properties are currently served by large septic systems (aka Class V wells) permitted through the WDEQ/UIC program. Groundwater monitoring data indicates the systems are not adequately treating wastewater, as ammonia concentrations exceed the groundwater protection standard (GPS). The Inns preferred wastewater management option is to connect to the Town's wastewater system. This would require construction of 7,500 LF of sanitary sewer force main along Highway 89.

The second example involves the consideration of temporary workforce housing by WYDOT, by the Bureau of Land Management (BLM) on the BLM parcel south of the Snake River Bridge on Highway 89. The South Park Boat Ramp is also located on the BLM parcel on the east side of Highway 89. WYDOT has proposed a storage tank to temporarily store and then pump wastewater. The force main in this area is of interest as Parcel 26 could be a potential site for an RV dump station as discussed in Attachment A.

There are many other locations within the County where ownership of new sewer lines may provide water quality benefits such as Hi Country Subdivision, South Park Ranches, etc. which may come as recommendations in the final WQMP.

BENEFITS	CHALLENGES
1. Remove source of current and future potential groundwater contamination sources 2. If adequately sized, will provide other landowners the opportunity to connect in the future and reduce the number of non-point sources, which could impact water quality. 3. The County would be allowed to apply for loans or grants from Clean Water State Revolving Fund (currently the County is not able to apply on behalf of another entity if we don't own the infrastructure). 4. Landowners along the conceptual Flat Creek force main route have expressed interest in connecting to the force main.	1. The County currently does not own wastewater infrastructure, with the exception of Adams Canyon sewer, and it is unclear how the the County would navigate the process of forming a utility. 2. Obtaining easements for a new force main in WYDOT ROW would require interested entities to form a Water & Sewer District. 3. Management, operation, and maintenance of infrastructure would require additional staff or a contractor. 4. Consideration of the capacity of Munger Mountain force main and other facilities to serve additional properties

ESTIMATED COST

TBD

COST NOTES

N/A

SUGGESTED NEXT STEPS

It is suggested that the Teton County Board of County Commissioners provide direction on whether or not to proceed. If so, staff would investigate implementation and operations options and will report back to the BCC.

ATTACHMENT C

NEW SNOW STORAGE AREAS

**ATTACHMENT C. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING**

MITIGATION MEASURE

Establish New Snow Storage Areas

DESCRIPTION

Snow removed within the Town of Jackson is stored in a large storage pile at the Teton County Fairgrounds and, at times, Town and WYDOT snow removal efforts fully utilize the site's capacity. When snow melts at the current site, snowmelt, as surface water runoff, is conveyed to the Karns Meadow treatment wetlands, which provide treatment prior to discharge to Flat Creek.

Trihydro contacted 13 snow removal companies to inquire about their snow removal practices. Only two companies have a designated snow storage location. The Town routinely fields requests from private companies to haul snow to the Fairgrounds. Due to limited capacity, the Town politely denies requests.

BENEFITS	CHALLENGES
1. Stored snow could be managed in a controlled manner, thus reducing impacts to water quality. 2. Provides a solution for snow storage during years of high snowfall. 3. Will reduce the likelihood of unauthorized snow storage on public lands.	1. Identifying and obtaining a suitable location(s) with adequate access and capacity. 2. Incorporating passive treatment technologies to treat snow melt prior to discharge to surface waters. 3. Determining how to charge for the service and who could utilize snow storage areas. 4. Will require additional staff time to manage the storage areas

ESTIMATED COST

TBD

COST NOTES

NA

SUGGESTED NEXT STEPS

It is suggested the Teton County Board of County Commissioners provide direction on how to proceed.

ATTACHMENT D

**RESIDENTIAL SEPTIC REPLACEMENT AND
SEWER CONNECTION PROGRAM**

- D-1. MITIGATION MEASURE SUMMARY**
- D-2. SHERIDAN COUNTY CONSERVATION DISTRICT (SCCD) PROGRAM
PROCESS**
- D-3. SCCD PROCESS CHECKLIST**
- D-4. SCCD SEPTIC SYSTEM SELF-ASSESSMENT AND PROGRAM ELIGIBILITY**

ATTACHMENT D-1

MITIGATION MEASURE SUMMARY

**ATTACHMENT D. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING**

MITIGATION MEASURE

Residential Septic Replacement and Sewer Connection Program

DESCRIPTION

Teton County currently has approximately 2,000 small wastewater facilities (SWF). The Teton Conservation District's septic inspection and maintenance program, which was active from 2017 to 2019, determined that approximately 11% of SWF's require immediate maintenance. However, it is unknown how many SWF's need to be replaced. Funds would be used to create a grant/loan program to provide financial assistance to low-income residents to replace their septic systems.

In 2022, Teton County submitted four projects for inclusion on the Clean Water State Revolving Fund (CWSRF) Intended Use Plan (IUP), including a Septic Replacement Program. None of the projects were included on the 2022 CWSRF IUP, which includes 178 projects statewide. Based on the CWSRF IUP ranking criteria, it is unlikely funding for a septic replacement program will be obtained through the CWSRF. However, other counties in Wyoming obtain funding through the Section 319 Program. Typically, these are cost-share programs with the funding entity providing funds for up to 50% of the project cost. Information on the Sheridan County Conservation District's program is attached.

BENEFITS	CHALLENGES
1. Would encourage homeowners with limited resources to replace leachfields or connect to sanitary sewer, thus reducing wastewater load to groundwater. 2. Opportunities to partner with other local agencies or NGO's on funding or operations.	1. Managing the program will require staff resources from the County. Staff are needed to determine if a system qualifies for financial assistance, confirm project requirements are met, etc. 2. Confirming the number of failed SWF's in Teton County will require significant effort. 3. Determining areas to prioritize sewer connection if lines are available or will come available in near future 4. Establishing a new program will require significant effort on existing staff whom already have substantial workloads.

ESTIMATED COST

TBD

COST NOTES

Cost will be dependent upon actual number of systems that require replacement and funding mechanism.

SUGGESTED NEXT STEPS

It is suggested the Teton County Board of County Commissioners provide direction on how to proceed.

ATTACHMENT D-2

SHERIDAN COUNTY CONSERVATION DISTRICT (SCCD) PROGRAM PROCESS



SHERIDAN COUNTY CONSERVATION DISTRICT

1949 SUGARLAND DRIVE, SUITE 102, SHERIDAN, WYOMING 82801
(307) 672-5820 ext. 3 | www.sccdwy.org

Protecting Sheridan County's Water and Land Quality through Assistance Programs, Information and Outreach, Monitoring, and Planning

WATER QUALITY IMPROVEMENT PROGRAM PROCESS DETAILS

1. Landowner identifies concerns and completes self-assessment.

Assessment can be picked up at our office or downloaded from www.sccdwy.org.

2. If project fits criteria in self-assessment, landowner contacts SCCD to set up a site visit.

3. SCCD determines project eligibility. If project is eligible:

- a. **Landowner submits a project application and self-assessment to SCCD prior to an announced application deadline (typically, once in spring and once in fall).** The SCCD staff is happy to assist the landowner with completion of the self-assessment and/or the project application. Depending on the complexity of the project and whether engineering/surveys are needed, there may be some technical work completed by SCCD/NRCS before the actual application is submitted; however, a signed application will be needed before project consideration by the Board. SCCD will use project ranking sheets to determine the project priority in relation to other project requests, priority watersheds, and available funding/assistance.
- b. **SCCD submits project description and location to the Wyoming Department of Environmental Quality (WDEQ) or other applicable funding agency for authorization to use funds.**
The funding that SCCD provides comes from federal and/or state grants that have certain requirements. SCCD is required to submit a project description and location to the WDEQ and other granting agencies for authorization to use the funds on a specific project. These agencies have 60 days to respond; it is best to submit these as early as possible.
- c. **SCCD submits a cultural resource clearance request to State Historical Preservation Office (SHPO).**
SCCD is also required to submit a project description and location to the State Historic Preservation Office for a cultural resource clearance.

*Authorization from a funding agency or permitting authority does **not** constitute approval from SCCD Board.*

4. SCCD and/or NRCS and landowner develop alternatives and project designs, if needed.

Based on resource concerns, site conditions, and landowner preferences, SCCD and NRCS will develop a project plan that identifies what practices will be completed and where. This can take some time with developing and modifying alternatives to meet landowner and program goals.

Landowner secures necessary permits, easements, water rights, etc., including, but not limited to:

Septic and/or sewer projects: The landowner or their contractor must submit a permit application to Sheridan County or the City of Sheridan. The permit application will require excavation of a test pit and percolation tests and includes the size and design information. An approved permit is required for SCCD to develop the contract and budget. SCCD will allow costs associated with preparation of the permit application to be retroactively included as part of the landowner match for the project. **Other construction activities must wait until after a SCCD contract is signed.**

Water projects: Wells or other permits for water sources must be submitted to the appropriate agency; any instream construction will require a turbidity waiver from WDEQ. These are submitted by the landowner.

Other Projects: Costs associated with engineering plans/designs and permits will be discussed on a case-by-case basis and an eligibility determination made by the Board.

5. Landowner obtains cost estimates from a contractor and provides SCCD with copies of the estimate, applicable permits, easements, etc.

For projects that will be completed by a contractor, the SCCD requires at least one cost estimate to use in contract and budget development. SCCD may request a second estimate if they feel one is needed. For labor that landowners complete themselves, SCCD uses a rate of \$20/hour for general labor and \$100/hour for labor involving large equipment. SCCD uses the NRCS Payment Schedule for materials provided by landowners; these may be adjusted in consultation with the landowner and/or SCCD staff.

6. After the appropriate batching deadline (one in spring, one in late summer), the Board will review, prioritize and allocate funding. If selected, SCCD develops a contract and budget.

A contract needs to be signed by the landowner and the Board prior to ANY project construction. SCCD staff will use the provided information, designs, cost estimates, etc. to develop the budget and contract.

a. A Board member will sign off on the project contract and budget.

b. Landowner reviews and signs the contract and budget and completes a W-9.

SCCD is required to submit 1099 information returns to the IRS for all cost-share payments; the W-9 ensures that we have the proper information. The landowner will have to complete all information, including providing a social security number or Tax Identification Number.

7. Landowner initiates project construction.

Once the contract has been approved and signed, the landowner may begin construction. The landowner can use any contractor, even one that did not submit a cost estimate. However, the project payment will be limited to what was included in the budget. The landowner is responsible for communicating project objectives and requirements to contractors; SCCD can meet with the contractor and landowner if needed. For any work not completed by a contractor, the landowner is responsible for maintaining documentation of hours for any labor, equipment, etc. SCCD does not assist in actual project construction; but may stop out during construction to evaluate progress.

8. SCCD visits the site to take pictures and measurements, as needed, before, during and after construction.

SCCD will visit the site to take measurements, photos, GPS points, and other notes needed to validate measurements and construction elements. SCCD does not provide inspection for regulatory compliance.

9. Landowner submits bills, invoices, receipts, etc. to SCCD after construction is complete.

10. SCCD submits reimbursement request to the funding agency.

Upon receipt of expense documentation, SCCD will submit a reimbursement request to the funding agencies. SCCD can only submit requests to a granting agency once per month and if a request has already been submitted, the request will have to wait until the next month. Upon receipt of the funds from the granting agency, SCCD will make payment to the landowner at the next regularly scheduled Board meeting. Please note that this payment can take up to 90 days after SCCD receives the bills from the landowner. The landowner is responsible for making all payments to the contractor and/or for purchasing supplies.

11. SCCD receives funds within 90 days. Landowner must sign a payment voucher prior to receiving payment.

SCCD is required to maintain a payment voucher for disbursements; these need to be signed by the landowner and returned to the SCCD.

ATTACHMENT D-3

SCCD PROCESS CHECKLIST



SHERIDAN COUNTY CONSERVATION DISTRICT

1949 SUGARLAND DRIVE, SUITE 102, SHERIDAN, WYOMING 82801
(307) 672-5820 ext. 3 | www.sccdwy.org

Protecting Sheridan County's Water and Land Quality through Assistance Programs, Information and Outreach, Monitoring, and Planning

WATER QUALITY IMPROVEMENT PROGRAM PROCESS CHECKLIST

The Sheridan County Conservation District (SCCD) will only pay for activities completed after a project contract and budget have been signed by the landowner and the SCCD Board. Project and contract development can take a considerable amount of time. In addition to SCCD staff time, permitting and/or other requirements imposed by granting agencies typically have a review and response period associated with them. SCCD staff will work with the applicant to ensure all items are completed; however, the applicant will have some work involved too. This checklist will guide you through the process as required to receive cost-share assistance on a project.

Steps	Description	Date
1.	Landowner identifies concerns and completes self-assessment.	
2.	If project fits criteria in the self-assessment, landowner contacts SCCD to set up a site visit.	
3.	SCCD determines project eligibility. If project is eligible: a. Landowner submits a project application and self-assessment to SCCD prior to an announced application deadline (typically one in spring, one in fall). b. SCCD submits project description and location to the Wyoming Department of Environmental Quality or other applicable funding agency for authorization to use funds. c. SCCD submits a cultural resource clearance request to the State Historical Preservation Office (SHPO). Authorization from the funding agency is only the first step in the approval process. Cost-share assistance is not guaranteed until a project contract and budget are approved and signed by the landowner and a Board member (step 7).	
4.	SCCD and/or NRCS and landowner develop alternatives and project designs, if needed.	
5.	Landowner secures necessary permits, easements, water rights, etc., including, but not limited to: <i>Septics:</i> County septic permit or City of Sheridan sewer tap permit <i>Stockwater:</i> Well and/or SAWS permit; water rights verification <i>Streamwork:</i> WDEQ turbidity waiver; COE authorizations/notifications	
6.	Landowner obtains cost estimates from contractor and provides SCCD with copies of the estimate, applicable permits, easements, etc.	
7.	Board reviews, prioritizes, and approves applications; SCCD staff develop a contract and budget for approved projects. a. A Board member will sign off on the project contract and budget. b. Landowner reviews and signs the contract and budget and completes a W-9.	
8.	Landowner initiates project construction. Any construction activities that occur prior to the completion of steps 1-7 will NOT be reimbursed.	
9.	SCCD visits the site to take pictures and measurements, as needed, before, during and after the construction process.	
10.	Landowner submits bills, receipts, etc. to SCCD after construction is complete.	
11.	SCCD submits a reimbursement request to the funding agency.	
12.	SCCD receives funds within 90 days. Landowner must sign a payment voucher and return completed W-9 prior to receiving payment.	

ATTACHMENT D-4

SCCD SEPTIC SYSTEM SELF-ASSESSMENT AND PROGRAM ELIGIBILITY



SHERIDAN COUNTY CONSERVATION DISTRICT

1949 SUGARLAND DRIVE, SUITE 102, SHERIDAN, WYOMING 82801
(307) 672-5820 ext. 3 | www.sccdwy.org

Protecting Sheridan County's Water and Land Quality through Assistance Programs, Information and Outreach, Monitoring, and Planning

SEPTIC SYSTEM SELF-ASSESSMENT AND PROGRAM ELIGIBILITY

INSTRUCTIONS: This form is intended to be used by owners/operators of septic systems to evaluate the potential risk factors of their septic system. It does not take the place of a septic system inspection.

LANDOWNER: _____

Septic System Features	Low Risk	High Risk	Unknown
REGULATORY CONSIDERATIONS			
Is the system permitted by Sheridan County?	Yes	No	Unknown
Does the location of the septic tank meet the following minimum distance requirements? →50' away from water wells (including neighbor's) →10' away from property lines →5' away from building foundations →25' away from potable water pipes →50' away from surface waterbodies	Yes	No	Unknown
Does the location of the leachfield meet the following minimum distance requirements? →100' away from water wells (including neighbor's) →10' away from property lines →5' away from building foundations without drains →25' away from building foundations with drains →25' away from potable water pipes →10' away from the septic tank →50' away from surface waterbodies	Yes	No	Unknown
What is the construction material of the septic tank?	Concrete, Fiberglass	Metal, Other	Unknown
Is there a clean out between the house and the septic tank?	Yes	No	Unknown
Is the leachfield located under an impermeable or compacted surface such as concrete, asphalt, brick, parking areas, or buildings?	No	Yes	Unknown
Is the septic tank capacity at least 1000 gallons (for ALL residences up to 4 bedrooms)?	Yes	No	Unknown
For residences with over 4 bedrooms, is the relationship between the septic tank and the size of the household less than 250 gallons per BEDROOM (septic tank size in gallons divided by the number of bedrooms)?	Yes	No	Unknown
ENVIRONMENTAL AND HEALTH CONSIDERATIONS			
Is wastewater discharged directly to any surface waterbody (stream/river, irrigation ditch, pond/reservoir etc.)?	No	Yes	Unknown
Is there ponding or wastewater breakout at the ground surface?	No	Yes	Unknown
Is the distance from the septic system (tank or leachfield) to any surface waterbody less than 50 feet?	No	Yes	Unknown
Does terrain slope towards or away from any surface waterbody?	Away	Toward	Unknown



SHERIDAN COUNTY CONSERVATION DISTRICT

1949 SUGARLAND DRIVE, SUITE 102, SHERIDAN, WYOMING 82801
(307) 672-5820 ext. 3 | www.sccdwy.org

Protecting Sheridan County's Water and Land Quality through Assistance Programs, Information and Outreach, Monitoring, and Planning

Septic System Features	Low Risk	High Risk	Unknown
Is the depth to the seasonal high groundwater table less than 4 feet?	No	Yes	Unknown
Are soils characterized by one of the following? →gravelly rocky soils that water passes through easily →very tight, clayey soils that water cannot penetrate	No	Yes	Unknown
Are there any signs of system malfunction present? →Septic Odors →Burnt out grass or ground staining over the leach field →Patches of lush green grass over the leach field →Pipes exposed or apparent cave-ins →Cracks or signs of leakage in risers and lids	No	Yes	Unknown
FUNCTION AND MAINTENANCE CONSIDERATIONS			
Is run-off from storm water, sump pumps, foundation drains or roofs diverted to flow into the septic system?	No	Yes	Unknown
Are trees, large shrubs, or other plants with extensive root systems in the vicinity (10 feet) of the leach field?	No	Yes	Unknown
Has the tank been inspected and/or pumped in the last three years?	Yes	No	Unknown
Is the system less than 25 years old?	Yes	No	Unknown

If most of your responses fall into a high-risk category (or are unknown), it is recommended that you explore options to address potential impacts. Please proceed to the next section to determine whether you qualify for funding assistance from the SCCD.

SECTION 1. BASIC PROGRAM ELIGIBILITY		
a) Was the existing system installed prior to July 1, 1973?	YES	NO
b) Does the system service a single-family dwelling only?	YES	NO
c) Does the system impact one of the eligible "impaired" waterbodies (below)?	YES	NO
If you answered NO to any of the questions in section 1, your system is not eligible for funding assistance through the SCCD. If you answered YES to <u>ALL</u> the questions in section 1, please proceed to section 2.		
SECTION 2. WATER QUALITY IMPACT PRIORITY		
a) Does the system discharge directly (i.e. straight pipe) into one of the listed waterbodies (below) or into a perennial tributary or ditch that flows into one of the listed waterbodies?	YES	NO
b) Does wastewater from the system surface within 500 feet of one of the listed waterbodies (below), or from a perennial tributary, or ditch that flows into one of the listed waterbodies?	YES	NO
c) If groundwater seepage from a system is suspected, is it within 50 feet of a listed waterbody (below)?	YES	NO
If you answered YES to any one of the above questions in Section 2, you may qualify for funding assistance. Please contact the Sheridan County Conservation District for a site evaluation.		

Sheridan County Waterbodies listed as impaired for bacteria by the State of Wyoming

Beaver Creek	Fivemile Creek	Little Goose Creek	Park Creek	Smith Creek
Big Goose Creek	Goose Creek	Little Tongue River	Prairie Dog Creek	Soldier Creek
Columbus Creek	Jackson Creek	Meade Creek	Rapid Creek	Tongue River
Wolf Creek	Kruse Creek	McCormick Creek	Sackett Creek	Wildcat Creek

ATTACHMENT E

**FUTURE DEVELOPMENT CONSIDERATIONS IN AREAS WITH WATER QUALITY
CONCERNS**

**ATTACHMENT E. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING**

MITIGATION MEASURE

Future Development Considerations in Areas with Water Quality Concerns

DESCRIPTION
County Planning and Engineering staff receive development applications in areas where groundwater quality exceeds drinking water standards, such as the Hoback Junction area. County staff is challenged to review and appropriately address proposed projects while knowing that water quality and vulnerability in certain areas is already an issue. Staff is seeking to obtain guidance from elected officials to determine the best path forward when reviewing proposed projects while adhering to current regulations.

BENEFITS	CHALLENGES
1. Provide staff with direction to adequately address proposed projects in areas that have known water contamination issues.	1. If projects meet current County regulations, it may be challenging to delay approval or impose more stringent requirements.

ESTIMATED COST

NA

COST NOTES
NA

SUGGESTED NEXT STEPS
It is suggested the Teton County Board of County Commissioners provide direction on how to proceed.

ATTACHMENT F

MODIFY LDR SUBDIVISION REVIEW PROCESS

**ATTACHMENT F. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING**

MITIGATION MEASURE

Modify LDR Subdivision Review Process

DESCRIPTION

Chapter 23 of the Wyoming Department of Environmental Quality Water Quality Rules and Regulations (WDEQ/WQRR) requires county subdivisions be reviewed by WDEQ. Teton County has been granted the authority to review subdivisions that create one to five lots (small subdivisions). Subdivisions that create six lots or more (large subdivisions) in Teton County are required to submit a Subdivision Application to WDEQ. The applicant is required to demonstrate the proposed sewer system will not affect the suitability or safety of the proposed water supply system and must demonstrate potential impacts to downgradient use of groundwater. WDEQ then reviews the application and provides recommendations to the county prior to subdivision approval. Chapter 23 also provides the county with the ability to defer review of small subdivisions to WDEQ in instances in which unique site conditions or other criteria are present and the county chooses not to review the application.

The current Teton County Land Development Regulations (LDR) do not reference Chapter 23 of the WDEQ/WQRR. However, the subdivision review process is still necessary per State statute. The county does not typically see subdivision applications that create lots, but it is important to reference Chapter 23 in the LDRs should a subdivision be proposed in the future.

BENEFITS

1. Will provide further clarification of the subdivision process for entities seeking to subdivide property.
2. Provide an avenue to address specific applications that the County does not have adequate expertise to review.

CHALLENGES

1. Modification of the LDRs is a lengthy process, thus implementation will take some time.

ESTIMATED COST

NA

COST NOTES

NA

SUGGESTED NEXT STEPS

The LDRs should be updated to reference WDEQ/WQRR Chapter 23. At a minimum, planning staff should be made aware of this requirement in the event a subdivision application is submitted prior to an LDR update.

ATTACHMENT G

WATER QUALITY MONITORING PROGRAM

**ATTACHMENT G. SHORT-TERM MITIGATION MEASURES
TETON COUNTY WATER QUALITY MASTER PLAN, TETON COUNTY, WYOMING**

MITIGATION MEASURE

Water Quality Monitoring Program

DESCRIPTION

The 1978 Water Quality Management Plan, or Section 208 Plan, recommended the county establish a county-wide water quality monitoring program. Additionally, several other studies recommended continued water quality monitoring. Available water quality data typically focuses on evaluating a specific issue over a specific period of time. Evaluation of data as part of the WQMP project has been challenging as the county's hydrogeology and hydrology is complex. Surface and groundwater are connected throughout many areas of the county and water quality varies from season to season. Consistent groundwater and surface water data collection since the 1970's would have provided information necessary to readily assess historical changes in water quality, as well as water quality today. The initiation of a program now would be beneficial to determine the effectiveness of mitigation measures implemented in the future.

BENEFITS

1. Will provide consistent water quality data going forward to evaluate water quality conditions and make informed decisions.
2. Will provide appropriate spatial and temporal data county-wide.
3. Will provide adequate data to evaluate the effectiveness of mitigation measures in the future.
4. Will provide background and downgradient water quality data, which is necessary to evaluate water quality impacts

CHALLENGES

1. Development of a countywide monitoring network will require significant planning to adequately monitor groundwater and surface conditions.
2. Self-performing monitoring activities will require A1 1-2 additional staff to collect samples, review data, and manage a database, or a consultant contract.
3. Multiple entities collect water quality data, and coordination with them is important, but might be challenging.
4. Statistical analysis requires at least 8-10 monitoring events

ESTIMATED COST

\$300,000 - \$500,000

COST NOTES

Costs of the program are relative to the number of monitoring locations, water quality parameters, and events per year included in the monitoring plan. There would be higher initial costs to establish monitoring network and protocols the first year.

SUGGESTED NEXT STEPS

Establishing a water quality monitoring program will likely require use of a consultant to develop the monitoring plan, conduct routine monitoring, perform data validation & analysis; and maintain a water quality database. The county may wish to consider the following steps to initiate the program:

1. Prepare a detailed scope of work
2. Solicit proposals from qualified consultants
3. Select and contract with a consultant
4. Consultant will design the monitoring network; recommend sampling frequency; develop a sampling and analysis plan; and, possibly develop a statistical analysis plan.
5. Conduct routine monitoring, data validation, and analysis

STAFF REPORT



Meeting Date:	March 20, 2023	Meeting Title:	Workshop
Submitting Department:	Community Development	Presenter:	Susan Scarlata & Aaron Carrillo
Agenda Item:	Parklet Fee Structure	Public Comment:	Yes

Purpose & Policy Considerations.

The purpose of this agenda item is to outline and get direction about the Town's plan for creating a permanent Parklet Program in the summer of 2023.

Requested Action.

Staff is seeking direction on the fee structure and permitting process for the Parklet Program.

Recommendations.

Staff recommends continuing the Parklet Program with a set, flat-rate fee structure and issuance of permits for up to 3 years.

Background.

In the summer of 2020, to offset some of the impacts of COVID, the Town of Jackson activated Flex Spaces along portions of Center Street and Deloney Avenue and permitted businesses to host Parklets as extensions of their indoor spaces. This practice was continued through the summers of 2021 and 2022. At Council's June 21, 2022 meeting an MOU between the Town of Jackson and the Jackson Hole Chamber of Commerce establishing the Parklet Ambassador Program was approved. In the Summer of 2022, 8 Parklets were approved and activated in front of businesses in the Public Right of Way (ROW). In addition, the Town activated Flex Space on Center Street and Deloney Avenue including tables, chairs, and planters placed in parking spaces on Center Street. As part of the Downtown Ambassador program, the JH Chamber of Commerce set up a table on the S.W. corner of the Town Square. In addition to being a presence and answering questions from visitors in the downtown area, the Downtown Ambassador regularly inspected the Parklets and cleaned and maintained the Flex Space areas. At Town Council's January 17, Council provided direction to continue creating Flex Space with the potential addition of umbrellas for shared, potential options for permitting length and fee schedules, and asked staff to bring the items back. Council also discussed the success of the Downtown Ambassador program in partnership with the Chamber of Commerce and Travel & Tourism Board and funding for this program as well as the Flex Space. Conversations on that program are still in process and will come back to Council before the start of the summer.

Analysis & Key Policy Questions.

As the Town of Jackson continues to create more structure for the Parklet Program, we are now seeking further clarity from Council about fees the Town may collect for allowing businesses to expand their operations into the Public Right of Way. Eight Parklets were approved last summer, and they utilized them differently to serve both food and alcohol, to serve food only, or to simply expand seating without food or beverage service. The majority of these Parklets utilized three parking spaces. Typically, the operating window when it is realistic that patrons will eat outside goes from mid-May through the end of October. For some specificity though, in 2022 various businesses hosted Parklets from June 11 through October 31.

The Town has not charged fees for Parklets yet. Last year Council indicated a desire to potentially charge as Parklets are utilizing the ROW, and administering and managing the program requires hours and capacity from Town staff. Staff researched several different Parklet Program Fee Structures in different parts of the country. A wide range of fee structures exist from municipalities that charge less than \$200 up to \$10,000 per Parklet. At the conclusion of the summer of 2021, staff surveyed all approved Parklet applicants about a number of different things including a possible fee structure for Parklets. Similar to what staff found through broader research, responses ranged from indicating that if

a fee was charged the business would choose not to host a Parklet to other businesses indicating that reasonable fees would be between \$6,500 and \$8,500 for an annual fee to host the parklet.

At its January 17 meeting, Council had a robust discussion about Parklets. Council agreed that applicants should be able to apply for Parklet Permits for 3-year terms, and that 3-parking spaces will continue to be the maximum number that businesses can utilize to host parklets. At that meeting, Council discussed the \$84 per-day fee the Town charges for construction projects to utilize or stage in parking spaces. Utilizing construction-project fees with a ballpark that businesses can host Parklets for 120 days (actually a low estimate) and most have three parking spaces, the annual fee for a Parklet would come to at least \$30,240. Council agreed that was helpful information and context but did not want to base the Town's Parklet fee structure on construction fees. In January, Council also asked for further information regarding sewer capacity fees that restaurants pay. The Town's Engineering Department typically reviews sewer capacity fees when a business submits a request for a change-of-use permit. Sewer capacity fees for restaurants are based on the number of seats and measured by dividing the amount of additional seating space requested by 15 square feet per seat. Sewer Capacity fees are charged once only and for full-service restaurants generally average out to about \$1,100 per seat. So, sewer capacity fees for a table with four seats would be about \$4,500 and adding 5 tables that seat 4 people would be about \$22,300. Staff interprets this similarly to the construction fees for parking spaces, which while helpful information that provides perspective and context, does not present a direct equivalent or basis for the Parklet Fee Structure the Town is creating.

Parklet Fee Structure

Having researched programs across the country, the vast majority of municipalities that have permanent Parklet programs have made them as simple as possible to reduce the administrative burden on staff. The more that staff dug in to this since January, the more convinced we have become that a flat-rate for Parklets, with some ability to pro-rate, makes the most sense for this program. Staff recommends that Parklet fees be a flat, non-refundable permit fee of \$3,500 to cover the Town's administration of this program. Businesses that are approved for Parklet permits may pay annually or all at once for a three-year term.

Parklet Requirements

Staff have provided below a general list of other parklet requirements for Council consideration:

1. Parklets may use up to 3 (non-restricted parking spaces, i.e., non-ADA, -fire lane, -red curb, 15-minute, etc.) parking spaces for Parklet operation.
2. Parklets may operate from May 1, through October 30, 2023.
3. Parklet Permits may be issued for up to 3 years; if businesses apply after May 1 of a permit issuance year, they would be prorated.
4. Parklet applications must include site-maps, which will be reviewed and approved by Town staff prior to permit issuance.
5. Businesses must adhere to the following minimum requirements and conditions in order to host Parklets.
 - Utilize up-to, but no more than, 3 parking spaces.
 - Remove all parklet structures and furnishings from the ROW no later than October 31 and not place any parklet structures or furnishings until April 30.
 - Not obstruct / interfere with the use of any restricted spaces (i.e., ADA, to include its appurtenant space, fire lane, red curb, 15-minute, etc.) or any parking spaces beyond those used for the Parklet.
 - Provide site plans, which TOJ will review and approve before the Parklet permit is issued.
 - Failure to comply with all TOJ codes may lead to revocation, suspension, and/or non-renewal of a Parklet Permit with no refund.
 - Provide proof of insurance.
 - Indemnify and hold the Town of Jackson harmless.

Key Questions:

1. Is Council comfortable with the staff recommended fee structure?
2. Is Council comfortable with the above minimum requirements and guidelines that will be incorporated into an Ordinance, establishing parameters to which businesses issued Parklet Permits will be expected to adhere?

Possible Alternatives.

Council could choose to create a sliding scale instead of a flat rate for the Parklet Program. This option will be more time consuming for staff, but provides for differentiation, lowering the barrier for entry for businesses not providing full food and beverage service. As previously proposed, permit fees could be based on the following. 1. Number of spaces used for Parklet (1, 2 or 3); 2. Number of months Parklet is hosted (May - October: 1, 2, 3, 4, 5 or 6); 3. Type of service in Parklet: seating only, food only, or food & alcohol.

A potential Parklet Fee Structure, based on previous example with suggested change incorporated:

- Establishment A: Seating area only (no food/beverage service) | $\$100 \times 6 \text{ months} \times 2 \text{ parking spots} = \$1,200$
- Establishment B: Full-service (food only) | $\$200 \times 6 \text{ months} \times 3 \text{ parking spots} = \$3,600$
- Establishment C: Full-service (food and alcohol) | $\$250 \times 6 \text{ months} \times 3 \text{ parking spaces} = \$4,500$

Comprehensive Plan & Priority Alignment.

The Parklet Program aligns with the Comprehensive Plan & Community Priority Goals in addressing Town as Heart of the Region - The Central Complete Neighborhood: The Town of Jackson will continue to be the primary location for jobs, housing, shopping, and cultural activities.

Fiscal Impact.

The Town of Jackson has not yet collected fees for Parklets so the decision today will, potentially, have a positive financial impact on the Town, helping recover some of the costs related to administering this program. The process for entities to apply to host Parklets is relatively set at this point, and the Flex Space tables and planters have already been purchased, so there are not currently any large costs related to this item.

Staff Impact.

Staff management of the Parklet program includes updating, posting, and reviewing and processing applications, reviewing site plans, and inspecting Parklets, reviewing guidelines with applicants, and general maintenance. Staff estimates the Parklet program has taken about 75 hours of staff time each summer.

Attachments or Links.

- Map of Parklets/Flex Space/Downtown Ambassador
- Survey of businesses who hosted Parklets last summer

Suggested Motion.

I move to direct staff to implement a Parklet program for the summer of 2023 with a flat rate fee structure and, at minimum, the operational requirements as presented in this staff report and direct staff to bring back an ordinance for Council review at a future Council meeting.

QUESTION #1

Based upon your use of a parklet previously are you in favor of continuing the program? Why?

Absolutely in favor!! Because of the pandemic, and the amazing weather in Jackson during the summer months, a lot of customers were specifically wanting to sit outside. Our parklet was full almost every day and it allowed us to provide seating to more guests than we have in past summers. In addition, our HOA has limited us on how many outside tables we can have so this allowed us to expand outside. We also purchased a lot of tables, chairs, planters, etc. specifically for the parklet – it would be a bummer if we weren't allowed to use again – I'm sure other businesses did the same.

After two years of parklets I would say they served their purpose during the height of the pandemic. I would not be in favor of continuing the program. The town of Jackson is hard enough to navigate with vehicles in the summer. We do not need the extra street blockage and diminished parking. Also, selfishly, we have a competitive advantage of having an outdoor space that we have paid all the mitigation fees on in order to maintain that advantage. Cafe Genevieve only has 50 seats indoors which in the winter is severely limiting. We make up for that lack of space in the summer months with the outdoor seating we provide. We also have paid the mitigation for sewer and water fees for our outdoor space.

We are in favor of it continuing both on a business and personal level. It allows for a lot more visitor entertainment, dining etc and creates a fun outdoor atmosphere in town. We have really enjoyed the ability to have a parklet the last few years and it has added to the visitor experience of Fall Arts Festival greatly. Our parklet allows us to have more of our artists at the gallery actively working and giving the public an opportunity to engage with artists, which is one of the experiences our clients remark as being one of the things they enjoy most about coming and returning year after year for the festival.

Yes, because everyone in this town was talking about how it transformed this town, people thought they were in Europe somewhere. Also the off set of losing dining inside. Even when restrictions were lifted we still didn't feel right cramming people next to others and giving them their space. It just feels right in a pandemic/endemic world. There was also the economic impact to us as a restaurant and the extra dollars that came in due to this. It was all a total win.

I am 100% in favor of keeping the parklet program going forward. Space is at such a premium in Jackson, that most restaurants can normally offer only very limited or no outdoor seating. The parklets are a great way to expand outdoor seating during the only months that it really makes sense as well as increase a restaurant's overall seating capacity and ability to serve more visitors.

I am in favor of continuing the program. I think it's a wonderful way that the town can help businesses with more opportunities and safety measures especially while most places are struggling with so many obstacles.

Yes, the parklet offered us the opportunity to serve a comfortable number of seats while social distance spacing and following the suggested guidelines put forth by the town while in Orange/Red covid levels. Assisted in keeping sales consistent. Without the parklet, we believe our restaurant would be in a much more dire financial position than it is now.

Yes! Definitely want to continue this in coming years ! Worked great for us.

QUESTION #2

Should the parklet program continue what do you believe is the value of the public right of way used for activating a parklet (utilizing 3 parking spaces for 6 months)?

Possible Ranges:

- a) \$0-\$2500
- b) \$2,500 – \$4,500
- c) \$4,500 - \$6,500
- d) \$6,500 - \$8,500
- e) Over \$10,000

Option a: \$0-\$2,500 – unfortunately, would probably not choose to have a parklet in the future if it was more than this.

I would think d. \$6500 - \$8500 per space used is reasonable.

I don't want to speak for the restaurants who have a parklet all summer in terms of value for them. Our recommendation would be to also have a shorter term fee for use of the spaces. We typically have it setup for about 2 weeks, so having a prorated weekly fee instead of a 6 month would be ideal for us.

I obviously would like to see this number as low as possible because it is the nature of the businessman in me to do so. However, if your studies have shown the average of \$5,500 then you cant argue that. I trust your judgment on what is right for the town and for its vendors to not make things excessive, but the town is a business just like us and the town has to make money, I get it.

I know that parking is always an issue and especially at a premium in the downtown area, but I really do think that the parklets are even more valuable. They really beautify the streets and make walking around downtown Jackson even more appealing. Personally, I would be comfortable with the B option, \$2500-4500 range for parklets. Beyond the rental of the space, parklets do cost quite a bit of money for each restaurant to equip and maintain. If the cost were above this range, I would have to think hard about participating again. Margins are already small in the food and beverage industry, and with the rising costs of food, rent, employees and inflation, I'm not sure that it is a cost I could justify.

Option a: It's hard to put a value on it because our parklet did not generate income for us this year due to being short staffed. We originally got approved to have it as a place where people could sit and drink a beer while they waited for their table. If we were to keep it as a "waiting area" I don't think it would generate enough income to make it worth a cost, again I'm really not sure because we couldn't use it.

We agree that it would make more sense to charge a monthly fee and an application fee. We do not believe the parklet should be a source of income for the town until we have lessened in risk level for a consistent period of time. If businesses will be charged by parking space we suggest that the town revisits parking fees for publicly parked cars around the square. Considering that we have 15+ employees who are using that parking daily, why charge businesses per parking spot when parking is not priced at a premium otherwise. On Center street alone: Tiger, Moos, Orsetto, Bistro & Kampai have a staff of roughly 10 (conservatively) each in the evenings, potentially 40-50 spots being used by staffing alone. We should push those spaces into public lots and charge for our tourists/locals in their leisure time, by the hours. As a note for Tiger specifically: We are the only restaurant in town that was heavily impacted by parklet costs, as we had to have one built. This program would not have been helpful to us if

we had not been able to afford close to 12k in building costs (especially in a town where the building is hard to come by and exorbitantly expensive.) It would be ideal for the town to help offset costs to businesses that exceed a reasonable cost.

I think the 0-2500 range is a good price

QUESTION #3

If parklets were approved to move forward, do you feel there is value in limiting the number of parking spaces utilized by a single parklet? If so, what would be the maximum number of parking spaces that a parklet should be permitted to utilize?

We had about 3 parking spaces taken up by our parklet I believe.. It was perfect! I don't have any preference really on whether or not it should be limited for our location specifically as there is plenty of street parking. But, I would like to have the option of 3 spots. Because ours was on the street, 3 gave us plenty of room for a decent amount of tables. More than 3 would have been harder to manage and keep clean so that's something to keep in mind. Also, in town parking is practically gold so I can see how limiting spaces in town might be necessary so there's room for people to park.

In order to be effective and financially viable, I would say three spaces would have to be the minimum, and they would need to be paid for up front. I think setting a higher price per space going forward would make operators really think about how they want to use the space they are taking away from the public.

There has to be some regulation or the whole thing has potential to be a giant parklet. I think restricting it to the spaces in front of a business is reasonable so it's not impeding access to any other business.

I think the 3 spaces allocated last year was perfect because it allowed us to get 5 four tops, which is what we lost inside.

I think a maximum of 2 parking spaces is reasonable.

Yes there should be a limit. I think the way you originally had it set up with 3 spaces worked well especially with the parking capacity we have and the amount of vehicles coming to our town.

Yes, We believe 3 spaces is sufficient for a business without a deck or patio, and 2 spaces for a business with a deck for a patio is sufficient. I wonder how the town feels about restaurants that have limited parking near them, Noodle kitchen comes to mind- will there be an option for them or a credit if they're unable to use the parking located around their facility? On a street such as Center, we are looking at 4-5 businesses intentionally taking up 12 spaces during the highest peak of our season- Tiger, Kampai, Orsetto & bistro, maybe Moos. That must impact businesses like Scandia down & the flower shop heavily, and should be taken into consideration. It would make sense that parking spots are prioritized and offered to businesses that do not have an existing roof/deck/patio. Bistro has a patio, rooftop, 3 parking spots for a parklet all while Cloudveil takes up an additional 4 spaces for arriving hotel guests. Orsetto as an example has reduced parking (public or private) by 3-4 spaces by installing a fixed patio. That may not fall under town parking, but it certainly has impacted our street. We recall it was brought up in years past and did not move forward, to turn Center into a closed-to-traffic street. As we move into our 3rd summer of covid, and local businesses on Center street have been able to adjust to parking and flow of traffic changes, this could be a good time to put that idea forward once more. We have been

informed that the town plans to run a walkway down Center street in the summer of 2023 that will push 6ft out from the boardwalk that the tiger is attached to. This could cause tiger to incur yet another parklet related cost for building- and will place a hard (public walking) obstacle between our restaurant and our guests. We would like to have a better understanding of the town's plan before the project is underway so we can plan accordingly, for our finances and service structure.

Limiting each Parklet to 3 spots I think is fair.

QUESTION #4

Do you have any additional feedback and/or considerations that you would like to provide?

We were very thankful to have the option of this parklet & I'm glad we had one. While the pandemic has overall brought many difficulties and effected our town (and the world) in many ways, I would say that the parklet has definitely been one positives to come out of the past 2 years! Thank you guys for allowing us to have this parklet & finding creative ways to support our local businesses.

I think it adds to the overall spirit of the town to have people out and about, provide more seating for dining and to help pull people off the square more. We would like to see them remain.

I know there is a cost to the town for this and I and many others are willing to pay for them, I would just hope that the town doesn't go too far with the fees and make it to where companies don't wish to do them because I think it does transform the town in the way I like my city to look for summer.

Nothing to add. I do believe that parklets add a lot to the atmosphere of downtown and make walking around especially appealing for visitors.

Overall the Parklet was a huge help to us during then continued pandemic and also as a tool to help us draw foot traffic over to our street . Love the atmosphere it creates in our downtown!

2022 Parklet / Flex Space

-  Parklet location
-  Flex Space location
-  Town Square Ambassador



One additional Parklet not on map
located at 505 Powderhorn Lane



COUNCIL WORKPLAN CALENDAR 2023				
MARCH	APRIL	MAY	JUNE	JULY
TOWN MTGS.	TOWN MTGS.	TOWN MTGS.	TOWN MTGS.	TOWN MTGS.
Begin Planning for Updates to Wasterwater Treatment Plant	Budget	License Plate Recognition Security Cameras	Equity Audit & Further Recommendations	Karns Meadow Master Plan
Wastewater Treatment Plant Construction Management	State Legislative Post-Session Debrief	Incorporating Drone-Use Into Police Department	State Legislative Post-Session Debrief? Moved to April	Stormwater Management Program
Joint Department Funding/Governance Proposal		Energy Audit RFP & Green House Gas Inventory		Support for Women's Reproductive Rights
		Updates to Public Works Fees		
		Budget		
JIM	JIM	JIM	JIM	JIM
Transportation Work Plan	Long-Range Planning Work Plan & Indicator Report	START JPA	Workforce Housing Mitigation	Workforce Housing Mitigation (Mtg. 2)
Housing Mitigation Policy Contract Amendment	Housing Supply & Work Plans	Budget	Rec Center Fee Policy & Schedule	
	Budget		Budget	
	START Van Pool/Ride Matching, Service to Airport/GTNP - Budget			
	New Housing Partnership Developments & Land Acquisition			
AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
TOWN MTGS.	TOWN MTGS.	TOWN MTGS.	TOWN MTGS.	TOWN MTGS.
State Legislative Approach & Agenda	Consideration of Town Org. Structure & Efficiency	Compliance Issues for FTA Grants	Town Mobility Overlay	Future staffing for all departments
Update to Anti-Discrimination Ordinance adding Anti-Bias Crimes	Council Retreat Planning & Execution	Urban Forest Ord. Update & Program Policy Procedures	Ecosystem Indicator Project	Total Compensation Review
	Design & Construction of Gregory Lane	Re-evaluation of large bldg/2:1 Workforce Bonus	Water Quality & Setting New Drinking Water Regs	Town Sustainability Plan
JIM	JIM	JIM	JIM	JIM
Cow Pasture 1 & 2 Softball Field Replacement	Design & Construction of Stilson	Safe Streets for All Safety Action Plan	Workforce Housing Mitigation (Mtg. 3)	Regional Gov. & Transportation Planning Process & Agreements

COUNCIL WORKPLAN CALENDAR 2024			
QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Town Employee Housing Strategy	Assisted Living Housing Program	Design of E. Broadway, N. Cache, Maple Way?	Water Quality & Setting Regs for Drinking Water (Mtg. 2)
Updated Design Standards for Safe Streets	Policy Manual Update	Continued Growth/Demand for EMS	Design & Construction of Gregory Lane (Mtg.3)
Planning Stormwater Management Program	Adding Fees for Services to Offset Costs	Fire/EMS Level of Service & Setting Expectations	
Equity Task Force Next Steps	Policy Manual Update	Volunteer Career/Staffing Model & Dynamics	
Budget	Design & Construction of Gregory Lane		
	Northern South Park		
	Budget		

SCOPING STAFF REPORTS

PROJECT	DEPARTMENT LEAD	REQUESTOR	MOTION MADE	BRING BACK DATE
				(60-ISH DAYS)
Construction Management Plans	Public Works	JR	8/15/22	February
Airport Capital Budget & Related Engagement	Admin	AJ	9/6/22	September
Center for the Arts Lease	Admin	AJ	5/22/22	March
Potential to Host Mountain Towns 2030	Comm. Dev.	JSC	12/19/22	March
Indoor Vaping Ordinance	Legal	HML	2/6/23	May
Research About Censure Policy	Legal	JR	2/9/23	June

POTENTIAL INITIATIVE (PI) LIST

PROJECT	Dept. Lead	Requestor
FROM COUNCIL		
Invest More Time in Relationship w/ County		JS
Information Technology 5-Year Work Plan	IT	JSC
Geographic Information System (GIS)		JSC
Revisit Comp Plan Definitions of 'Healthy Community'		JS
Revisit Comp Plan Definitions of 'Healthy Economy'		AJ
Alternative Forms of Government, Expanding # of Council Seats		JSC
Outside Evaluator to Assess Org. Structure & Transformation		JS
Adding Mill of Property Tax		AJ
Town Manager Prioritizing Organizational transformation		JS
Senior Staff Building in Time to be Strategic & Proactive		JS
Lodging Tax		AJ

Submittal / Request Section**April 10, 2023 JIM**

#	Submitter Name	Agenda Item	Time Needed	Date Submitted
1	April Norton	Housing Supply Plan + Housing Department Work Plan	120 min	12/28/2022
2	Ryan Hostetter	Long Range Planning Indicator Report and Work Plan	90 min	
3				
4				

April 17, 2023 Special Town Council Workshop - 9:00am

TOPIC

Workshop Items

Budget Introduction and Overview

Adjourn

DRAFT

April 17, 2023 Regular Town Council Workshop

Discussion

Budget Introduction and Overview

Council Liaison Assignments and Role Discussion

Legislative Approach/WAM Resolutions

Matters from Mayor and Council

Liaison Reports

Upcoming Agenda Update

Council Priorities and Upcoming Agendas

Adjourn

April 17, 2023 Regular Town Council Meeting

Consent Calendar

Special Event: Ultimate Towner Amazing Race

P23-002: Book Fair Temporary Sign

E21-002: 174 N King Street Easement Vacate Access and Utility Easement

E22-008: 225 N Jean Teton County School District Water Easement

E22-010: 520 W Broadway (Staples) Sewer Easement

Energy Audit for Town Facilities RFP

Discussion & Action Items

Resolutions

Ordinances

Ordinance J: Neighborhood High Density - 1 (NH-1) Zonign Amendment (second reading)

Matters from Mayor and Council

Town Manager's Report

Adjourn