# WASTEWATER TREATMENT FACILITY REUSE PLANNING STUDY

FOR THE

## TOWN OF CEDAREDGE

JUNE 2026

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# REUSE PLANNING STUDY

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JVA Project No. 260085.ENV

JUNE 2026

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# SECTION 1 - EXECUTIVE SUMMARY

This study evaluated the feasibility of implementing Colorado Department of Public Health and Environment (CDPHE) Regulation 84, compliant reclaimed water reuse, at the Town of Cedaredge Wastewater Treatment Facility (WWTF), with primary focus on golf course irrigation and secondary consideration of other non-potable uses. Using WWTF effluent as reclaimed water for golf course irrigation represents a practical opportunity to improve the Town's overall water management by putting a currently discharged resource to beneficial use. The analysis indicates that reclaimed water could offset a meaningful portion of irrigation demand during the irrigation season and reduce the frequency of the WWTF needing to meet the general permit obligations. However, supplemental supply from Cook Ditch and/or the existing storage pond would still be required during higher-demand irrigation periods, and the WWTF would continue to discharge effluent during non-irrigation months, non-irrigation hours, wet weather periods, maintenance events, treatment outages, and other times when reclaimed water cannot be beneficially used.

Based on review of existing treatment performance, the current WWTF is best aligned with Category 1 reclaimed water criteria and does not presently meet Category 2 requirements. Current effluent data indicate that the facility can reliably meet Category 1 E. coli and TSS criteria; however, the measured turbidity data are above the thresholds applicable to Category 2 reclaimed water, and the existing treatment process does not include tertiary filtration. For golf course irrigation, the applicable reclaimed water category depends on whether irrigation can be operated as restricted-access or must be treated as unrestricted-access. If public access cannot be effectively controlled during reclaimed water use, Category 2 treatment would likely be required. If the site can be managed as restricted-access during irrigation events, Category 1 may be feasible. This Category determination is subject to confirmation with the Town and CDPHE during reuse authorization development.

The alternatives were revised to reflect the Town Board's direction following the May 21st, 2026, Board meeting. The preferred near-term pathway is Category 1 reuse without equalization, consisting of direct pumping to the golf course irrigation connection near Holes 10-11, with the primary intent of irrigating Holes 10-18. A second Category 1 alternative retains equalization storage for added operational flexibility. A third alternative evaluates Category 2 reuse with tertiary filtration and no equalization, which would allow the Town to alternate between Surface Creek discharge and golf course irrigation. The previously evaluated option to pump to the upper golf course storage pond with larger pumps and electrical upgrades is documented as an evaluated but non-preferred alternative because the Town Board indicated that approach was cost prohibitive.

Overall, reclaimed water reuse appears technically feasible on a limited seasonal basis, but implementation is conditioned by three key issues:

- Confirmation of the required reuse category for golf course irrigation and other candidate uses;
- Completion of treatment upgrades if Category 2 reuse is pursued; and

- Confirmation of operational strategies for daily balancing, user authorization, and site management.

The recommended next step is for the Town to confirm the preferred reuse objective (restricted-access Category 1 reuse or unrestricted-access Category 2 reuse) and then advance the selected treatment and permitting path into preliminary design, Letter of Intent preparation, and coordination with CDPHE.

For Town decision-maker purposes, the principal policy and funding question is whether the Town wants to preserve a lower-cost Category 1 restricted-access reuse pathway for golf course irrigation or plan for a more expensive Category 2 unrestricted-access pathway with broader long-term flexibility.

# SECTION 2 – PROJECT BACKGROUND

## PROJECT PURPOSE

The purpose of this project is to evaluate the feasibility of implementing CDPHE Regulation 84-compliant reclaimed water reuse requirements at the Town of Cedaredge Wastewater Treatment Facility to support long-term sustainability, reduce operational and regulatory costs, and provide the Town with a clear basis for future decision-making. The study is intended to assess existing facility capabilities, identify viable reuse applications such as golf course irrigation and other non-potable uses, determine what treatment or infrastructure upgrades may be required and provide a limited comparison of filtration options, and evaluate the associated costs, risks, permitting implications, and potential financial benefits. The outcome is an integrated evaluation report that will define reuse viability, outline implementation considerations, and guide the Town's next steps toward permitting and design.

## TOWN INFRASTRUCTURE

### WASTEWATER TREATMENT FACILITY

The Town of Cedaredge Wastewater Treatment Facility (WWTF) is a centralized municipal wastewater treatment facility located south of downtown Cedaredge at an elevation of approximately 5,640 feet. The facility uses sequencing batch reactors for secondary treatment followed by chlorination and dechlorination prior to discharge. Average treated flow is approximately 0.140 million gallons per day (MGD), with observed seasonal variation generally between 0.120 and 0.160 MGD, and a maximum design capacity of 0.375 MGD. Based on available operating data, the facility provides consistent secondary treatment performance and currently discharges treated effluent by pumping approximately 4,960 feet to the outfall location.

### Current Discharge Permit Constraints

The Cedaredge WWTF currently discharges to Surface Creek under CDPS General Permit Certification COG591173. The certification authorizes discharge from the WWTF to Surface Creek and identifies the facility as a mechanical treatment facility with design flows greater than 0.25 MGD and less than 1.0 MGD. The hydraulic and organic capacities identified in the certification are 0.375 MGD and 939 lbs BOD5/day, respectively.

The discharge permit remains an important constraint for reuse planning because certain reclaimed water use would be seasonal and intermittent. Even if reclaimed water is used during approved golf course irrigation periods, the Town would continue to discharge to Surface Creek during non-irrigation months, non-irrigation hours, wet weather periods, maintenance events, treatment outages, and other times when reclaimed water cannot be beneficially used.

The current certification includes effluent limits and monitoring requirements for conventional parameters such as BOD5, TSS, pH, E. coli, and total residual chlorine, as well as additional parameters including total inorganic nitrogen, ammonia, nitrite, sulfate, sulfide, chloride, arsenic,

selenium, iron, manganese, chronic whole effluent toxicity, and one-time PFAS monitoring. The discharge permit fact sheet indicates that Surface Creek Segment COGULG07b is reviewable and classified for Agriculture, Aquatic Life Cold 1, Recreation P, and Water Supply uses. The low-flow analysis resulted in a 30E3-to-design-flow dilution ratio of 0:1 at the Cedaredge WWTF outfall. As a result, the discharge has little to no available dilution during critical low-flow conditions, which contributes to stringent water-quality-based and antidegradation-based effluent limitations.

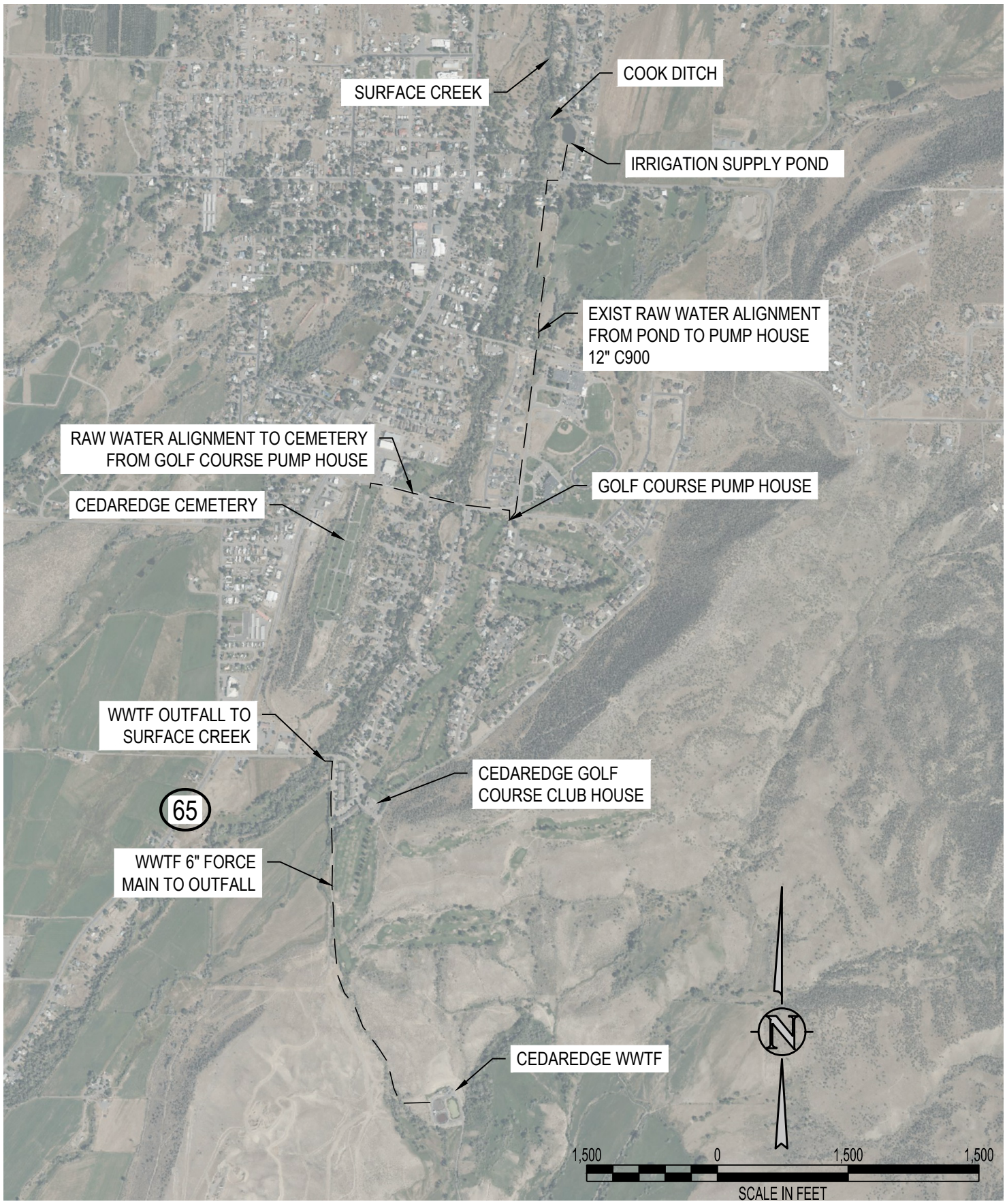
Several discharge permit requirements remain important to future WWTF planning. However, the timing of future compliance actions is currently uncertain because CDPHE has issued temporary discretion related to the COG591 general permit, and revised compliance milestones may be established once additional direction is available. The current certification includes compliance schedules for total recoverable arsenic, ammonia and total inorganic nitrogen, E. coli, and dissolved manganese. The ammonia and total inorganic nitrogen schedule had identified future milestones for engineering plans, construction commencement, and construction completion, but those deadlines are expected to be revisited once CDPHE provides additional direction. The Town should therefore continue tracking the COG591 requirements and anticipated schedule updates, while recognizing that new or revised compliance dates may be issued in the future. If the Town ultimately needs WWTF upgrades to address COG591, Regulation 31, Regulation 85, or stream-classification-based discharge requirements, those upgrades should be evaluated for compatibility with future Category 2 reuse so that discharge compliance improvements can potentially support both permit compliance and expanded reuse flexibility.

## Golf Course

The Cedaredge Golf Course, formerly known as the Deer Creek Village golf course, represents a significant municipal asset located at an elevation of approximately 6,100 feet on the southern slope of the Grand Mesa in Cedaredge, Colorado. This 18-hole public facility encompasses approximately 96.8 acres and has operated under the authority of the Town of Cedaredge since its establishment in 1992.

Public access is from 7:30 a.m. to 7:30 p.m. daily, necessitating an overnight irrigation window to ensure uninterrupted daytime use. To accommodate this schedule, the irrigation cycle is scheduled to run from approximately 7:45 p.m. to 6:45 a.m. over 500 zones, 11 zones at a time throughout the active growing season, which extends from mid-March to early November. Monthly water requirements vary significantly by season, escalating from 4 million gallons in the early spring to 15 million gallons during peak summer months, highlighting the system's total reliance on consistent mechanical performance and hydraulic integrity.

Currently, the irrigation infrastructure utilizes a water delivery system sourced from Surface Creek via the Cook Ditch, which feeds into a holding pond about a mile north of the golf course. Water gravity flows from the holding pond into a pump station on the north side of the golf course near hole 4. This raw water system irrigates holes 10-18 by gravity while holes 1-9 are boosted by 5 hp pumps. The irrigation distribution network consists of approximately 608 rotor heads and 892 impact sprinklers operating at a system pressure of roughly 80 psi. An overall site plan showing existing Town infrastructure is shown in Figure 1.




# FIGURE 1 - EXISTING INFRASTRUCTURE MAP

CEDAREDGE WWTF REUSE STUDY

MAY 2026

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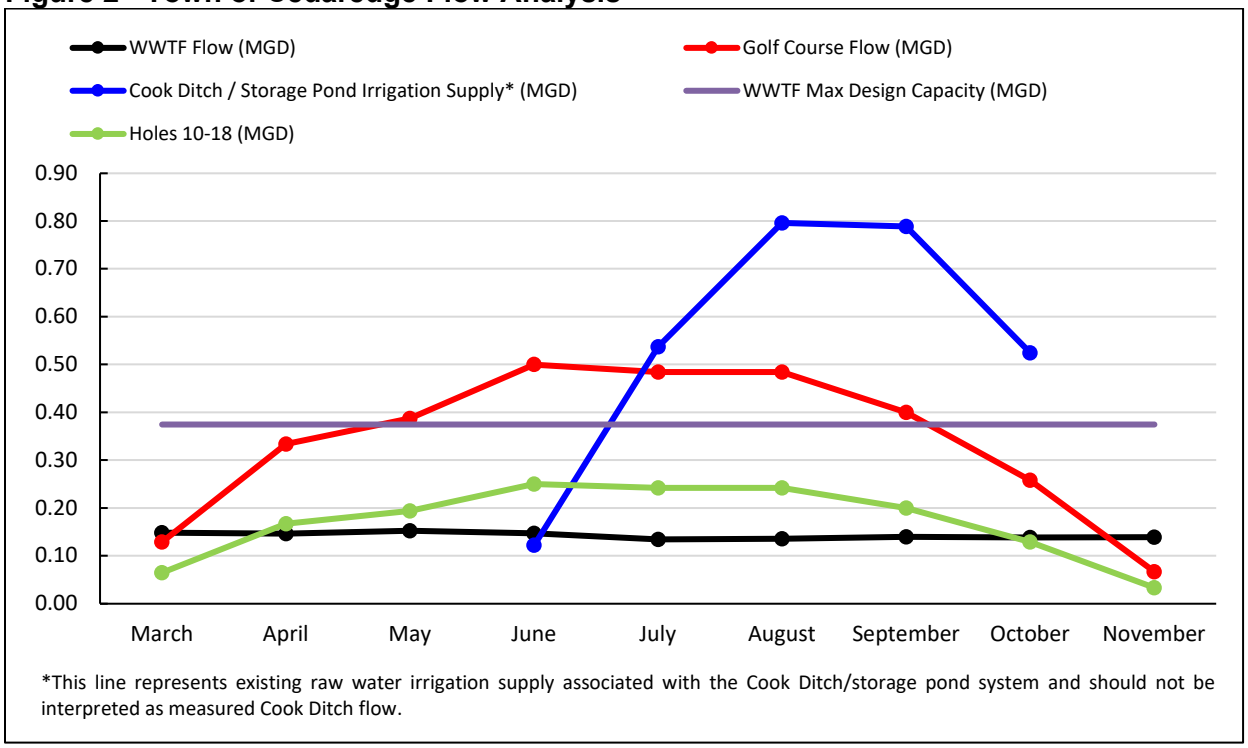
The Cedaredge Golf Course exhibits high seasonal water demand with total irrigation requirements ranging from approximately 0.067 MGD in November to approximately 0.500 MGD in June. For planning purposes, the estimated demand for Holes 10-18 was assumed to be approximately fifty-percent of total golf course demand because hole-by-hole irrigation data was not available. Under that assumption, Holes 10-18 demand ranges from approximately 0.033 MGD in November to approximately 0.250 MGD in June. By comparison, the WWTF produces a relatively consistent effluent flow throughout the year, averaging approximately 0.142 MGD with a maximum design capacity of 0.375 MGD, as shown in Figure 2 below. This suggests reclaimed water may substantially offset demand for Holes 10-18, but supplemental irrigation supply would still be needed during higher-demand months.

**Figure 2 - Town of Cedaredge Flow Analysis**




The monthly demand comparison demonstrates that reclaimed water could offset a portion of golf course irrigation demand during the irrigation season; however, monthly comparisons alone do not fully describe the operational mismatch between continuous wastewater generation and time-limited irrigation use. The WWTF produces effluent continuously over a 24-hour period, whereas golf course irrigation is expected to occur primarily during overnight hours. One implementation approach would be to automate diversion so that treated effluent is discharged to Surface Creek during non-irrigation periods and diverted to the golf course during approved irrigation periods. This approach could reduce capital cost by avoiding new equalization storage but would increase operational complexity and would require additional controls, instrumentation, and fail-safe interlocks associated with the chlorination/dechlorination system and diversion valves at the WWTF.

Alternatively, implementation of reuse could include short-term operational balancing, such as wet well storage, equalization volume, or limited reclaimed water storage, to better align daily production with the irrigation window. Equalization would improve operating flexibility but is not absolutely required if the Town elects to alternate between reclaimed water delivery and permitted discharge to Surface Creek. In addition, wet weather events, shoulder-season low irrigation demand, and temporary treatment outages would reduce immediate reclaimed water use and would require the Town to continue relying on the existing permitted discharge pathway when reclaimed water cannot be beneficially used. During irrigation periods when treated effluent is beneficially reused instead of discharged to Surface Creek, the Town may reduce exposure to discharge-related treatment, sampling, and reporting requirements under General Permit COG591; however, those permit requirements would continue to apply whenever effluent is discharged to Surface Creek.

A future design phase should further assess short-duration equalization needs and operational controls to manage day-to-day variation in reclaimed water production and demand. One potential planning-level option for short-term balancing may be repurposing and re-lining either part or all the former secondary oxidation pond, which is currently used as an emergency overflow basin. Based on preliminary assumptions, this basin may be able to provide about 2 million gallons of storage. This option would be subject to confirmation of available volume, operability, regulatory acceptability, and compatibility with the Town's overall WWTF operations.

Seasonal storage of the full non-irrigation season effluent volume may be technically possible but would be a substantially larger project than the alternatives evaluated in this study. A preliminary planning-level assessment indicates that storing winter effluent could require about 20 to 40 acres of suitable property, depending on storage depth, usable volume, geotechnical conditions, liner requirements, evaporation, and freeboard assumptions, and whether the facility would be regulated as a jurisdictional or non-jurisdictional dam by the State Engineer. Because of the likely land acquisition, permitting, geotechnical, dam safety, and capital cost implications, full seasonal storage should be identified as outside the scope of this study and carried forward only as a future separate evaluation if the Town wishes to eliminate or substantially reduce winter discharge.

# SECTION 3 – REGULATORY ASSESSMENT

## PURPOSE & PARAMETERS

CDPHE Regulation 84 governs the production and use of reclaimed water for approved non-potable applications. Reclaimed water is domestic wastewater treated to a specified level for authorized non-drinking uses including irrigation, industrial uses, fire protection, and certain indoor non-potable applications. The primary reuse application evaluated in this study is golf course irrigation, with secondary consideration of other landscape, construction, and municipal non-potable uses.

The Regulation defines the entity producing the effluent for reuse as "Treaters" and the entity receiving and utilizing the reuse water as "Users." Treaters (the WWTF) are further classified as centralized and localized facilities. Based on the Town's wastewater collection and treatment arrangement, the Cedaredge WWTF is best characterized as a centralized treatment system under Regulation 84. Accordingly, this evaluation is based on the regulatory framework applicable to centralized domestic wastewater treatment and reuse.

For all reuse applications, the key regulatory question is which reclaimed water category is required for the intended use and what treatment and operational controls are needed to meet that category. For irrigation, the required category depends on site access during reclaimed water use. These categories and their correlation with existing Town infrastructure are further described below.

Implementation under Regulation 84 would also require separate Treater and User authorizations, identification of the point of compliance, and compliance with applicable requirements for site management, signage, cross-connection control, operator training, monitoring, and agronomic-rate application. If the Town elects to proceed, a Letter of Intent (LOI) would be required to identify the proposed Treater and User, intended reclaimed water uses, anticipated reuse category, point of compliance, and general treatment and distribution approach. A more detailed breakdown of the requirements of the LOI are included in Section 6, however, the preparation and submittal of the LOI are excluded from this scope.

Regulation 84 authorization is separate from the Town's CDPS discharge permit for Surface Creek. Regulation 84 governs the production, distribution, and authorized use of reclaimed water for approved non-potable uses. The CDPS discharge permit governs treated effluent discharged to Surface Creek. Because the proposed reuse program would be seasonal and intermittent, and because the WWTF would continue to discharge when reclaimed water cannot be beneficially used, both regulatory frameworks must be considered. Reuse may reduce discharge-related compliance exposure during periods when effluent is diverted to authorized reclaimed-water use, but it does not eliminate CDPS permit requirements when effluent is discharged to Surface Creek.

## Reclaimed Water Categories

Reclaimed water quality and allowable uses are organized into three primary categories with defined numeric standards. Table 1 summarizes the reclaimed water categories required for selected irrigation uses based on Section 84.10 of Regulation 84.

**Table 1 - Authorized Uses of Reclaimed Water for Landscape Irrigation**

| Authorized Uses | Category 1 | Category 2 | Category 3 |
|---|---|---|---|
| Restricted Access | Allowed | Allowed | Allowed |
| Unrestricted Access | Not Allowed | Allowed | Allowed |
| Resident-Controlled | Not Allowed | Not Allowed | Allowed |

**Category 1** reclaimed water requires, at a minimum, secondary treatment with disinfection. The microbiological standard is E. coli 126 colony forming units (cfu) per 100 mL as a monthly geometric mean and 235 cfu/100 mL as a single-sample maximum. Total suspended solids must not exceed 30 mg/L as a daily maximum.

**Category 2** reclaimed water requires, at a minimum, secondary treatment with filtration and disinfection. It retains the Category 1 E. coli limits and imposes turbidity limits of no greater than 3 NTU as a monthly average and no greater than 5 NTU in more than five percent of individual results in any month.

**Category 3** requires secondary treatment, filtration, and disinfection with stricter microbial expectations: E. coli must not be detected in at least 75 percent of samples in a calendar month, and the single-sample maximum is 126 cfu/100 mL. The turbidity limits match Category 2.

## Landscape Irrigation Access Requirements

Under Regulation 84, Category 1 restricted-access landscape irrigation requires reclaimed water meeting Category 1 standards at the point of compliance, separate Treater and User authorizations, agronomic-rate application, required signage and cross-connection controls, and site-specific measures that restrict public access during irrigation by approved timing controls or physical barriers. By contrast, unrestricted-access landscape irrigation requires Category 2 reclaimed water and the associated filtration, monitoring, and operational controls. Current WWTF compliance with Regulation 84 categories is summarized in Table 2 below.

Existing Colorado golf course reclaimed-water approvals provide useful precedent for a Category 1 restricted-access approach. Lake Valley Golf Club and Glacier/Durango Golf Course were both approved for Category 1 restricted-access landscape irrigation. Their certifications require the user to restrict access to landscaped areas where Category 1 reclaimed water is applied, using methods identified in the approved User Plan to Comply. The accepted methods include irrigating only during approved periods to strictly minimize public contact or installing barriers and ceasing irrigation at least one hour before barriers are removed. These precedents support Cedaredge's argument that overnight irrigation during periods when the golf course is closed to public play may be a reasonable access-control strategy, subject to CDPHE review and approval through the Town's User Application and Site Management Plan.

For unrestricted-access irrigation, the reclaimed water system must be designed and operated so that spray, runoff, and other potential human exposure remain within the approved use area and do not reach areas not designated for reclaimed water use. Where reclaimed water systems operate alongside potable or other non-potable systems, cross-connection controls and clear system identification are required. Reclaimed water piping must be purple or otherwise clearly labeled as non-potable reclaimed water where applicable.

Public notification through signage is also required, and onsite reclaimed water systems may only be operated by authorized personnel who have received the required training. Leaks in reclaimed water piping, sprinklers, hoses, or related equipment must be repaired immediately, or reclaimed water use must be suspended until repairs are completed. Users must maintain a current User Authorization and User Application and Site Management Plan (UASMP), and the Treater must provide annual education and training that meets Regulation 84 requirements.

### AGRONOMIC RATE

Agronomic rate refers to the application rate of reclaimed water and associated nutrients that meets the watering and nutrient needs of the User while minimizing runoff to surface waters and preventing nutrients from moving below the facility root zone. Regulation 84 requires reclaimed water used for irrigation to be applied at or below the agronomic rate.

To demonstrate compliance, Treaters and Users must prepare an agronomic-rate analysis as part of the UASMP showing that irrigation practices will not exceed the agronomic capacity of the landscape. Irrigation systems must be designed and operated to prevent ponding and runoff and to maintain application rates within agronomic limits. The regulation prohibits flood and sheet irrigation for many authorized uses and requires operational controls such as automated irrigation scheduling, rain shutoff devices, and monitoring of water use to prevent over-application.

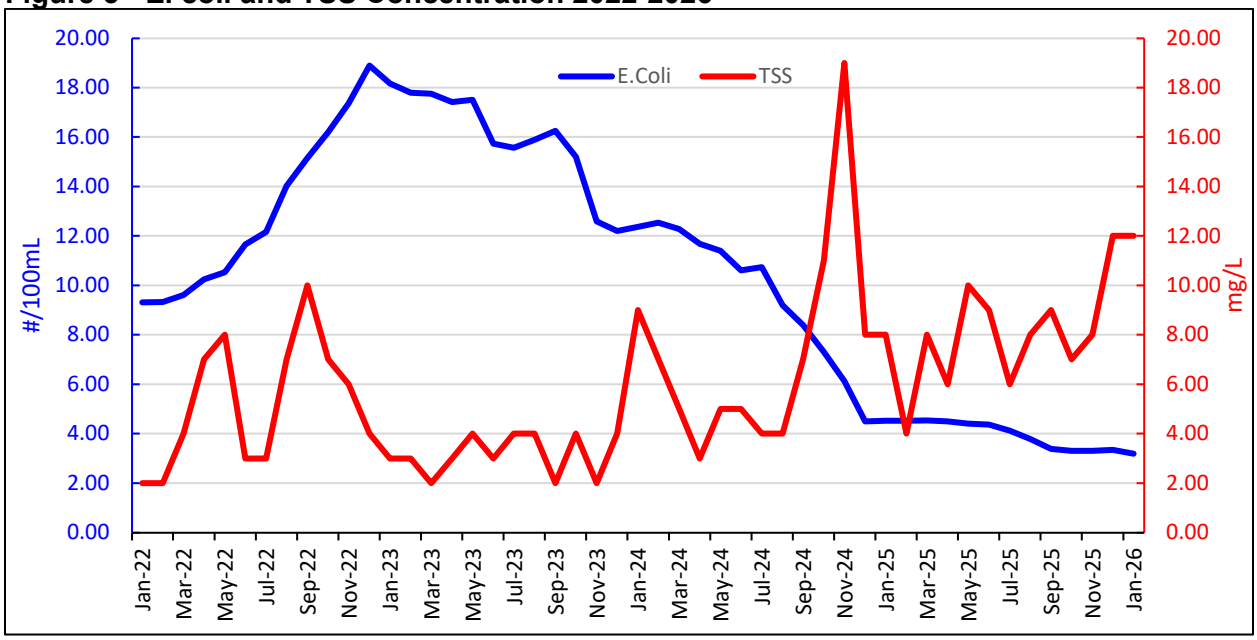
In watersheds where nutrient limits have been established under other regulations, those limits must also be followed. Treaters and Users share responsibility for calculating agronomic rates, documenting them in the UASMP, implementing them during system operation, and monitoring irrigation practices to ensure reclaimed water use does not create off-site impacts or violate regulatory authorizations.

## EXISTING COMPLIANCE

### CATEGORY ANALYSIS

To assess the current WWTF parameters and the use of reclaimed water, data has been collected from the past three years for E. coli in # of colonies/100mL and for Total Suspended Solids (TSS) in mg/L, as shown in Figure 3.

**Figure 3 - E. coli and TSS Concentration 2022-2026**




Regulation 84 requires Category 1 reclaimed water at the point of compliance to have an E. coli limit of 126/100 mL as a monthly geometric mean, with a 235/100 mL single sample maximum, and a Total Suspended Solids limit of 30 mg/L as a daily maximum. The graphed results from 2022 through 2026 stay below those limits, with E. coli remaining far under the regulatory threshold and TSS peaking at 19 mg/L throughout the period shown. Based on those values, the current WWTF effluent meets the Category 1 numeric criteria for E. coli and TSS under Regulation 84.

To study the possible use of WWTF reclaimed water for Category 2, turbidity monitoring began in March 2026, and the data collected to date show an average turbidity of 8.5 NTU and a maximum observed value of 13 NTU. Under Regulation 84, Category 2 reclaimed water must not exceed 3 NTU as a monthly average, and individual results above 5 NTU may not occur in more than 5 percent of samples during a calendar month. Compared to those standards, 95% of samples are above 5 NTU, the current average of 8.5 NTU is well above the allowable monthly average, and the highest recorded value of 12 NTU is also substantially above the individual-result benchmark, indicating that the measured turbidity is not consistent with Category 2 water quality expectations at this time. Category 2 also requires a tertiary filter system, which is not present in the current wastewater treatment process.

Based on currently available information, reclaimed water use at the golf course could be considered a Category 1 candidate if the site can be reliably operated as restricted-access during irrigation. If public exposure cannot be effectively controlled, including incidental access from adjacent residences or unfenced areas, the more conservative planning assumption is that Category 2 treatment would be required. Because this access determination directly affects treatment requirements and project cost, it should be confirmed with the Town and CDPHE before a final reuse pathway is selected.

**Table 2 - Cedaredge WWTF Reg 84 Category Compliance**

| Regulation 84 | Minimum Treatment Requirement | WWTF Treatment Performance | Compliance |
|---|---|---|---|
| Category 1 | • E. coli: 126/100 mL monthly geometric mean; 235/100 mL single sample max.<br>• TSS: 30 mg/L daily max | • E. coli: 9.84/100mL monthly geometric mean;<br>• TSS: 19 mg/L daily max | **Compliant** |
| Category 2 | • E. coli: same as Category 1;<br>• Turbidity: ≤3 NTU monthly average and ≤5 NTU in more than 5% of monthly results<br>• Filtration Required | • Turbidity: 8.55 NTU monthly average<br>• No Tertiary Filtration System | **Not Compliant** |
| Category 3 | • E. coli: none detected in at least 75% of monthly samples; 126/100 mL single sample max;<br>• Turbidity: same as Category 2<br>• Filtration Required | • E. coli: 9.84/100mL monthly geometric mean<br>• Turbidity: 8.55 NTU monthly average<br>• No Tertiary Filtration System | **Not Compliant** |

## AGRONOMIC RATE SCREENING

One of the requirements when submitting the Landscape Irrigation UASMP is demonstrating that the reclaimed water will be applied at or below acceptable agronomic rates. The CDPHE guidance document for Determination of Agronomic Rate for Application of Reclaimed Water (Policy 21) gives a maximum application rate of 174 lbs. per acre per year for areas comprised of 90% turf grass or more.

Parks and golf courses where irrigated landscaping is almost solely comprised of lawn areas with traditional turf grasses, such as bluegrass, fall into this category. Using the equation below from Policy 21, an estimated rate for Cedaredge was calculated.

$$\frac{Total\ Annual\ Volume\ of\ Recalimed\ Water\ Applied\ x\ Average\ Annual\ TIN\ x\ 8.34}{Total\ Area\ Irrigated\ with\ Reclaimed\ Water}$$

$$\frac{52.642\ MG\ x\ 4.75\ mg/L\ x\ 8.34}{86.79\ acres} = 24.03\ lbs\ of\ Nitrogen\ per\ acre\ per\ year$$

The preliminary agronomic-rate screening indicates that reclaimed water application to golf course turf areas may be feasible under Regulation 84 and applicable guidance. The calculation remains sensitive to the acreage basis used for the irrigated area. At present, the available source information indicates a discrepancy between mapped turf areas and tabulated golf course acreage, but the calculation uses the more conservative (larger) irrigated area. Prior to finalizing the UASMP basis or confirming full agronomic compliance, the Town should verify the irrigated acreage to be served by reclaimed water, including whether the analysis should be based on actively irrigated turf only or on the broader irrigated landscape area. For this study, the agronomic-rate discussion should therefore be presented as a planning-level screening, not as a final compliance determination.

# SECTION 4 – PROCESS ALTERNATIVES EVALUATION

Based on the effluent quality data discussed above, the existing WWTF is presently best aligned with a Category 1 reclaimed water pathway, provided the golf course can be operated as a restricted-access reuse site. Following review with the Town Board, the alternatives in this section were revised to focus on direct delivery to the golf course irrigation connection near Holes 10-11, see Figure 4 Tie-in map, with the primary intent of irrigating Holes 10-18. The previously evaluated alternative to pump reclaimed water to the upper golf course storage pond with larger effluent pumps and electrical upgrades is not carried forward as a preferred alternative because the Town Board indicated that approach was cost prohibitive. The revised alternatives are: Alternative 1, Category 1 reuse without equalization; Alternative 2, Category 1 reuse with equalization; and Alternative 3, Category 2 reuse without equalization.

Equalization is recommended where the Town wants additional operational flexibility, but it is not required for a direct diversion strategy that alternates between golf course irrigation and Surface Creek discharge. If equalization storage allows the Town to beneficially reuse all treated effluent during approximately six months of the irrigation season, and no effluent is discharged to Surface Creek during that period, the Town may reduce or avoid discharge-related treatment, sampling, reporting, and effluent-limit compliance risk under COG591 during those no-discharge periods. This benefit would not eliminate the need to maintain the Surface Creek discharge permit, because discharge would still be required during non-irrigation months, wet weather, treatment outages, golf course outages, or periods when reclaimed water cannot be beneficially used. However, equalization could provide a clearer pathway for the Town to evaluate additional reclaimed-water uses during shoulder-season or winter months, with the long-term goal of further reducing or potentially eliminating routine discharge to Surface Creek if sufficient year-round beneficial reuse opportunities and storage can be developed and authorized.

In addition to providing equalization volume, use of the former oxidation pond for reclaimed water storage would require further evaluation of liner condition, seepage control, and operational water quality. CDPHE does not require every reclaimed water impoundment to be lined by default. However, impoundments containing reclaimed water must either obtain a seepage waiver based on the allowable seepage rate under Regulation 61.14(9)(a) or be authorized under an applicable surface water or groundwater discharge permit. The seepage threshold in Regulation 61.14(9)(a) is $10^{-6}$ cm/sec. This threshold is used to determine whether seepage from an impoundment is low enough to be considered insignificant for permitting purposes. If the Town cannot demonstrate using a CDPHE approved method that seepage from the pond is less than or equal to this threshold, the pond would likely require additional permitting or improvements to reduce seepage. For planning purposes, re-lining the former oxidation pond is therefore assumed to be the most direct approach to support a seepage waiver application and reduce seepage-related permitting risk.

The pond should also be managed as short-term equalization storage rather than long-term seasonal storage. Maintaining a lower hydraulic retention time and storing only the volume needed for daily or short-duration operational balancing would reduce the potential for stagnant conditions, duckweed, and algae growth. Long-term storage conditions could increase TSS, affect TDS concentration through evaporation, and create additional challenges for maintaining a consistent

chlorine residual prior to reuse. During design, the usable storage volume, operating depth, turnover rate, mixing needs, liner system, seepage testing requirements, and disinfection strategy should be evaluated to confirm that the pond can provide equalization without creating water quality concerns that would affect reclaimed water compliance or golf course irrigation operations.

## Alternative 1 - Category 1 Reuse: Direct Pumping to Golf Course Irrigation System Without Equalization

This alternative assumes the golf course can be operated as a restricted-access landscape irrigation site under Regulation 84 and therefore could be served with Category 1 reclaimed water. Under this approach, treated WWTF effluent would be conveyed to the existing golf course irrigation system through an approximately 500-foot, 8-inch connection pipeline extending from the existing WWTF discharge forcemain to the golf course gravity line near Holes 10 and 11. The main intent of this alternative is to serve Holes 10-18, which currently receive gravity irrigation from the existing raw water system. Preliminary hydraulic calculations indicate that the existing WWTF effluent pumps appear to have sufficient head to deliver flow to this connection point while still maintaining adequate capacity for near-term facility operations. This closest connection point assumes that the existing golf course gravity line can manage an additional 5 to 10 psi.

### Hydraulic and Operational Considerations

Based on preliminary pump curve review, this alternative would add approximately 100 feet of total dynamic head (TDH) to the effluent pumping system. Under that condition, pump efficiency is estimated to decline from approximately 68 percent to about 60 percent, and estimated delivery capacity would decrease from approximately 175 gpm to 140 gpm for a single pump, and from approximately 350 gpm to 260 gpm for two pumps operating in parallel. Because the WWTF is currently operating well below its reported design maximum flow, this approximate 25 percent reduction in effluent pumping capacity appears acceptable for the near term. If influent flows increase over time, pump upgrades may be warranted in a future phase. In addition, WWTF equalization storage could provide operational buffering during peak-day or storm-related flow events and may help address the reduced pumping capacity associated with this alternative.

Because this alternative does not include equalization storage, operations would rely on automated diversion between the golf course irrigation connection and the existing Surface Creek discharge. Reclaimed water would be diverted to the golf course during approved nighttime irrigation periods and routed to Surface Creek when irrigation is not occurring. The diversion vault should include motorized valves, a magnetic flowmeter, electrical service for valve operators and controls, a manual sample tap, and an autosampler. The controls should be interlocked with the WWTF dechlorination system so sodium bisulfite feed is turned off when water is routed to the golf course and restored when water is routed to Surface Creek. This operating strategy reduces capital cost by avoiding equalization storage, but increases operational and regulatory risk because the system would switch between reuse and discharge modes. Final design should confirm whether a chlorine residual is required in the reclaimed water pipeline and should include safeguards to prevent chlorinated effluent from being discharged to Surface Creek.

This control strategy is also important for CDPS permit compliance. The current COG591173 certification includes total residual chlorine limits for the Surface Creek discharge, including a 30-

day average limit of 0.011 mg/L, a daily maximum limit of 0.019 mg/L, and a two-year average limit of 0.0017 mg/L. Therefore, the diversion and dechlorination controls are not simply operational preferences; they are necessary safeguards to reduce the risk of discharging chlorinated effluent to Surface Creek during mode changes between reuse and discharge.

From a Category 1 conveyance standpoint, this alternative appears feasible at a planning level; however, its operability would depend on alignment of irrigation demand, and the ability of the reduced pumping capacity to support the desired irrigation schedule.

### ADVANTAGES

This alternative represents the lowest-capital upgrade pathway identified because it relies on the existing effluent pumps, avoids full replacement of the WWTF pumping system, and does not include lining the former oxidation pond or constructing a new WWTF equalization pump station. It may therefore provide the most economical near-term path to a limited Category 1 reuse program if the golf course can be managed as restricted-access during irrigation.

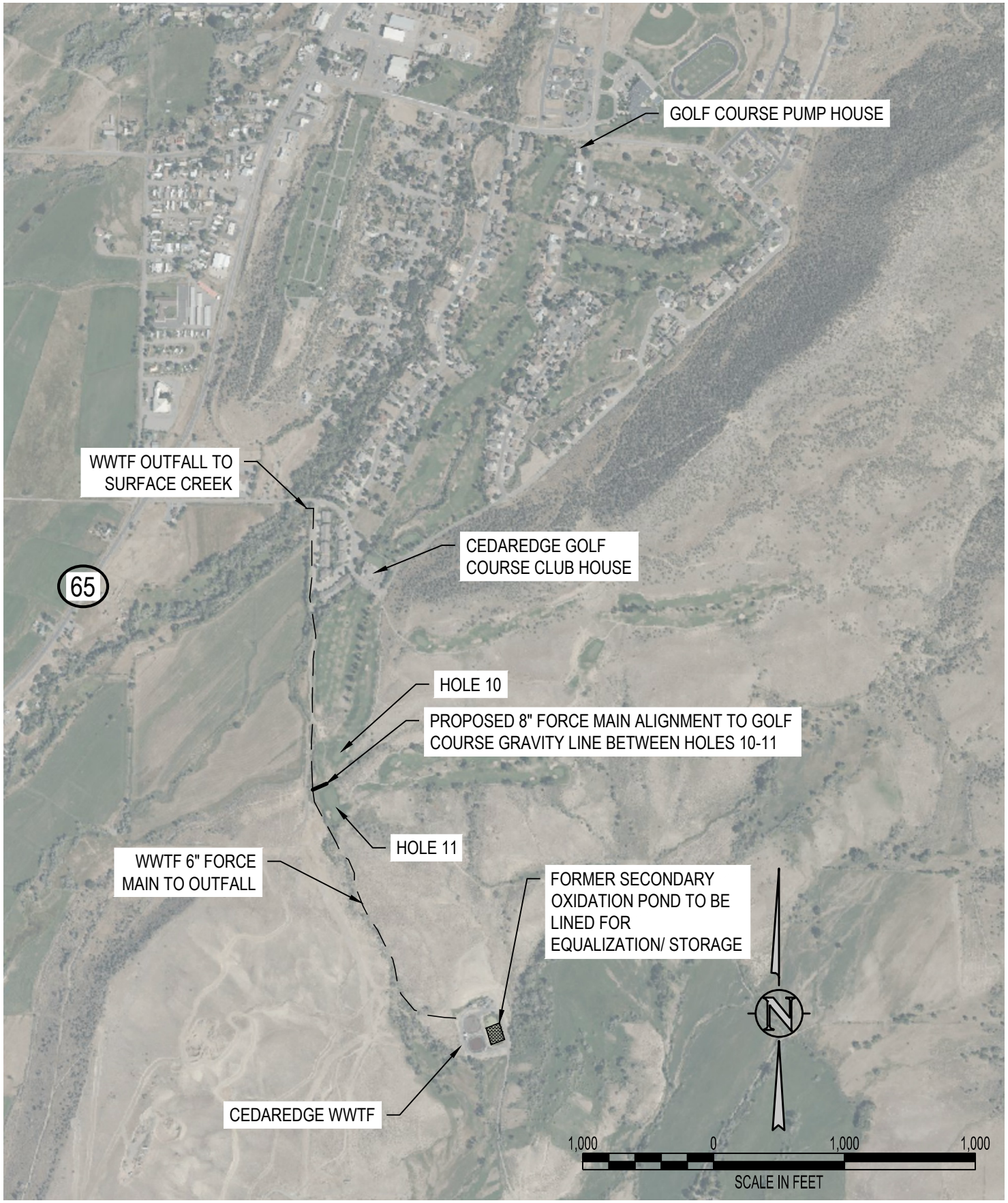
In addition to reducing capital cost, this alternative allows the Town to implement a limited Category 1 reuse program with fewer new process components, less site disturbance, and fewer pond-liner/seepage permitting questions than an equalized storage alternative.

### LIMITATIONS

This alternative provides less operational flexibility than an equalized system because WWTF effluent must either be used during active irrigation or discharged to Surface Creek. It also requires reliable automated controls, valve operation, flow measurement, sampling, and operator response to prevent improper routing of chlorinated or dechlorinated effluent. The existing pumps may still be able to deliver flow beyond Holes 10-18 and to the upper 9 holes if needed, but that operating condition should be confirmed during preliminary design based on available pressure, flow, and the golf course irrigation schedule.

### OPINION OF PROBABLE COST

The estimated capital cost for Alternative 1 is $812,000 and is attached to Appendix A.




# FIGURE 4 - REUSE GOLF COURSE TIE-IN

CEDAREDGE WWTF REUSE STUDY

MAY 2026

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## Alternative 2 - Category 1 Reuse: Direct Pumping to Golf Course Irrigation System with Equalization

This alternative is based on the same restricted-access Category 1 reuse framework described for Alternative 1, including delivery of reclaimed water to the existing golf course irrigation system through an approximately 500-foot, 8-inch connection pipeline extending from the existing WWTF discharge forcemain to the golf course gravity line near Holes 10 and 11. The primary intent of this alternative is to serve Holes 10-18, which currently receive gravity irrigation from the existing raw water system. Preliminary hydraulic calculations indicate that the existing WWTF effluent pumps appear to have sufficient head to deliver flow to this connection point while maintaining adequate capacity for near-term facility operations. This connection assumes that the existing golf course gravity line can accommodate an additional 5 to 10 psi.

Unlike Alternative 1, this alternative includes short-term equalization storage at the WWTF (Figure 4) to buffer continuous effluent production outside the golf course irrigation window. Reclaimed water would be stored at the WWTF when irrigation is not occurring and then pumped to the golf course irrigation connection during approved irrigation periods. This would improve day-to-day operational flexibility, reduce the need to frequently switch between Surface Creek discharge and golf course irrigation, and increase the potential to avoid discharge to Surface Creek during active irrigation periods.

The primary reuse objective would remain irrigation of Holes 10-18, with potential delivery to other portions of the golf course if hydraulic conditions and irrigation operations allow. Like Alternative 1, this alternative is not intended to pump reclaimed water to the upper golf course storage pond. Equalization is assumed to be provided by repurposing and lining the former oxidation pond, or by another WWTF-site storage facility confirmed during preliminary design. The upper golf course storage pond is not included as part of this alternative.

### Hydraulic and Operational Considerations

The hydraulic basis for this alternative is generally the same as the direct connection described for Alternative 1. Reclaimed water would be delivered to the golf course irrigation system at the connection near Holes 10 and 11 rather than being pumped to the upper golf course storage pond.

The main difference between Alternative 1 and Alternative 2 is the addition of WWTF equalization storage. With equalization, the Town would not need to rely only on real-time diversion of effluent during active irrigation. Instead, treated effluent could be stored during non-irrigation hours, wet weather timing mismatches, or periods when golf course demand is temporarily below WWTF production, then pumped to the golf course during the approved nighttime irrigation window. This would reduce the frequency of switching between reuse and Surface Creek discharge compared to the no-equalization option and would provide more operational buffering if irrigation timing changes, individual zones are offline, or the golf course does not need the full available WWTF flow on a given night.

### ADVANTAGES

This alternative provides more operational flexibility than the Category 1 no-equalization option while maintaining the same general direct-connection approach to the golf course irrigation system. Equalization storage would allow the WWTF to continue producing reclaimed water throughout the day and would allow the Town to store that flow until the golf course irrigation system is operating. This would better accommodate the mismatch between continuous WWTF production and the golf course's overnight irrigation schedule.

Compared to the no-equalization alternative, this option reduces dependence on immediate, real-time use of effluent at the golf course. If irrigation start times change, zones are temporarily unavailable, or reclaimed water production exceeds short-duration irrigation demand, the WWTF equalization storage would provide a buffer before water must be discharged to Surface Creek. This improves operational resiliency and may reduce the risk of losing usable reclaimed water during short-term timing mismatches.

### LIMITATIONS

This alternative would have higher capital cost than the Category 1 no-equalization option because it includes WWTF equalization storage, storage piping, lining or construction of a storage facility, additional pumping, valves, instrumentation, and related controls. If the former oxidation pond is used for equalization, the Town would need to confirm available volume, liner requirements, seepage considerations, hydraulics, constructability, and compatibility with existing WWTF operations. Alternative 2 does not eliminate the need for the existing Surface Creek discharge. During the non-irrigation season, wet weather events, golf course outages, or periods when reclaimed water cannot be beneficially used, the Town would still need to route effluent to the permitted discharge. Therefore, equalization should be presented as an operational flexibility improvement, not as a full seasonal storage or discharge elimination strategy. Full winter storage would remain outside the scope of this alternative.

As an alternative to repurposing and lining the former oxidation pond, the Town could consider a dedicated above-grade or partially buried concrete or steel reclaimed-water storage tank. Tank storage would likely provide better control of water quality than open pond storage, particularly where longer water age is expected, because it would reduce exposure to sunlight, windblown debris, algae growth, duckweed, evaporation, and wildlife contact. However, tank storage would likely have substantially higher capital cost than pond-based equalization. At a planning level, a two-million-gallon storage tank could add approximately $1.5 million to $3.0 million compared to the lined-pond concept, depending on tank type, foundation conditions, site constraints, piping, mixing, access, and appurtenances. Because of this cost premium, tank storage is not carried as the base Alternative 2 concept but may be evaluated during preliminary design if the Town prioritizes water quality control, reduced seepage/permitting risk, or reduced open-storage maintenance.

### Opinion of Probable Cost

This opinion of probable cost for Alternative 2 includes the upgrades in Alternative 1, plus WWTF short-term storage pond improvements, pond lining, storage pond piping, storage pond lift station, related controls, and associated electrical improvements. The cost for these improvements is estimated to be $1,922,500.

### Alternative Not Carried Forward

The previous version of Alternative 2 evaluated pumping reclaimed water to the upper golf course storage pond with larger effluent pumps and electrical upgrades. The Town Board indicated that this approach was cost prohibitive. Therefore, that alternative is not carried forward as a preferred implementation pathway. The revised Alternative 2 retains Category 1 reuse with WWTF equalization storage, but delivery is assumed to occur at the golf course irrigation connection near Holes 10 and 11 rather than at the upper storage pond.

## Alternative 3 - Category 2 Reuse: Direct Pumping to Golf Course Irrigation System with Tertiary Filtration and No Equalization

This alternative is the same general operating strategy as Alternative 1 but adds tertiary filtration to achieve Category 2 reclaimed water standards. Under this approach, the Town would alternate between discharge to Surface Creek and golf course irrigation without equalization storage. Category 2 would be required if the golf course cannot be reliably managed as restricted-access during reclaimed water irrigation, or if future WWTF upgrades for COG591, Regulation 85, or Regulation 31 make tertiary filtration a practical shared investment. If the Town must pursue a Category 2 reuse pathway, a tertiary filtration technology would need to be selected to reduce turbidity and support compliance with Regulation 84 requirements for unrestricted-access irrigation. In addition to the new reuse pipeline and electrical service improvements, this alternative would require:

- tertiary filtration for turbidity reduction;
- treatment interconnections and process controls;
- additional instrumentation and compliance monitoring; and
- continued disinfection consistent with Regulation 84 Category 2 requirements.

Because the Category 2 pathway is driven primarily by the need to reduce turbidity and satisfy unrestricted-access reuse requirements, the tertiary treatment technology becomes the key differentiator within this option. The tertiary treatment technologies evaluated at this planning level include cloth disk filtration, dual-media granular filtration, and membrane filtration. These technologies are compared below based on expected effluent quality, operator attention, monitoring requirements, and relative capital and O&M considerations.

### Filter Evaluation

Settling, clarification, or pond storage may reduce suspended solids and may lower turbidity under favorable conditions. However, these processes should not be relied on as the sole Category 2

compliance strategy for this project. Regulation 84 Category 2 requires secondary treatment with filtration and disinfection, with turbidity not to exceed 3 NTU as a monthly average and not to exceed 5 NTU in more than five percent of individual monthly results. The current WWTF does not include tertiary filtration, and recent turbidity monitoring indicates the effluent is above Category 2 criteria. Therefore, clarification or pond settling could be considered pretreatment or operational polishing, but an engineered filtration process should remain the planning basis unless CDPHE accepts an alternative treatment approach during permitting.

### Cloth Disk Filtration

Cloth media filtration is an outside-in, gravity-driven process to remove suspended solids and turbidity, reducing particulates that can harbor pathogens. Influent is fed directly into the filter basin, where it passes through a series of circular disks. The water is filtered through a unique pile cloth media with a nominal pore size of approximately 10 microns. This filtration process typically achieves an effluent turbidity of less than 1.0 NTU and reduces total suspended solids (TSS) to below 3.0 mg/L, representing an average removal efficiency of 75% to 85%. While it does not typically receive the same high regulatory credits as membranes, it can achieve a 1.0 to 2.0-log reduction of bacteria such as E. coli.

The filter system is a complete treatment package that includes a filter basin, disk assemblies, and an integrated pumping system for backwash and solids management. The operation is fully automated by a programmable logic controller (PLC) based control system, which manages the three primary modes: filtration, backwash, and solids wasting. Unlike pressure-driven systems that require pre-filters, this gravity-fed system handles influent directly within the basin. The backwash sequence is automatically initiated based on either an adjustable timer or head loss across the media. During the backwash cycle, the disks rotate to allow the fixed backwash to clean the entire media surface. Additionally, heavier solids that settle in the hopper-bottom of the basin are removed through an automated solids wasting mode, which utilizes a dedicated waste pump to maintain basin capacity.

The operator manages the system through a local control panel interface, which provides real-time system status, alarm history, and elapsed time meters for process monitoring. Through this interface, the operator can manually adjust process variables, such as backwash intervals and sludge waste durations, to optimize performance based on influent conditions. While the backwash and solids wasting cycles are automated, the operator is responsible for monitoring the interface for alarms and performing periodic maintenance as specified by the control strategy. Because the system is designed for continuous filtration, water can typically continue to be processed even during the backwash of individual disks, provided the basin level is managed correctly. The PLC ensures that all automated sequences, including disk rotation and pump activation, are recorded and monitored daily for reliable operation.

### Dual-media Granular Filtration

Dual-media granular filtration is a downward-flow, gravity-driven process designed to remove suspended solids and turbidity, providing a physical barrier against pathogens. Influent is distributed across the top of the filter bed, which consists of two distinct layers: a top layer of crushed anthracite coal and a bottom layer of fine silica sand. The water percolates through the coarse anthracite first, which traps larger particles, followed by the finer sand layer that captures

smaller remaining solids. Water filtered through this bed is collected by an underdrain system at the bottom of the basin and is then routed to a clearwell or disinfection contact tank.

This filtration process typically achieves a high-quality effluent with turbidity levels less than 0.3 NTU and reduces TSS to below 2.0 mg/L, representing an average removal efficiency of 85% to 95%. In terms of pathogen removal, dual-media filters are often credited with a 0.5 to 1.0-log reduction of Giardia and Cryptosporidium through physical straining and adsorption.

The granular filter system includes the filter basin, specialized underdrains, media layers, and a suite of pumps and blowers for backwashing. The operation is managed by a PLC that coordinates the filtration, backwash, and filter-to-waste modes. Unlike cloth media systems, dual-media filters typically require a "filter-to-waste" period after a backwash to allow the media to resettle and the effluent quality to stabilize before returning to service. The backwash sequence is automatically triggered by a predetermined increase in headloss (measured by pressure transducers), a high-turbidity alarm, or a set run-timer.

The operator manages the filter through a local human-machine interface (HMI), which provides real-time data on headloss, effluent turbidity, and flow rates. Through this interface, the operator can manually adjust backwash durations, air scour intensities, and ripening periods to optimize performance based on seasonal changes in raw water quality. While the primary cycles are automated, the operator is responsible for performing periodic media depth measurements and "sieve analyses" to ensure the anthracite and sand layers have not been lost or mixed over time. Because large-scale facilities usually employ multiple filter cells, water treatment remains continuous as individual cells are taken offline for cleaning.

### Membrane Filtration

Membrane filtration is an outside/in, pressure-driven process to remove suspended solids and turbidity, reducing pathogens like Giardia and Cryptosporidium. Membrane filtration can achieve 2.0-log inactivation of *Cryptosporidium* and 3.0-log inactivation of *Giardia.* For an automated membrane system, pathogen credit is established as log removal verified by membrane challenge testing and direct integrity testing, rather than fixed pathogen inactivation values. The membrane system is expected to produce filtrate with turbidity typically below 0.1 NTU, with continuous monitoring of each membrane unit. Raw water is directly fed to the membrane system, typically by automated duty/standby feed pumps. The raw water is pumped through a prefilter to remove larger debris prior to the membrane. Water is then pushed through a semi-permeable membrane rated to 0.1 micron. Water filtered through this membrane, called the permeate, is then disinfected. The membrane filter requires regular backwashing to remove accumulated foulants by reversed inside/out flow with air scour for increased agitation. Chemically enhanced backwashes, called CEB, are performed automatically on a preset interval or transmembrane pressure (TMP) trigger with a chemical soak to decrease TMP and prevent membrane fouling or failure.

The automated membrane filter system comes mounted on a skid complete with pre-filters, bladder tanks, valves, piping, controls, and instrumentation. The backwash system is automated based on elapsed filtration time, processed volume, and TMP, which will be continuously monitored by the PLC and reviewed daily by the operator. As the TMP increases to the programmed setpoint, or at the end of the programmed filtration cycle, the backwash system is automatically initiated. The

backwash is a combined air and water scrub, with current automated UF guidance using a set filtration cycle followed by air scour and drain, and one current design manual listing a maximum TMP of 0.15 MPa (22 psi) for that membrane platform.

Clean-In-Place (CIP) is automated on this membrane skid. The operator will need to specify the performance thresholds for when a CIP is triggered and when the membrane modules will be taken out of service or otherwise investigated and repaired, using normalized TMP increase, normalized permeability decline, maximum operating TMP, and failed integrity testing as the primary control parameters. Water is not treated by the affected membrane train during a CIP operation and therefore must be performed during a time when water can be delivered from the existing storage tank or from parallel treatment capacity. The operator does not need to be onsite for the CIP, as it is automatically initiated and sequenced by the control system, but must respond to alarms and review cleaning results. The operator must also verify that automated membrane integrity testing (MIT) is performed on each membrane unit at least once per day of operation, with filtrate turbidity monitored at least every 15 minutes and immediate integrity testing required if turbidity exceeds 0.15 NTU for more than 15 minutes.

### Filtration Evaluation Summary

For purposes of this planning-level study, cloth disk filtration is carried forward as the basis of evaluation for the Category 2 reuse option. This assumption is based on its apparent suitability for the Town's scale, relatively simple O&M profile, compact tertiary treatment configuration, and potential to provide a practical expansion path if future reuse demands increase. Membrane filtration remains the most robust treatment option from an effluent quality and future-proofing standpoint, but it would likely impose greater process complexity and operator burden. Dual-media filtration remains a viable conventional alternative, but for this study cloth disk filtration is considered the most practical basis for comparison and preliminary costing.

**Table 3 - Tertiary Treatment Comparison**

| Category 2 Treatment Technologies | Membrane | Cloth Disk | Dual-Media |
|---|---|---|---|
| Relative Effluent Quality | Highest | Moderate-High | High |
| Relative O&M Complexity | Highest | Moderate | Moderate-High |
| Relative Future Flexibility | Highest | Moderate-High | Moderate |
| Pathogen Removal (Log)* | 3.0 – 4.0+ (High) | 0.0 – 1.0 (Low) | 0.5 – 1.5 (Moderate) |
| Effluent Turbidity* | < 0.1 NTU | < 1.0 NTU | < 0.3 NTU |
| Planning Note | Best future-proofing, Highest complexity | Simpler tertiary pathway | Conventional filtration approach |

## ADVANTAGES

This alternative provides the clearest pathway to compliance if the golf course cannot be reliably managed as restricted-access. It also provides a stronger basis for future regulatory flexibility, potential broader municipal reuse applications, and possible dual benefit if tertiary treatment becomes advantageous or necessary in response to future discharge permit requirements. The study scope specifically calls for consideration of upgrades that may serve both reuse and COG591-related objectives.

Although Category 2 treatment may not be cost-effective solely for Regulation 84 reuse at this time, tertiary filtration may become more feasible if the Town is required to upgrade the WWTF for COG591, Regulation 85, Regulation 31, or stream-classification-based permit limits. In that case, Category 2 reuse could become a logical secondary benefit of a future WWTF upgrade. The Town could pursue Category 1 reuse initially, then request a permit or authorization modification after future WWTF treatment upgrades are completed.

### Limitations

This alternative would have the highest capital cost, the highest process complexity, and the greatest O&M burden of the alternatives considered. It would also require final selection among the tertiary treatment technologies based on lifecycle cost, operability, footprint, and future retrofit considerations. For that reason, this alternative should be presented as a Category 2 implementation pathway with a subordinate technology selection decision.

### Opinion of Probable Cost

This opinion of probable cost for Alternative 3 includes the upgrades in Alternative 1, plus tertiary filtration, treatment interconnections, a filtration building, related mechanical and electrical improvements, instrumentation, controls, monitoring equipment, and associated infrastructure. The cost for these improvements is estimated to be $4,079,500.

A planning-level capital and O&M estimate for dual-media filtration should be developed before a final treatment recommendation is made. For purposes of this study, dual-media filtration is expected to have capital cost comparable to or somewhat higher than cloth disk filtration, with O&M requirements generally in the same range or slightly higher due to backwash, media management, and filter-to-waste operations.

### Summary

At a planning level, the alternatives indicate that a Category 1 restricted-access reuse program offers the lowest-cost and least complex path to initial implementation, provided the Town can reliably control public access during irrigation. Within that pathway, Alternative 1 offers the lowest-capital entry point but with less operational flexibility, while Alternative 2 provides a more robust pumping and storage configuration at higher capital and energy cost. If unrestricted-access operation is required, the Town should assume a Category 2 pathway, which would require tertiary filtration and result in the highest capital cost and O&M burden, but would also provide the strongest long-term regulatory flexibility and potential for future reuse expansion. Table 4 below shows the advantages and limitations of each alterative side-by-side.

**Table 4 - Alternatives Comparison***

| Alternative | Major Improvements | Key Advantages | Key Limitations | OPC |
|---|---|---|---|---|
| Alternative 1 – Cat 1: Direct Pumping to Golf Course Irrigation System without Equalization | 500 LF of 8-inch pipe, diversion structure, automated valves, doghouse, and autosampler | Lowest capital pathway; limited upgrades | Reduced pump efficiency/capacity; depends on direct irrigation timing; less flexible | $812,000 |
| Alternative 2 – Cat 1: Direct Pumping to Golf Course Irrigation System with Equalization | 500 LF of 8-inch pipe, diversion structure, automated valves, doghouse, WWTF equalization/storage | Better operational flexibility; supports storage-based operation | Higher capital | $1,922,500 |
| Alternative 3 – Cat 2: Direct Pumping to Golf Course Irrigation System with Tertiary Filtration and No Equalization | Alternative 1 improvements plus tertiary filters, treatment interconnections, controls, added monitoring, and filtration building/site improvements. | Supports unrestricted access reuse; strongest future flexibility | Highest cost and complexity | $4,079,500 |

* Former storage pond pumping alternative not carried forward per Town Board direction
** A two-million-gallon concrete or steel storage tank could add approximately $1.5 million to $3.0 million compared to the lined-pond storage concept, depending on tank type, site conditions, and appurtenances.

# SECTION 5 – FEASIBILITY AND RISK ANALYSIS

## REGULATION 84 REUSE VALUE ASSESSMENT

Reclaimed water reuse appears to provide value primarily as a seasonal beneficial-use strategy rather than as a full replacement for existing irrigation sources. For Cedaredge, the principal value of reuse is the ability to offset a meaningful portion of golf course irrigation demand using a currently discharged resource, while potentially reducing exposure to the more stringent treatment, sampling, and reporting burden anticipated under General Permit COG591 during periods when effluent is reused rather than discharged. That value must be weighed against the added capital cost, operational complexity, and regulatory implementation requirements associated with the selected reuse pathway.

Because golf course irrigation is seasonal and generally occurs from mid-March through early November, reuse would not eliminate the Town's need to comply with its discharge permit. The more stringent discharge permit requirements would remain relevant during the non-irrigation season and any other periods when effluent is not routed to the golf course. This continued discharge obligation is one reason the no-equalization alternative may be acceptable as a lower-cost initial phase, while still recognizing that WWTF discharge compliance remains a long-term Town issue.

## ADDITIONAL REUSE OPPORTUNITIES

Golf course irrigation is expected to remain the primary reclaimed water use under the alternatives evaluated in this study and appears capable of beneficially using most available WWTF effluent during the irrigation season. Accordingly, the following opportunities are not considered necessary to justify the project, but may warrant future screening as secondary, contingency, or phased-expansion uses that could provide additional operational flexibility during shoulder months, irrigation outages, maintenance periods, or future system expansion.

### Landscape Irrigation

Reuse irrigation at the Town cemetery appears to be the most practical secondary landscape irrigation opportunity because it already connects into the broader irrigation system and may require less new distribution infrastructure than a completely new reuse site. This potential near-term secondary use should be screened in a future phase for acreage, irrigation demand, access classification, and agronomic-rate compliance.

Town parks, medians, athletic fields, or other landscaped municipal parcels may also represent future expansion opportunities if additional distribution piping can be justified. These uses would likely require screening for proximity, public access classification, and agronomic-rate compliance, and would be most appropriate as longer-term system expansion opportunities rather than near-term project drivers.

### Other Opportunities

Construction water may represent a practical secondary reuse opportunity because Regulation 84 authorizes non-discharging construction and road maintenance as an approved reclaimed water use. This could be implemented through a controlled fill station and appropriate operational procedures, signage, training, and hauling controls.

Non-potable fire protection may also represent a future opportunity. Regulation 84 authorizes nonresidential fire protection for Category 2 and Category 3 reclaimed water, although this is not considered a near-term implementation driver unless a specific municipal facility or development area creates a defined demand.

Street sweeping, equipment washdown, and other municipal operations could also be considered as future screening items if the Town identifies a specific operational need. Similarly, commercial or industrial customer reuse may be considered in the future if specific nearby users are identified. These uses are not currently relied upon in this study as part of the primary reclaimed water demand basis.

Snowmaking is not currently identified as an authorized reclaimed water use under Regulation 84 and is therefore not treated in this study as a defined implementation pathway. However, because CDPHE has recently indicated willingness to review potential snowmaking proposals on a case-by-case basis, this use may warrant future monitoring as a potential long-term opportunity if the regulatory framework evolves.

## COST-BENEFIT SUMMARY

### QUANTITATIVE

Potential quantitative benefits of reuse include partial offset of golf course irrigation demand, reduced reliance on Cook Ditch and other supplemental supplies during the irrigation season, and possible reduction in the treatment, sampling, and reporting burden associated with General Permit COG591 during periods when treated effluent is beneficially reused rather than discharged.

### QUALITATIVE

Qualitative benefits include improved beneficial use of treated effluent, greater long-term water management flexibility, and reduced exposure to future regulatory uncertainty associated with discharge requirements. These benefits must be weighed against added capital cost, operational complexity, and the need for user authorization, access control, and short-term balancing infrastructure.

Planning-level cost comparisons for the reuse alternatives are presented in Section 4. At a high level, Alternative 1 appears to offer the lowest-capital entry point, Alternative 2 offers greater operational flexibility at higher capital and energy cost, and the Alternative 3 pathway would impose the highest capital cost and O&M burden due to added tertiary treatment, controls, and monitoring. The value of these added costs depends on the required reuse category, the Town's desired operational flexibility, and the degree to which reuse reduces future discharge-related regulatory burden.

The original aerated lagoon WWTF discharged to Alfalfa Ditch which fed Fruitgrowers Reservoir. Fruitgrowers Reservoir was classified as a State 303(d) impaired water body for dissolved oxygen (DO) and Total Phosphorus (TP). In 2011 Colorado adopted very stringent total maximum daily limits (TMDL) for impaired water bodies, and the EPA followed in 2013. At the time of expansion, it was determined to be too risky for the Town to pursue meeting the strict TMDLs so the discharge was re-routed to Surface Creek. If Category 2 filtration were required to meet Regulation 84 turbidity requirements, filtration technologies that meet the TMDLs for TP could be explored. This could give the Town the option to re-permit an alternative surface discharge to Fruitgrowers Reservoir. However, this would need to be fully vetted (recommended filtration type, water rights considerations) in a different study.

All reuse alternatives would increase operational requirements relative to the current discharge-only condition. Even the lowest-capital Category 1 option would require additional operator attention, sampling, valve and control maintenance, coordination with golf course operations, and careful management of chlorination/dechlorination. Alternatives that include equalization or tertiary filtration would further increase power use, chemical use, maintenance requirements, instrumentation, and compliance monitoring.

## Risk and Sensitivity Comparison

At a planning level, the principal risk of the no-reuse pathway is continued reliance on the existing discharge framework, including ongoing exposure to anticipated more stringent treatment, sampling, and reporting requirements under General Permit COG591. The principal benefit of the no-reuse pathway is avoidance of near-term capital investment and added operational complexity.

Under a reuse pathway, the principal benefits include reuse of treated effluent, reduced reliance on other irrigation supplies during the irrigation season, and potential reduction in discharge-related regulatory burden during periods when effluent is reused rather than discharged. The principal risks include capital cost, implementation complexity, added O&M requirements, and the need to satisfy Regulation 84 authorization and site-management requirements. The recommendation is most sensitive to the required reuse category, the practicality of short-term equalization/storage, the actual cost of pumping and treatment upgrades, and the magnitude of avoided COG591 compliance burden. If the golf course can be reliably operated as restricted-access, a Category 1 pathway may represent a lower-risk, lower-cost implementation approach. If unrestricted-access operation is required, the project becomes significantly more sensitive to treatment cost and long-term O&M burden because a Category 2 pathway would likely be required.

The no-equalization options are particularly sensitive to control reliability because the system would alternate between reclaimed water diversion and permitted discharge. Interlocks between the diversion valves and dechlorination system are required to reduce the risk of sending chlorinated effluent to Surface Creek or improperly dechlorinated water to the reuse system. This risk should be addressed during preliminary design and CDPHE coordination.

# SECTION 6 – NEXT STEPS

## CONCLUSIONS

The study indicates that reclaimed water reuse for golf course irrigation is a viable supplemental water management strategy for the Town of Cedaredge. While the WWTF does not produce sufficient effluent to meet total golf course irrigation demand during peak summer conditions, it can offset a meaningful portion of seasonal demand and thereby reduce reliance on Cook Ditch water and other supplemental supplies. As a result, reclaimed water reuse should be viewed as a partial substitution strategy that improves beneficial use of treated effluent and supports the Town's broader long-term water management objectives, rather than as a standalone irrigation supply. A further potential benefit is that, during irrigation months when treated effluent is reused in lieu of discharge, the Town may reduce exposure to the more stringent treatment, sampling, and reporting requirements anticipated under General Permit COG591.

## SELECTED ALTERNATIVE

At the planning level, the preferred near-term implementation pathway is Alternative 1, Category 1 restricted-access reuse without equalization and direct pumping to the golf course irrigation connection near Holes 10-11. This alternative was specifically requested during the Town Board discussion and appears to provide the lowest-capital path to initial reuse if restricted-access operation can be confirmed. A Category 1 alternative with equalization should be retained as a secondary option if the Town wants additional operational flexibility. Category 2 reuse should be retained as a future or conditional option if unrestricted-access irrigation is required or if future WWTF upgrades for COG591, Regulation 85, Regulation 31, or stream-classification based limits make tertiary filtration necessary for discharge compliance.

## WORK PACKAGES

In order to progress the selected alternative, the Town may advance the project as outlined in the work packages described below. These packages focus on the engineering services and not construction.

### PACKAGE 1 – PRE-APPLICATION AND ACCESS-CONTROL CONFIRMATION

Following completion of this study, the Town should first confirm the preferred reuse pathway, including whether the golf course can be managed as restricted-access landscape irrigation or whether unrestricted-access irrigation should be assumed. Once the preferred pathway is selected, the Town should initiate coordination with CDPHE and begin the pre-application process, including prepare the Letter of Intent, Treater Application, User Application and Site Management Plan, Reuse System Management Plan, agronomic-rate analysis, point-of-compliance schematic, cross-connection control approach, and supporting maps and certifications required under Regulation 84.

If the Town proceeds with a Category 1 restricted-access reuse pathway, a site-specific access-control and best management practices package for the golf course should be developed. This package should document proposed irrigation windows, public-access restrictions, signage, operator responsibilities, inspection procedures, overspray and runoff controls, cross-connection prevention, sampling locations, reporting procedures, and response actions for leaks, system malfunctions, or unauthorized reclaimed-water use. The access-control strategy should focus on demonstrating that reclaimed water irrigation will occur only during approved periods when public contact is minimized, unless CDPHE requires supplemental physical barriers or other controls.

The Town should review existing Colorado Category 1 golf course reuse authorizations as reference examples. Lake Valley Golf Club and Glacier/Durango Golf Course provide publicly available examples of Category 1 restricted-access landscape irrigation approvals. In addition, JVA has prepared or supported Category 1 reclaimed-water permitting for other golf course reuse facilities, including Ballyneal WWTF and Mount Vernon Country Club Metropolitan District. These in-house project examples are expected to provide useful go-by materials for developing the Letter of Intent, Treater Application, User Application and Site Management Plan, access-control approach, BMPs, and supporting figures for Cedaredge. However, Cedaredge's authorization will need to be based on site-specific conditions, irrigation operations, hydraulic configuration, water quality, and CDPHE review.

As part of pre-application coordination, the Town should review the current COG591 permit requirements for seasonal effluent limits and confirm whether winter or summer limits control the most restrictive design condition. This review should be summarized in the final report because reuse will reduce discharge during irrigation periods but will not eliminate discharge during the non-irrigation season.

## Package 2 - Letter of Intent & Preliminary Design

The Letter of Intent (LOI) should be prepared as a preliminary summary of the information required for the Treater Application under Section 84.6(A). At a minimum, the LOI should identify the Town of Cedaredge as the Treater, the Cedaredge WWTF as the centralized reclaimed water treatment facility, the Legally Responsible Individual and facility contact, the proposed User(s), and the intended reclaimed water uses. The LOI should also identify the anticipated reclaimed water category, the proposed point of compliance, the existing and proposed treatment process, and the general conveyance, storage, and distribution approach. Because the primary reuse application evaluated in this study is golf course irrigation, the LOI should clearly state whether the Town intends to pursue restricted-access Category 1 landscape irrigation or unrestricted-access Category 2 landscape irrigation, since that determination controls whether tertiary filtration is required.

For irrigation reuse, the LOI should also state that the final Treater Application and User Application and Site Management Plan will include an agronomic-rate analysis demonstrating that reclaimed water will be applied at or below agronomic rates. The LOI should describe the anticipated irrigated area, irrigation season, reuse demand, supplemental water sources, and operational controls that will be used to minimize ponding, runoff, windblown spray, and application outside approved reuse areas. For the golf course scenario, the LOI should also identify whether reclaimed water will be delivered directly to the irrigation system or routed to storage,

whether existing ponds or equalization facilities will contain reclaimed water, and whether any secondary users, such as the cemetery or other municipal landscape areas, are included in the initial authorization or reserved for future expansion.

The LOI should further commit to preparation of a Reuse System Management Plan consistent with Section 84.6(A), including a description of Treater responsibilities, annual User training, signage and labeling procedures, cross-connection control measures, inspection and recordkeeping procedures, and an Enforcement Escalation Plan. The LOI should also acknowledge that final authorization will require Division review of the Treater Application, UASMP materials for each User, certification statements, evidence of the Town's legal ability to terminate reclaimed water service for noncompliance, and an affirmation that the proposed reuse will not materially injure water rights. If fire protection, construction water, non-food crop irrigation, or other municipal non-potable uses are later added, those uses should be identified as separate reuse scenarios and evaluated against the applicable category limits and implementation requirements.

For the initial LOI, the Town should identify Category 1 restricted-access landscape irrigation without equalization as the proposed near-term reuse scenario, with Category 1 equalization and Category 2 filtration identified as potential future or alternate scenarios. The LOI should describe the proposed diversion point near Holes 10-11, the intended use on Holes 10-18, the operating mode that alternates between golf course irrigation and Surface Creek discharge, and the controls used to manage chlorination/dechlorination and prevent improper routing.

Preliminary design should begin in conjunction with the CDPHE documents mentioned above. For the preferred Category 1 no-equalization alternative, design would focus on the reclaimed water conveyance connection, diversion vault, motorized valves, magnetic flowmeter, autosampler, manual sample tap, electrical service, controls, dechlorination interlocks, signage, labeling, cross-connection prevention, and site-management provisions. If the Town elects the Category 1 equalization alternative, design would also include WWTF equalization and storage improvements and associated pumping or piping improvements. For the Category 2 alternative, design would additionally include tertiary filtration, treatment interconnections, instrumentation, controls, backwash, or waste-stream handling, and expanded compliance monitoring provisions. Preliminary design should also confirm hydraulic conditions in the existing golf course irrigation system, verify the useable equalization and storage volume, define all tie-in locations, and identify any improvements required to prevent public exposure, ponding, runoff, or cross-connections.

## Package 3 – Final Design and Bid Documents

Once CDPHE has approved all the application documents and reviewed the preliminary design, the confirmed alternative will be detailed in final design. Drawings and specifications will be prepared for the Town to put the project out to bid.

## Package 4 – Bidding and Construction Phase Services

JVA can assist the Town through the bidding process and construction. It is anticipated that the construction contract can be one package unless Category 2 equipment procurement drives pre-purchase agreements due to long-lead times. The detailed scope and fee for packages 3 and 4 would be defined and agreed upon by the Town following completion of Package 2.

Implementation should be phased to align with the golf course operating and irrigation schedule. Construction affecting the golf course irrigation system should be avoided during peak irrigation months from mid-June through the end of August unless temporary bypass pumping, supplemental Cook Ditch supply, or other operational controls are provided. A reasonable planning-level schedule is summarized in Table 5 below showing durations with planning-level assumptions. The CDPHE review period is based on Regulation 84 review timelines. Design, procurement, construction, and startup durations are engineering estimates that will depend on alternative selection, equipment lead times, seasonal work windows, and Town procurement/funding requirements. Based on current assumptions, the earliest the Town could begin delivering reuse water to the golf course would be late Spring 2027.

**Table 5 - Project Implementation Plan**

| Package No. | Description | Approximate Duration | Planning Assumption |
|---|---|---|---|
| 1 | Town Alternative Selection and CDPHE Pre-application Coordination | 1 to 2 months | Confirm Category 1 vs. Category 2 pathway and required authorization strategy. |
| 2 | Application/LOI Coordination, Treater Application, UASMP(s), and Supporting Materials | 2 to 4 months | Prepare agronomic-rate analysis, maps, point-of-compliance schematic, Reuse System Management Plan, and cross-connection control approach. |
| 2 | CDPHE Review and Authorization | 2 to 3 months | 60-day review if no public notice; 90-day review if public notice is required. |
| 2 & 3 | Category 1 Design | 6 to 9 months | Conveyance, storage/equalization, pumping, controls, site-management, and signage improvements. |
| 2 & 3 | Category 2 Design | 9 to 12 months | Category 1 improvements plus tertiary filtration, process controls, and monitoring provisions. |
| 4 | Bidding and Procurement | 2 to 4 months | Longer lead times should be assumed for pumps, electrical equipment, filtration systems, and controls. |
| 4 | Construction and Startup | 8 to 10 months for Category 1; 10 to 14 months for Category 2 | Schedule major tie-ins during the irrigation off-season where practicable. |
| 4 | Initial Reuse Operation | First available irrigation season after authorization, construction, startup testing, and operator training | Confirm water quality, operational controls, training, signage, reporting, and UASMP compliance before routine operation. |

# APPENDIX A – OPINION OF PROBABLE COSTS

**Job Name: WWTF Reuse Planning Study**
**Job Number: 260085.ENV**
**Date: 6/9/2026**
**Prepared By: JNG**
**Checked By: MK**

| OPINION OF PROBABLE COST FOR ALTERNATIVE 1<br>CATEGORY 1 REUSE: DIRECT PUMPING TO GOLF COURSE WITHOUT EQUALIZATION | | | | |
|---|---|---|---|---|
| **Description** | **Quantity** | **Units** | **Unit Cost** | **Total Cost** |
| **Division 02 - Sitework** | | | | |
| Erosion Control | 1 | LS | $20,000 | $20,000 |
| Traffic Control | 1 | LS | $15,000 | $15,000 |
| WWTF Effluent FM Extention (8" C900) | 500 | LF | $200 | $100,000 |
| Road Base & Asphalt T-Patch (8") | 1 | LS | $50,000 | $50,000 |
| Site Grading | 1 | LS | $10,000 | $10,000 |
| Seeding | 0.5 | AC | $10,000 | $5,000 |
| | | | **Sitework Subtotal** | **$200,000** |
| **Division 03 - Concrete** | | | | |
| Tie-in Valve Vault | 1 | EA | $15,000 | $15,000 |
| Diversion Valve Vault and Doghouse | 1 | EA | $30,000 | $30,000 |
| | | | **Concrete Subtotal** | **$45,000** |
| **Division 15 - Mechanical** | | | | |
| Air / Vacuum Release Assemblies | 1 | LS | $20,000 | $20,000 |
| Valves | 1 | LS | $40,000 | $40,000 |
| Fittings and Appurtenances | 1 | LS | $40,000 | $40,000 |
| | | | **Mechanical Subtotal** | **$100,000** |
| **Division 16 - Electrical** | | | | |
| Electrical Instrumentation and Controls | 1 | LS | $50,000 | $50,000 |
| Magnetic Flowmeter | 1 | EA | $10,000 | $10,000 |
| Autosampler | 1 | EA | $12,000 | $12,000 |
| | | | **Electrical Subtotal** | **$72,000** |

| | |
|---|---|
| **Project Subtotal** | **$417,000** |
| General Conditions (10%) | $42,000 |
| Contingency (30%) | $138,000 |
| Contractor's OH&P (15%) | $90,000 |
| Engineering, Permitting and Design (12%) | $83,000 |
| Bidding and Construction Administration (6%) | $42,000 |
| **Project Total** | **$812,000** |

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**Job Name: WWTF Reuse Planning Study**
**Job Number: 260085.ENV**
**Date: 6/9/2026**
**Prepared By: JNG**
**Checked By: MK**

| OPINION OF PROBABLE COST FOR ALTERNATIVE 2 | | | | |
|---|---|---|---|---|
| CATEGORY 1 REUSE: DIRECT PUMPING TO GOLF COURSE WITH EQUALIZATION | | | | |
| **Description** | **Quantity** | **Units** | **Unit Cost** | **Total Cost** |
| **Division 02 - Sitework** | | | | |
| Erosion Control | 1 | LS | $20,000 | $20,000 |
| Traffic Control | 1 | LS | $15,000 | $15,000 |
| WWTF Effluent FM Extention (8" C900) | 500 | LF | $200 | $100,000 |
| Road Base & Asphalt T-Patch (8") | 1 | LS | $50,000 | $50,000 |
| Earthwork, WWTF Storage Pond | 2500 | CY | $25 | $62,500 |
| Storage Pond Liner | 40000 | SF | $2.5 | $100,000 |
| Site Grading | 1 | LS | $10,000 | $10,000 |
| WWTF Storage Pond Pipping (8") | 200 | LF | $200 | $40,000 |
| Road Base for WWTF Access Road | 1 | LS | $10,000 | $10,000 |
| Seeding | 1 | AC | $10,000 | $10,000 |
| | | | **Sitework Subtotal** | **$417,500** |
| **Division 03 - Concrete** | | | | |
| Pre-Cast Conrete - WWTF Lift Station Vault | 1 | EA | $20,000 | $20,000 |
| Tie-in Valve Vault and Doghouse | 1 | EA | $30,000 | $30,000 |
| Diversion Valve Vault | 1 | EA | $15,000 | $15,000 |
| | | | **Concrete Subtotal** | **$65,000** |
| **Division 11 - Equipment** | | | | |
| Pre-Packaged WWTF Lift Station | 1 | EA | $120,000 | $120,000 |
| | | | **Equipment Subtotal** | **$120,000** |
| **Division 13 - Special Construction** | | | | |
| Building - WWTF Lift Station | 100 | SF | $250 | $25,000 |
| | | | **Special Construction Subtotal** | **$25,000** |
| **Division 15 - Mechanical** | | | | |
| Slide Gates Valves | 2 | EA | $20,000 | $40,000 |
| Air / Vacuum Release Assemblies | 1 | LS | $20,000 | $20,000 |
| Valves | 1 | LS | $40,000 | $40,000 |
| Fittings and Appurtenances | 1 | LS | $40,000 | $40,000 |
| | | | **Mechanical Subtotal** | **$140,000** |
| **Division 16 - Electrical** | | | | |
| Electrical Instrumentation and Controls | 1 | LS | $200,000 | $200,000 |
| Magnetic Flowmeter | 1 | EA | $10,000 | $10,000 |
| Autosampler | 1 | EA | $12,000 | $12,000 |
| | | | **Electrical Subtotal** | **$222,000** |

| | |
|---|---|
| **Project Subtotal** | **$989,500** |
| General Conditions (10%) | $99,000 |
| Contingency (30%) | $327,000 |
| Contractor's OH&P (15%) | $213,000 |
| Engineering, Permitting and Design (12%) | $196,000 |
| Bidding and Construction Administration (6%) | $98,000 |
| **Project Total** | **$1,922,500** |

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**Job Name: WWTF Reuse Planning Study**
**Job Number: 260085.ENV**
**Date: 6/9/2026**
**Prepared By: JNG**
**Checked By: MK**

| OPINION OF PROBABLE COST FOR ALTERNATIVE 3 | | | | |
|---|---|---|---|---|
| CATEGORY 2 REUSE - DIRECT PUMPING TO GOLF COURSE WITH TERTIARY FILTRATION & NO EQUALIZATION | | | | |
| **Description** | **Quantity** | **Units** | **Unit Cost** | **Total Cost** |
| **Division 02 - Sitework** | | | | |
| Erosion Control | 1 | LS | $20,000 | $20,000 |
| Traffic Control | 1 | LS | $15,000 | $15,000 |
| WWTF Effluent FM Extention (8" C900) | 500 | LF | $200 | $100,000 |
| Road Base & Asphalt T-Patch (8") | 1 | LS | $50,000 | $50,000 |
| Site Grading | 1 | LS | $10,000 | $10,000 |
| Seeding | 1 | AC | $10,000 | $10,000 |
| | | | **Sitework Subtotal** | **$205,000** |
| **Division 03 - Concrete** | | | | |
| Tie-in Valve Vault | 1 | EA | $15,000 | $15,000 |
| Diversion Valve Vault and Doghouse | 1 | EA | $30,000 | $30,000 |
| | | | **Concrete Subtotal** | **$45,000** |
| **Division 11 - Equipment** | | | | |
| Cloth Media Filters | 1 | LS | $958,780 | $958,800 |
| | | | **Equipment Subtotal** | **$958,800** |
| **Division 13 - Special Construction** | | | | |
| Building - WWTF Filtration | 1000 | SF | $250 | $250,000 |
| | | | **Special Construction Subtotal** | **$250,000** |
| **Division 15 - Mechanical** | | | | |
| Slide Gates Valves | 2 | EA | $20,000 | $40,000 |
| Air / Vacuum Release Assemblies | 1 | LS | $20,000 | $20,000 |
| Valves | 1 | LS | $40,000 | $40,000 |
| Fittings and Appurtenances | 1 | LS | $40,000 | $40,000 |
| | | | **Mechanical Subtotal** | **$140,000** |
| **Division 16 - Electrical** | | | | |
| Electrical Instrumentation and Controls | 1 | LS | $479,640 | $479,700 |
| Magnetic Flowmeter | 1 | EA | $10,000 | $10,000 |
| Autosampler | 1 | EA | $12,000 | $12,000 |
| | | | **Electrical Subtotal** | **$501,700** |

| | |
|---|---|
| **Project Subtotal** | **$2,100,500** |
| General Conditions (10%) | $211,000 |
| Contingency (30%) | $694,000 |
| Contractor's OH&P (15%) | $451,000 |
| Engineering, Permitting and Design (12%) | $415,000 |
| Bidding and Construction Administration (6%) | $208,000 |
| **Project Total** | **$4,079,500** |

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## Summary of Changes: Draft Report vs. Final Report (Final Document Dated 20260619)

*Draft source: 260085.ENV - Cedaredge WWTP Reuse Study - DRAFT Evaluation Report-20260514.pdf | Final source: 260085.ENV - Cedaredge WWTP Reuse Study - Evaluation Report - 20260619.docx*

| Report area / section | Draft report | Final report (20260619) | Key change / impact | Source / basis |
|---|---|---|---|---|
| **Overall document** | May 2026 Draft PDF with draft title/watermark; 35-page report. | June 2026 report in the document dated 20260619; draft language removed; 39-page report. | Final document adds substantive content, revises the alternatives, and reorganizes the next-step structure. | Draft pp. cover/TOC; Final 20260619 pp. cover/TOC |
| **Table of Contents / structure** | No standalone discharge-permit subsection. Section 6 included Project Schedule, Permit, Letter of Intent, Design, and Implementation Timeline. | Adds Current Discharge Permit Constraints under Section 2. Section 4 uses Alternative 1/2/3 plus Alternative Not Carried Forward. Section 6 now includes Work Packages and Packages 1 through 4. | Final structure better reflects discharge-permit constraints, Board direction, and implementation work packages. | Draft TOC; Final 20260619 TOC |
| **Section 1 - Executive Summary** | Reuse was described as offsetting a meaningful portion of overall golf course demand, with WWTF production not satisfying peak summer demand and short-term balancing/equalization anticipated. | Reuse is described as offsetting irrigation demand and reducing the frequency of the WWTF needing to meet general permit obligations. Final also clarifies supplemental Cook Ditch/storage pond supply is still needed and WWTF discharge continues during non-reuse periods. | Final reframes the benefit from only irrigation-supply offset to also include potential reduction of discharge-permit exposure during reuse periods. | Draft Sec. 1; Final 20260619 Sec. 1 |
| **Section 1 - Alternatives summary** | Three pathways were evaluated: two Category 1 conveyance alternatives and one Category 2 tertiary-treatment pathway. | Alternatives were revised following the May 21, 2026 Town Board meeting. Preferred near-term pathway is Category 1 reuse without equalization, direct pumping near Holes 10-11, primarily for Holes 10-18. Category 1 with equalization and Category 2 without equalization are retained as other alternatives. | Final identifies a specific Board-directed near-term implementation approach. | Draft Sec. 1; Final 20260619 Sec. 1 |
| **Section 1 - Upper storage pond option** | Pumping to the upper golf course storage pond was evaluated as a main Category 1 option. | Upper storage pond pumping with larger pumps and electrical upgrades is documented as evaluated but non-preferred because the Town Board indicated it was cost prohibitive. | Final records the Board-driven reason for not carrying forward the upper storage pond pumping option. | Draft Sec. 4; Final 20260619 Sec. 1 and Sec. 4 |
| **Section 1 - Policy framing** | No separate decision-maker framing statement. | Adds that the principal policy/funding question is whether to preserve a lower-cost Category 1 restricted-access path or plan for a more expensive Category 2 unrestricted-access path with broader long-term flexibility. | Final makes the Town-level decision point clearer. | Final 20260619 Sec. 1 |
| **Section 2 - WWTF background** | Described WWTF process, flows, capacity, and discharge to Surface Creek under permit COG591173. | Retains WWTF description and adds Current Discharge Permit Constraints as a new subsection. | Final expands the regulatory and permit context for reuse planning. | Draft Sec. 2; Final 20260619 Sec. 2 |
| **Section 2 - Current Discharge Permit Constraints** | Not included as a standalone subsection. | Adds discussion of CDPS General Permit Certification COG591173, Surface Creek discharge, hydraulic/organic capacity, monitored parameters, 0:1 dilution, antidegradation limitations, CDPHE temporary discretion, and future compliance schedule uncertainty. | Final ties reuse planning directly to discharge-permit compliance and future WWTF upgrade planning. | Final 20260619 Sec. 2 |
| **Section 2 - Golf course demand basis** | Compared WWTF effluent production to total golf course irrigation demand. | Adds Holes 10-18 demand, assumed at approximately 50% of total golf course demand because hole-by-hole irrigation data were not available. | Final provides a more targeted basis for the preferred direct connection near Holes 10-11. | Draft Sec. 2; Final 20260619 Sec. 2 |
| **Section 2 - Figure / flow analysis** | Figure compared WWTF flow, golf course flow, Cook Ditch flow, and WWTF max design capacity. | Figure adds Holes 10-18 demand and clarifies that the Cook Ditch/storage pond line represents existing raw water irrigation supply, not measured Cook Ditch flow. | Final improves the interpretation of available supply/demand information. | Draft Fig. 1; Final 20260619 Fig. 2 |
| **Section 2 - Equalization/storage** | Short-term operational balancing or equalization was treated as likely necessary for reuse implementation. | Equalization is described as beneficial for flexibility but not absolutely required if the Town alternates between reclaimed-water delivery and permitted Surface Creek discharge. | Final makes a no-equalization direct-diversion strategy viable as the lowest-cost near-term approach. | Draft Sec. 2/4; Final 20260619 Sec. 2/4 |
| **Section 2 - Seasonal storage** | Long-term seasonal storage was excluded from the study scope and left for separate evaluation. | Adds preliminary note that storing winter effluent could require roughly 20 to 40 acres, depending on storage depth, liner, geotechnical, evaporation/freeboard, and dam-safety assumptions. | Final gives more context for why full seasonal storage is outside the alternatives and should be a separate future study. | Final 20260619 Sec. 2 |
| **Section 3 - Regulatory framework** | Focused on Regulation 84 reclaimed water categories and Treater/User authorization requirements. | Adds that Regulation 84 authorization is separate from the CDPS Surface Creek discharge permit and both frameworks must be considered because reuse would be seasonal/intermittent. | Final more clearly distinguishes reuse authorization from discharge-permit compliance. | Draft Sec. 3; Final 20260619 Sec. 3 |
| **Section 3 - Category 1 access precedent** | Did not include specific Colorado golf course reuse authorization precedents. | Adds Lake Valley Golf Club and Glacier/Durango Golf Course as Category 1 restricted-access landscape irrigation precedents. | Final strengthens the support for overnight golf course irrigation as a potential Category 1 restricted-access strategy, subject to CDPHE review. | Final 20260619 Sec. 3 |
| **Section 3 - Existing compliance** | WWTF was found to meet Category 1 E. coli/TSS criteria and not meet Category 2 turbidity/filtration requirements. | Same core finding retained: Category 1 compliant for E. coli/TSS; Category 2 and Category 3 not compliant because turbidity and filtration requirements are not met. | No major technical change; the Category 1 vs. Category 2 decision remains driven by access control and filtration needs. | Draft Sec. 3/Table 2; Final 20260619 Sec. 3/Table 2 |
| **Section 4 - Overall alternatives approach** | Alternatives included storage/equalization assumptions and an option to pump to the upper golf course storage pond. | Alternatives were revised to direct delivery at the golf course irrigation connection near Holes 10 and 11: Alternative 1 no equalization, Alternative 2 with WWTF equalization, Alternative 3 Category 2 no equalization. | Final shifts from an upper storage pond pumping framework to a direct-connection framework. | Draft Sec. 4; Final 20260619 Sec. 4 |
| **Section 4 - Draft Category 1 Option 1 vs. Final Alternative 1** | Category 1 Option 1 included use of the WWTF overflow pond/short-term storage, storage pond lift station, new forcemain, and tie-in; OPC $1,452,500. | Alternative 1 is Category 1 direct pumping without equalization, including 500 LF of 8-inch pipe, diversion structure, automated valves, doghouse, and autosampler; OPC $812,000. | Final creates a lower-cost initial implementation path by removing equalization/storage from the base option. | Draft Sec. 4/App. A; Final 20260619 Sec. 4/Table 4/App. A |
| **Section 4 - Draft Category 1 Option 2 vs. Final Alternative 2** | Category 1 Option 2 pumped to the upper golf course storage pond and required larger pumps and electrical upgrades; OPC $1,988,500. | Alternative 2 is Category 1 direct pumping near Holes 10-11 with WWTF equalization/storage; OPC $1,922,500. | Final removes the upper storage pond pumping approach but retains equalization as an added-flexibility option. | Draft Sec. 4/App. A; Final 20260619 Sec. 4/Table 4/App. A |
| **Section 4 - Alternative not carried forward** | The upper storage pond pumping option was a primary evaluated alternative. | The final document states the Town Board indicated that approach was cost prohibitive and therefore it is not carried forward as a preferred implementation pathway. | Final documents why the earlier alternative was dropped. | Final 20260619 Sec. 4 |
| **Section 4 - Category 2 alternative** | Category 2 included tertiary treatment plus conveyance and storage improvements; OPC $5,157,300. | Alternative 3 is Category 2 direct pumping with tertiary filtration and no equalization; OPC $4,079,500. | Final reduces the Category 2 capital cost basis by removing equalization/storage from the base Category 2 | Draft Sec. 4/App. A; Final 20260619 Sec. 4/Table |
| **Section 4 - Controls / dechlorination** | Less detailed discussion of automated diversion and dechlorination controls. | Adds diversion vault, motorized valves, magnetic flowmeter, manual sample tap, autosampler, electrical service, controls, and interlocks with the chlorination/dechlorination system. Also discusses total residual chlorine limits for Surface Creek discharge. | Final adds specific safeguards needed to alternate between reuse and discharge without routing water incorrectly. | Final 20260619 Sec. 4 |
| **Section 4 - Pond storage details** | Former oxidation pond was identified as possible short-term balancing storage. | Adds discussion of liner condition, seepage control, Regulation 61.14(9)(a), 10^-6 cm/sec seepage threshold, water age, mixing, algae/duckweed, TSS/TDS, and chlorine residual considerations. | Final gives more design and permitting detail for any future use of WWTF pond equalization. | Final 20260619 Sec. 4 |
| **Section 4 - Storage tank note** | Draft noted a 2-million-gallon storage tank could cost approximately $1.5 million to $3 million. | Final retains the $1.5 million to $3 million tank premium as a note to Table 4 and clarifies tank storage is not carried as the base Alternative 2 concept. | Final keeps tank storage as a possible preliminary-design consideration rather than the base case. | Draft Sec. 4; Final 20260619 Sec. 4/Table 4 |
| **Section 4 - Alternatives comparison table** | Table 4 compared the Draft alternatives and costs. | Table 4 compares the three revised alternatives and notes the former storage pond pumping alternative was not carried forward per Town Board direction. | Final alternatives table is fully replaced to match the revised implementation strategy. | Draft Table 4; Final 20260619 Table 4 |
| **Section 5 - Feasibility and risk analysis** | Reuse was presented as technically feasible on a limited seasonal basis, with risks tied to category selection, costs, storage, and operations. | Adds stronger emphasis that reuse is a seasonal beneficial-use strategy, not a full replacement for existing irrigation sources or discharge-permit compliance. Recognizes no-equalization as a potentially acceptable lower-cost initial phase. | Final better balances reuse benefits with the continued need for Surface Creek discharge compliance. | Draft Sec. 5; Final 20260619 Sec. 5 |
| **Section 5 - Additional reuse / discharge opportunities** | Other reuse opportunities were discussed generally. | Adds discussion of the original lagoon discharge to Alfalfa Ditch/Fruitgrowers Reservoir, 303(d) impairment/TMDL issues, and the possibility that Category 2 filtration technologies meeting TP-related objectives could be explored in a separate study for potential alternative discharge permitting. | Final adds a new strategic consideration linking future filtration to possible alternate discharge/reuse opportunities, while noting it would require a separate study. | Final 20260619 Sec. 5 |
| **Section 5 - Risk and sensitivity** | Risk discussion focused on capital cost, implementation complexity, storage, category selection, and regulatory requirements. | Adds that no-equalization options are particularly sensitive to control reliability and require interlocks between diversion valves and dechlorination to avoid sending chlorinated effluent to Surface Creek or improperly dechlorinated water to reuse. | Final more clearly identifies operational risk introduced by alternating between reuse and discharge. | Draft Sec. 5; Final 20260619 Sec. 5 |
| **Section 6 - Selected alternative** | Recommended confirming Category 1 restricted-access vs. Category 2 unrestricted-access and advancing the selected path into preliminary design, LOI, and CDPHE coordination. | Identifies Alternative 1 - Category 1 restricted-access reuse without equalization and direct pumping near Holes 10-11 as the preferred near-term implementation pathway. | Final provides a clearer preferred alternative. | Draft Sec. 6; Final 20260619 Sec. 6 |
| **Section 6 - Work packages / next steps** | Section 6 included Project Schedule, Permit, Letter of Intent, Design, and Implementation Timeline subsections. | Section 6 now includes Work Packages: Package 1 Pre-Application and Access-Control Confirmation; Package 2 Letter of Intent & Preliminary Design; Package 3 Final Design and Bid Documents; Package 4 Bidding and Construction Phase Services. | Final converts next steps into a clearer implementation-work-package structure. | Draft Sec. 6; Final 20260619 Sec. 6 |
| **Section 6 - LOI and preliminary design** | LOI and design direction were more general. | Final says the initial LOI should identify Category 1 restricted-access landscape irrigation without equalization as the proposed near-term reuse scenario and describe diversion near Holes 10-11, intended use on Holes 10-18, alternating operation with Surface Creek discharge, and dechlorination/routing controls. | Final aligns permitting and preliminary design with the selected near-term alternative. | Final 20260619 Sec. 6 |
| **Section 6 - Final design and bid documents** | Draft design section broadly referenced design phase and implementation requirements. | Final adds Package 3 - Final Design and Bid Documents and Package 4 - Bidding and Construction Phase Services. | Final better defines the progression from regulatory confirmation to design and construction support. | Final 20260619 Sec. 6 |
| **Appendix A - Opinion of Probable Costs** | Draft OPCs: Category 1 Option 1 $1,452,500; Category 1 Option 2 $1,988,500; Category 2 $5,157,300. | Final 20260619 alternatives use revised OPCs: Alternative 1 $812,000; Alternative 2 $1,922,500; Alternative 3 $4,079,500. The OPC sheets embedded in the final document are dated 6/9/2026. | Appendix A was revised to match the new direct-connection/no-equalization base strategy and updated alternatives. | Draft App. A; Final 20260619 App. A/Table 4 |

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