Appendix D
Reclaimed Water Business Case Evaluation

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Long Range Water Resources Plan Update: Reclaimed Water Program Business Case Evaluation

PREPARED FOR:	Town of Cary
DATE:	December 31, 2018
PROJECT NUMBER:	692605
REVISION NO.:	Revised Final

Introduction

The Town of Cary (Town) partnered with CH2M HILL North Carolina, Inc. (CH2M) to update the 2013 Long Range Water Resources Plan (LRWRP). The Town is including reclaimed water as a component of its long range water resources forecast, a step that was not taken formally in 2013 (CH2M, 2013). As part of this effort to develop the water demand and wastewater flow forecast, CH2M is scoped with the development of a business case evaluation (BCE) for the Town's reclaimed water program based on the last 5 years of information. Within this period, the Town completed an update to its Reclaimed Water Master Plan in December 2017 (CDM Smith, 2017) and formally met with Durham County (a source of reclaimed water) to discuss the future availability of this resource.

The Town's drivers for a reclaimed water program include innovation, cost conscientiousness, and environmental stewardship. Benefits to the Town include offset potable demands, reduced nutrient loading in the Neuse River basin (by reducing treated wastewater discharge), and reduced interbasin transfer. Customer benefits include reduced rates for reclaimed water usage over irrigation rates and exemption from the Town's alternate day watering ordinance. The Town's general drivers were incorporated into the BCE; specifics such as interbasin transfer were not as the role of reclaimed water in the Town's overall water resources strategy is supplementary only. The Western Wake Regional Water Reclamation Facility (WWRWRF) is now online and discharges to the Cape Fear River basin; the reclaimed water program served a larger role in offsetting interbasin transfer prior to operation of this facility.

The Town's Policy Statement 132 guiding the reclaimed water program, effective September 16, 2010 and included in Attachment A, states in part that:

> *Reclaimed water is "an integral part of the Town's plan for providing water resources to meet long-term water demand requirements. Use of reclaimed water also helps to prevent peak potable water demands from accelerating the need for expansion of the Cary/Apex Water Treatment Plant."*

The policy was updated in 2013 to include:

> *"This policy directs staff to develop the necessary ordinances and procedures to ensure the effective utilization of the Town's reclaimed water system."*

Other details of the Town's reclaimed water program are included in Section 36, Article V of the Town's Code of Ordinances. This ordinance clarifies that reclaimed water, where available, will be required for landscape and grounds irrigation systems and will be permitted, but not required, for other uses such as cooling or industrial uses (Attachment A).

Purpose of this Evaluation

The Town has observed changes in irrigation usage over the last 5 years; these changes are documented as part of the 2018 LRWRP Update. With this information, the Town has raised questions regarding the best path forward for the program. Reclaimed water use is separately metered by the Town and statistics for the years 2013-2016 are included in CH2M's Water Use Analysis Technical Memorandum (TM), finalized in December 2017 (CH2M, 2017). This TM summarizes those statistics, assumptions made by the Town regarding the future direction of the reclaimed water program, and the BCE which incorporates both financial and non-financial factors in its decision-making process.

The purpose of this evaluation is to support the Town in its effective utilization of the system moving forward. As part of the workshops associated with this task, the Town developed a problem statement to focus this business case evaluation:

> *The Town of Cary needs to understand their long-term business case for the reclaimed water program including an evaluation of the operational challenges (both quantity and quality) and:*
>
> *1) if the BCE supports an official change in the Town's reclaimed water policy statement (as it relates to service areas and that new irrigation users "must use" reclaimed water) and*
>
> *2) how specifically to supply the West service area.*

Recent History and Details of Reclaimed Water Program

In 2001, the Town became the first municipality in North Carolina to distribute reclaimed water to customers. Since then, the Town has continued to update its reclaimed water master planning as additional or new trends and goals for the program have become available. Most recently, The Town prepared an addendum to the 2017 Master Plan Update. This addendum focuses on the West service area and the options to expand both service and sources of reclaimed water (CDM Smith, 2017a and 2017b).

Service Area

The Town's reclaimed water service area serves a portion of the Town's water and wastewater service area, as shown in Figure 1. The Town's current policy states that all new customers within the service area must use reclaimed water for irrigation, offsetting potential potable water usage to meet this portion of the Town's water resources demands. In addition, some non-residential water customers use reclaimed water to meet their irrigation and cooling water needs. Others opt to continue using potable water to meet water quality requirements for their cooling water needs.

The Town's service area is divided into 3 segments: West Cary, North Cary, and South Cary. Currently, each of these areas is served by a different wastewater treatment facility source (Figure 1). Those areas currently with reclaimed water service and those expecting to receive service in the future are depicted for the purposes of projections and this BCE. The total combined West and North Cary service area boundary and the South Cary boundary are not expected to increase in size, as depicted in Town Policy Statement 132. These base assumptions are factors used in this BCE and the preparation of reclaimed water demand projections.

Sources

The Town currently holds permits to distribute about 5 million gallons per day (MGD) of reclaimed water, avoiding this additional discharge to waterways. The Town also holds a contract with Durham County to purchase reclaimed water.

Durham County Wastewater Treatment Facility

The Durham County Wastewater Treatment Plant (WWTP), operated by Durham County, provides reclaimed water via contract to the Town to the West Cary service area. This contract includes a provision to provide a peak pumping rate capacity of at least 150,000 gallons per hour (or 3.6 MGD) at the point of delivery (a meter along the transmission main) through 2021. The Town's payback schedule runs through June 2022. The county stated their willingness to be a long-term provider of reclaimed water for the Town in the county's recent Reclaimed Water Master Plan (CDM Smith, 2017a) and in a meeting between the utilities on January 26, 2018. The Town expects that a new, long term contract agreement will be reached when the current contract expires. This source of water is from the Haw River basin.

North Cary Water Reclamation Faculty

The North Cary Water Reclamation Facility (NCWRF) serves the North Cary reclaimed water service area. In addition to serving its customer base, reclaimed water is used onsite for maintenance purposes and irrigation. The NCWRF has a capacity of 12.0 MGD and discharges into Crabtree Creek within the Neuse River basin.

South Cary Water Reclamation Facility

In the smaller South Cary reclaimed water service area, the SCWRF is the source. Much of reclaimed water demands within this service area are at the SCWRF itself, for maintenance purposes and irrigation. The facility's capacity is 12.0 MGD and it discharges into Middle Creek within the Neuse River basin.

Reclaimed Water Demands

In 2016, the Town's annual average reclaimed water demands totaled 0.31 MGD. Usage in the West and North Cary service areas totaled 0.26 MGD while in the South Cary service area, usage totaled 0.05 MGD on an average annual basis. On the peak day, reclaimed water demands totaled almost 0.7 MGD (CH2M, 2017). This seasonality is presented in Figure 5-6 of the 2017 *Water Use Analysis* (CH2M, 2017). Additionally, reclaimed water is used onsite at each of the Town's wastewater reclamation facilities. For the purposes of this BCE, these onsite uses have not been included in demand projections.

To forecast future reclaimed water demands, CH2M carried forward assumptions updated in the 2017 *Reclaimed Water Master Plan Update Addendum* (CDM Smith, 2017b). In that evaluation, CDM Smith refreshed many assumptions used in the 2013 Master Plan Update (CDM Smith, 2013) to reflect more recent trends in irrigation. Reclaimed water demand projections decreased because of the application of these refreshed assumptions:

- No Town plans for the retrofit of reclaimed water pipes within existing developments
- Plans to connect reclaimed water lines installed as part of developments but not yet connected to the Town's reclaimed water distribution system
- Separately-metered irrigation systems are assumed to occur in 13 percent of new residential development in the reclaimed water service areas, a decrease from the 35 percent assumption in the 2013 Reclaimed Water Master Plan
- Updated peaking factors based on historical and recent metering data. CH2M used a peaking factor of 2.5. Three of the past four years have had a peaking factor between 1.9 and 2.0. However, higher peak demands were seen in earlier years. In 2013, the maximum day peaking factor was 2.8, and 25 days had peaking factors greater than 2.5. Based on this historical data and considering the relatively wet weather during the 2013 – 2016 period that contributed to lower peak demands, CH2M selected 2.5 as the peaking factor for projections.

In addition to customer demands, the Town also provides bulk reclaimed water (a relatively small quantity not included in this analysis) and considers reclaimed water operational usage and flushing programs. Due to the reclaimed water system's seasonal demands fluctuations, the Town implements a significant flushing program to maintain water quality in the system. In the West Cary service area, the Town's purchase from Durham County includes this flushing volume. In addition, the Town employs an annual "reclaimed water holiday" and performs maintenance on the system every February for approximately 10 days. Two full time employees (FTE) lead this maintenance program. This BCE includes this usage and staff resources.

Reclaimed Water Rates

Customers benefit financially from access to reclaimed water, as it is priced by the Town to be less expensive than potable water used in separately metered irrigation systems. Reclaimed water customers are also exempt from the Town's alternate day watering schedule ordinance. The Town's rate per 1,000 gallons for fiscal year 2018 is $3.86 compared to separate irrigation meters for Single Family Residential Tier Usage of $6.65 per 1,000 gallons (Town of Cary, 2017a).

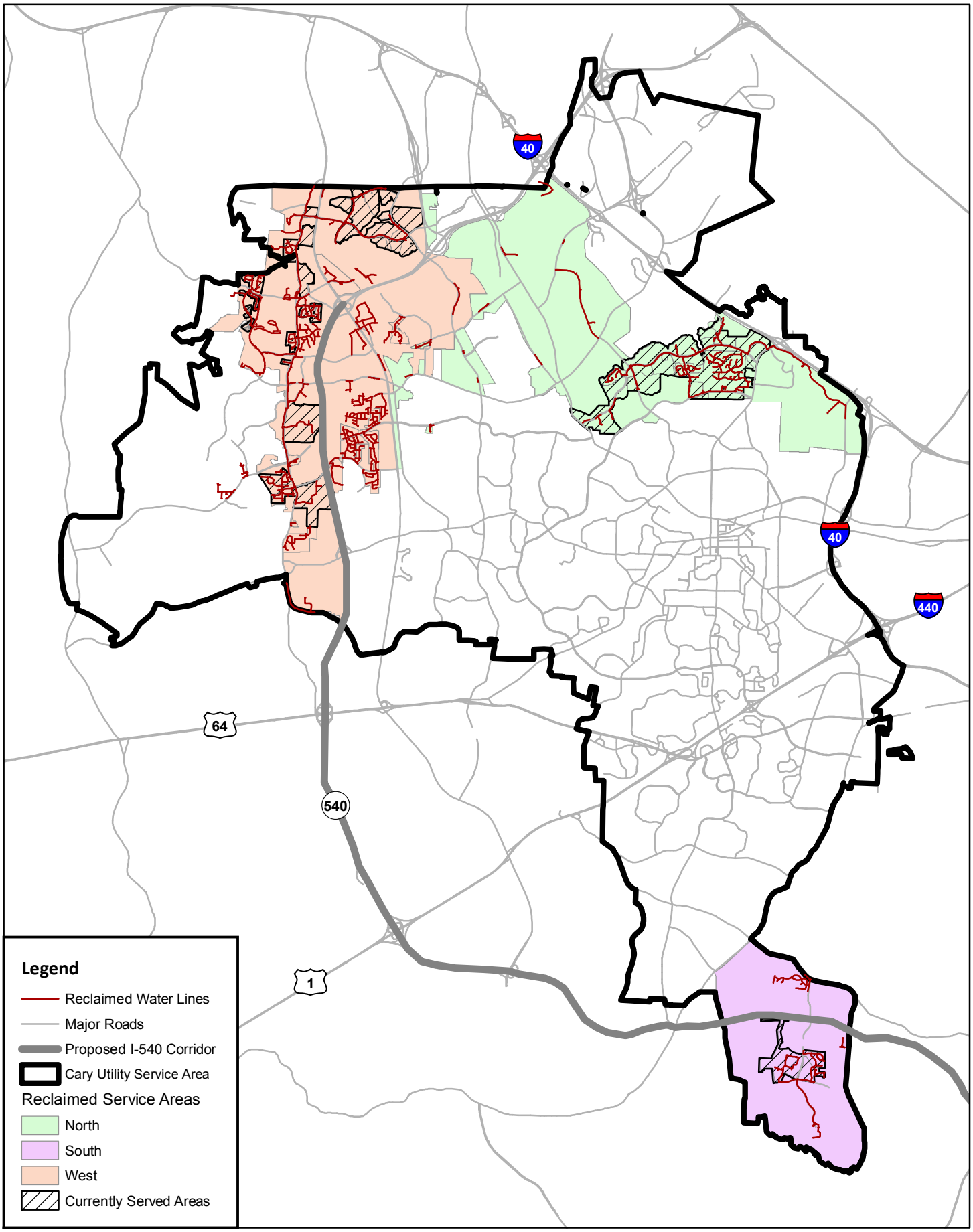

Figure 1
Reclaimed Water System

Future Projections for Reclaimed Water Demands

Projections presented in the 2018 *Forecast of Water Demands and Wastewater Projections* and used herein for the business case evaluation were developed using the 2016 water meter layer, billing data for the years 2013 through 2016, and reclaimed service area boundaries as provided by the Town (CH2M, 2018). Data from reclaimed water meters currently using reclaimed water or potable water were used in the development of the forecast. Both existing customers and future likely customers are included. Existing customers currently use reclaimed water and have a reclaimed water meter. Future likely customers are those that have a reclaimed water meter and currently use potable water. These customers have the potential to be converted to reclaimed water once a connection is made with a reclaimed water source. A small number of reclaimed water customers fall outside of the reclaimed service area boundaries. These customers are included in the demand projections.

Table 1 includes data for 2016 usage and future distributed reclaimed water projections at the 75th percentile of the forecast. Usage at the NCWRF and SCWRF is not included in this BCE. CH2M assumed all customers with existing, installed reclaimed water systems in their neighborhoods will receive reclaimed water service by 2028. Other assumptions used in the forecast are listed above. For the purposes of the BCE, CH2M modified projections for each alternative as noted in Table 2.

Table 1. 75th Percentile Total Reclaimed Water Distributed Demand Projections by Service Area, 2016 to 2065, MGD, Annual Average Day

Service Area	Use	2016	2025	2045	2065
North	Residential	0.05	0.09	0.18	0.25
	Cooling & ICI	0.11	0.12	0.17	0.19
	Operational	0.25	0.26	0.29	0.29
West	Residential	0.01	0.05	0.13	0.28
	Cooling & ICI	0.09	0.17	0.23	0.30
	Operational	0.01	0.02	0.04	0.07
South	Residential	0.01	0.02	0.03	0.04
	Cooling & ICI	0.09	0.09	0.14	0.15
	Operational	0.06	0.06	0.07	0.08
Total Reclaimed Water (No Operational)		**0.36**	**0.54**	**0.88**	**1.21**
Total Reclaimed Water (Incl. Operational)		**0.68**	**0.88**	**1.28**	**1.65**

Source: CH2M, 2018

ICI = industrial, commercial, and institutional customers

Development of Alternatives

CH2M and the Town developed the following alternatives through a series of workshops. These alternatives focus on the West and North Cary service areas only and were developed to evaluate a series of potential operational and reclaimed water source options. Infrastructure improvements required under each alternative are provided in the *2017 Reclaimed Water Master Plan Update Addendum* (CDM Smith, 2017) and summarized in Attachments C and D.

Alternative 1: Targeted Expansion

- Sources: Maintain current configuration of sources
- Continue service to existing customers in North and West Service Areas
- Extend service to future reclaimed customers who have existing reclaimed water infrastructure but not reclaimed water service
- Consider targeted reclaimed water service expansions in the future
- Assume additional service connections are in place by 2028

Alternative 2: Western – Seasonal Conversion Option

- West – Operate with reclaimed water from Durham County during irrigation months only, identified as March through October
- West – Winterize reclaimed water system for residential customers during non-irrigation months (to limit seasonal flushing)
- West – Switch RTP South customers to potable supply during winter months, identified as November through February
- West – Continue expanding per 2017 Master Plan Update
- North – Maintain service from NCWRF
- North – Continue expanding service area per 2017 Master Plan Update

Alternative 3: End Durham County Contract

- West – End Durham County contract; this would occur if the Town reaches an impasse with Durham County during contract negotiations or they can no longer meet the Town's West Cary supply needs
- West – Transition source to potable supply; assume this begins in 2028; permanent switch
- North – Maintain NCWRF source
- North – Continue expanding service area per 2017 Master Plan Update

Alternative 4: Maximize Durham County Contract for West Cary Service Area; Provide Year-Round Service so No Winterizing

- West – Continues to use reclaimed supply from Durham County year-round
- West – Continue expanding service area per 2017 Master Plan Update
- North – Maintain NCWRF source
- North – Continue expanding service area per 2017 Master Plan Update

Alternative 5: NCWRF Connector to West Cary Service Area

- Prepare for capital expansion of North-West Connector, supporting distribution of NCWRF reclaimed water to West Cary service area
- Build NCWRF Connector to West Cary Service Area; assume complete in 2028
- West – Operate with Durham County reclaimed water source year-round until contract expires and NCWRF Connector is in service; assume Durham County contract is extended to 2028, then supply from NCWRF once connector is in service
- West – Continue expanding service area per 2017 Master Plan Update
- North – Maintain NCWRF source
- North – Continue expanding service area per 2017 Master Plan Update

Approach

The Town has multiple objectives for its reclaimed water program. To fully weigh each alternative's potential to meet these objectives, the Town selected a multi-objective decision analysis (MODA) technique. MODA is a quantitative technique for making decisions that involve multiple financial, environmental, and social objectives. Financial factors include infrastructure costs, Durham County reclaimed water purchase costs, treatment costs, and labor costs for additional staffing as necessary for each alternative. Nonfinancial costs include factors for system reliability and operational ease, stewardship of public funds, maintaining public and customer expectations, and minimizing negative impacts on the natural environment.

The Town selected a 20-year planning period through 2038 and to focus on the West and North Cary service areas only, as operational and infrastructure decisions made in these service areas would not impact the South Cary service area.

Demand Projections for each Alternative

Demand projections presented in the 2018 LRWRP Forecast technical memorandum (CH2M, 2018) include the expectation that infrastructure will be expanded per the *2017 Reclaimed Water Master Plan Update Addendum* (CDM Smith, 2017). The Town provided a measles chart referencing each alternative and required infrastructure projects (Attachment C). Demand projections listed in Table 2 reflect the water source and infrastructure components of each alternative.

Table 2. Average Day Customer Water Customer Demands, MGD

Alternative	Year	North	West		Total
		Reclaimed	Reclaimed	Potable	
1. Targeted Expansion	2016	0.16	0.10	-	0.26
	2028	0.19	0.21	-	0.40
	2038	0.19	0.21	-	0.40
2. West - Seasonal Conversion[a]	2016	0.16	0.10	-	0.26
	2028	0.22	0.14	0.07	0.36
	2038	0.23	0.14	0.07	0.37
3. End Durham County Contract[b]	2016	0.16	0.10	-	0.26
	2028	0.26	-	0.29	0.55
	2038	0.32	-	0.34	0.66
4. Maximize Durham County Contract for West – Provide Year-Round Service	2016	0.16	0.10	-	0.26
	2028	0.22	0.29	-	0.51
	2038	0.23	0.34	-	0.57
5. NCWRF Connector to West[c]	2016	0.16	0.10	-	0.26
	2028	0.26	0.29	-	0.55
	2038	0.32	0.34	-	0.66

[a] Demands in West met seasonally by Durham County beginning in 2020. Winter demands met by potable water.
[b] Demands in West to be met with potable water beginning in 2028.
[c] Demands in West to be met with Durham County until connector online in 2028, then source switch to NCWRF.

Cost Development

Capital Improvement Projects

CH2M obtained costs associated with each capital improvement project from the *Reclaimed Water Master Plan Update Addendum* (CDM Smith, 2017) and summed them by alternative. CH2M escalated costs to 2018 dollars. Additional notes provided by the Town and organized by alternative are included in Attachment D.

Communications with the Town confirmed, as noted in Table 3, that Alternatives 2, 4, and 5 would require booster chlorination. Previous planning efforts for booster chlorination assumed that the systems would be collocated with existing lift stations. The Town removed this assumption for the purposes of this BCE, and CH2M used an updated cost estimate of $1,000,000. Operation and maintenance costs for a chlorine booster station is assumed to be $2.86 per 1,000 gallons (Greywood Engineering, 2013).

These same alternatives 2, 4, and 5 also require additional tank storage at a cost of $2,000,000. Alternative 3 includes a switch to potable water for the West service area after the conclusion of the Town's contract with Durham County, so additional tank storage is not necessary and booster chlorination is not necessary. For those alternatives that expand reclaimed water service, the Town would add additional staff resources. The annual cost for a new full-time employee (FTE) is $50,000 / year is based on relevant staffing costs from the Cary 2018 Annual Operating Budget (Town of Cary, 2018) and is in line with costs included in the study by Greywood Engineering (2013). Demands for alternative 5 are slightly higher than under the other alternatives because additional customers could be served along the connector route.

Under Alternative 3, reclaimed water infrastructure in the West service area would no longer be used after 2028. Capital investment into this infrastructure would be sunk costs. Most of the reclaimed water pipe is less than 20 years old, and therefore it would only be utilized for half of its useful life when abandoned in 2028.

Table 3. Additional Reclaimed Water Capital Projects and Resources Overview

Alternatives	New FTE(s)	Chlorine Booster Station	Storage Tank
1. Targeted Expansion			
2. West - Seasonal Conversion	●	●	●
3. End Durham County Contract			
4. Maximize Durham County Contract for West – Provide Year-Round Service	●	●	●
5. NCWRF Connector to West	● ●	●	●

Operations and Maintenance

The rate for current and projected reclaimed water operations and maintenance is based on information within the Cary 2018 Annual Operating Budget (Town of Cary, 2018). The formulation for the rate is presented in Table 4 and is in addition to the operations and maintenance costs associated with the FTEs and capital projects listed in Table 3.

Table 4. Formulation for Reclaimed Water Operations Costs

Parameter	2018 Value
Miles of pipeline	52
Feet of pipeline	274,560
2018 Budget	
Personnel Services	$164,850
Operations and Maintenance	$532,306
Total	$697,156
Cost per foot of pipeline	$2.54 / LF

Data selected from Town of Cary 2018 Annual Operating Budget

Additional costs associated with reclaimed water include flushing and blowoff volume and treatment costs. Costs of conveying these volumes are captured in the operations and maintenance costs of the system. Costs for treatment at the NCWRF and the WWRWRF were obtained from the Cary 2018 Annual Operating Budget and are as follows:

- NCWRF Treatment: $1.60 per 1,000 gallons
- WWRWRF Treatment: $2.13 per 1,000 gallons
- Blowoff Treatment: $2.13 per 1,000 gallons

The cost for potable water production of $5.34 per 1,000 gallons was obtained through personal communications with the Town. This cost was applied to Alternatives 2 and 3 only.

Durham County Contract

Fees for reclaimed water provided by Durham County currently include both a volume charge and a charge to pay the costs of the Cary-only portion of the reclaimed water distribution line from Durham County. This charge is $524 per day and will end in June 2022. At that time, ownership of the line will be transferred to the Town and the capital charge will end. This cost reduction was incorporated into the financial analysis of the business case evaluation.

The Town pays a volume charge of $2.68 per 1,000 gallons under this Durham County contract. This contract lasts until 2021. The Town provided future Durham County contract options for each alternative, as listed in Table 5.

Table 5. Durham County Contract Options

Alternative	Contract Status
1. Targeted Expansion	Renew Agreement after 2021; Maintain into future
2. West - Seasonal Conversion	Renew Agreement after 2021; Seasonal purchase
3. End Durham County Contract	End Agreement in 2028
4. Maximize Durham County Contract for West – Provide Year-Round Service	Renew Agreement after 2021; Maintain into future
5. NCWRF Connector to West	Renew Agreement after 2021; Maintain into future

Provided by Town of Cary, 2018

Additional Financial Assumptions

To support development of the BCE over the 20-year planning period, additional financial factor assumptions are needed to establish a full picture of the costs and calculation of net present value in 2018 dollars. CH2M made recommendations for these factors and they were reviewed in task workshops. A full list is provided in Attachment C.

Benefits Development

The Town collects revenue for reclaimed and potable water use by its customers. This potential for revenue is a benefit. The Town collects $3.98 per 1,000 gallons for reclaimed water and $5.42 per 1,000 gallons for potable water used in separately metered irrigation customers. This incentivizes customers to use reclaimed water. Estimated revenue generation is used as the benefit component of the business case evaluation methodology.

Non-financial Factors Development

In addition to the traditional cost and benefits components of the business case evaluation, nonfinancial factors also play a role in the Town's decision-making process. The Town also lists water resources management, operational and maintenance, and citizen service goals and initiatives in its operational budget (Town of Cary, 2017b). CH2M organized these goals and initiatives for the purposes of this non-financial evaluation into four objectives to also align with the 2040 Cary Community Plan, as listed in Table 6.

The Town desires to maintain its high level of service, including its recent record of no citizen complaints during the annual reclaimed water holiday and reduction in the number of reclaimed water spills. Each spill adds operational costs and time spent on filing paperwork, and the Town hopes that reduction in the amount of flushing provides both financial and nonfinancial benefits.

Table 6. Non-financial Objectives and Components of the BCE

Objective	Components
A. Provide for System Reliability	Maintain comprehensive and top-quality infrastructure
	Proactively maintain infrastructure to provide uninterrupted service to all users except during planned "holidays" used for maintenance
	Support regional cooperation through contract with Durham County
B. Stewardship of Public Funds	Fiscal health and appropriate rate setting
	Evaluation of capital spending against Town goals
	Limiting flushing impact to capacity of WRFs and reduce retreatment costs
C. Maintain Public Trust and Confidence	Meet expectations of developers who have previously installed infrastructure in both West and North service areas
	Meet expectations established in Town Policy 132
D. Minimize Negative Effects to the Natural Environment	Promote water and energy efficiency by limiting flushing and reducing repumping and retreatment
	Need for additional regulatory consultation
	Protect water quality and the environment by limiting flushing discharges and spills to the environment

Business Case Evaluation

Financial Considerations

This economic analysis provides a comparison of 20-year life cycle net present value (NPV) costs and equivalent annual costs (EAC) of the alternatives. Table 7 presents a financial analysis summary for each option through 2038. Attachment C includes details used for the financial analysis.

CH2M used a NPV approach in the life-cycle cost analysis, with NPV defined as the difference between the present value of cash inflows and the present value of cash outflows over a period of time (20 years in this evaluation). A negative NPV indicates a project net loss. EAC is another way to consider costs and is defined as the annualized cost of owning and operating the assets over the forecast period. This metric intentionally excludes revenues and other cash savings.

Table 7. Summary of Financial Analysis (FY2019 – FY2038)

Alternative	Capital Costs	Maintenance Costs	Net Present Value Total Costs	Equivalent Annual Costs	Cost Ranking
1. Targeted Expansion	$10,790,000	$36,450,000	$(22,880,000)	$(2,580,000)	Low
2. West - Seasonal Conversion	$19,880,000	$38,680,000	$(28,170,000)	$(3,260,000)	Medium
3. End Durham County Contract	$7,130,000	$27,180,000	$(11,620,000)	$(1,910,000)	Lowest
4. Maximize Durham County Contract for West – Provide Year-Round Service	$19,880,000	$39,590,000	$(27,690,000)	$(3,320,000)	Medium
5. NCWRF Connector to West	$53,900,000	$45,380,000	$(50,710,000)	$(6,030,000)	High

Presented in 2018 Dollars

Table 7 includes a comparative cost ranking. Alternative 5, the connector option, is the most capital cost-intensive option, and also has the highest NPV and EAC costs. Conversely, Alternative 3 provides the lowest NPV costs and EAC, followed by Alternative 1. Alternatives 2 and 4 are clustered, separated by less than $480,000 in NPV costs and $60,000 in EAC, making these two options similar from a financial perspective.

Figure 2 presents the net cash flow for future year costs for each alternative, in 2018 dollars. Costs begin to jump as infrastructure expansions and/or improvements are scheduled to begin. Alternative 5 is the costliest option throughout the forecast period due to the capital investment required to connect the North and West reclaimed water areas. This is approximately double that of the next costliest alternative.

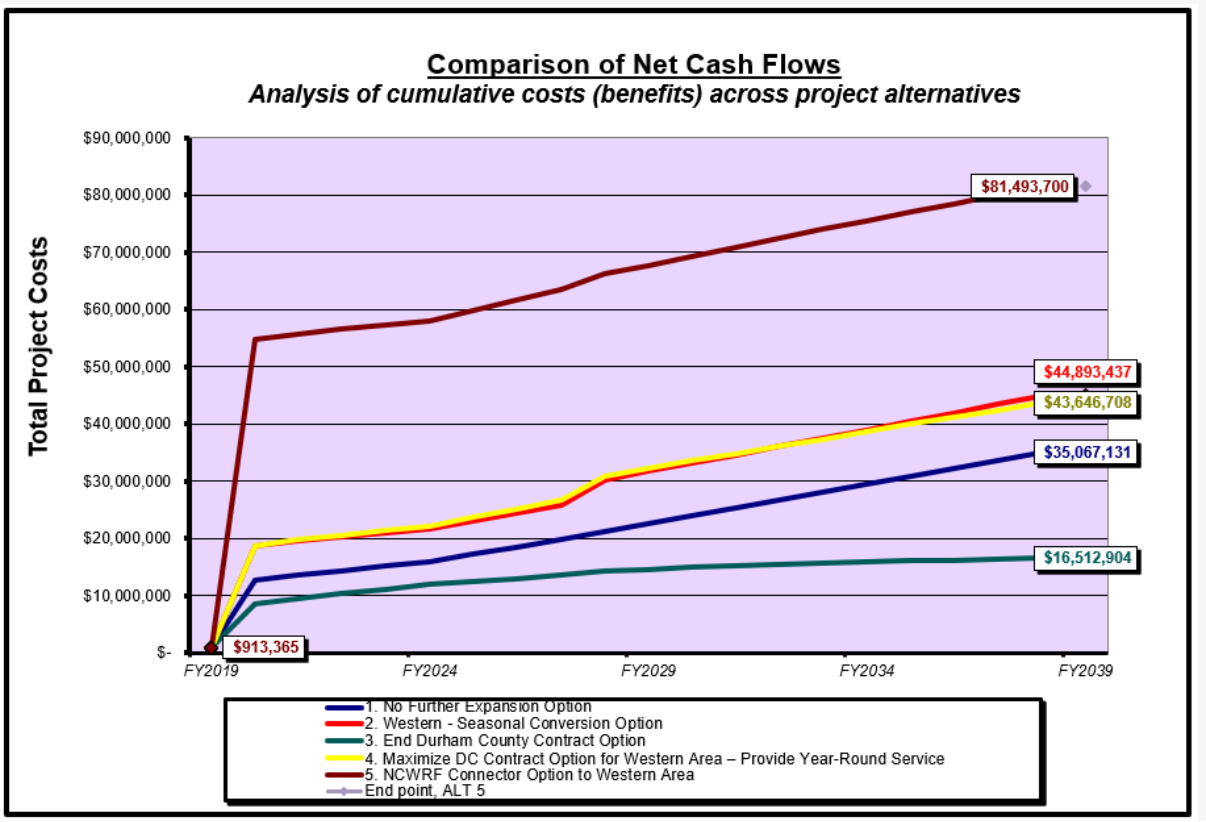

Figure 2. Comparison of Net Cash Flow (FY2019 - FY2038)

Non-Financial Considerations

CH2M ranked each alternative on a scale of 1 to 10, with 10 being strong performance for each criterion. These rankings were reviewed in a workshop and then a sensitivity analysis was performed. The results of the evaluation of non-financial objectives using equal weighting are presented in Table 8 and graphically in Figure 3. Alternative 1 is the most desirable project alternative based on the specified non-financial objectives because it contains the highest overall benefit score. It is closely followed by Alternatives 2 and 4. Alternative 5 ranks just below these alternatives while Alternative 3 is the least preferred option using non-financial criteria.

Table 8. Non-financial Criteria Rankings

Alternative	Reliable, Sustainable Infrastructure	Stewardship of Public Funds	Public and Community Expectations	Impacts to Natural Environment
1. Targeted Expansion	7	8	6	10
2. West - Seasonal Conversion	9	6	6	9
3. End Durham County Contract	5	8	4	7
4. Maximize Durham County Contract for West – Provide Year-Round Service	7	6	8	9
5. NCWRF Connector to West	7	4	8	7

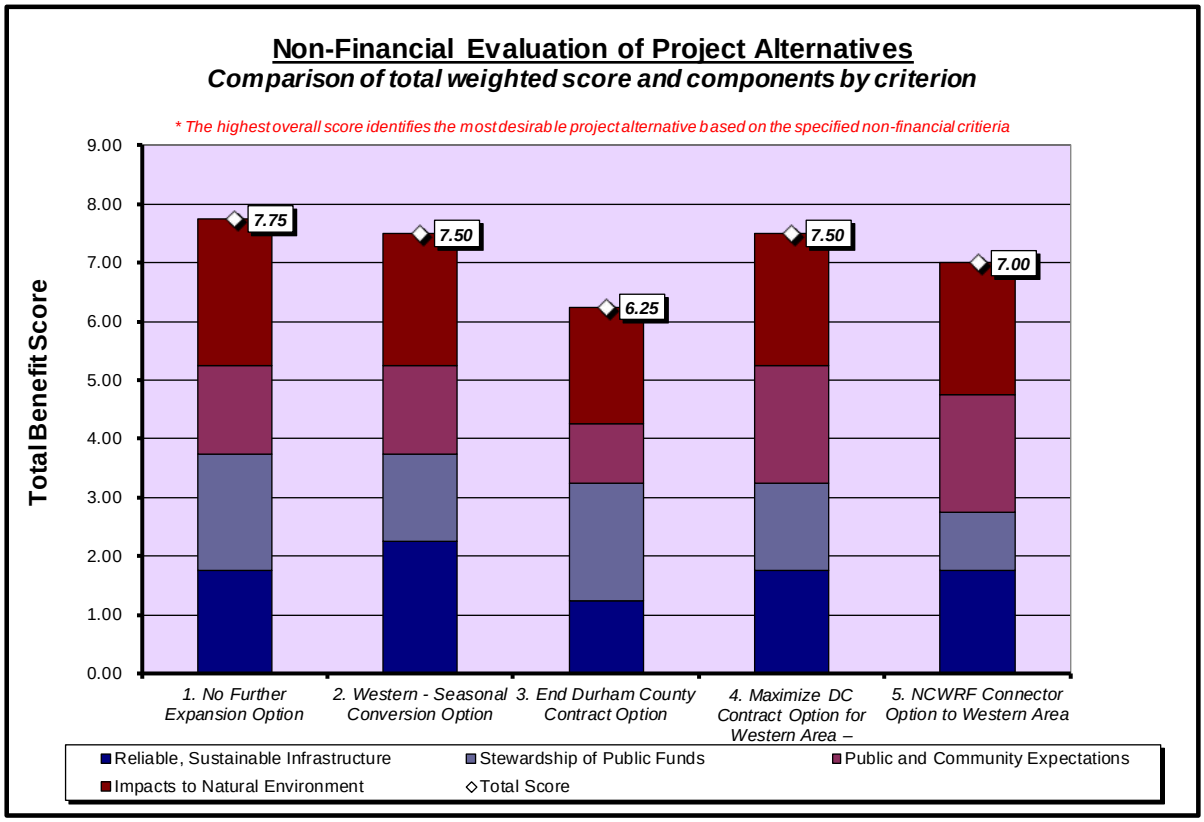

Figure 3. Reclaimed Water Non-Financial Criteria Evaluation Results

A sensitivity analysis was conducted for the results presented in Table 8; results are presented in Table 9. First, the small difference in score between Alternative 1 and Alternatives 2 and 4 was selected. The difference is small enough that a change of -1 in any Alternative 1 criterion lowers the total non-financial score to 7.25. This ranks the Alternative 1 total score slightly below the 7.50 of Alternatives 2 and 4.

The Town desires to meet public and community expectations regarding the continuation of a reclaimed water program while promoting strong stewardship of public funds. A second sensitivity analysis was performed by adjusting the weighting of these criteria (Table 9). First, CH2M adjusted the weighting of stewardship of public funds, using a 20/40/20/20 weighting for the four criteria. In this sensitivity analysis, the adjusted weighting produces a greater difference or spread between the alternatives. Alternative 1 looks more favorable compared to the others because less capital investment is required. Then, CH2M adjusted meeting public and community expectations to be double that of the others. Under this 20/20/40/20 weighting approach, Alternative 4, maximizing the Durham County contract, moves into the first-place rank.

Alternative 1 meets the non-financial objectives, while scoring high in “Stewardship of Public Funds” and highest in the “Impacts to Natural Environment” objectives. Alternative 2 scores highest in “Reliable, Sustainable Infrastructure” while Alternatives 4 and 5 top “Public and Community Expectations.” Alternative 2 would require some regulatory coordination to achieve a seasonal operations schedule, but this is acceptable to the Town. Alternative 3 has the lowest total benefit score, because it was identified as not meeting “Public and Community Expectations” in the West Service Area during project workshop discussions. This objective is important to the Town, as reflected in its policy, and therefore Alternative 3 is not considered a feasible alternative, though the alternative supports “Minimize Impacts to Natural Environment” by reducing or eliminating West service area flushing and blowoff flows.

Table 9. Results of Sensitivity Analysis on Non-financial Criteria Rankings

Alternative	Original, Evenly Weighted Score	Scenario 1: Adjustment of Alternative 1 Score, Evenly Weighted	Scenario 2: 20/40/20/20 weighting in favor of Stewardship of Public Funds	Scenario 3: 20/20/40/20 weighting in favor of Public and Community Expectations
1. Targeted Expansion	**7.75**	7.25	**7.80**	7.40
2. West - Seasonal Conversion	7.50	**7.50**	7.20	7.20
3. End Durham County Contract	5.50	5.50	6.60	5.80
4. Maximize Durham County Contract for West – Provide Year-Round Service	7.50	**7.50**	7.20	**7.60**
5. NCWRF Connector to West	7.00	7.00	6.40	7.20

Bold text: Highest non-financial score in each scenario

Discussion of Results

This discussion can be used by the Town to further move forward its decision-making process for the effective utilization of the reclaimed water system, specifically for the West and North service areas. A summary of the benefits and risks, or pros and cons, of each of the alternatives to serve the West and North service areas is presented in Table 10.

Table 10. Summary of Business Case Evaluation for Town of Cary Reclaimed Water Program

Alternative	Pros	Cons
1. Targeted Expansion	Provides service to all with existing reclaimed water meters Limits capital investment and is lowest NPV alternative Highest non-financial score	Does not expand system except to those customers with existing reclaimed water meters Does not address issues related to significant current flushing program
2. West - Seasonal Conversion	Provides seasonal service to all with reclaimed water meters and supports expansion of service Reduces water quality issues related to seasonal demand fluctuation Adds additional capital projects to address operations and maintenance issues	Requires regulatory coordination Requires additional operational support for seasonal switches in source Reliant on outside seasonal source for West service area Costs associated with expansion of infrastructure compared to Alternative 1
3. End Durham County Contract	Lowest capital cost option Simplifies operations in West service area through switch to potable water Ends blowoff flows to WWRWRF and associated costs of repumping and retreating highly-treated reclaimed water	Does not meet Town Policy 132 Does not meet expectation of serving all customers with existing reclaimed water meters Does not utilize West service area reclaimed water infrastructure beyond half of its useful life
4. Maximize Durham County Contract for West – Provide Year-Round Service	Supports expansion of service Adds additional capital projects to address operations and maintenance issues	Reliant on outside source for West service area Costs associated with expansion of infrastructure compared to Alternative 1
5. NCWRF Connector to West	Supports expansion of service and maximizes use of reclaimed water supply Adds additional capital projects to address operations and maintenance issues	Highest cost alternative and highest NPV alternative Significant capital cost investment compared to other alternatives

The BCE clearly shows that Alternative 5, construction of a connection to serve the West service area from the NCWRF, is significantly more expensive than all other alternatives during the 20-year evaluation period. While the potential for reclaimed water revenue is higher with this alternative, it is outweighed by costs. The Town better meets its fiscal objectives and “Stewardship of Public Funds” goals through the continued purchase of reclaimed water from Durham County. The Town values its relationship and contract with Durham County for reclaimed water. With the expected availability of reclaimed water from Durham County and the estimated costs of implementation, Alternative 5 is not a preferred option for the Town moving forward.

The Town’s desire to maintain its relationship and contract with Durham County along with its desire to meet reclaimed water service expectations of its current customers led to a lower non-financial score for Alternative 3 when compared to the others. Alternative 3 would not deliver on citizens' expectations

that reclaimed water would eventually be provided to those with installed reclaimed water meters, resulting in a low score for the Meets Community Expectations criterion. While the financial analysis of this BCE provides a justification for re-evaluating the long-term goals of the Town's reclaimed water program, the West reclaimed water service area is currently operating in a stable manner, and Durham County's willingness to provide reclaimed water long-term to the Town for the West Reclaimed Water Service Area is a positive development. Cost to operate the West Service Area will be significantly reduced once the Durham County capital charge is ended in 2022.

The Town will further evaluate the remaining alternatives and determine a path forward. A rate evaluation may also prove beneficial to support decision-making. Specific infrastructure projects such as booster chlorination systems could address the current level of flushing and reduce operational costs (including labor) associated with current operational efforts needed to maintain suitable system water quality. Service area expansions could also be conducted in ways to better facilitate system looping and reduce dead ends. The seasonal use schedule used in Alternative 2 is worthy of additional investigation. This business case evaluation was conducted at a high level and further detailed analyses of these items will support specific expansion and infrastructure decisions moving forward.

The Town should also consider the selected alternative’s potential to influence potable water demands and therefore treatment capacity. A slight increase in potable water demands would result from some alternatives, however any impact to treatment capacity at the water treatment plant would not be realized during the 20-year planning period of this evaluation. Future advances in technologies and customer preferences may also impact the relative costs of reclaimed water. Emerging reclaimed water technologies, such as indirect or direct potable reuse, might play a role in meeting the Town’s total water demands at some point in the future. In summary, the Town should monitor future opportunities for reclaimed water and revisit a business case evaluation when warranted.

Additionally, the Town is further evaluating the potential for expansion of its South service area. The extension of Highway 540 will bisect the service area, potentially making it costlier to reach potential customers on the north side of the highway. Town staff are planning ways to address this prior to construction. Most of the currently served South service area is built upon, with little expansion of residential demands expected.

In summary, the Town’s reclaimed water system provides benefits to its customers through the reduction of potable water usage, reasonable rates for irrigation and cooling uses, and relief from the Town’s alternate day watering ordinance. Those commercial customers with sustainability goals benefit from the availability of reclaimed water. The Town could further benefit from operational and capital projects to reduce both costs and labor currently associated with system maintenance while maintaining its contract with Durham County and potentially expanding service within its defined West and North service areas. The Town’s customer service and operational goals could be reached with implementation of Alternatives 1, 2, or 4.

References

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Attachment A

Town of Cary Policy 132

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Town of Cary

Policy Statement 132

EFFECTIVE UTILIZATION OF RECLAIMED WATER SYSTEM
ADOPTED BY COUNCIL: 9/16/2010
EFFECTIVE: 9/16/2010

Purpose and Background

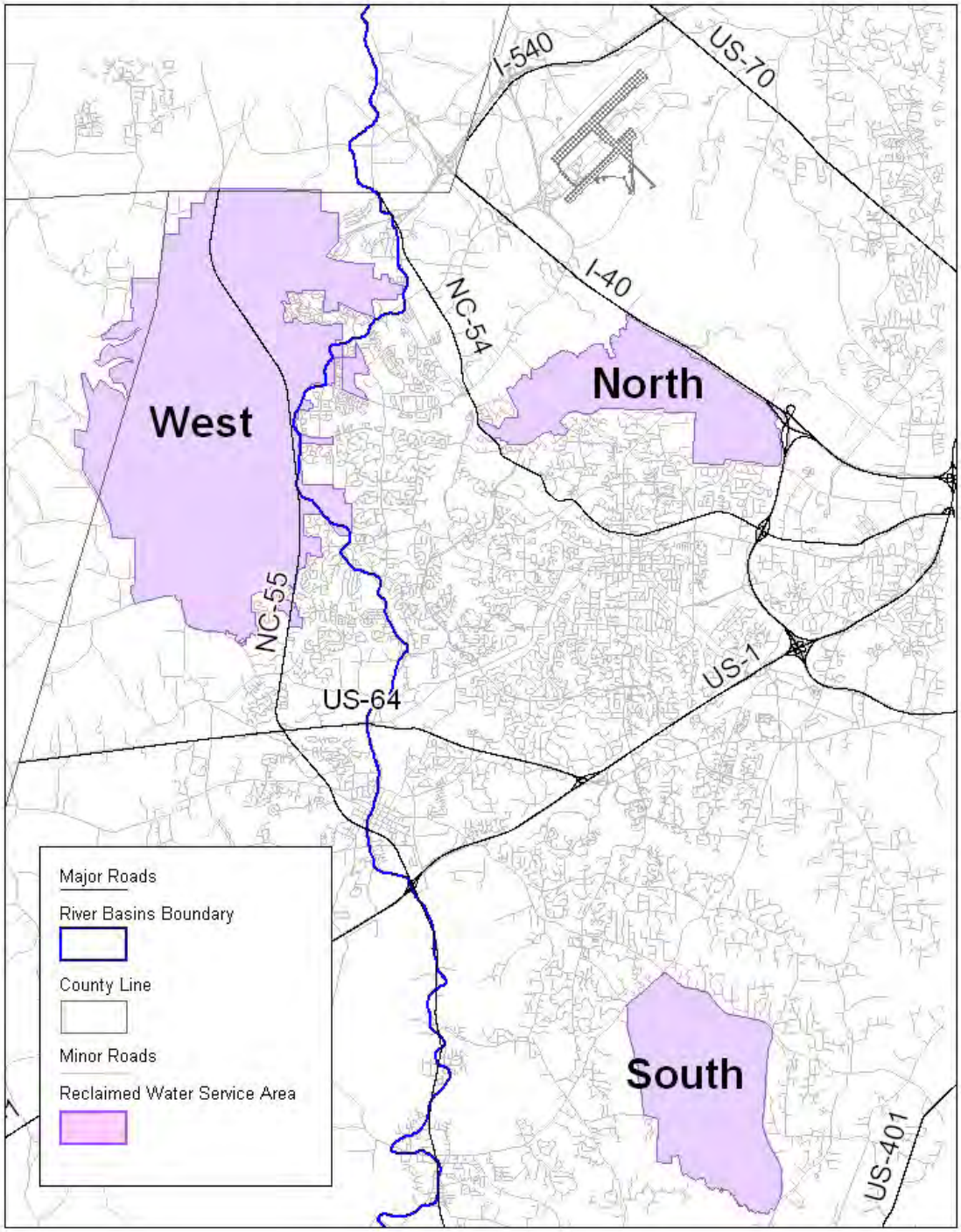
In an effort to reduce the non-essential use of potable water, the Town of Cary has developed a reclaimed water system that went online June 22, 2001. Reclaimed water is an integral part of the Town's plan for providing water resources to meet long-term water demand requirements. Use of reclaimed water also helps to prevent peak potable water demands from accelerating the need for expansion of the Cary/Apex Water Treatment Plant. This policy has been adopted to ensure the continued orderly expansion of and effective utilization of the reclaimed water system.

Policy

It is the policy of the Town of Cary that residents and businesses utilize—to the maximum extent possible—the Town's reclaimed water system for secondary plumbing usage, including irrigation, cooling towers, and other potential uses ("secondary water use facilities") as determined by the Town Manager or designee (hereafter "Manager"). The Town has designated reclaimed water service areas (Figure 1 – Figure 10 in this document) where reclaimed water service will be provided according to the Reclaimed Water Master Plan. For development within those designated reclaimed water service areas, the developer shall install, and shall be responsible for the full cost of, reclaimed water facilities within their own properties. The developer shall extend the reclaimed water system to the development including the reclaimed water line connecting adjoining properties along the edge of the developer's property line, and shall be responsible for the full cost of these facilities. Any infrastructure reimbursement shall be accomplished as established in the Town's utility system extension and connection policy. Any infrastructure oversizing shall be accomplished as established in the Town's utility system extension and connection policy. All facilities installed shall fully comply with Town design standards and the Reclaimed Water System Master Plan.

If reclaimed water is not available to a site for use when that site is ready for development, all on-site secondary water use facilities suitable for reclaimed water shall be designed to be readily converted to use reclaimed water when reclaimed water supply is available to the site. The Town may provide potable water supply to secondary water use facilities on such site, at potable water rates, only until reclaimed water is available to the site and connection to the Town's reclaimed water system is possible. Such potable water supply shall be isolated from potential backflow from the secondary use facilities by suitable backflow prevention as described in the Town's Utilities ordinance and Standard Specifications and Details. At the time that reclaimed water is available to the site, permanent disconnection from the potable water system and connection to the reclaimed water system is required. The reclaimed water customer will be responsible for Utility connection fees at the time the connection is made.

Figure 1: Reclaimed Water Service Areas



TOWN of CARY

Effective Utilization of Reclaimed Water System - Policy Statement 132

EFFECTIVE UTILIZATION OF RECLAIMED WATER SYSTEM
POLICY STATEMENT 132

PREPARED BY: Stephen J. Brown, P.E., Director of Public Works and Utilities
SUPERSEDES: Policy Statement, No. 132 (September 16, 2010)
ADOPTED BY COUNCIL: March 14, 2013
EFFECTIVE: March 14, 2013

Purpose and Background
In an effort to reduce the non-essential use of potable water, the Town of Cary has developed a reclaimed water system that went online June 22, 2001. Reclaimed water is an integral part of the Town's plan for providing water resources to meet long-term water demand requirements. Use of reclaimed water also helps to prevent peak potable water demands from accelerating the need for expansion of the Cary/Apex Water Treatment Plant. This policy has been adopted to ensure the continued orderly expansion of and effective utilization of the reclaimed water system.

Policy
It is the policy of the Town of Cary that residents and businesses utilize—to the maximum extent possible—the Town's reclaimed water system for secondary plumbing usage, including irrigation, cooling towers, and other potential uses ("secondary water use facilities") as determined by the Town Manager or designee (hereafter "Manager"). The Town has designated reclaimed water service areas (Figure 1) where reclaimed water service will be provided according to the Reclaimed Water Master Plan. For development within those designated reclaimed water service areas, the developer shall install, and shall be responsible for the full cost of, reclaimed water facilities within their own properties. The developer shall extend the reclaimed water system to the development including the reclaimed water line connecting adjoining properties along the edge of the developer's property line, and shall be responsible for the full cost of these facilities. Any infrastructure reimbursement shall be accomplished as established in the Town's utility system extension and connection policy. Any infrastructure oversizing shall be accomplished as established in the Town's utility system extension and connection policy. All facilities installed shall fully comply with Town design standards and the Reclaimed Water System Master Plan. Town Council may grant waivers to eliminate the requirement to make connection to the reclaimed water system.

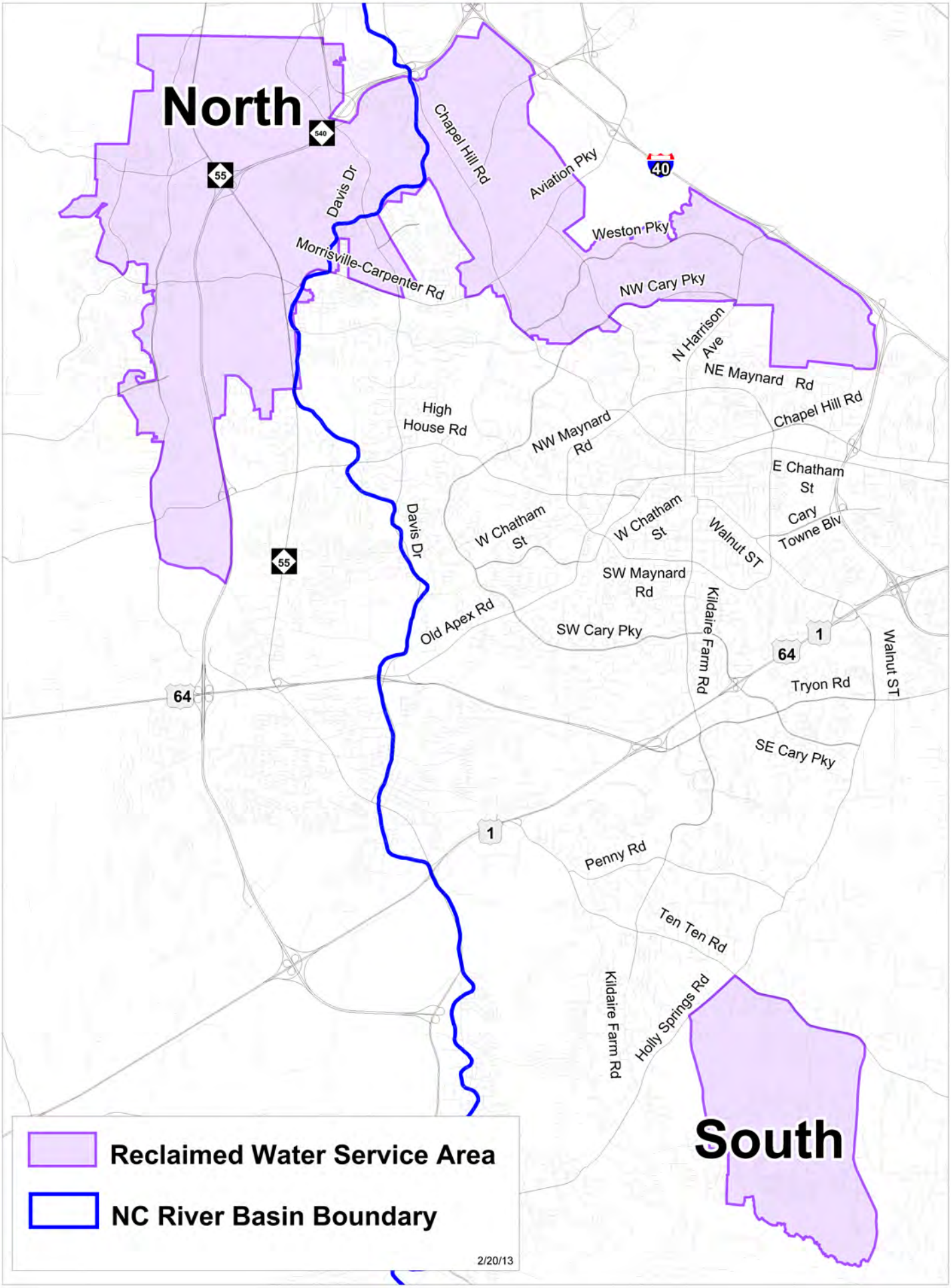
If reclaimed water is not available to a site for use when that site is ready for development, all on-site secondary water use facilities suitable for reclaimed water shall be designed to be readily converted to use reclaimed water when reclaimed water supply is available to the site. The Town may provide potable water supply to secondary water use facilities on such site, at potable water rates, only until reclaimed water is available to the site and connection to the Town's reclaimed water system is possible. Such potable water supply shall be isolated from potential backflow from the secondary use facilities by suitable backflow prevention as described in the Town's Utilities ordinance and Standard Specifications and Details. At the time that reclaimed water is available to the site, permanent disconnection from the potable water system and connection to the reclaimed water system is required. The reclaimed water customer will be responsible for Utility connection fees at the time the connection is made.

No person shall plumb or alter secondary plumbing fixtures, including irrigation systems, or otherwise modify such potential reclaimed water appurtenances so as to preclude the use of reclaimed water when such becomes available.

This policy directs staff to develop the necessary ordinances and procedures to ensure the effective utilization of the Town's reclaimed water system.

See Figure 1, the reclaimed water service area.

RELATED POLICY STATEMENTS:
Other policy statements include provisions related to this policy statement, including but not limited to: Policy Statement 23 – Utility System Extension and Connection Policy


North
South
Chapel Hill Rd
Aviation Pky
Davis Dr
Morrisville-Carpenter Rd
Weston Pky
NW Cary Pky
N Harrison Ave
NE Maynard Rd
Chapel Hill Rd
High House Rd
NW Maynard Rd
E Chatham St
Cary Towne Blv
W Chatham St
W Chatham St
Walnut ST
SW Maynard Rd
Kildaire Farm Rd
Old Apex Rd
SW Cary Pky
Tryon Rd
Walnut ST
SE Cary Pky
Penny Rd
Ten Ten Rd
Holly Springs Rd
Kildaire Farm Rd
Davis Dr
40
55
540
64
1
Reclaimed Water Service Area
NC River Basin Boundary
2/20/13

Attachment B

Town of Cary Alternatives Descriptions

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Reclaimed Water Business Case Options

Information from Town of Cary Utilities Department, 7/2/2018; updated for clarification 10/2018 and 12/2018

Alternative #1: (Targeted Expansion Option)

- Fulfill current commitments:
  - Continue service to existing customers in North and West Service Areas
  - Extend reclaimed water service to "future reclaimed" customers who have existing reclaimed water infrastructure by not reclaimed water service
- Consider targeted reclaimed water service expansions in the future, such as new high-value commercial developments with year-round demand.
- Durham Co. (DC) continues to supply Western Cary.
- Current equipment and systems should meet commitments.
- No additional storage needed.
- No chlorine boosting anticipated.
- Water pressure is desirable under current reclaimed service conditions.
- CIP projects to be added in future for operational effectiveness and efficiency – (looping mains)

Alternative #2: (Western - Seasonal Conversion Option)

- Continues to use reclaimed supply from Durham County.
- North - Expand per 2017 Master Plan Update; Without connecting infrastructure between North and West, the West service area shrinks but North-West boundary does not shift westward. This gap between service areas reduces demands compared to Option 5.
- West – Operate with Reclaimed Water from DC during irrigation months, identified as March through October)
- West – Winterize reclaimed system for residential customers during non-irrigation months.
- West – Switch RTP South Customers to potable backup during winter months
- West – The idea of maintaining reclaimed to RTP South during winter doesn't seem like a workable option and would be an operations problem for Durham County.
- Maintenance practice – Flush reclaimed water system with potable water for winterizing for a week.
- Maintenance flush before spring service.
- Durham County shuts down for maintenance during non-irrigation months.
- Continue expanding Western Service Area.
- Maintain current desirable water pressure.
- Consider a ground storage tank with pump station and chlorine boosting facility. (Monitor and control chlorine residual through water inside the tank) Assume constructed ~2028.
- Storage tank levels operated by DC, monitored by Cary staff via SCADA. Monitoring setup at NCWRF and through USM SCADA). Facility maintained by USM staff. Include SCADA integration as part of Tank project.
- Looking at potential staffing impact of approximately 1-FTE additional for a combination of reclaimed program implementation plus utility maintenance of storage facilities.

Alternative #3: (End Durham County Contract Option)

- If we reach an impasse with DC or they can no longer meet our supply needs in the western area, then we simply arrange for a transition to potable supply. Assume this begins 2028.
- No obligation for Cary to provide service to West Service Area via NCWRF.
- We determine the billing arrangement, whether reclaimed or potable.
- RTP could do their own agreement with DC. BCE will not address this possibility.
- It would be good to know how much irrigation demand vs. cooling tower demand is needed for RTP South.

- Uphold potable water program components, alternate day watering, etc. upon conversion to potable. BCE will not address change in rate revenue for potable vs reclaimed to customers, as how Council would address is uncertain (i.e., Council may decide to continue reclaimed rates to former reclaimed accounts).

Alternative #4: (Maximize DC Contract Option for Western Area – No Winterizing – Provide Year-Round Service)

- Continues to use reclaimed supply from Durham County.
- North - Expand per 2017 Master Plan Update; Without connecting infrastructure between North and West, the West service area shrinks but North-West boundary does not shift westward. This gap between service areas reduces demands compared to Option 5.
- West – Operate with Reclaimed Water from DC year-round.
- Maintenance practice – Maintain existing flushing practices with annual chlorine boosting.
- Durham County shuts down for 10-day reclaimed holiday for annual maintenance.
- Continue expanding Western Service Area.
- Maintain current desirable water pressure.
- Consider a ground storage tank with pump station and chlorine boosting facility. (Monitor and control chlorine residual through water inside the tank) Assume constructed ~2028.
- Storage tank levels operated by DC, monitored by Cary staff via SCADA. Monitoring setup at NCWRF and through USM SCADA). Facility maintained by USM staff.
- Looking at potential staffing impact of approximately 1-FTE additional for a combination of reclaimed program implementation plus utility maintenance of storage facilities.

Alternative #5: (NCWRF Connector Option to Western Area)

- Prepare for capital expansion of NW Connector.
- Continue building NCWRF Connector to Western Service Area (assume complete in 2028)
- North – Expand per 2017 Master Plan Update
- West – Operate with DC reclaimed water year-round until contract expires and NCWRF Connector is in service. Assume DC contract extended to 2028.
- Maintenance practice – Maintain existing flushing practices with annual chlorine boosting.
- NCWRF shuts down for 10-day reclaimed holiday for annual maintenance.
- Prepare for loss of service to NCWRF and Western Cary systems during spills.
- Continue expanding Western service area per 2017 Master Plan Update.
- Consider a ground storage tank with pump station and chlorine boosting facility. (Monitor and control chlorine residual through water inside the tank) Assume Tank constructed ~2028.
- Storage tank levels operated by DC, monitored by Cary staff via SCADA. Monitoring setup at NCWRF and through USM SCADA). Facility maintained by USM staff.
- Consider second, intermediate chlorine boosting system between NCWRF and western system.
- Consider intermediate system storage on the Northwest area.
- Looking at potential staffing impact of approximately 2-FTE's additional, and potentially 3, for a combination of reclaimed program implementation plus utility maintenance of storage facilities, chlorine boosting locations and SCADA support.

Attachment C

Town of Cary Reclaimed Water BCE Evaluation Financial Assumptions

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Town of Cary Reclaimed Water BCE Financial Assumptions

Revenue

- Potable Water FY 2018: $5.42/1000 gallons
- Reclaimed Water FY 2018: $3.98/1000 gallons
- 2% yearly increase in rates
- 10-day RCW vacation for maintenance: rates change from RCW to potable rates
- Alternative 2 seasonal: rates change from RCW to potable rates
- Alternative 3: no rate change after switch from RCW to potable

Capital

- Projects as listed in reference reports
- Chlorination Booster Stations would not be collocated with existing lift stations

Reclaimed Water O&M

- $2.54/linear feet
- 1% yearly increase
- New asset maintenance added in 2025 (midpoint of project completion in 2028)
- Linear feet estimates based on Cary-provided reclaimed water GIS layer
- Alternative 2 includes $10,000/year switch over cost

Durham Reclaimed Water Purchase

- Capital payback ends 2022
- $2.68/1000 gallons
- 3% cost increase on renewal in 2022
- Includes demand + West flushing demand
- Contract ends in 2028 for Alternatives 3 and 5

NCWRF RCW Production O&M

- $1.60/1000 gallons
- 1% yearly increase

West Flushing Demand and Blowoff Treatment

- $2.13/1000 gallons at WWRWRF
- West Flushing Demand
- Blowoff demand of 8.3% of demand

West Flushing (% of demand)		
	2019-2027	2028+
Alternative 1	1.000	1.000
Alternative 2	1.000	1.000
Alternative 3	1.000	0.000
Alternative 4 & 5	1.000	0.250

Booster Chlorination O&M

- $2.86/1000 gallons
- Based on blowout demand of 8.3% of demand

Potable Water O&M

- $5.34/1000 gallons
- 1% yearly increase

FTE

- $50,000/year
- 3% yearly increase

Assets

- Alternative 3, West reclaimed water infrastructure to be closed and no longer maintained. This infrastructure will have no salvage value at the end of the forecast period.
- New assets: straight line depreciation with 50-year useful life

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Attachment D

Town of Cary Capital Projects

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Comparison of Capital Projects Required for Reclaimed Water BCE Options

Recommended Project in CDM Reclaimed Water Master Plan Update, December 2017 Addendum

BCE Option	NW-1	NW-2	NW-3	NW-4	NW-5	NW-6 (GST)	NW-7	NW-8	NW-9	NW-10A	NW-10B	NW-11 (PRV)	NW-12	NW-13 (PRV)
Option 1 - No Expansion		●		●	●		●	●	●		●		●	
Option 2 - Seasonal System, No NCWRF Interconnect	●	●	●	●	●		●	●	●		●		●	
Option 3 - Abandon West RCW Service Area														
Option 4 - RCW Master Plan Recommendations, No NCWRF Interconnect	●	●	●	●	●		●	●	●		●		●	
Option 5 - Interconnect West-North RCW Service Areas	●	●	●	●	●	●	●	●	●	●	●	●	●	●

BCE Option (Continued)	NW-14 (GST Pumps)	NW-15	NW-16	NW-17	NW-18	NW-19 (WRF Pumps)	NW-20 (GST Pumps)	NW-21	NW-22	NW-23 (PRV)	NW-24	NW-25	NW-26	Eliminate Jumpers	Potable Services for West Svc Area	Smaller RCW Tank ($2M)
Option 1 - No Expansion								Partial[1] ●				Partial[2] ●	●	●		
Option 2 - Seasonal System, No NCWRF Interconnect		●	●	●	●			Partial[1] ●				Partial[2] ●	●			●
Option 3 - Abandon West RCW Service Area			●	●	●			Partial[1] ●				Partial[2] ●		●	●	
Option 4 - RCW Master Plan Recommendations, No NCWRF Interconnect		●	●	●	●			Partial[1] ●				Partial[2] ●	●			●
Option 5 - Interconnect West-North RCW Service Areas	●	●	●	●	●	●	●	●	●	●	●	●	●			

Options 1, 2, 3 and 4 would reduce the scope of 2 Master Plan recommended projects, NW-21 and NW-25:						
NW-21 for Options 1/2/3/4:	2,100 ft	11.92%	$394,000	NW-25 for Options 1/2/3/4:	13,500 ft	16.88% $1,540,000
NW-21 for Option 5:	17,300 ft	100%	$ 3,300,000	NW-25 for Option 5:	79,900 ft	100% $9,100,000
Options 2 and 4 would require only a smaller reclaimed water storage tank; for evaluation purposes cost is estimated at $2,000,000						

Reclaimed Water BCE - Cost Considerations

BCE Option	Capital Cost Elements	O&M Cost Elements	Durham Co. Reclaimed Supply	Other Considerations
Option 1 - No Expansion	Recommended CIP Projects to provide reclaimed service for Orphan Areas; Eliminate Jumpers; Chlorine Booster Systems (2)	Reclaimed Water O&M Budget, increased proportionate to expansion for Orphan Areas; O&M and rehab/replacement for Chlorine Booster Systems	Renew Reclaimed Supply Agreement after 2021; Capital Charge ends 2022	
Option 2 - Seasonal System, No NCWRF Interconnect	Recommended CIP Projects (except no projects to connect North & West Svc Areas); Chlorine Booster Systems (2); replace Recommended storage tank with smaller tank	Reclaimed Water O&M Budget, increased proportionate to expansion for Master Plan; O&M and rehab/replacement for Chlorine Booster Systems	Renew Reclaimed Supply Agreement after 2021; Capital Charge ends 2022	West Reclaimed Service Area operates March-October; Potable Service to RTP South remainder of the year
Option 3 - Abandon West RCW Service Area	Recommended CIP Projects for North Service Area; Potable Service for current RCW services in West Service Area; Eliminate Jumpers	Reclaimed Water O&M Budget, increased proportionate to expansion for Master Plan	Do not renew Reclaimed Supply Agreement; pay off remaining supply line capital as lump sum in 2021	
Option 4 - RCW Master Plan Recommendations, No NCWRF Interconnect	Recommended CIP Projects (except no projects to connect North & West Svc Areas); Chlorine Booster Systems (2); replace Recommended storage tank with smaller tank	Reclaimed Water O&M Budget, increased proportionate to expansion for Master Plan; O&M and rehab/replacement for Chlorine Booster Systems	Renew Reclaimed Supply Agreement after 2021; Capital Charge ends 2022	
Option 5 - Interconnect West-North RCW Service Areas	All Recommended CIP Projects in RCW Master Plan Update Addendum; Chlorine Booster Systems (2 or more?)	Reclaimed Water O&M Budget, increased proportionate to expansion for Master Plan; O&M and rehab/replacement for Chlorine Booster Systems	Renew Reclaimed Supply Agreement after 2021, through evaluation period; Capital Charge ends 2022	