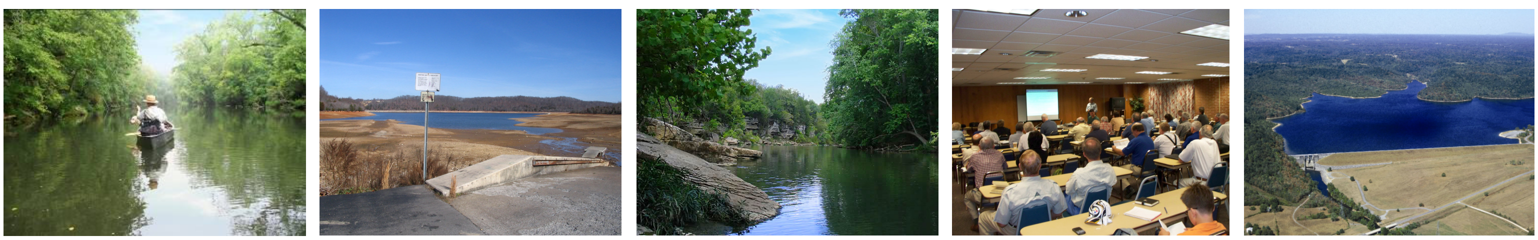
FINAL REPORT

Maury County Regional Water Supply Strategic Plan



Tennessee Duck River Development Agency

September 10, 2015

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GLOSSARY OF TERMS

ARAP	Aquatic Resource Alteration Permit
BCUD	Bedford County Utility District
CBER	Center for Business and Economic Research (at University of Tennessee)
CIP	Capital Improvements Program
CPWS	Columbia Power & Water Systems
CWA	Clean Water Act
D/DBP	Disinfectants/Disinfection Byproducts
DRA	Tennessee Duck River Development Agency
DRUC	Duck River Utility Commission
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
fps	Feet per Second
FY	Fiscal Year
gpm	Gallons per Minute
HAAs	Haloacetic Acids
IESWTR	Interim Enhanced Surface Water Treatment Rule
L	Liter
MC	Maury County
MCL	Maximum Contaminant Level
MG	Million Gallons
mgd	Million Gallons per Day
mg/L	Milligrams per Liter
NEPA	National Environmental Policy Act
psi	Pounds per Square Inch
RWSFS	Regional Water Supply Feasibility Study

RWSSP	Regional Water Supply Strategic Plan
SDWA	Safe Drinking Water Act
SRF	State Revolving Fund
SWTR	Surface Water Treatment Rule
TDEC	Tennessee Department of Environment and Conservation
THMs	Trihalomethanes
TNC	The Nature Conservancy
TWRA	Tennessee Wildlife Resources Agency
TVA	Tennessee Valley Authority
µg/L	Micrograms per Liter
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEDA	U.S. Economic Development Administration
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
7Q10	Seven-day Consecutive Low Flow with a Recurrence Interval of Ten Years

ACKNOWLEDGEMENTS

The Tennessee Duck River Development Agency (DRA) acknowledges the following for their participation in this effort:

Water Utilities

Columbia Power & Water Systems

City of Spring Hill

City of Mt. Pleasant

Maury County Water System

Strategic Team

O'Brien & Gere

Water Utility Representatives

Dempsey, Dilling & Associates, P.C.

Heathcoat & Davis, Inc.

SECTION 1 – INTRODUCTION AND BACKGROUND

1.1. PURPOSE

The purpose of the Tennessee Duck River Development Agency's (DRA) Maury County Regional Water Supply Strategic Plan (Maury County RWSSP) includes the following:

- Build on work performed in the Maury County Regional Water Supply Feasibility Study (April 2014) to further refine the general location and size of proposed water facilities (i.e., river intake, pumping station, water treatment plant, and piping).
- Define the timing for implementation of proposed water facilities based on technical and financial considerations in order to provide a "roadmap" for planning, design, and construction of regional water facilities.
- Assess the benefits associated with constructing a new water treatment plant (WTP) downstream of Columbia in proximity to the proposed river intake versus constructing a new WTP remote from the river intake and near the water demand center for Spring Hill and Columbia.
- Provide water utilities with information needed to make sound decisions on the technical, environmental and economic benefits of future investments in regional water infrastructure in Maury County.
- Identify what work needs to be completed to bring the proposed water facilities on-line and who will pay for it.

The Maury County RWSSP addresses one of the five water supply components recommended in the DRA's Comprehensive Regional Water Supply Plan (March 2011).

1.2. SCOPE OF SERVICES

In October 2014, O'Brien & Gere and DRA initiated work on the Maury County RWSSP based on the following scope of services:

- Identify the general location, size and timing of water facilities (i.e., water supply source; raw water intake, pumping and pipelines; water treatment plant; treated water pumping station; treated water pipelines; etc.) based on technical and financial considerations.
- Compare the benefits of constructing a new WTP near the proposed river intake downstream of Columbia versus constructing a new WTP remote from the river intake and in proximity to the water demand center for Spring Hill and Columbia.
- Attend meetings to present findings and solicit input from stakeholders.
- Prepare draft and final reports.

The process used for conducting the DRA's Maury County RWSSP followed a "work session" approach similar to the one used in the DRA's Comprehensive Regional Water Supply Plan (March 2011). In addition to the work sessions, individual meetings with each water utility were conducted to collect and discuss data and findings.

1.3. PARTICIPANTS IN THE MAURY COUNTY RWSSP

At the outset of the DRA's Maury County RWSSP, DRA assembled the following key personnel to assist with development of the study (Table 1).

Table 1. Key participants in the Duck River Agency's Maury County RWSSP

Participant	Entity
Doug Murphy	Duck River Agency
George Rest	O'Brien & Gere
Thomas Dumm	O'Brien & Gere
David Wilkes	O'Brien & Gere
Caryl Giles	City of Spring Hill
Dan Allen	City of Spring Hill
Wes Kelley	Columbia Power & Water Systems
Jonathan Hardin	Columbia Power & Water Systems
Larry Chunn	Maury County Water System (MCWS)
Bobby Worthington	Mt. Pleasant
Alton Heatchcoat	Heathcoat & Davis representing Mt. Pleasant and MCWS
Ricky Oakley	Heathcoat & Davis representing Mt. Pleasant and MCWS
Jerome Dempsey	Dempsey, Dilling & Associates representing Spring Hill

1.4. BACKGROUND FOR MAURY COUNTY REGIONAL WATER SUPPLY STRATEGIC PLAN

In March 2011, the Duck River Agency completed the Comprehensive Regional Water Supply Plan which included a list of 40 potential water supply alternatives that was reduced to 26 unique alternatives considered worthy of further consideration. These alternatives were developed to meet a 2060 potential deficit of up to 32 mgd (1.4 BG) at Columbia. Alternatives included a wide array of non-structural and structural measures such as:

- Implementing additional water use efficiency measures
- Implementing a regional drought management plan
- Changing operation of Normandy Reservoir
- Modifying river constraints
- Raising Normandy Dam
- Constructing tributary reservoirs (Fountain Creek Reservoir)
- Building offstream storage reservoirs (pumped storage)
- Utilizing quarries
- Constructing pipelines from reservoirs, rivers or other water systems

A summary matrix was developed which described each of the alternatives and documented key aspects of the alternative related to seven criteria: reliable capacity, raw water quality, cost, implementability (permitting), flexibility (phasing), environmental benefits, and recreation. During public work sessions with stakeholders, the alternatives were discussed and sorted into four categories:

- Baseline (water use efficiency, drought management, etc.)
- Fatally Flawed or Highly Unlikely (unreliable, permitting obstacles, etc.)
- Backup (alternative which may be suitable for implementation with a cornerstone alternative)
- Cornerstone (alternatives capable of satisfying entire river deficit in 2060)

Using the evaluation criteria and working closely with the stakeholders, a reliable, diverse, and flexible portfolio of water supply alternatives was developed which included the following non-structural and structural components shown in Figure 1:

- **Non-Structural Components:**
  - **Drought Management Plan** – Develop and implement a regional drought management plan.
  - **Water Use Efficiency Program** – Develop and implement a water management program.
  - **Optimize Normandy Reservoir Releases** – Optimize releases from Normandy Reservoir to preserve water in storage in the reservoir for periods when it is most needed.
- **Structural Components**
  - **Normandy Reservoir Capacity Improvements** – Increase the elevation of Normandy Dam by five feet and increase the Winter/Spring pool elevation by approximately five feet (i.e., 864 feet to 869 feet) without increasing the Summer/Fall pool elevation (i.e., 875 feet). This component increases the volume of water in storage during droughts, enhances flood protection while minimizing environmental impacts relative to other alternatives, and enhances the reliable yield available for all Duck River uses.

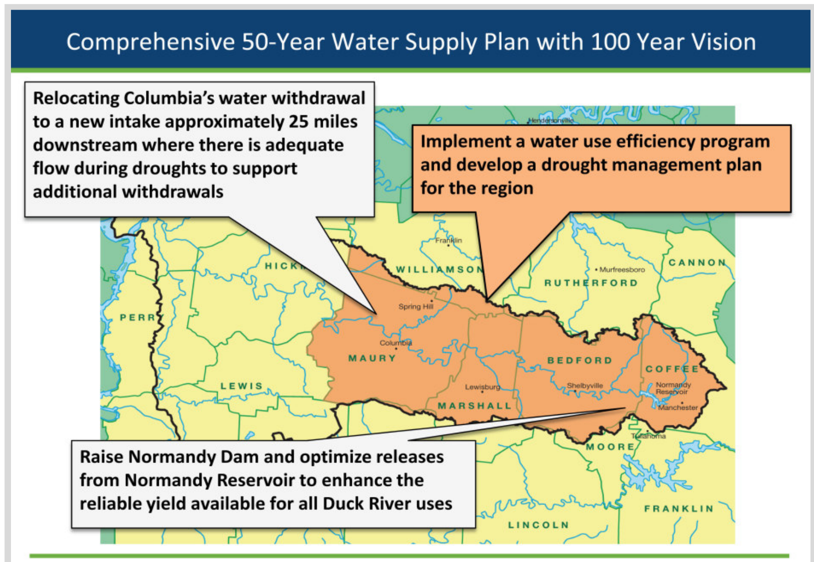

Figure 1. Recommended alternatives

  - **New intake on the Duck River for Columbia Power & Water Systems** – Relocate water withdrawals for a portion of Maury County customers to a new intake downstream of Columbia where there is adequate flow in the river during droughts to satisfy Maury County's projected needs. This component addresses the potential deficit in Maury County and southern Williamson County with a local, highly reliable supply and will eliminate their sole reliance on Normandy Reservoir during a severe drought.

The Duck River Agency is conducting investigations and developing implementation plans for the recommended alternatives.

SECTION 2 – WATER SUPPLY CHARACTERISTICS

2.1. OVERVIEW OF WATER SUPPLY CHARACTERISTICS

The Duck River Agency represents seven water utilities which serve approximately 250,000 people and industries that include car manufacturers, food processing plants, and other businesses utilizing water for production. In addition to public water supply needs, the river provides a wide range of other values including recreation, an excellent fishery, and some of the most biologically-rich freshwater habitat in North America.

Portions of the Duck River have been impounded since the mid-1800's. Currently, there are four low head dams located on the Duck River which were constructed in the early 1900's:

- Cortner Mill near Normandy (drainage area = 214 square miles at approximately Duck River Mile 245.1)
- Shelbyville (drainage area = 425 square miles at Duck River Mile 221.4)
- Lillard Mill near Milltown (drainage area = 919 square miles at Duck River Mile 179.2)
- Columbia (drainage area = 1,206 square miles at Duck River Mile 133.5)

Normandy Reservoir (Figure 2) is located in Bedford and Coffee Counties about 1.5 miles upstream of Normandy, Tennessee and was constructed in 1976 by the Tennessee Valley Authority (TVA) based on a request made by DRA. Normandy Reservoir was designed to provide a variety of recreation, water supply, flood control and water quality benefits both upstream and downstream from the dam. Normandy Reservoir releases are the primary source of water for the Duck River upstream of Columbia during severe droughts and the reservoir has the following characteristics:

Figure 2. Normandy Reservoir

- Located in the upper portion of the Duck River watershed between Shelbyville and Manchester (Duck River Mile 248.6) and is fed by the Duck River.
- Normandy Dam is 2,248 feet in length and is about 95 feet in height.
- Volume of water in storage is roughly 38 billion gallons at a Summer/Fall pool level of 875 feet and 28 billion gallons at a Winter/Spring pool level of 864 feet.
- Drainage area for the reservoir is roughly 195 square miles.

The Tennessee Valley Authority (TVA) manages and operates Normandy Reservoir, including the dam and its releases. TVA operates Normandy Reservoir based on an operating rule curve (Figure 3) for flood control and to meet all State designated uses for the Duck River, including domestic water supply, industrial water supply, fish and aquatic life, recreation, livestock watering and wildlife, irrigation, and trout stream (seasonal trout fisheries below Normandy Dam). Normandy Reservoir flood guide elevations are:

- Summer/Fall pool level of 875 feet
- Winter/Spring pool level of 864 feet

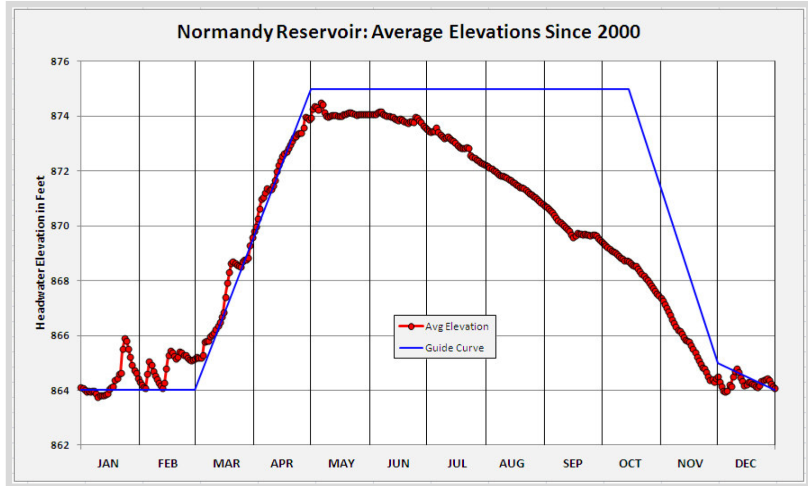

Figure 3. Normandy Reservoir operating rule curve

Public water systems upstream from Normandy Dam (primarily Tullahoma and Manchester) are served from the Duck River Utility Commission's (DRUC) water intake located in Normandy Reservoir while downstream water systems meet their needs with direct withdrawals from the Duck River. Normandy Reservoir and the Duck River provide virtually all of the public water supply needs in the five county planning area.

The following direct public water supply withdrawals occur along an 88 mile segment of the Duck River between Shelbyville and Columbia:

- Shelbyville Power, Water and Sewerage System - Duck River Mile 221.9
- Bedford County Utility District - Duck River Mile 202.4
- Lewisburg Water and Wastewater - Duck River Mile 181
- Spring Hill Water Department - Duck River Mile 166
- Columbia Power & Water Systems - Duck River Mile 133.9

Current and estimated future water use was loaded into the hydrologic model "OASIS" to predict the magnitude and timing for future water supply deficits. The hydrologic model was run using current and projected water demands under the following reservoir and river constraints:

- Normandy Reservoir
  - » Release from Normandy Reservoir to maintain 25.8 mgd (40 cfs) minimum instantaneous flow just downstream of the dam.
- Shelbyville
  - » Release from Normandy Reservoir to maintain 77.5 mgd (120 cfs) minimum instantaneous flow at Shelbyville (December through May) at Duck River Mile 221.4.
  - » Release from Normandy Reservoir to maintain 100.2 mgd (155 cfs) minimum instantaneous flow at Shelbyville (June through November) at Duck River Mile 221.4.
  - » 6.5 mgd (10 cfs) allocation for Shelbyville's water supply intake at Duck River Mile 221.9.
- Columbia
  Columbia Power & Water System's Aquatic Resource Alteration Permit (ARAP) identifies the following permit conditions:

- Columbia Power & Water System's maximum instantaneous withdrawal rate shall be limited to 19.4 mgd (30 cfs) at Duck River Mile 134.05.
- Columbia Power & Water System's withdrawal shall not result in a reduction of flow in the Duck River of less than 64.6 mgd (100 cfs) as measured downstream of the intake at Duck River Mile 133.9 (Figure 4).

Figure 4. Columbia Dam

2.2. NEED FOR MAURY COUNTY WATER SUPPLY FACILITIES

The need for a water utility to construct major water supply facilities (i.e., water supply intakes, water treatment plants, pipelines) can be driven by a multitude of factors, such as drought, aging infrastructure, reduction in capabilities of existing supplies, growth or a combination of these and other considerations. As shown in Table 2, the hydrologic modeling conducted under the DRA's Comprehensive Regional Water Supply Plan identified that during severe droughts the current water supply deficit at Columbia is 4 mgd and the potential water supply deficit in 2060 is 32 mgd (which equates to approximately 1.4 BG).

Table 2. Current and projected water supply deficits at Columbia for the Duck River

Deficit	2010	2020	2030	2040	2050	2060
Potential water supply deficit at Columbia based on critical drought year of record and maintenance of 100 cfs at Duck River Mile 132.8 (MG)	300	500	700	900	1150	1400
Potential water supply deficit at Columbia based on critical drought year of record and maintenance of 100 cfs at Duck River Mile 132.8 (mgd)	4	10	15	21	27	32

In addition to the assessment of water supply availability from the Duck River during drought conditions, this strategic plan builds on the work conducted in the Maury County Regional Water Supply Feasibility Study (2014) by further investigating the capabilities of existing production and delivery facilities under non-drought conditions. The water demand conditions of particular interest in this study include the following:

- Average day demands - represents the amount of potable water required in a year, divided by 365 days. Population projections or other data are used to derive average day water demands.
- Maximum day demands - represents the amount of potable water required in a single 24-hour period for a historical day of maximum usage. Maximum day water demands are generated using a ratio of the historic maximum:average day water demands. Water demands for Spring Hill and CPWS which have direct withdrawals from the Duck River are based on maximum day demands because these water systems must withdraw water from the Duck River at a rate which essentially matches customer demands throughout the day. Maximum day demands are typically used to size raw water intakes on river supplies, water treatment plants, and major water transmission mains. As a result, maximum day demands are used extensively in this study.

Tables 3 through 5 summarize the water demands in Maury County for Spring Hill and Columbia Power & Water Systems. Note that Maury County Water System purchases water from CPWS for its entire customer base and these demands are therefore included in the water demands for CPWS.

Table 3 summarizes the water use for Spring Hill and CPWS in 2010 and the average day water demands developed from population projections for 2020 through 2060. Population projections were used in the DRA's Comprehensive Regional Water Supply Plan to estimate water demands and were based on information from University of Tennessee's Center for Business and Economic Research (CBER).

Table 3. Average and maximum day water demands for Maury/southern Williamson Counties

Water System	2010	2020	2030	2040	2050	2060
Average day demands (mgd)						
Spring Hill	2.6	3.1	3.7	4.2	4.7	5.3
Columbia (includes MCWS)	8.3	10.6	13.2	15.6	18.1	20.6
Total average day demand	**10.9**	**13.7**	**16.9**	**19.8**	**22.8**	**25.9**
Maximum day demands (mgd)						
Spring Hill	4.7	5.6	6.7	7.6	8.5	9.5
Columbia (includes MCWS)	12.5	16	19.8	23.5	27.2	30.8
Total maximum day demand	**17.2**	**21.6**	**26.5**	**31.1**	**35.7**	**40.3**

Table 4 compares the capacity of the Spring Hill intake and water treatment plant to the maximum day demands through the planning period. As shown in Table 4, Spring Hill has 6 mgd of capacity at the intake on the Duck River and the 18-inch pipeline from the intake to the water plant which is sufficient to meet maximum day water demands through approximately 2025. For treatment, Spring Hill has a 4 mgd water treatment plant expandable to 6 mgd. TDEC has granted Spring Hill permission to operate the plant at peak rates up to 6 mgd, but improvements are needed for a continuous rating. Consequently, the Spring Hill WTP production capacity of 4 mgd is currently deficient and the 6 mgd capacity (with the required improvements) would be sufficient to meet maximum day demand through approximately 2025.

Table 4. Surplus/deficit for Spring Hill intake and water treatment plant

Spring Hill	2010	2020	2030	2040	2050	2060
River Intake						
Maximum day demands (mgd)	4.7	5.6	6.7	7.6	8.5	9.5
Intake capacity (mgd)	6	6	6	6	6	6
Intake surplus/deficit (mgd)	**1.3**	**0.4**	**-0.7**	**-1.6**	**-2.5**	**-3.5**
Water treatment plant						
Maximum day demands (mgd)	4.7	5.6	6.7	7.6	8.5	9.5
WTP capacity (mgd)	4	4	4	4	4	4
WTP surplus/deficit (mgd)	**-0.7**	**-1.6**	**-2.7**	**-3.6**	**-4.5**	**-5.5**

Table 5 compares the capacity of the CPWS intake and water treatment plant to the maximum day demands through the planning period. As shown in Table 5, CPWS has 20 mgd of capacity at the intake on the Duck River and at its water treatment plant which is sufficient to meet maximum day water demands through approximately 2030.

Table 5. Surplus/deficit for Columbia Power & Water Systems intake and water treatment plant

Columbia Power & Water Systems (including MCWS)	2010	2020	2030	2040	2050	2060
River Intake						
Maximum day demands (mgd)	12.5	16	19.8	23.5	27.2	30.8
Intake capacity (mgd)	20	20	20	20	20	20
Intake surplus/deficit (mgd)	**7.5**	**4**	**0.2**	**-3.5**	**-7.2**	**-10.8**
Water treatment plant						
Maximum day demands (mgd)	12.5	16	19.8	23.5	27.2	30.8
WTP capacity (mgd)	20	20	20	20	20	20
WTP surplus/deficit (mgd)	**7.5**	**4**	**0.2**	**-3.5**	**-7.2**	**-10.8**

A summary of the information presented in Tables 4 and 5 is shown in Figure 5. In addition, Figure 5 shows the combined maximum day water demands for Spring Hill and CPWS as well as the combined water treatment plant capacity. As shown in the figure, the combined capacity of the existing Spring Hill and CPWS water treatment plants is sufficient to meet the combined needs of Spring Hill and CPWS through approximately 2025.

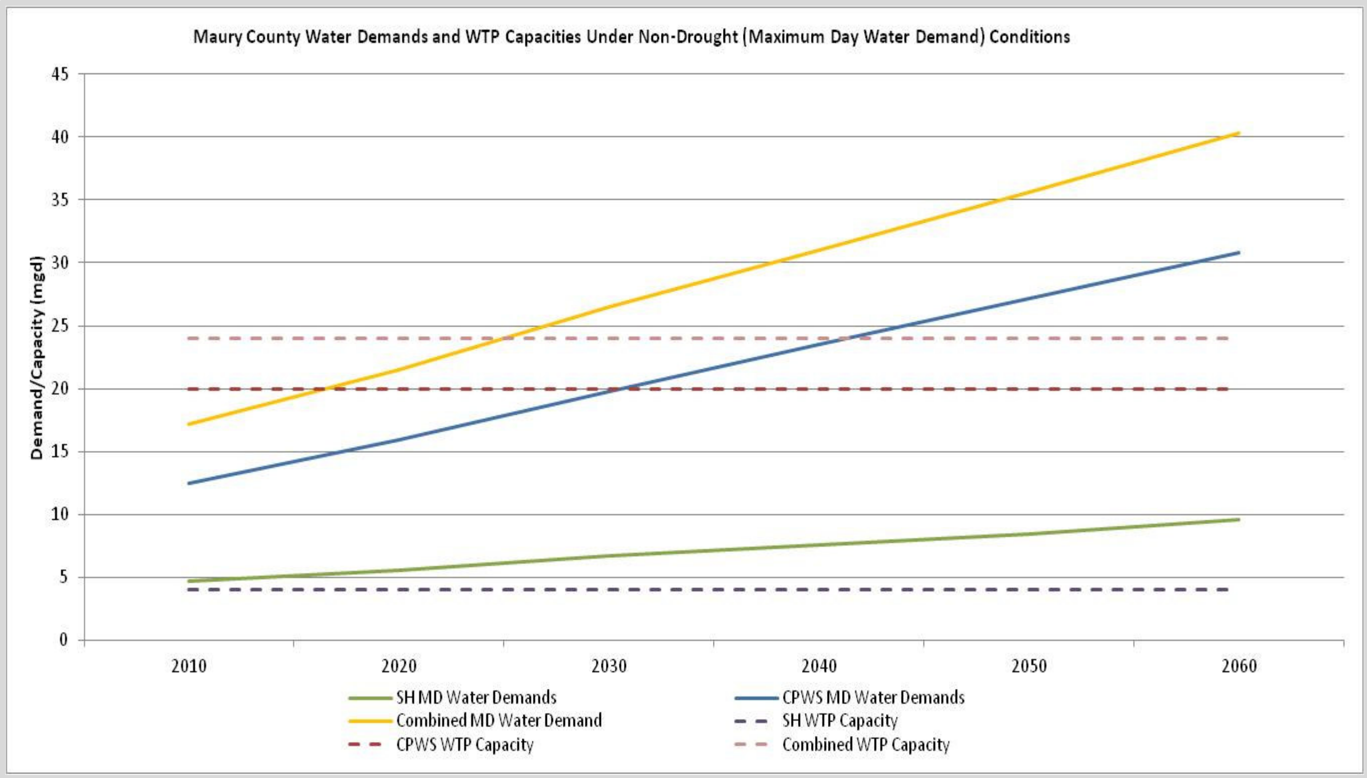

Figure 5. Comparison of maximum day water demands and WTP capacities

SECTION 3 – ALTERNATIVES ANALYSIS

3.1. RECOMMENDED ALTERNATIVE FROM COMPREHENSIVE REGIONAL WATER SUPPLY PLAN (MARCH, 2011)

In the Duck River Agency's Comprehensive Regional Water Supply Plan (March 2011), a list of 40 potential water supply alternatives was reduced to 26 unique alternatives which were considered worthy of further consideration. These alternatives were developed to meet a 2060 potential deficit of up to 32 mgd (which equates to 1.4 BG) at Columbia for the users of the Duck River between Shelbyville and Columbia. The alternatives were screened to develop a portfolio of five recommended components, one of which is the alternative to relocate water withdrawals for a portion of Maury County customers to a new raw water intake downstream of Columbia. This alternative addresses the potential water supply deficit in Maury County and southern Williamson County with a local, highly reliable water supply and eliminates their sole reliance on Normandy Reservoir during a severe drought.

3.2. RECOMMENDED ALTERNATIVE FROM MAURY COUNTY REGIONAL WATER SUPPLY FEASIBILITY STUDY (APRIL, 2014)

In November 2012, DRA and O'Brien & Gere initiated work on the Maury County Regional Water Supply Feasibility Study (Maury County RWSFS) which further evaluated the feasibility of constructing the water facilities described in the new raw water intake alternative recommended in the Comprehensive Regional Water Supply Plan. The Maury County RWSFS culminated in development of the Alternatives Summary Matrix shown in Appendix A. The "alternatives" identified in the Alternatives Summary Matrix represented new water supply or delivery facilities or arrangements (including agreements) that had a reasonable potential to contribute to meeting near-term or long-term water supply requirements for Maury County and southern Williamson County.

For each of the four Maury County water systems, the Alternatives Summary Matrix included a brief description of the existing water supply and infrastructure as well as the water supply and infrastructure needs through 2060 based on capacity, water quality, facility conditions, and any major risks or concerns. In addition to the information in the Alternatives Summary Matrix, O'Brien & Gere developed a *Cost Model* to evaluate the cost considerations associated with the alternatives identified for each utility. The *Cost Model* is an Excel spreadsheet model which provides an "apples-to-apples" comparison of alternatives from a financial standpoint using annualized costs (i.e., capital, debt service, operating, wholesale purchase, etc.) over the planning period. For the Maury County Regional Water Supply Feasibility Study, pricing factors (i.e., CPWS's current wholesale price and daily minimum purchase) were used solely for the purposes of developing a cost comparison, and do not represent an offer or agreement by either CPWS or Spring Hill. In addition, the estimated costs for a majority of the proposed facilities (e.g., treatment plants, river intakes, pumping stations, groundwater wells, etc.) were conceptual and not based on specific locations for new facilities. However, preliminary pipeline alignments were prepared in order to estimate the length and associated cost. The pipeline alignments presented in the Maury County RWSFS are shown in Figure 6 and were considered representative of the approximate location, and were for cost estimating purposes only. More detailed alignment studies would be needed for the proposed pipelines prior to initiating design, permitting, and construction.

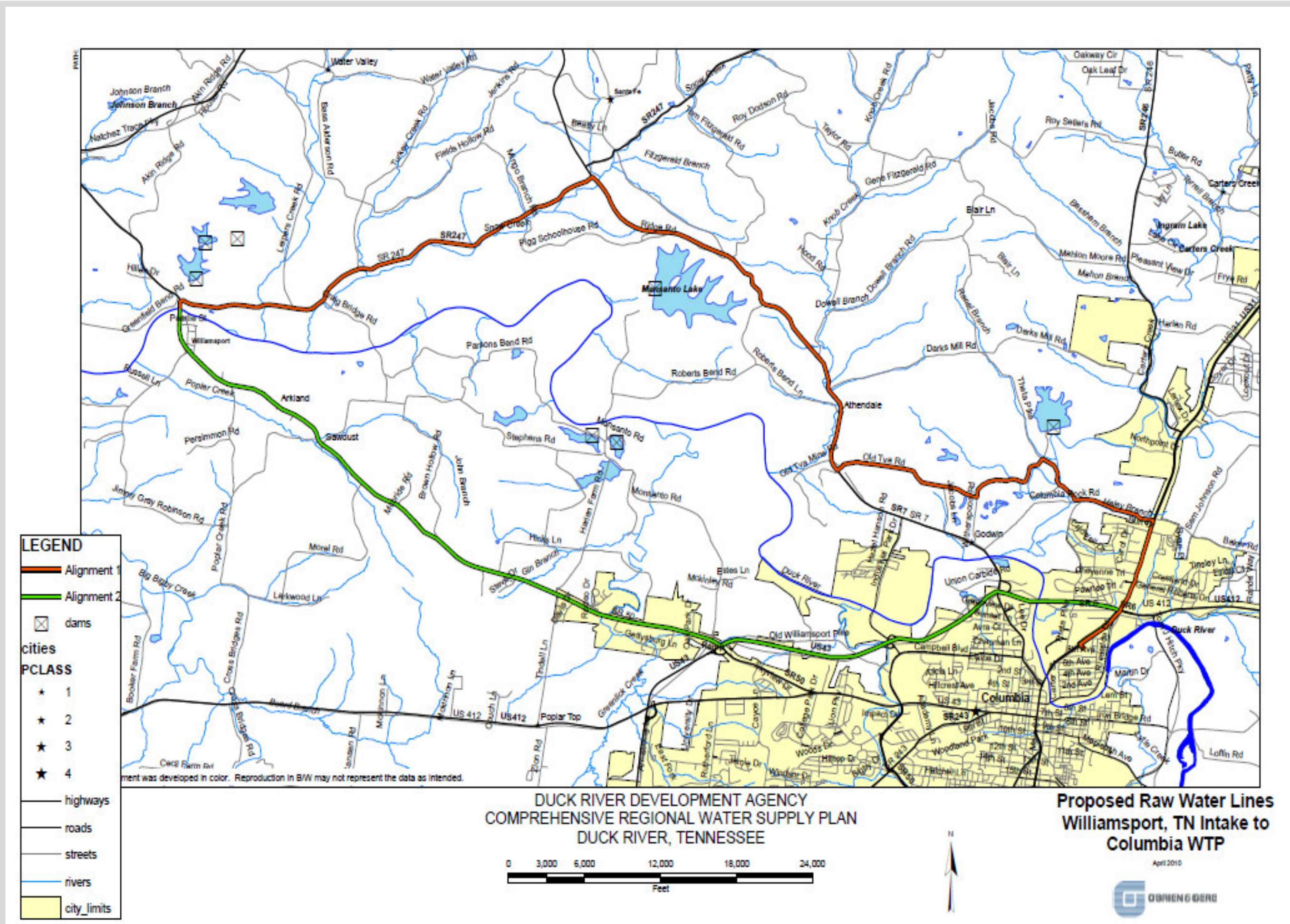

Figure 6. Proposed raw water pipelines from an intake downstream of Columbia to CPWS WTP

For the Maury County RWSFS, the recommended alternative for each water system was presented in the Alternatives Summary Matrix and is described briefly below:

- **Spring Hill** – This alternative involved Spring Hill retaining its existing supply (4 mgd) from the Duck River, and purchasing additional water from CPWS in the near-term. This approach avoided the need for Spring Hill to invest in expanding the permanent capacity of its WTP to 6 mgd in the near-term. With Spring Hill's demand reaching 10 mgd in the planning period (2060), Spring Hill could purchase up to 6 mgd over the longer term depending on availability from CPWS. The analysis used the wholesale cost of water currently charged by CPWS. However, it is noted that the new facilities downstream of Columbia could be owned by a regional utility, in which case Spring Hill may also have a contract or ownership interest with the regional entity. The water facilities downstream of Columbia would include a new raw water intake and pipeline(s) connecting the intake with CPWS, and indirectly with MCWS and Spring Hill, in order to meet long-term needs for Maury County beyond 2025. The near-term capacity of the existing CPWS WTP and finished water pipeline from CPWS to Spring Hill are both adequate to meet at least 3 mgd of additional demand for Spring Hill. Additional piping improvements will be needed between Spring Hill and CPWS when the purchase exceeds 3 mgd. As shown in Figure 7, compared to expansion of the Spring Hill WTP from 4 mgd to 6 mgd, purchasing finished water from CPWS could be significantly less expensive through 2025-2030. These savings are based primarily on two pricing factors: (1) CPWS's current wholesale price of $2.40/1,000 gallons and (2) a minimum daily purchase (so called "take or pay") equal to 10% of the wholesale contracted amount. In both cases, these pricing factors were used in the Maury County Regional Water Supply Feasibility Study solely for the purposes of developing a cost comparison, and do not represent an offer or agreement by either CPWS or Spring Hill. The description under CPWS (below) identifies how the finished water facilities relate to the drought deficit.

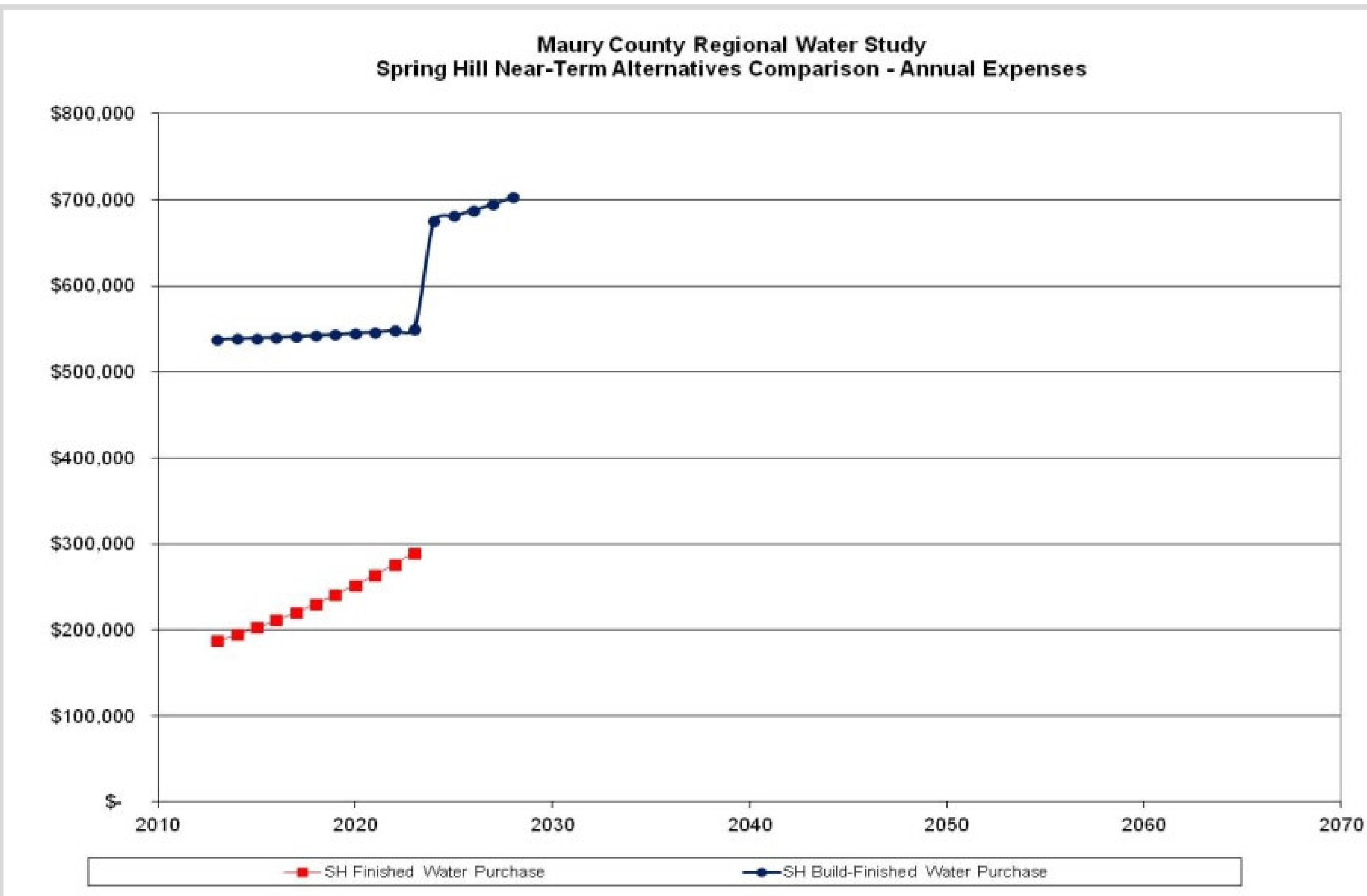

Figure 7. Comparison of wholesale purchase and WTP expansion for Spring Hill

- **Maury County Water System** – Due to the interconnectivity between the MCWS and CPWS systems, MCWS should continue to purchase treated water from CPWS, which currently has adequate spare capacity.

- **Mount Pleasant** – This alternative recommended that Mt. Pleasant retain its existing water supply sources, and construct a new 2 mgd membrane WTP as planned. Mt. Pleasant should continue to investigate development of 0.5 mgd of additional groundwater, and to add to 2 mgd of additional WTP capacity. As shown in Figure 8, building the new 2 mgd of plant capacity (MP B-FWP) is less expensive compared to purchase options (MP FWP) due to need for piping infrastructure investment and purchase price vs. production cost.

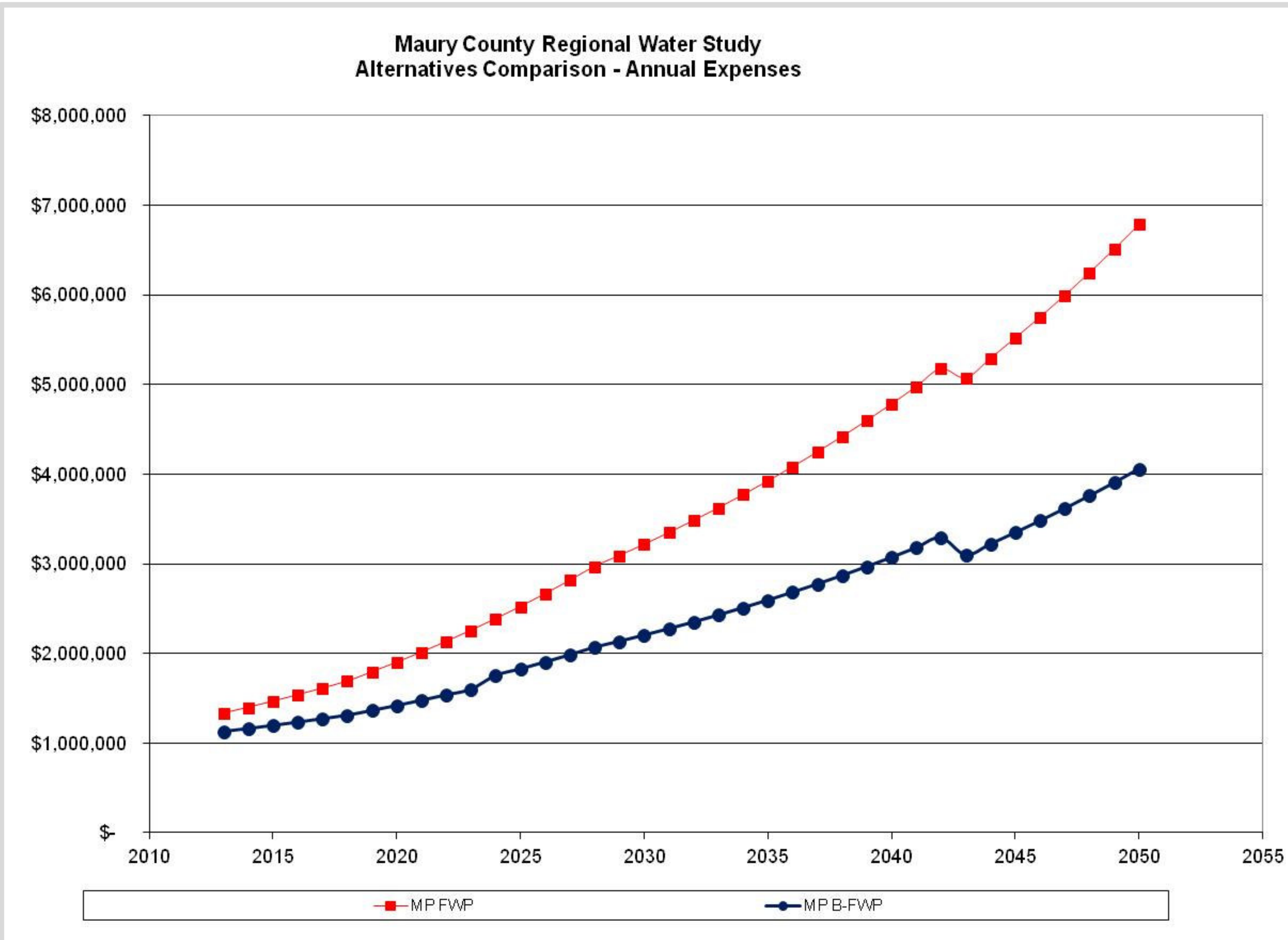

Figure 8. Comparison of wholesale purchase and WTP expansion for Mt. Pleasant

- **Columbia Power & Water Systems** - CPWS has available water treatment plant capacity and infrastructure to sell water to meet the near-term growth needs of Spring Hill, Maury County Water System and/or Mount Pleasant. In the long-term, CPWS could construct a new intake downstream of Columbia and expand its treatment capacity to meet the future needs for Maury County. Beyond the 2025-2030 timeframe, additional WTP capacity will be required to keep pace with growth in maximum day water demands in Maury County. It is noted that the increase in maximum day capacity would partially address the drought deficit estimated in DRA's Comprehensive Regional Water Supply Plan (March 2011). It was recommended that CPWS and Spring Hill work together to determine how best to develop the initial increment of supply and treatment (say 5 mgd) and subsequent expansions to meet the maximum day demands beyond 2030. A possible configuration of water facilities with the new water treatment plant located downstream of Columbia is shown in Figure 9.

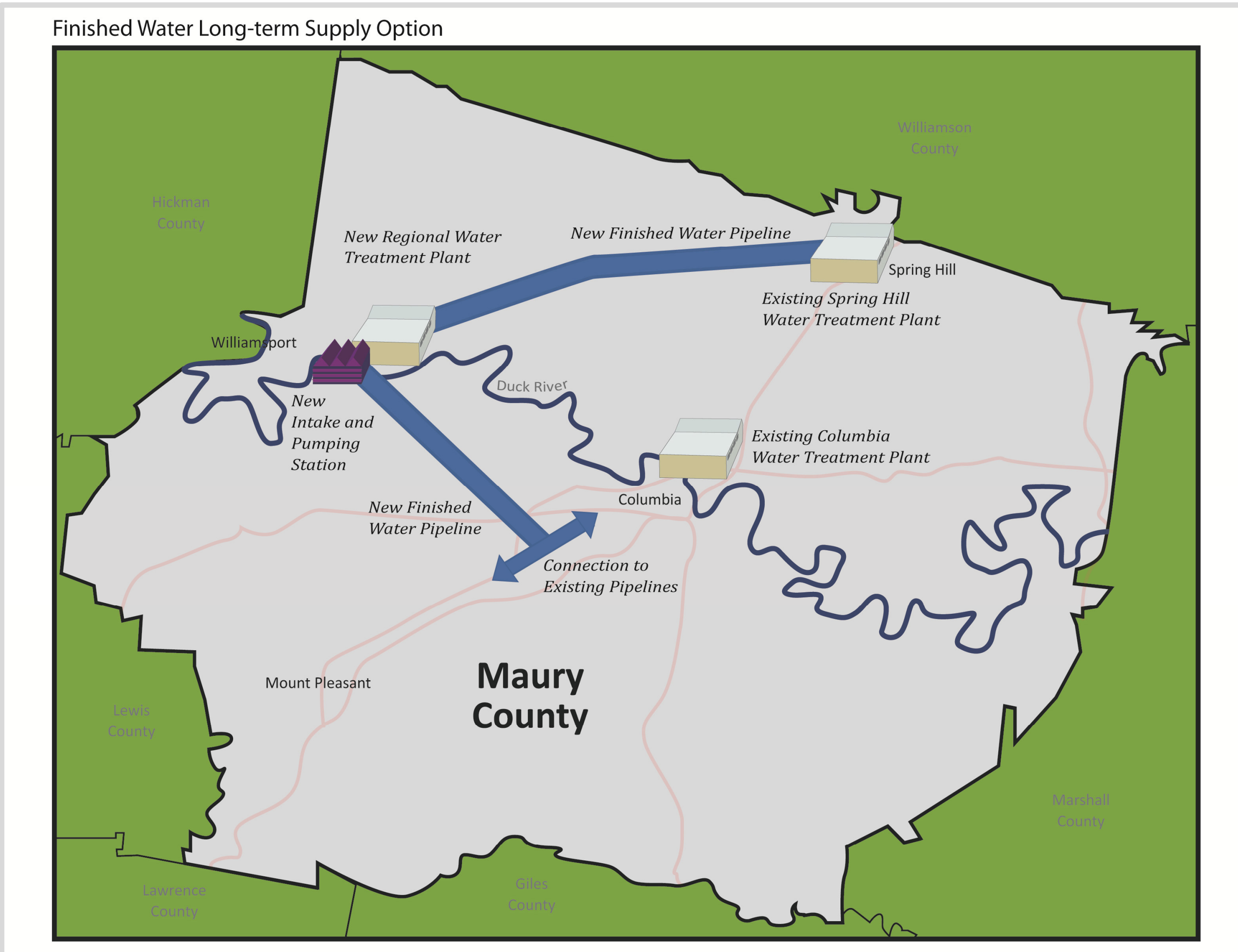

Figure 9. Long-term water supply option with new water treatment plant downstream of Columbia

3.3. EVALUATION OF ALTERNATIVES FOR MAURY COUNTY REGIONAL WATER SUPPLY STRATEGIC PLAN (MAY 2015)

In October 2014, DRA and O'Brien & Gere initiated work on the Maury County Regional Water Supply Strategic Plan (Maury County RWSSP) based on the key recommendations in the Maury County RWSFS which included Spring Hill purchasing water from CPWS in the near-term and construction of new water facilities downstream of Columbia to serve Maury County and southern Williamson County beyond 2025. The purpose of the Maury County RWSSP was to refine the general location, size and timing of the water facilities (i.e., river intake, pumping station, water treatment plant, and piping) as well as timing for finances in order to provide a "roadmap" for planning, design, construction and operation of a regional water treatment plant and its associated facilities.

3.3.1. Evaluation Criteria

At the outset of the alternatives evaluation for the Maury County RWSSP, the following evaluation criteria were developed and refined with the stakeholders:

- **Reliability** – addresses ability to meet projected water demands under drought and non-drought conditions and interruption of water supplies
- **Water Quality** – addresses predicted finished water quality including water age and Disinfection By-products (DBPs)
- **Cost** – addresses the following:
  - » capital costs through planning period for new and existing water supply components
  - » avoided costs related to Spring Hill wastewater treatment plant discharge
- **Flexibility** – provides opportunity to:
  - » defer capital investments
  - » spread costs over time by phasing water supply facilities
  - » repurpose Spring Hill intake/raw water pipe for wastewater treatment plant discharge
- **Environmental Benefits** – augments Duck River flows in Designated Critical Habitat Area upstream of the Columbia wastewater treatment plant
- **Ease of Implementation** – addresses the relative ease of implementing the proposed improvements and considers the potential that regulatory permitting (including environmental considerations), public acceptance, property acquisition, or constructability issues could delay implementation

3.3.2. Water Supply Alternatives Evaluated In Maury County RWSSP

Eight water supply alternatives were identified and each included water facility configurations for 30 mgd (2040), 40 mgd (2060) and 50 mgd (2080). Figures showing the water facility configurations for each of the eight alternatives are included in Appendix B. Descriptions for the facilities components and evaluations of each alternative based on the six evaluation criteria are presented in the Alternatives Matrix in Appendix B. Cumulative project costs were developed for each alternative and included the following:

- Capital cost for water treatment, pumping and pipelines with a 20 percent contingency allowance
- A 20 percent allowance added to the capital cost for engineering, legal and administrative costs

O'Brien & Gere developed a *Cost Model* to evaluate the cost considerations associated with the alternatives identified for each utility. The *Cost Model* is an Excel spreadsheet model which provides an "apples-to-apples" comparison of alternatives from a financial standpoint using annualized costs (i.e., capital, debt service, operating, wholesale purchase, etc.) over the planning period. For the Maury County Regional Water Supply Strategic Plan, costs are based primarily on two pricing factors: (1) CPWS's current wholesale price of $2.40/1,000 gallons and (2) a minimum daily purchase (so called "take or pay") equal to 10% to 50% of the wholesale contracted amount. In both cases, these pricing factors were used in the Maury County Regional Water Supply Strategic Plan solely for the purposes of developing a cost comparison, and do not represent an offer or agreement by either CPWS or Spring Hill. For the Maury County RWSSP, the estimated costs for a majority of the proposed facilities (e.g., treatment plants, river intakes, pumping stations, groundwater wells, etc.) were conceptual and not based on specific locations for new facilities. However, preliminary pipeline alignments were prepared in order to estimate the length and associated cost.

Using the figures and the information presented under the evaluation criteria in the Summary Matrix, DRA and O'Brien & Gere facilitated a work session on December 12, 2014 with the stakeholders and assigned scores to each of the alternatives (Figure 10). Scores were assigned based on discussion and consensus among stakeholders at the work session.

Alternative Scorecard - Raw Scoring
(5 = Best, 1 = Worst)

Duck River Agency - Maury County Strategic Plan
2-Dec-14

	Raw Score							
Alternatives Evaluation Criteria	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8
Reliability	2	1	2	3	5	4	5	4
Water Quality	1	1	5	5	3	3	5	5
Cost	2	1	4	4	3	4	5	3
Flexibility	1	1	2	4	3	3	4	2
Environmental	1	5	4	4	4	4	5	5
Ease of Impelementation	3	3	3	3	3	3	3	3
Totals	10	12	20	23	21	21	27	22
Cumulative Project Costs (50 r	$199	$321	$169	$167	$166	$149	$160	$171

Reliability – addresses ability to meet projected water demands under drought and non-drought conditions and interruption of water supplies
Water Quality – addresses predicted finished water quality including water age and DBPs
Cost - address project costs and SH WWTP costs
Flexibility – provides opportunity to defer capital over time, spread costs, and repurpose SH intake and pipe for wastewater discharge
Environmental Benefits – augments Duck River flows in Designated Critical Habitat Area
Ease of Implementation – ability to secure permits and approvals

Figure 10. Alternatives scoring (work session 12/12/14)

Participants at the December 12, 2014 work session concluded that Alternative 7 exhibited the most benefits of the eight alternatives under consideration.

SECTION 4 – RECOMMENDED ALTERNATIVE

4.1. DESCRIPTION

Using the feedback obtained from the discussions with the water system stakeholders at the work session held on December 12, 2014, O'Brien & Gere modified Alternative 7 to develop a "Hybrid Alternative" which incorporated the most desirable aspects of the eight alternatives. Subsequent work sessions with representatives from Spring Hill, CPWS and Maury County Water Systems were held and the representatives agreed to move forward with the Hybrid Alternative as the recommended alternative.

The water system facilities proposed in the recommended alternative are shown in Figures 11 and 12 and include the following:

- **30 mgd water system (2040)**
  - Expand the Spring Hill raw water intake from 6 mgd to 10 mgd
  - Construct a new 24-inch raw water transmission main from the Spring Hill raw water intake to the Spring Hill WTP (note that existing 18-inch raw water pipeline to be used for Spring Hill wastewater discharge to the Duck River)
  - Expand the Spring Hill WTP from 4 mgd to 10 mgd
  - Construct a new 18 mgd raw water intake and pumping station on Duck River near Parsons Bend
  - Construct a new 30-inch raw water transmission main from the raw water intake at Parsons Bend to the existing CPWS WTP and continuing to the new 4 mgd WTP in the Spring Hill/Columbia corridor
  - Construct a new 4 mgd WTP in the Spring Hill/Columbia corridor
- **40 mgd water system (2060)**
  - Expand raw water intake and pumping station on Duck River near Parsons Bend from 18 mgd to 26 mgd
  - Expand WTP in the Spring Hill/Columbia corridor from 4 mgd to 11 mgd

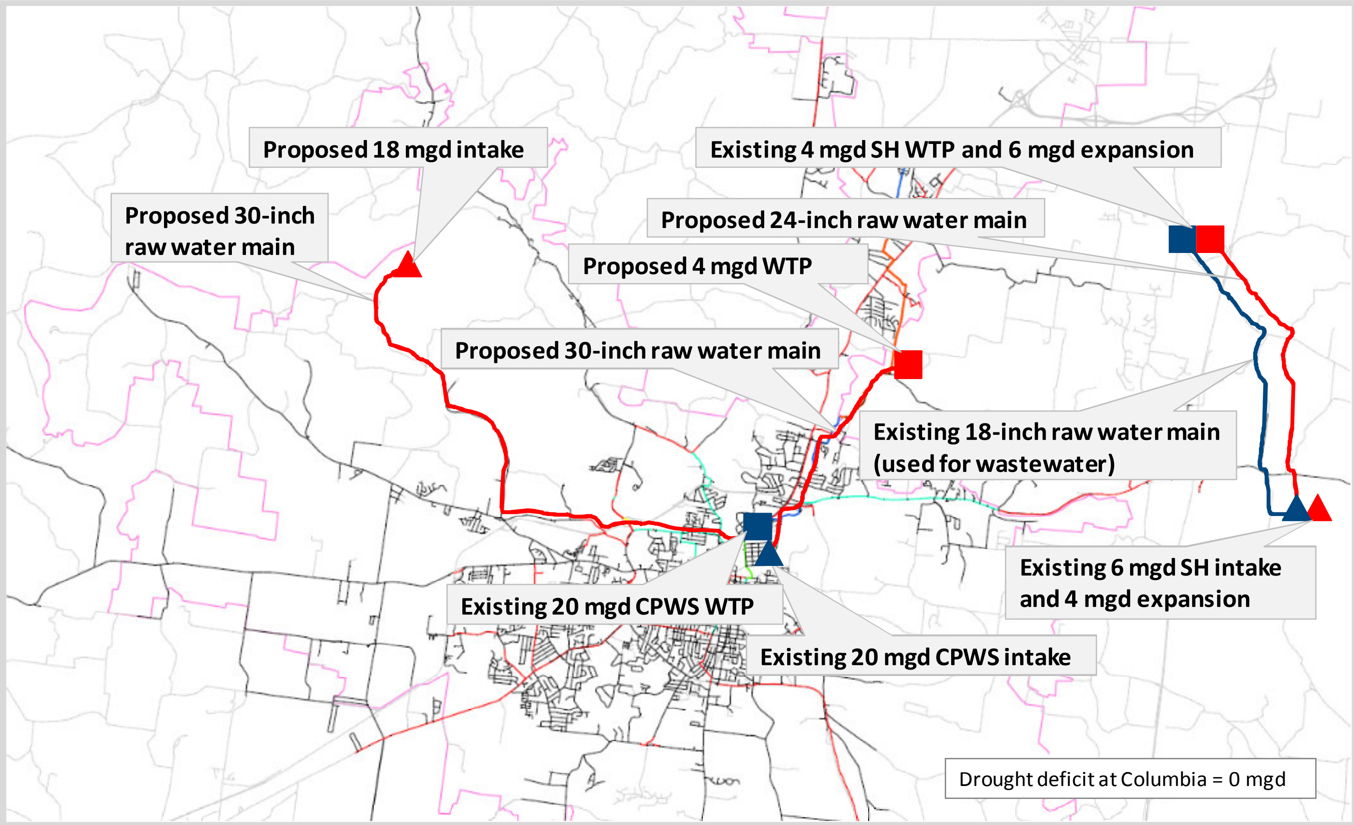

Figure 11. Recommended alternative for 30 mgd water system (2040)

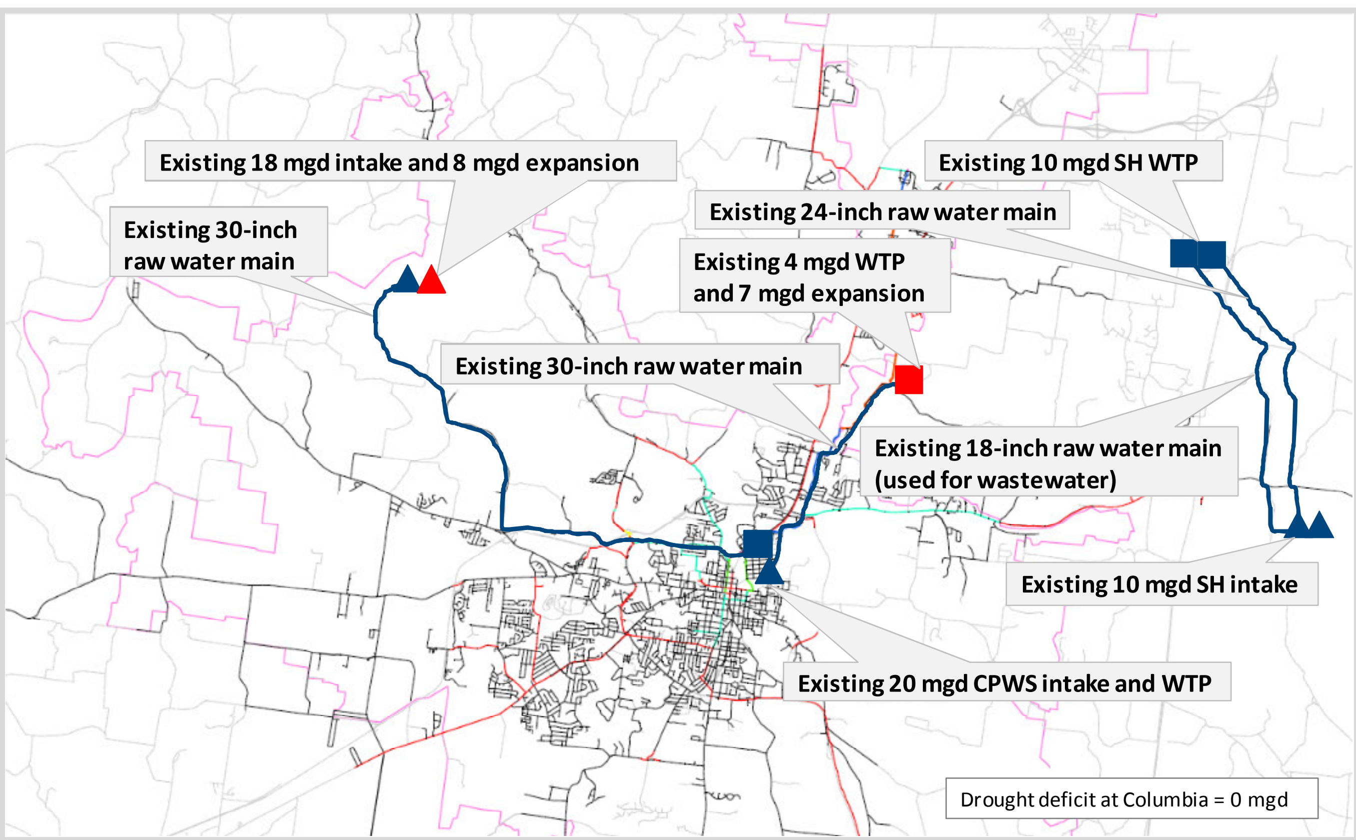

Figure 12. Recommended alternative for 40 mgd water system (2060)

4.2. BENEFITS OF RECOMMENDED ALTERNATIVE

The near-term and long-term benefits of the recommended alternative are as follows.

Near-term Benefits (prior to 2025)

The combined capacity of the existing Spring Hill and CPWS water treatment plants is sufficient to meet the combined needs of Spring Hill and CPWS through approximately 2025. There are a number of reasons why the water systems in Maury County would elect to construct elements of the recommended alternative prior to 2025 (i.e., drought resiliency, emergency reliability, water quality, uncertainty in water demands, etc.). Because CPWS currently has available treatment capacity and Spring Hill has an immediate need, the critical component of the near-term program is the Spring Hill/CPWS Water Sales Agreement which has the following benefits:

- Allows Spring Hill to meet their rapidly increasing water demands, and addresses Spring Hill's urgent need for additional capacity
- Allows CPWS to use the revenues from water sales to Spring Hill to help finance water facilities in the recommended alternative which improves regional drought resiliency
- Increases Spring Hill's ability to draw water from CPWS in an emergency after piping improvements are completed
- Facilitates the extension of the existing water withdrawal permits (ARAP permits) for both Spring Hill and CPWS and would likely be viewed favorably by TDEC
- Allows Spring Hill to expand its revenue base prior to assuming debt for a long-term construction program. A wholesale water purchase agreement with CPWS would substantially reduce Spring Hill's need for additional revenues, and therefore substantially lessen the size of near-term rate increases. Assuming a 10-year term agreement that utilizes the available treatment capacity from CPWS, Spring Hill could potentially save an average of $2 million annually by purchasing treated water. Expanding Spring Hill's water system to 10 mgd would require water rates to roughly double. The wholesale agreement between Spring Hill/CPWS would allow for a much smaller and more gradual increase in water rates.
- Allows Spring Hill to sell water to CPWS after Spring Hill's water supply and treatment facilities are expanded

Long-term Benefits

- Retains operation of the existing Spring Hill intake, piping and WTP, which is expected to receive support and approvals from Spring Hill representatives
- Uses existing Spring Hill raw water main for Spring Hill wastewater discharge to Duck River which could result in a substantial cost savings for Spring Hill
- Provides new raw water main (10 mgd capacity) from existing Spring Hill raw water intake on the Duck River to the existing Spring Hill WTP
- Offsets additional Spring Hill withdrawals from Duck River upstream of Columbia and supplements flow in Designated Critical Segment of the Duck River by returning flow from Spring Hill's wastewater treatment plant to the Duck River
- Allows Spring Hill to independently implement water supply projects based on its schedule and needs
- Facilitates approvals of landowners and utilities by avoiding construction of a long cross-county pipe

- Addresses regional drought deficit with new Parsons Bend raw water intake and raw water pipeline
- Meets drought deficit at Columbia through 2060
- Allows CPWS to fully utilize capacity at existing WTP during drought by obtaining water from Duck River downstream of Columbia
- Allows CPWS to independently implement projects as growth develops and provides a number of potential WTP locations in the CPWS service area
- Provides opportunity to extend piping to a future intake on Duck River further downstream for additional supply if needed
- Provides opportunity for bi-directional buy-sell agreement between Spring Hill and CPWS

SECTION 5 – NEXT STEPS

DRA has identified the following key items that need to be addressed in the near-term in conjunction with the recommended alternative:

- DRA to work with TDEC to identify the water quality data which TDEC will need to evaluate permit requests for wastewater discharges and water supply intakes on Duck River
- DRA to work with Columbia, CPWS and Spring Hill to collect the data requested by TDEC
- DRA to work with TDEC to obtain existing water quality data for the Duck River downstream of Columbia
- Continue to work with TDEC to solicit a decision on the anti-degradation determination for the recommended alternatives in the DRA's Comprehensive Regional Water Supply Plan
- Continue to work with Spring Hill and CPWS on the water supply agreement
- Develop organizational and financial approaches needed to implement the recommended plan
- Initiate work on siting and permitting for new intake and pumping station on Duck River downstream of Columbia
- Provide briefings for DRATAC, DRA Board, regulators and stakeholders

Maury County Regional Water Supply Strategic Plan

Appendix A

Final 01/29/14 **Alternatives Summary Matrix – Maury County Regional Water Supply Feasibility Study**

Water System	Description of Existing Supplies and Facilities	Water Supply and Infrastructure Needs: Capacity	Water Quality	Facilities Condition	Major Risks or Concerns	Alternatives: Raw Water Regional Supply	Finished Water Purchase from CPWS	Finished Water Regional WTP	Other Alternatives	Comments
Spring Hill	• 6 mgd raw water intake on Duck River upstream of Columbia (permitted for 6 mgd, not likely to get increase). • 6.5 miles of 18-inch raw water pipeline. • 4 mgd WTP in Spring Hill, expandable to 6 mgd. TDEC granted permission for peak rates up to 6 mgd, but improvements are required for continuous rating. • Current average day production is 2.7 mgd with 4.8 mgd peak. • CPWS can provide 3 mgd to Spring Hill through existing piping.	• Need to increase continuous capacity to 6 mgd soon, as maximum day demands exceed WTP's current design capacity. • Need additional capacity beyond 6 mgd in 5 to 8 years. • Need additional 4 mgd of long-term water treatment capacity to 10 mgd (20 year projection).	• Borderline for Stage 2 DBP compliance. • Currently testing powdered activated carbon feed for moderate reduction in DBPs. • Also considering more extensive process upgrades for enhanced removal of organics.	• Spring Hill piping and WTP in very good condition (10 years old).	• Inadequate supply for future growth. • Water quality concerns for DBPs.	• This option (SH-B-RWR) would first expand existing WTP from 4 mgd to 6 mgd, and use the full 6 mgd of Spring Hill's permitted withdrawal from Duck River. For growth beyond 6 mgd, purchase 4 mgd of capacity in regional intake and raw water pipeline connecting Williamsport and CPWS. Construct 53,000 lf of 16-inch raw water pipeline from intersection of Columbia Rock Road and Nashville Hwy (Route 31) to Spring Hill WTP. Construct 4 mgd of additional treatment capacity at Spring Hill WTP (expand from 6 mgd to 10 mgd). • <u>Cost</u>: Comparable in cost to other SH alternatives through initiation of regional projects then much more expensive compared to "Finished Water Purchase from CPWS" and "Other Alternatives".	• This option (SH FWP) retains existing supply (4 mgd) and avoids investing to expand permanent capacity of WTP. Purchase up to 6 mgd of treated water from CPWS. CPWS will construct raw water intake and pipeline connecting Williamsport and CPWS. Near-term capacity of CPWS WTP and finished water pipeline from CPWS to Spring Hill are both adequate to meet at least 3 mgd of additional demand for Spring Hill. Additional piping improvements needed between Spring Hill and CPWS purchase exceeds 3 mgd. • <u>Cost</u>: Least expensive alternative based on CPWS minimum 10% "take-or-pay" of contracted amount and $2.40/1000 gallons.	• This option (SH B-FWP-FWR) would first expand existing WTP from 4 mgd to 6 mgd, and use the full 6 mgd of Spring Hill's permitted withdrawal from Duck River. Purchase finished water beyond 6 mgd from CPWS until regional facilities are constructed. Retain existing 6 mgd supply and purchase up to 4 mgd of capacity in regional intake, raw water pipeline, WTP, and finished water pipeline to Nashville Hwy (Route 31). Connect to existing finished water pipeline along Nashville Hwy (Route 31). • <u>Cost</u>: Comparable in cost to "Other Alternatives" through initiation of regional facilities then much more expensive compared to all other SH alternatives.	• This option (SH B-FWP) would first expand existing WTP from 4 mgd to 6 mgd, and use the full 6 mgd of Spring Hill's permitted withdrawal from Duck River. For growth beyond 6 mgd, purchase 4 mgd of finished water from CPWS. • <u>Cost</u>: Compared with "Finished Water Purchase from CPWS", this alternative is more expensive on annual basis through year 2040.	Recommend SH either retain existing capacity (4 mgd) and negotiate buy-sell agreement with CPWS or build additional 2 mgd capacity at existing WTP (4 mgd to 6 mgd) and negotiate buy-sell agreement with CPWS. SH needs minimum "take-or-pay" terms for water purchase from CPWS.
Maury County Water System (MCWS)	• MCWS currently purchases water from CPWS through roughly 40 interconnections throughout Maury County. • Current average day demand is approximately 1.3 mgd and is projected to be roughly 2.1 mgd in 2020. • Growth rate of 3% is reasonable projection for planning purposes.	• Water system pipelines are undersized for fire protection (4-inch and 6-inch).	• Recently exceeded DBP compliance levels. CPWS WTP upgrades should solve DBP problems.	• MCWS water system pipelines are in relatively good condition (majority of piping is PVC).	• Primary concern is water quality; CPWS upgrades should address concern.	• Construct, maintain and operate water treatment facilities to treat water from the regional raw water system and deliver to MCWS customers. • <u>Cost</u>: Significantly more expensive compared to other options due to extensive CPWS piping infrastructure in-place throughout Maury County.	• Purchase 2 mgd of treated water from CPWS, which currently has adequate spare capacity. This option includes CPWS ultimately constructing a raw water intake and pipeline connecting Williamsport and CPWS, and constructing additional treatment capacity to meet longer term needs. • <u>Cost</u>: Similar to cost for "Finished Water Regional WTP".	• Purchase 2 mgd of capacity in regional intake, raw water pipeline, WTP, and finished water pipeline. This option could involve a new regional wholesale water organization. • <u>Cost</u>: Similar to cost for "Finished Water Purchase from CPWS".	• Not applicable.	Recommend that MCWS revisit buy-sell agreement with CPWS and continue to purchase finished water from CPWS due to extensive CPWS piping infrastructure in-place throughout Maury County.

Water System	Description of Existing Supplies and Facilities	Water Supply and Infrastructure Needs				Alternatives				Comments
		Capacity	Water Quality	Facilities Condition	Major Risks or Concerns	Raw Water Regional Supply	Finished Water Purchase from CPWS	Finished Water Regional WTP	Other Alternatives	
Mount Pleasant	• Supply from four springs that are considered under the influence of surface water. • 1 mgd WTP. • Current demand is 0.8 mgd.	• Planning to construct a new 2 mgd WTP to meet 20-year growth projection. • Need an additional supply when demands exceed 2.5 mgd.	• No water quality concerns after new plant is operational. • Mount Pleasant conducts extensive flushing to maintain water quality.	• Water system pipelines are in relatively good condition. • Existing CPWS connection to MP not strong enough to deliver 2 mgd. CPWS would need to make upgrades to their piping, pumping and storage facilities. MP's 8-mile long AC pipe has history of breaks. • Existing MP WTP in poor condition.	• No major risks or concerns after planned improvements are complete.	• Retain existing water supply sources, and construct new 2 mgd membrane WTP. Purchase 0.5 mgd of capacity in regional intake and construct 70,000 lf of 12-inch raw water pipeline from Williamsport to Mount Pleasant WTP. Provides backup source of supply for MP WTP. • Cost: More expensive compared to "Other Alternatives" due to piping infrastructure investment.	• This option (MP FWP) includes initial purchase of 2 mgd of treated water from CPWS and ultimate purchase of additional 0.5 mgd. Initially CPWS would use spare supply capacity and construct upgrades to transmission, pumping and storage. Ultimately, CPWS would construct raw water intake and pipeline connecting Williamsport and CPWS, to provide additional supply capacity. • Cost: More expensive compared to "Other Alternatives" due to cost of CPWS purchase versus MP production.	• Purchase up to 2.5 mgd of treated water capacity in new regional water system. • Cost: Similar to cost for "Finished Water Purchase from CPWS".	• Retain existing water supply sources, and construct new 2 mgd membrane WTP. Investigate development of 0.5 mgd of additional groundwater, to add to 2 mgd capacity of new WTP. • Cost: Less expensive compared to purchase options due to need for piping infrastructure investment and purchase price vs. production cost.	Recommend that MP continue development of MP water supplies, construct new 2 mgd membrane WTP and develop additional 0.5 mgd source of supply and WTP in future.
Columbia Power and Water Systems	• 20 mgd raw water intake on Duck River from Columbia pool. • 20 mgd WTP in Columbia. • Current average day production is 7.5 mgd with 12 mgd peak (includes 1.3 mgd from MCWS).	• Adequate capacity for CPWS's anticipated future demands.	• No water quality concerns, except for Stage 2 DBP compliance, which will be addressed by WTP upgrades.	• WTP upgrades should extend plant for 20 years or more.	• Most significant risks are related to loss of withdrawals from the Columbia pool, or failure of one or both of the two watermains crossing Duck River.	• Retain existing supply and participate in constructing new regional intake and raw water pipeline connecting Williamsport and CPWS. • Cost: Similar to "Finished Water Purchase from CPWS" and "Finished Water Regional WTP" alternatives.	• CPWS has available capacity to sell water to meet near term growth needs of Spring Hill, Maury County and/or Mount Pleasant. In long term, CPWS could construct new intake near Williamsport and expand treatment capacity. This option requires establishing long term buy/sell agreements. • Cost: Similar to "Raw Water Regional Supply" and "Finished Water Regional WTP" alternatives.	• CPWS could participate with other utilities to form new regional wholesale water organization, each paying for their committed capacity. This option involves forming a regional organization to control key water supply and treatment assets, and then sell water wholesale to CPWS, Spring Hill, MCWS, and/or Mt. Pleasant). • This approach could be in combination with the other alternatives, when new capacity is needed, after first optimizing use of existing assets. • Cost: Similar to "Raw Water Regional Supply" and "Finished Water Regional WTP" alternatives.	• Not applicable.	Recommend that CPWS negotiate buy-sell agreement for finished water with SH, continue sale to Maury County, and continue to assess source reliability to determine when to initiate further studies on a new source of supply (i.e., Williamsport or other source likely needed in year 2020-2030 timeframe when CPWS deficit is roughly 10-15 mgd).

Maury County Regional Water Supply Strategic Plan

Appendix B

Tennessee Duck River Development Agency

Maury County Regional Water Supply Program

Strategic Plan Progress Meeting

December 12, 2014

O'BRIEN & GERE

Agenda

- Welcome
- Review water needs (5 minutes)
- Infrastructure alternatives (30 minutes)
- Project costs and cost model (30 minutes)
- Evaluation criteria (10 minutes)
- Alternatives matrix and scoring (60 minutes)
- Alternative funding strategies and timing (10 minutes)
- Next Steps (5 minutes)

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Projected Drought Deficits for Duck River at Columbia

Table 2. Current and projected water supply deficits at Columbia for the Duck River

Deficit	2010	2020	2030	2040	2050	2060
Potential water supply deficit at Columbia based on critical drought year of record and maintenance of 100 cfs at Duck River Mile 132.8 (MG)	300	500	700	900	1150	1400
Potential water supply deficit at Columbia based on critical drought year of record and maintenance of 100 cfs at Duck River Mile 132.8 (mgd)	4	10	15	21	27	32

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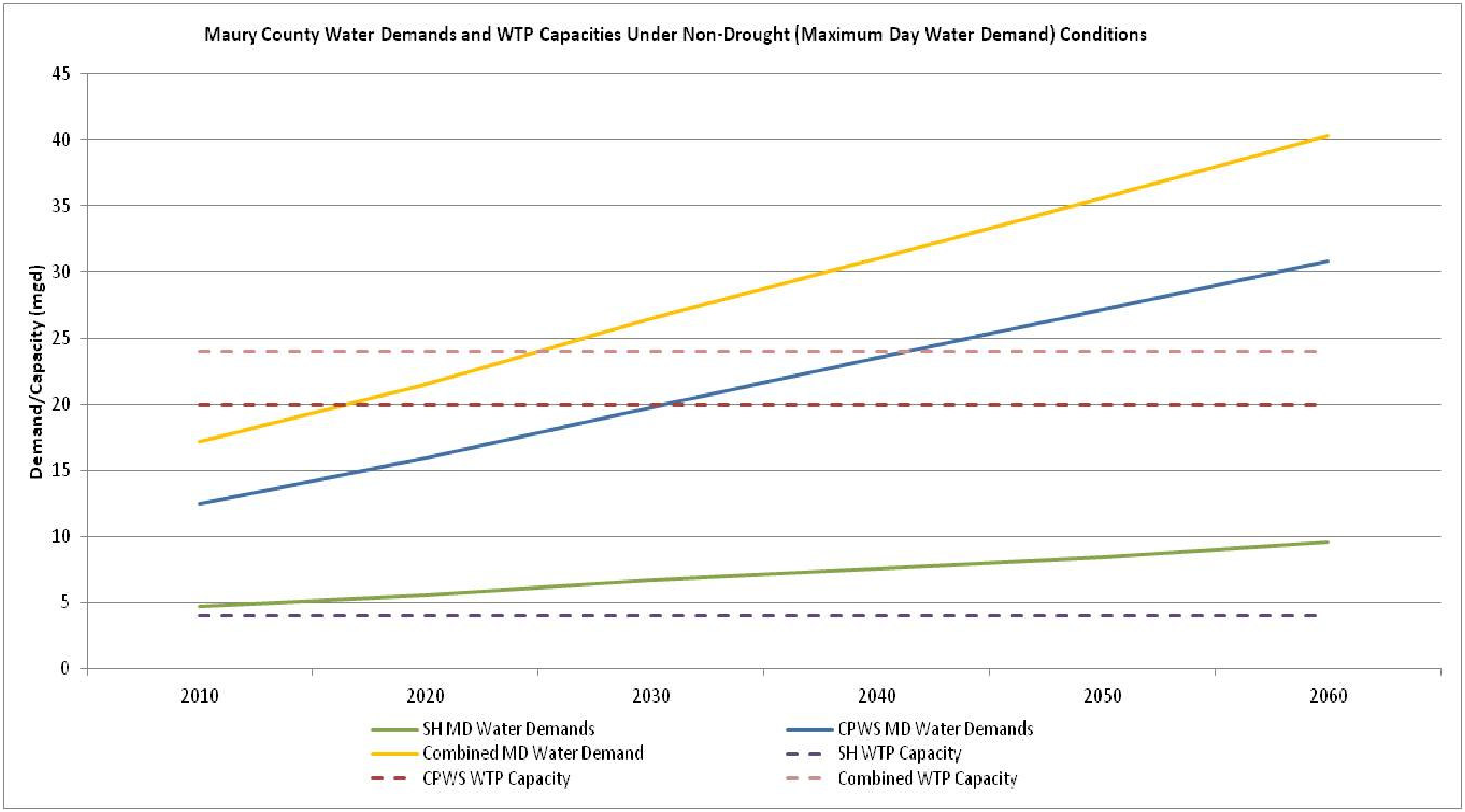
Summary of Water Demands and Supply Capabilities



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Review of Findings from Feasibility Study (present through 2024)

- **Spring Hill** - Retain existing supply (4 mgd) and purchase additional water from CPWS
- **Maury County Water System** - Continue to purchase treated water from CPWS, which currently has adequate spare capacity
- **Mt. Pleasant** – Retain existing water supply sources and construct a new 2 mgd membrane WTP as planned
- **Columbia Power & Water Systems** – Use available water treatment plant and infrastructure capacity to sell water to meet near-term growth needs of Spring Hill, Maury County Water System, and/or Mount Pleasant. Work with Spring Hill to determine how best to develop the initial increment of supply and treatment (say 5 mgd) and subsequent expansions to meet the maximum day demands beyond 2030.

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Configuration of Alternatives

- *See figures showing configuration of alternatives*

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Project Costs and Cost Model

- *See spreadsheets showing project costs and cost model*

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Suggested Evaluation Criteria

- **Reliability** – addresses ability to meet projected water demands under drought and non-drought conditions and interruption of water supplies
- **Water Quality** – addresses predicted finished water quality including water age and DBPs
- **Cost** – addresses the following:
  - capital and O&M costs through planning period for new and existing water supply components
  - avoided costs related to SH WWTP discharge
- **Flexibility** – provides opportunity to:
  - defer capital investments
  - spread costs over time by phasing water supply facilities
  - repurpose SH intake/raw water pipe for WWTP discharge
- **Environmental Benefits** – augments Duck River flows in Designated Critical Habitat Area upstream of Columbia WWTP
- **Ease of Implementation** – addresses the relative ease of implementing the proposed improvements and considers the potential that regulatory permitting (including environmental considerations), public acceptance, property acquisition, or constructability issues could delay implementation

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Water Supply and Infrastructure Needs from Feasibility Study

- *See Matrix from Feasibility Study*

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Alternatives Summary Matrix

- *See Alternatives Summary Matrix*

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Strategic Issues

- Permits and approvals for new intake
- Permits and approvals for SH wastewater discharge
- Cost sharing
- Defining partnership among water utilities and DRA to implement Regional Water Supply Program
  - Ownership and Operations
  - Financing
    - New Contracts and/or Legislation
      - Reliable revenue stream makes DRA "credit worthy"
    - Use Water Supply Escrow Fund ($12M) to pay for some structural components
- "Putting a Stake in the Ground"
  - Spring Hill /CPWS wholesale water Buy-Sell Agreement
    - Firms up near-term regional approach
  - Phased Plan for Maury County Improvements
    - Construction timing based on water demands…size may be based on both drought and peak day demands

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Next Steps

- Meet with TDEC for their input on wastewater discharge and intakes on Duck River
- Revisit scoring of alternatives to reflect TDEC's input
- Prepare draft report for Strategic Plan and provide briefings
- Discuss organizational and financial approaches
- Initiate work on siting and permitting for new intake and pumping station on Duck River

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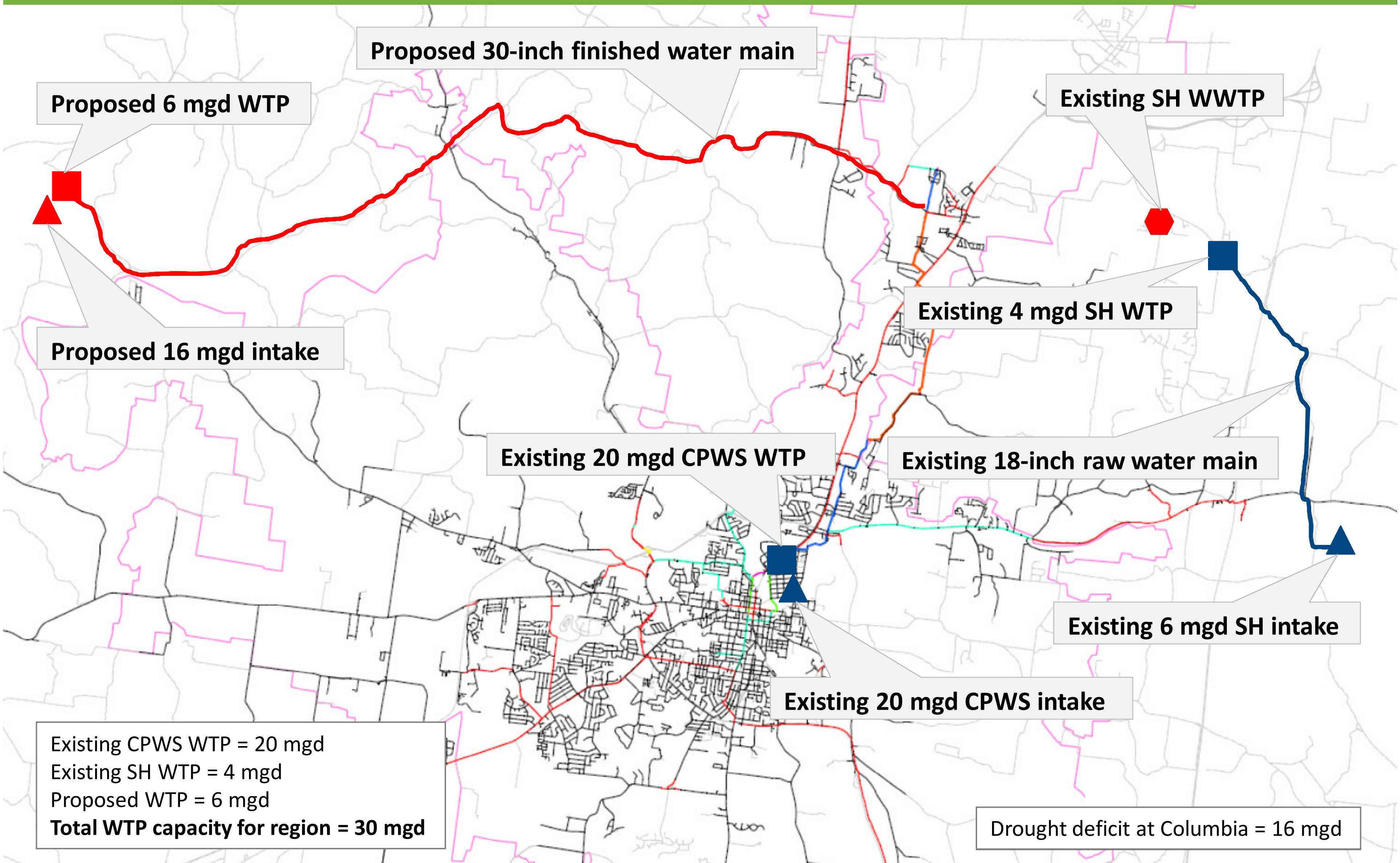
Alt. 1A

Water system at 30 mgd (2040):

Construct new 6 mgd WTP, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Proposed WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 16 mgd

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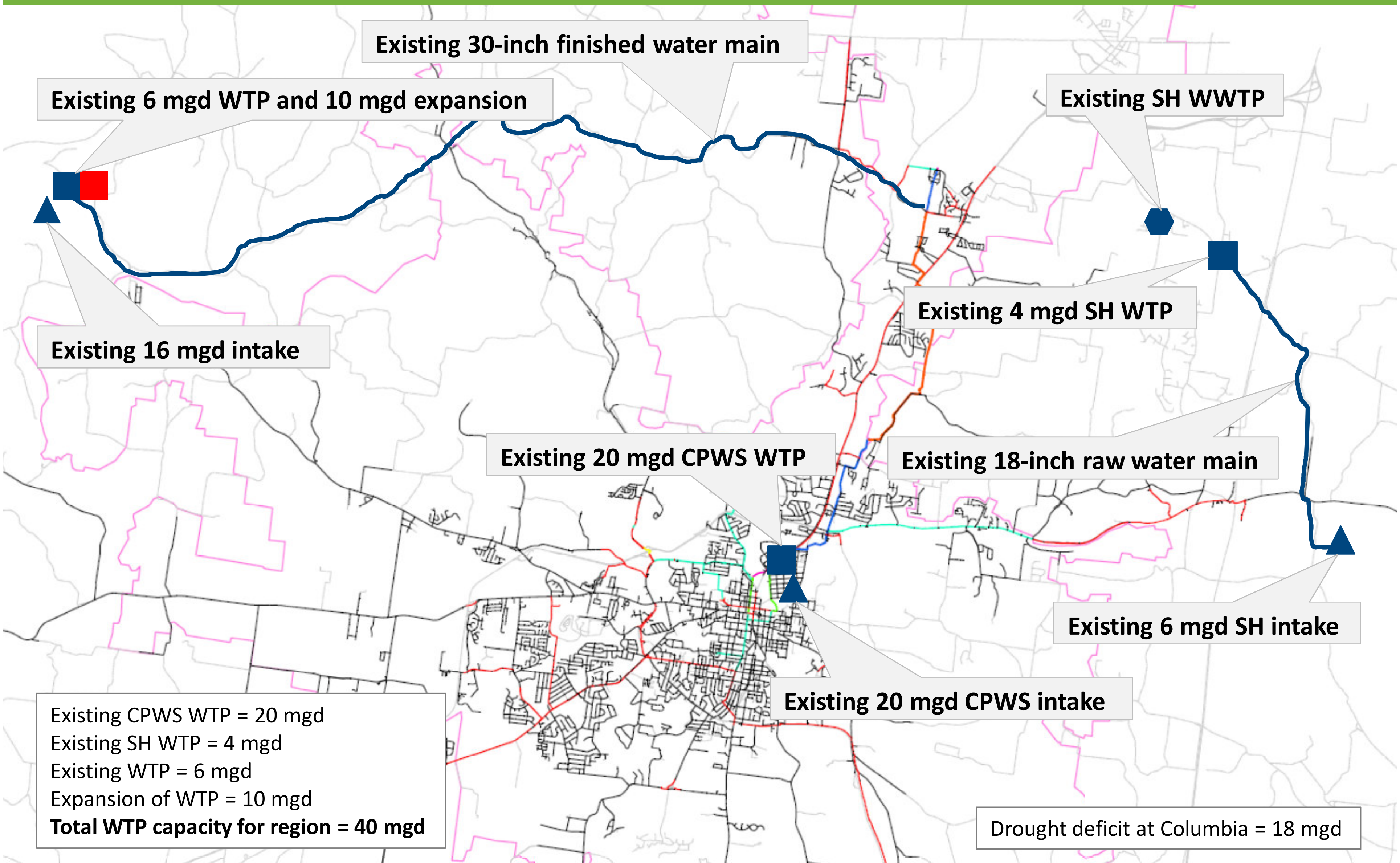
Alt. 1B

Water system at 40 mgd (2060):

Expand WTP to 16 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Existing WTP = 6 mgd
Expansion of WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 18 mgd

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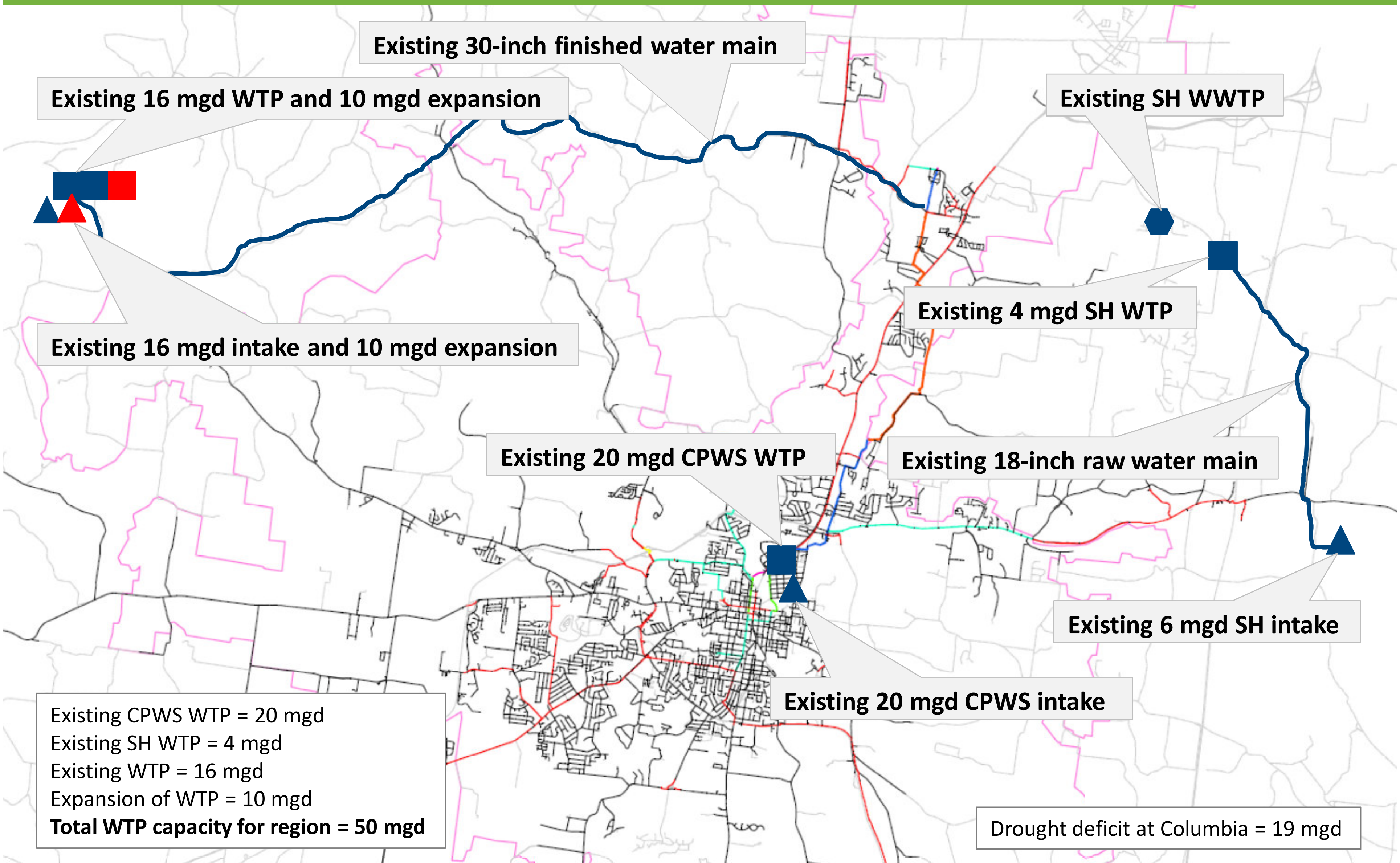
Alt. 1C

Water system at 50 mgd (2080):

Expand WTP to 26 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Existing WTP = 16 mgd
Expansion of WTP = 10 mgd
Total WTP capacity for region = 50 mgd

Drought deficit at Columbia = 19 mgd

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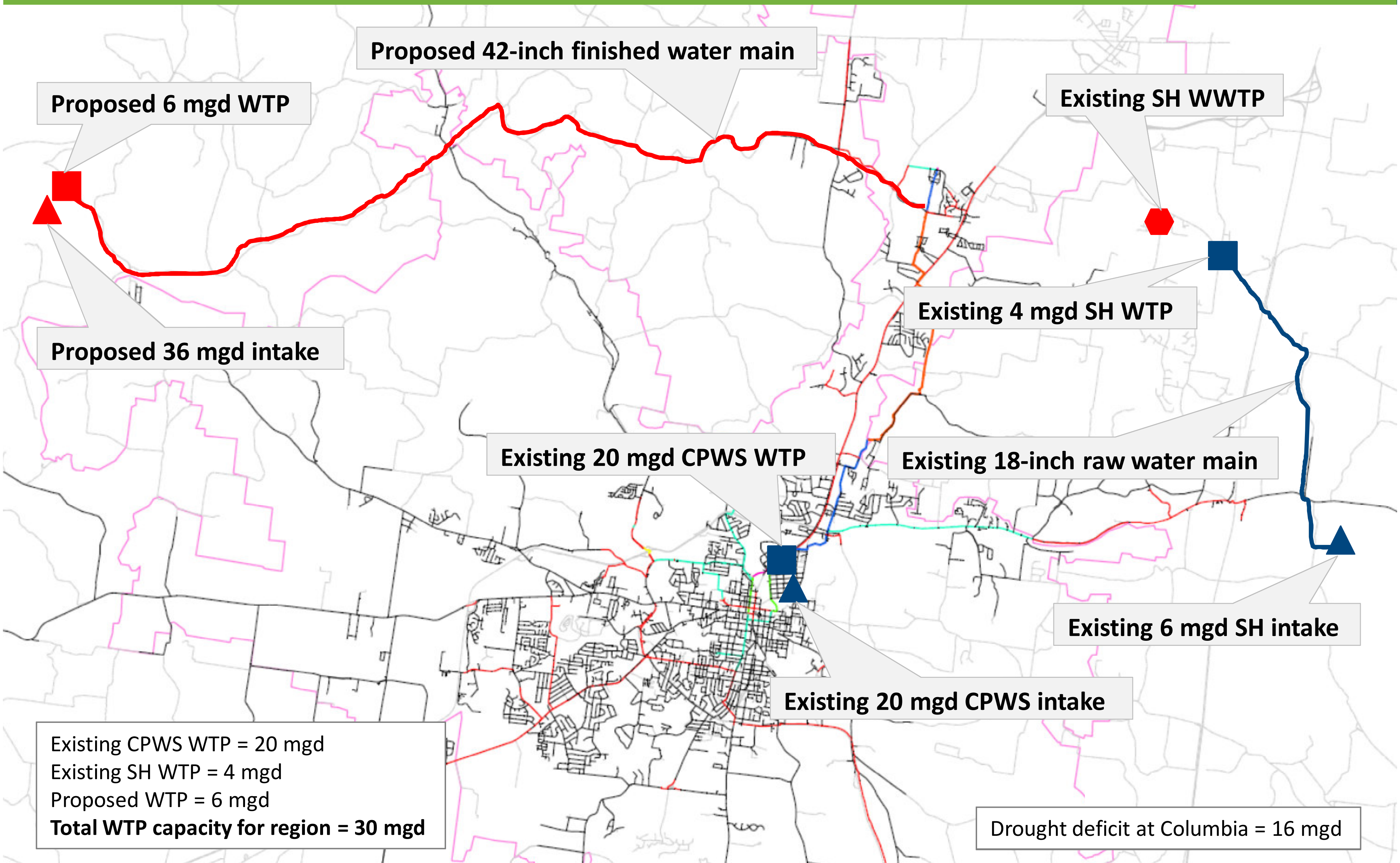
Alt. 2A

Water system at 30 mgd (2040):

Construct new 6 mgd WTP, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



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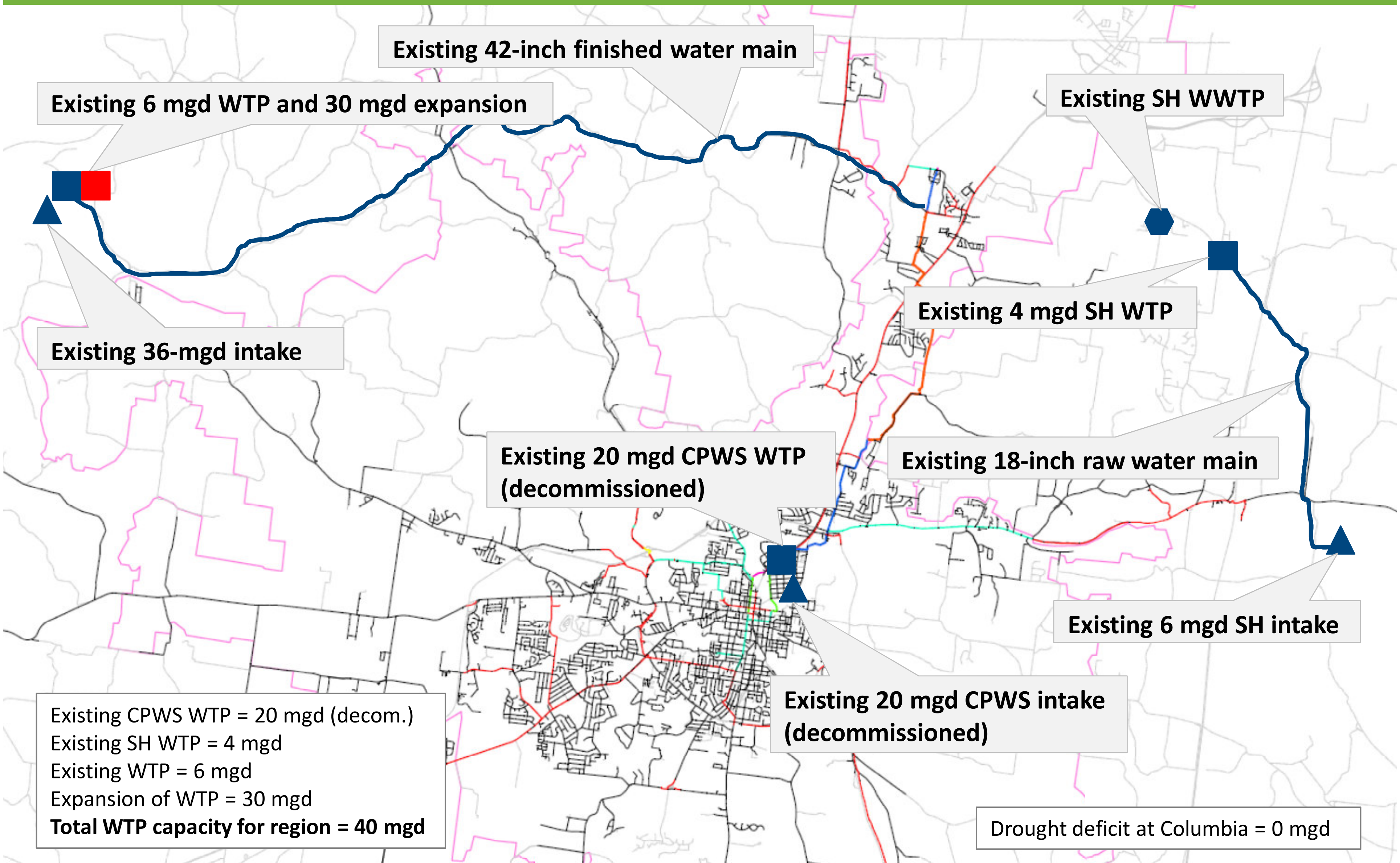
Alt. 2B

Water system at 40 mgd (2060):

Expand WTP to 36 mgd, decommission CPWS WTP, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd (decom.)
Existing SH WTP = 4 mgd
Existing WTP = 6 mgd
Expansion of WTP = 30 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 0 mgd

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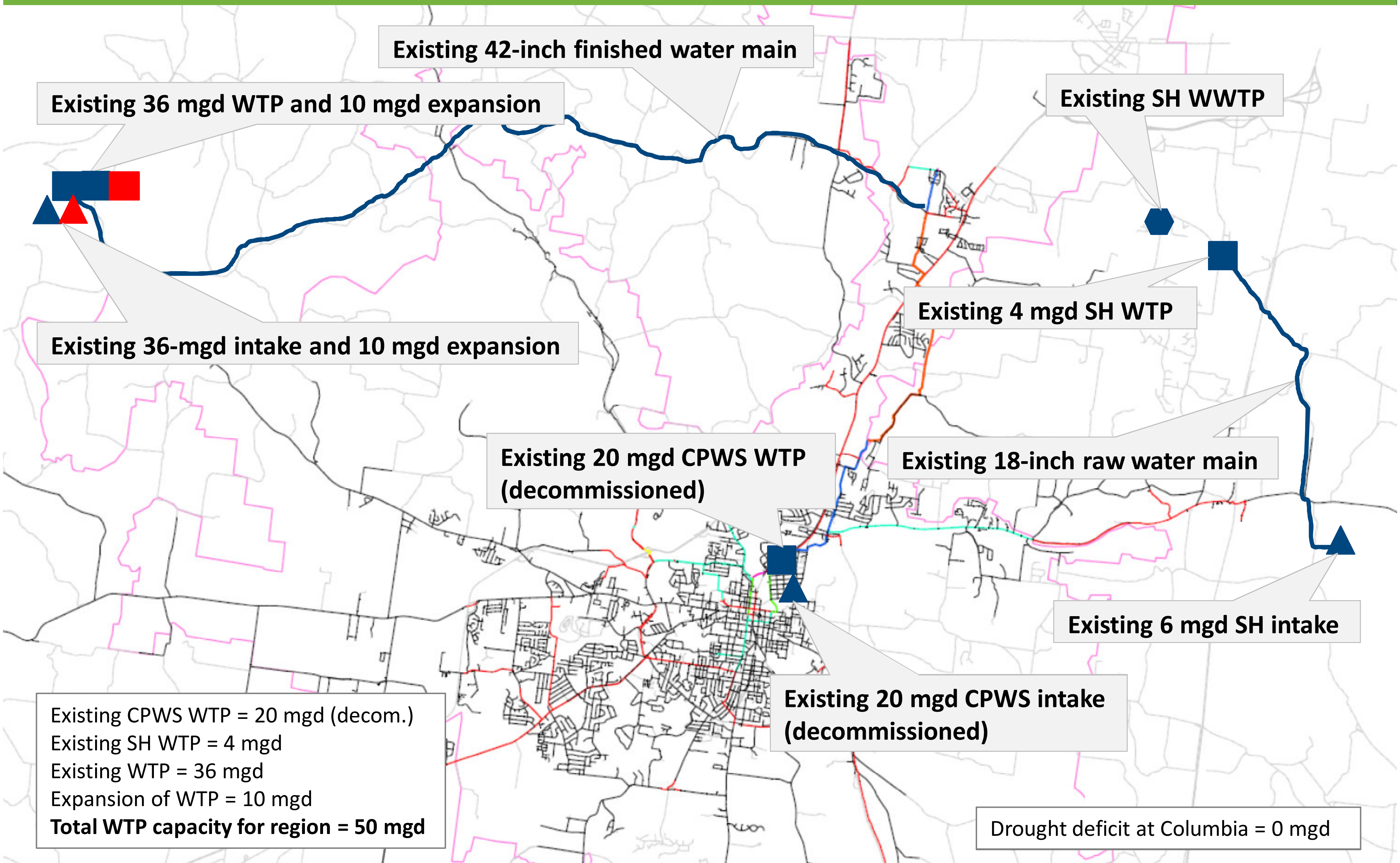
Alt. 2C Water system at 50 mgd (2080):

Expand WTP to 46 mgd, decommission CPWS WTP, and retain SH WTP at 4 mgd



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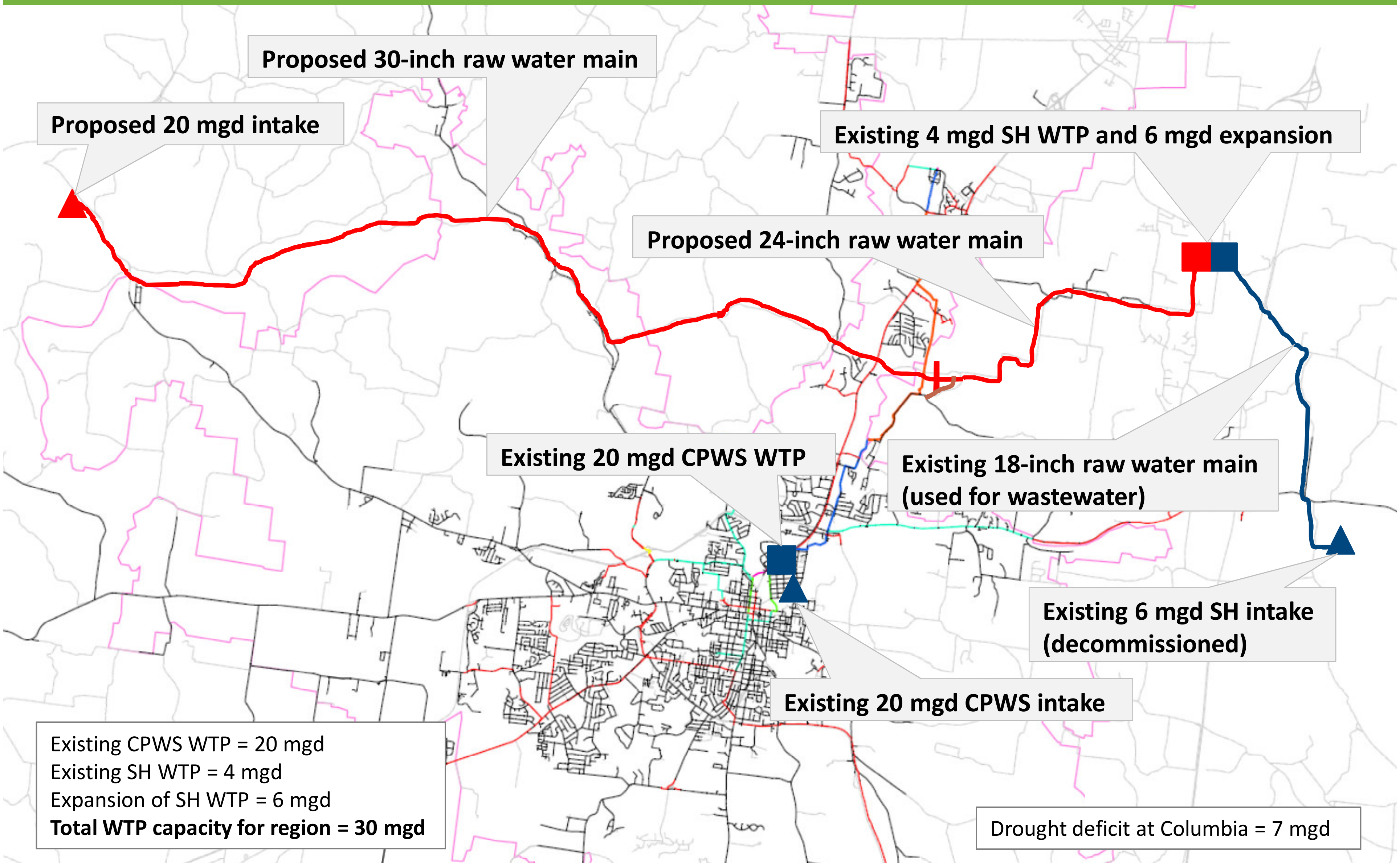
Alt. 3A Water system at 30 mgd (2040):

Retain CPWS WTP at 20 mgd, and expand SH WTP to 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Expansion of SH WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 7 mgd

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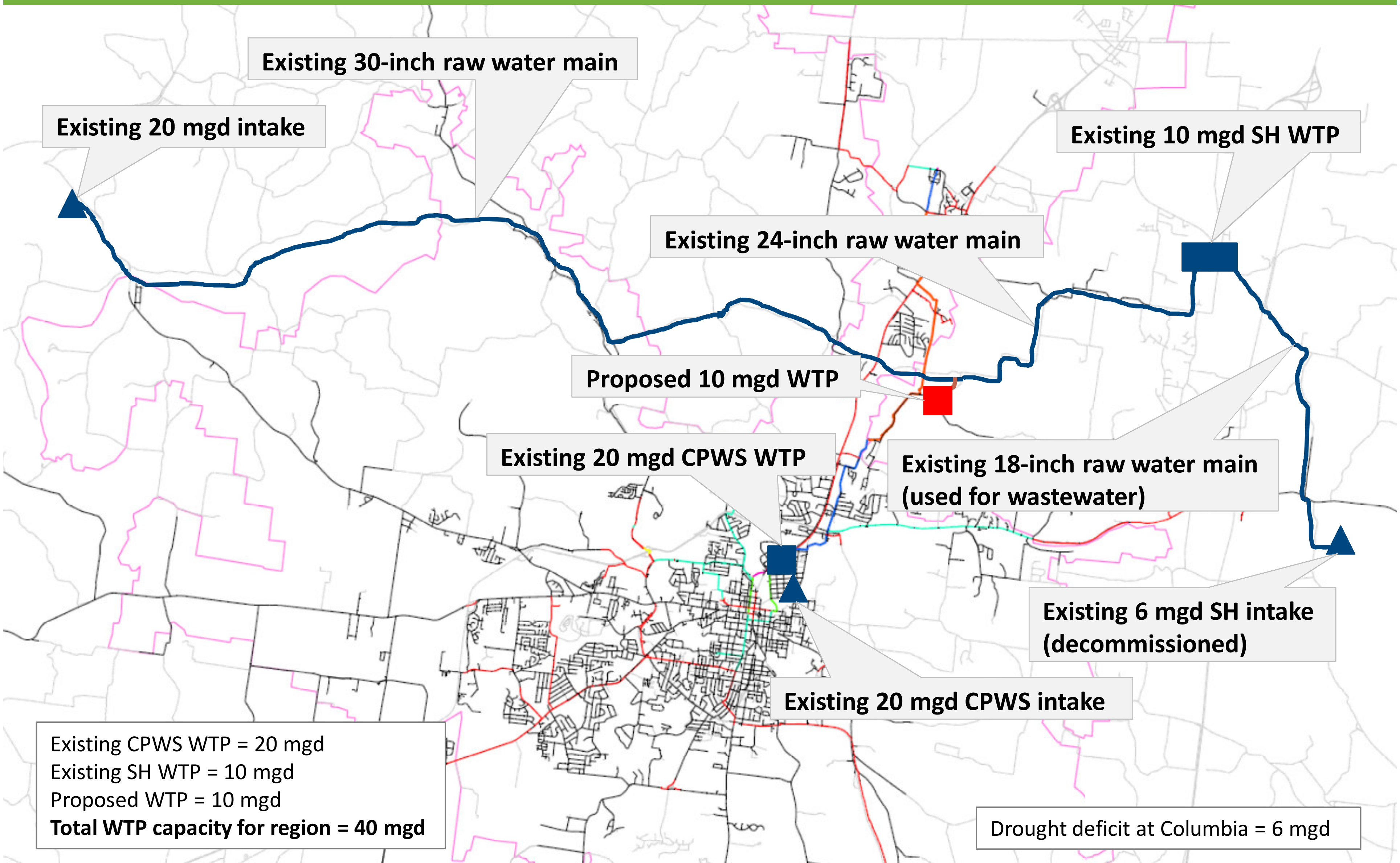
Alt. 3B Water system at 40 mgd (2060):

Construct new 10 mgd WTP, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 6 mgd

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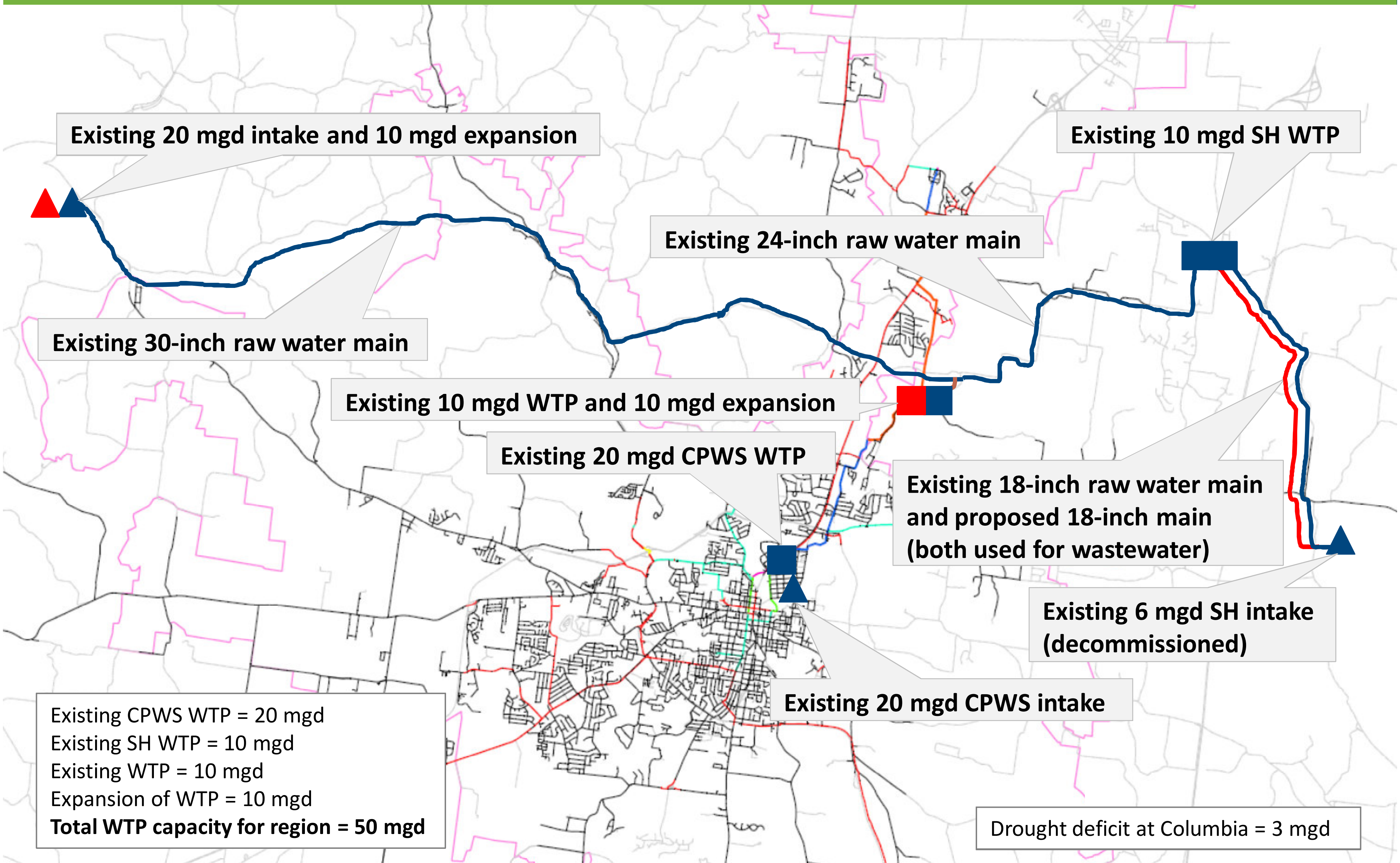
Alt. 3C

Water system at 50 mgd (2080):
Expand WTP to 20 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



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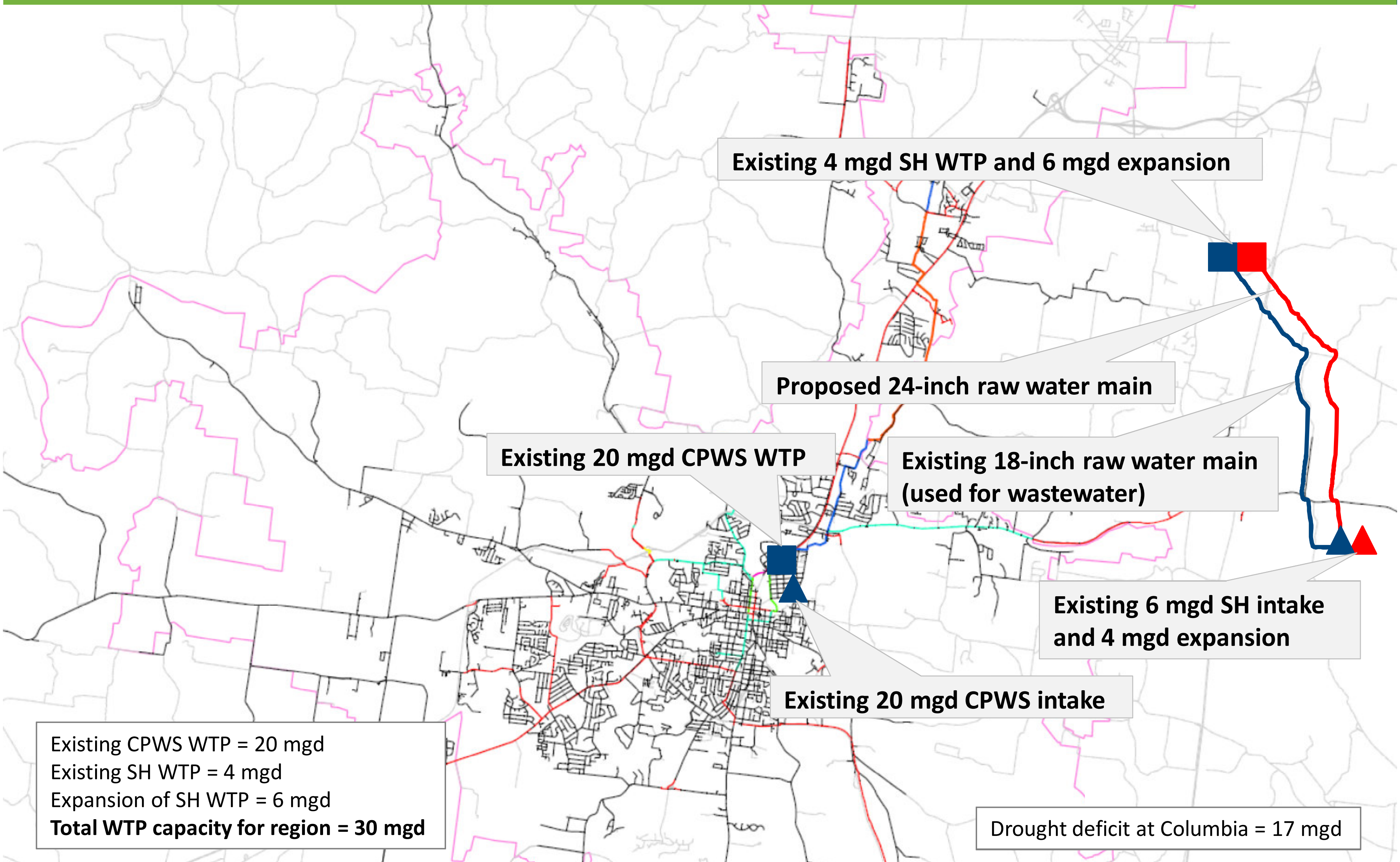
Alt. 4A

Water system at 30 mgd (2040):
Retain CPWS WTP at 20 mgd, and expand SH WTP to 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Expansion of SH WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 17 mgd

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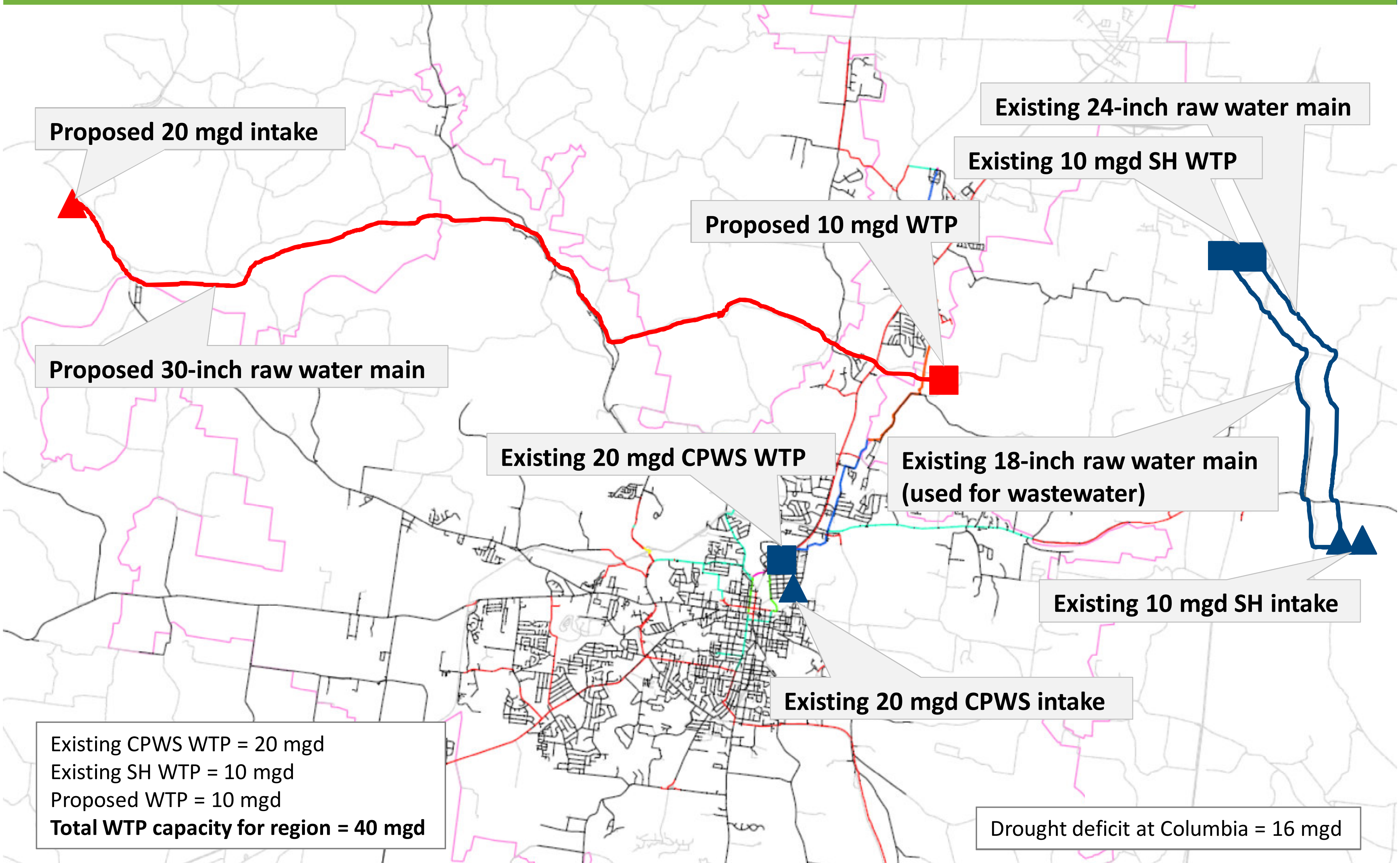
Alt. 4B

Water system at 40 mgd (2060):
Construct new WTP at 10 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 16 mgd

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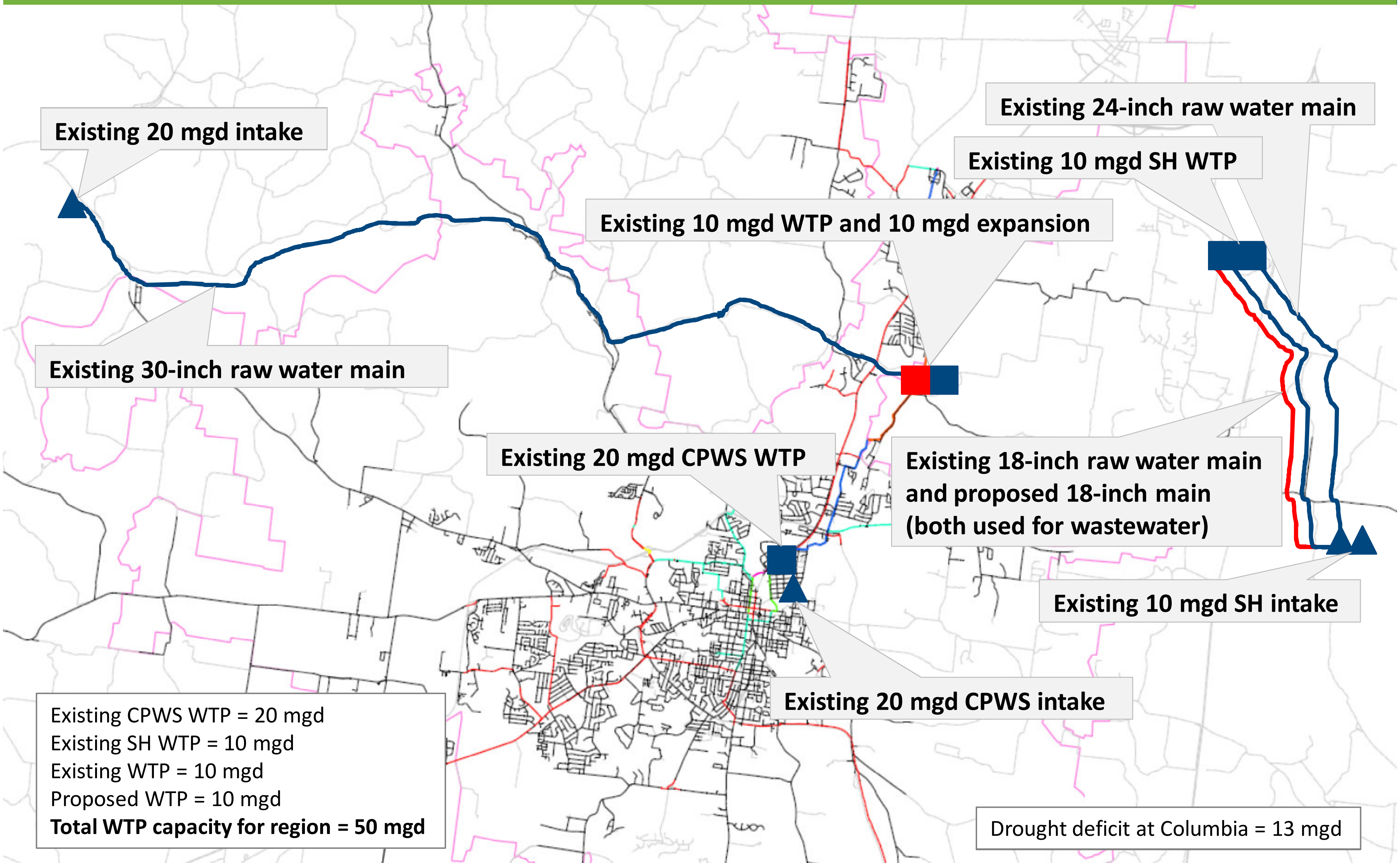
Alt. 4C Water system at 50 mgd (2080):

Expand WTP to 20 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Existing WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 50 mgd

Drought deficit at Columbia = 13 mgd

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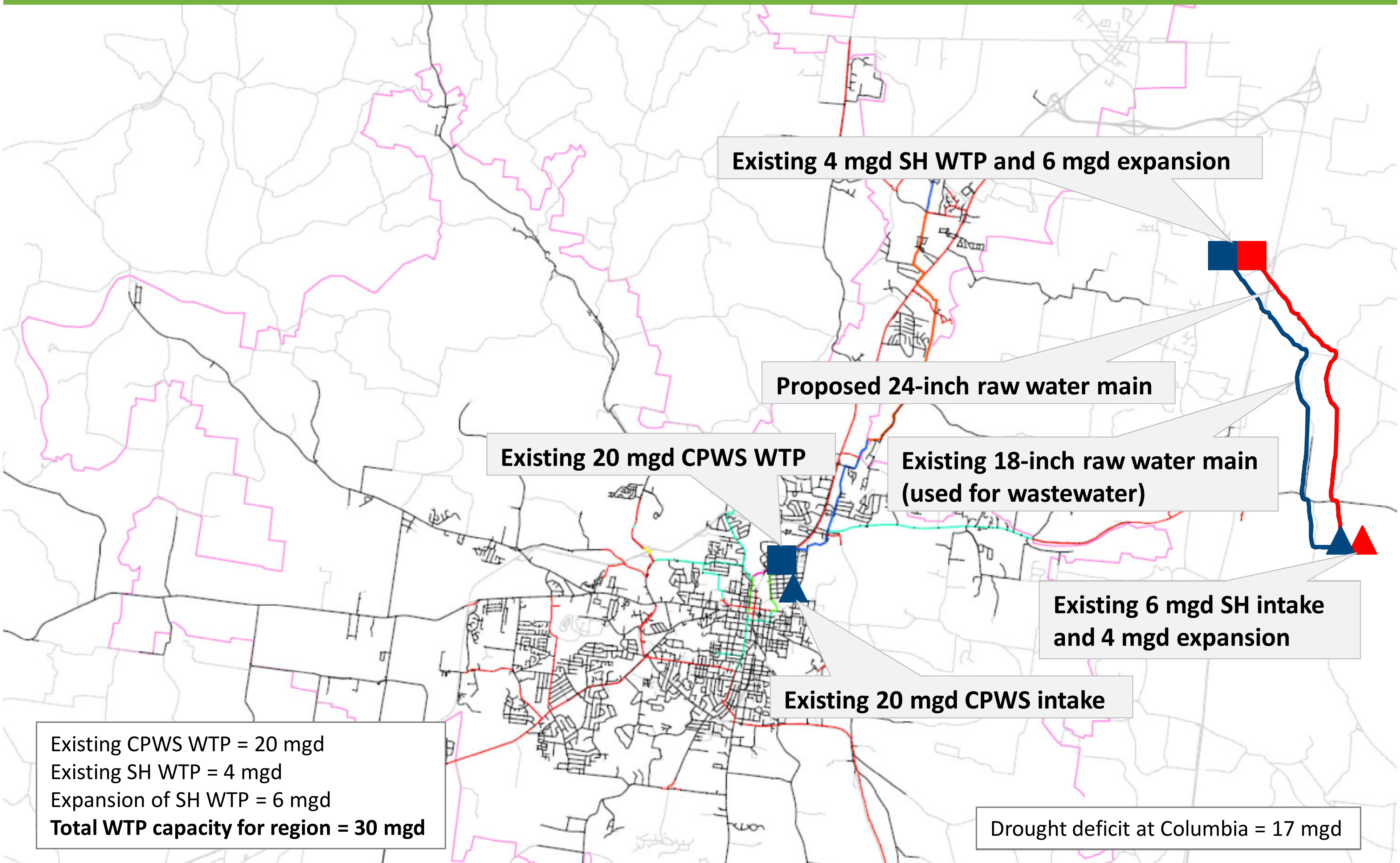
Alt. 5A Water system at 30 mgd (2040):

Retain CPWS WTP at 20 mgd, and expand SH WTP to 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Expansion of SH WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 17 mgd

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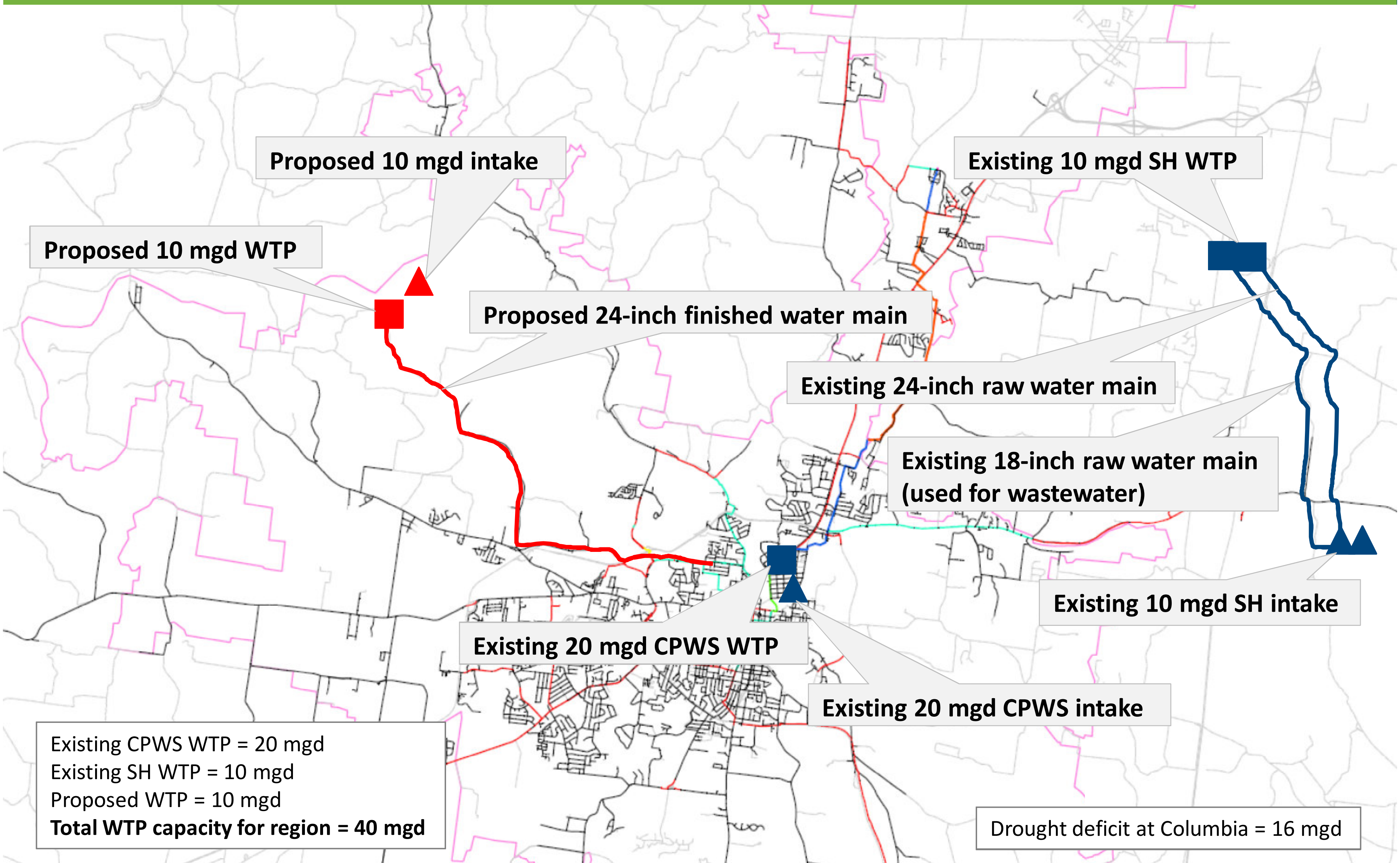
Alt. 5B **Water system at 40 mgd (2060):**

Construct WTP at 10 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 16 mgd

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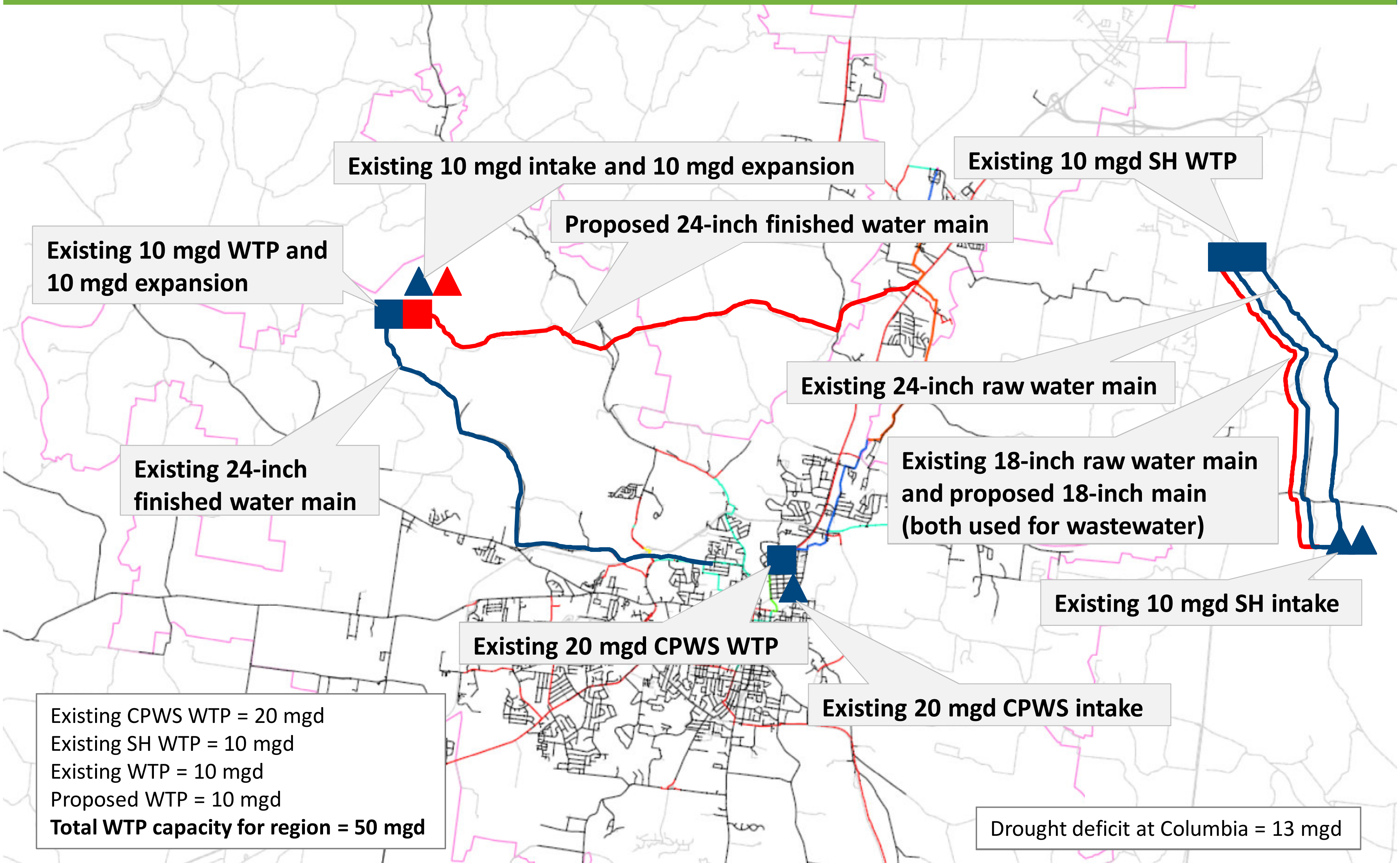
Alt. 5C

Water system at 50 mgd (2080):

Expand WTP to 20 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Existing WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 50 mgd

Drought deficit at Columbia = 13 mgd

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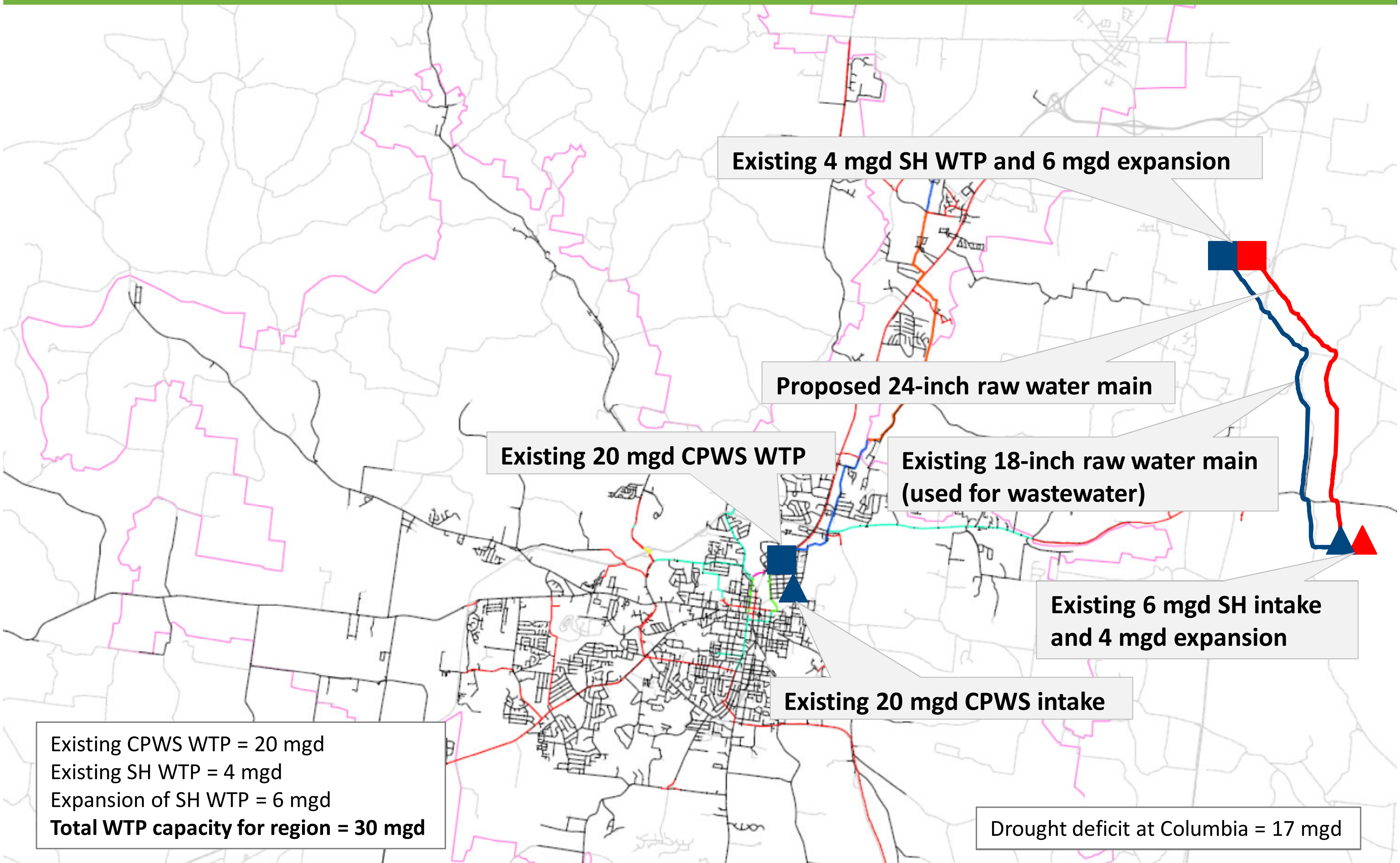
Alt. 6A

Water system at 30 mgd (2040):

Retain CPWS WTP at 20 mgd, and expand SH WTP to 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Expansion of SH WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 17 mgd

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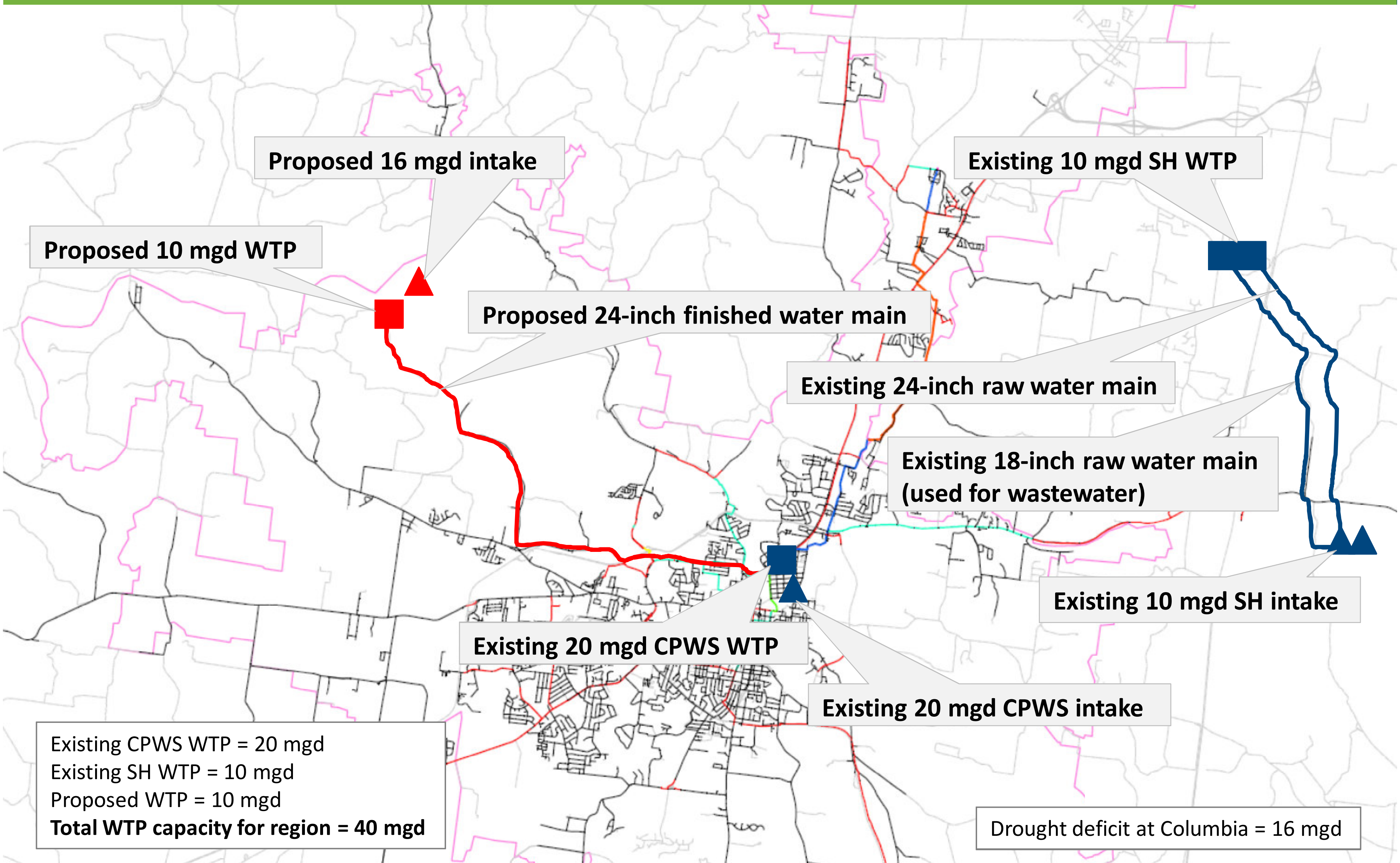
Alt. 6B

Water system at 40 mgd (2060):

Construct WTP at 10 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 16 mgd

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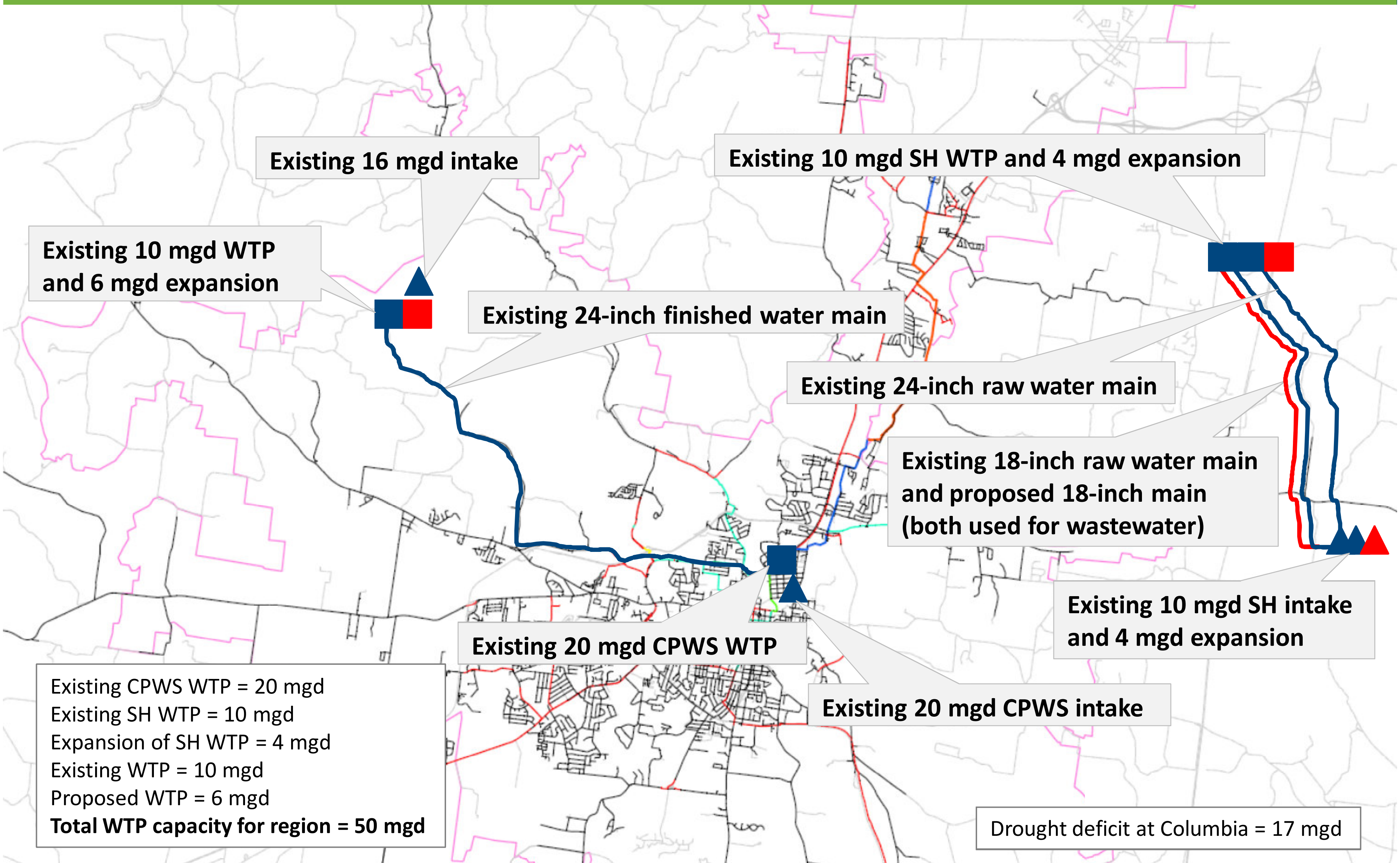
Alt. 6C Water system at 50 mgd (2080):

Expand WTP to 16 mgd, retain CPWS WTP at 20 mgd, and expand SH WTP to 14 mgd



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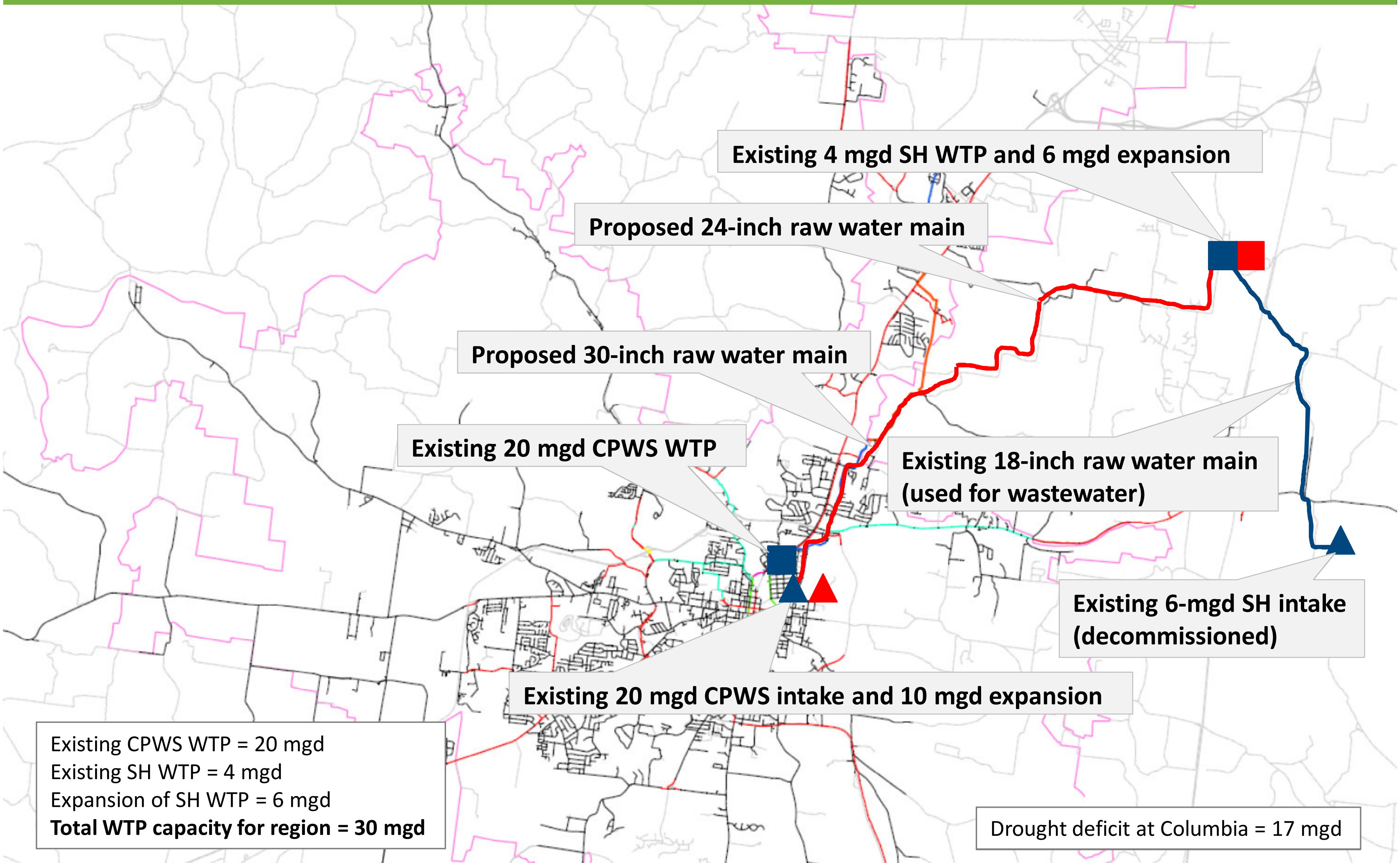
Alt. 7A Water system at 30 mgd (2040):

Retain CPWS WTP at 20 mgd, and expand SH WTP to 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Expansion of SH WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 17 mgd

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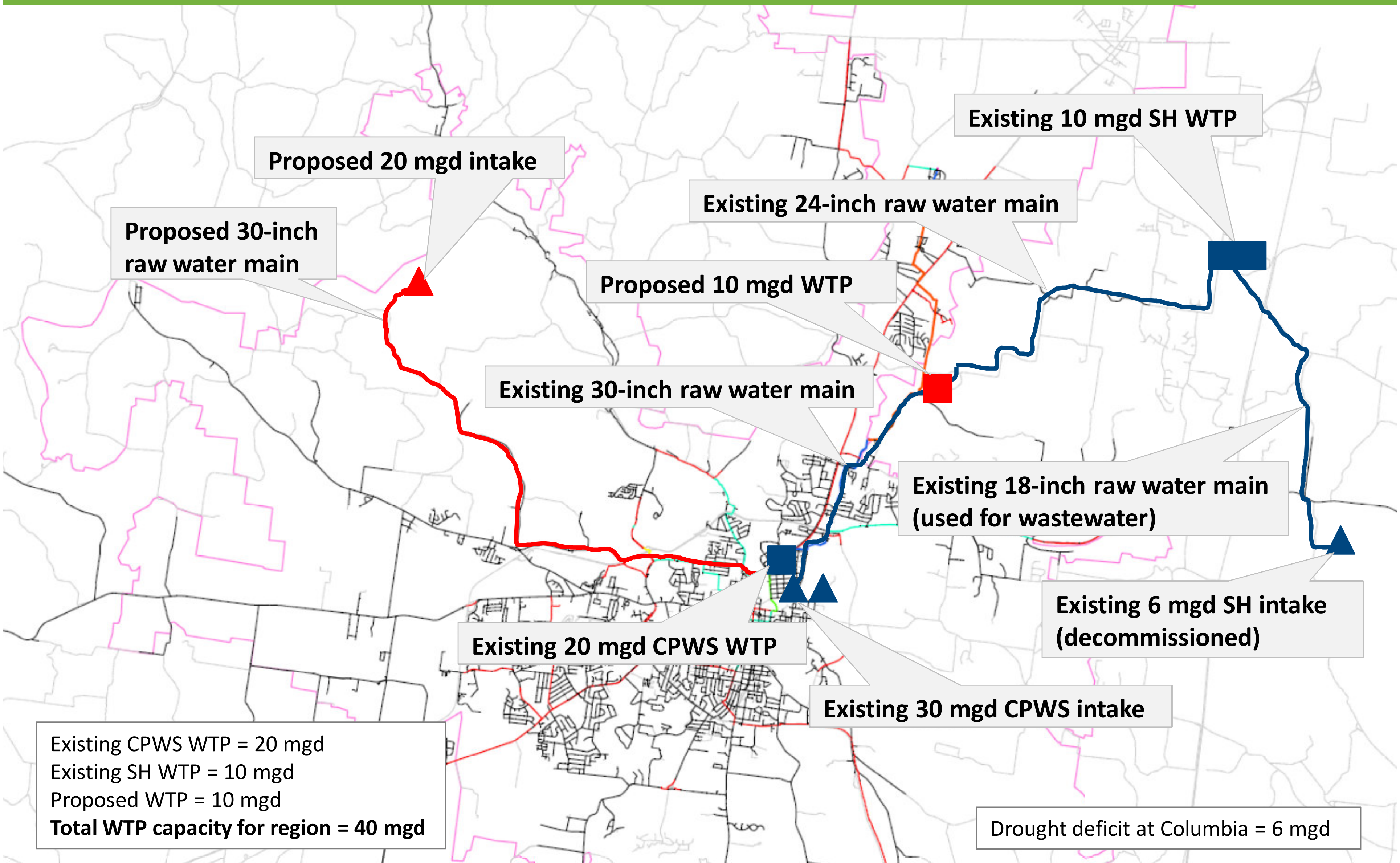
Alt. 7B

Water system at 40 mgd (2060):

Construct WTP at 10 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 10 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 10 mgd
Proposed WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 6 mgd

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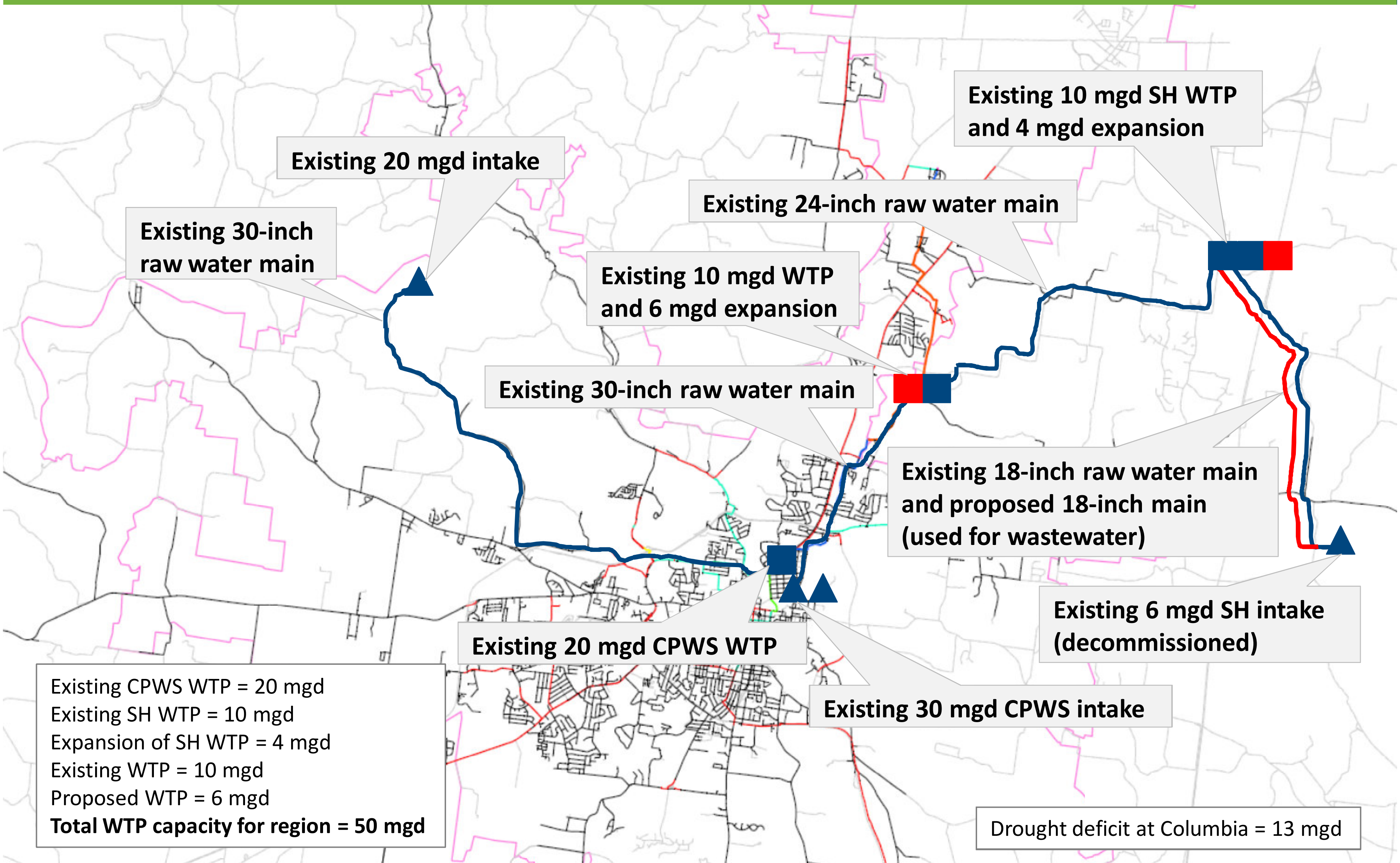
Alt. 7C

Water system at 50 mgd (2080):

Expand WTP to 16 mgd, retain CPWS WTP at 20 mgd, and expand SH WTP to 14 mgd



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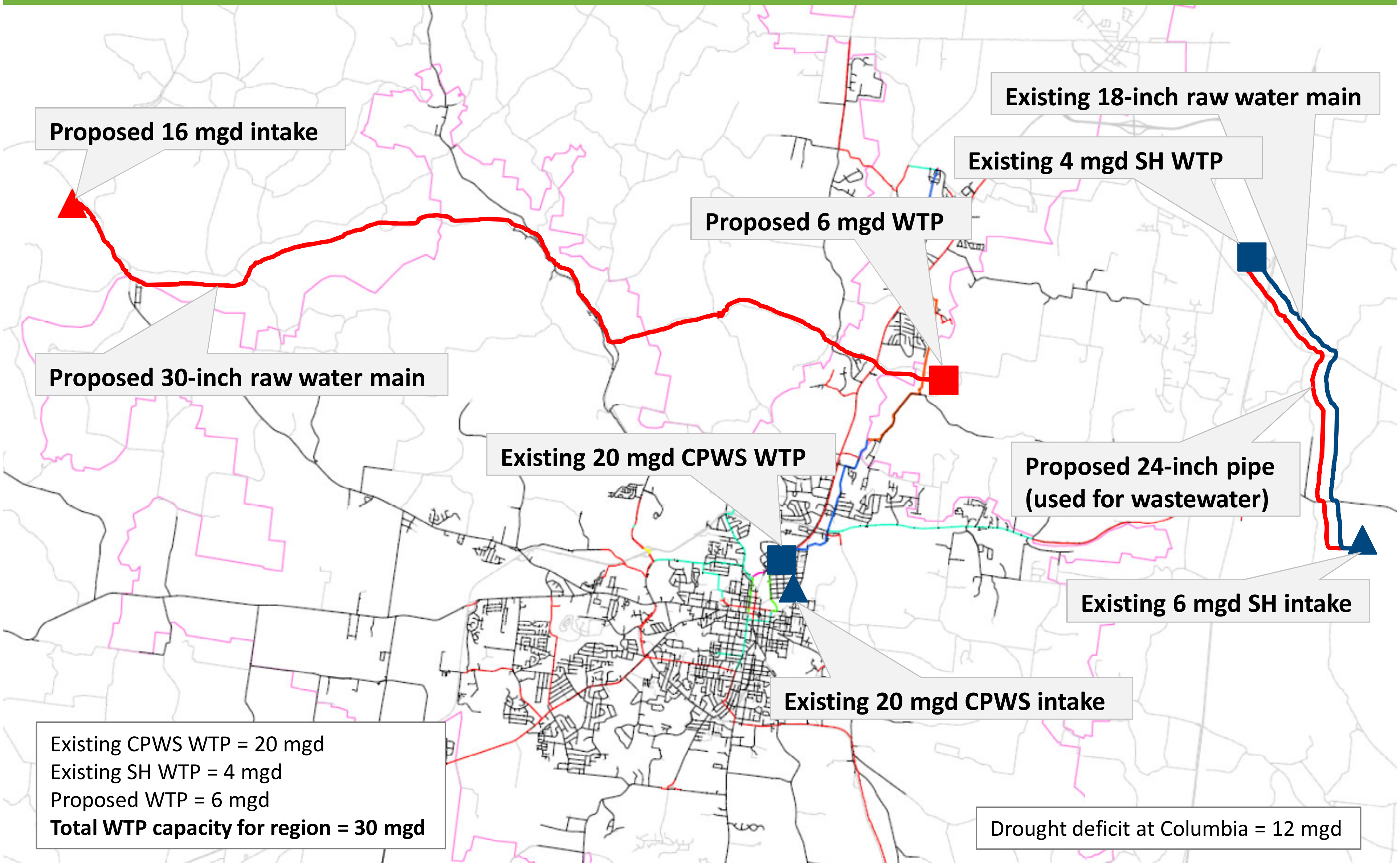
Alt. 8A Water system at 30 mgd (2040):

Construct WTP at 6 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Proposed WTP = 6 mgd
Total WTP capacity for region = 30 mgd

Drought deficit at Columbia = 12 mgd

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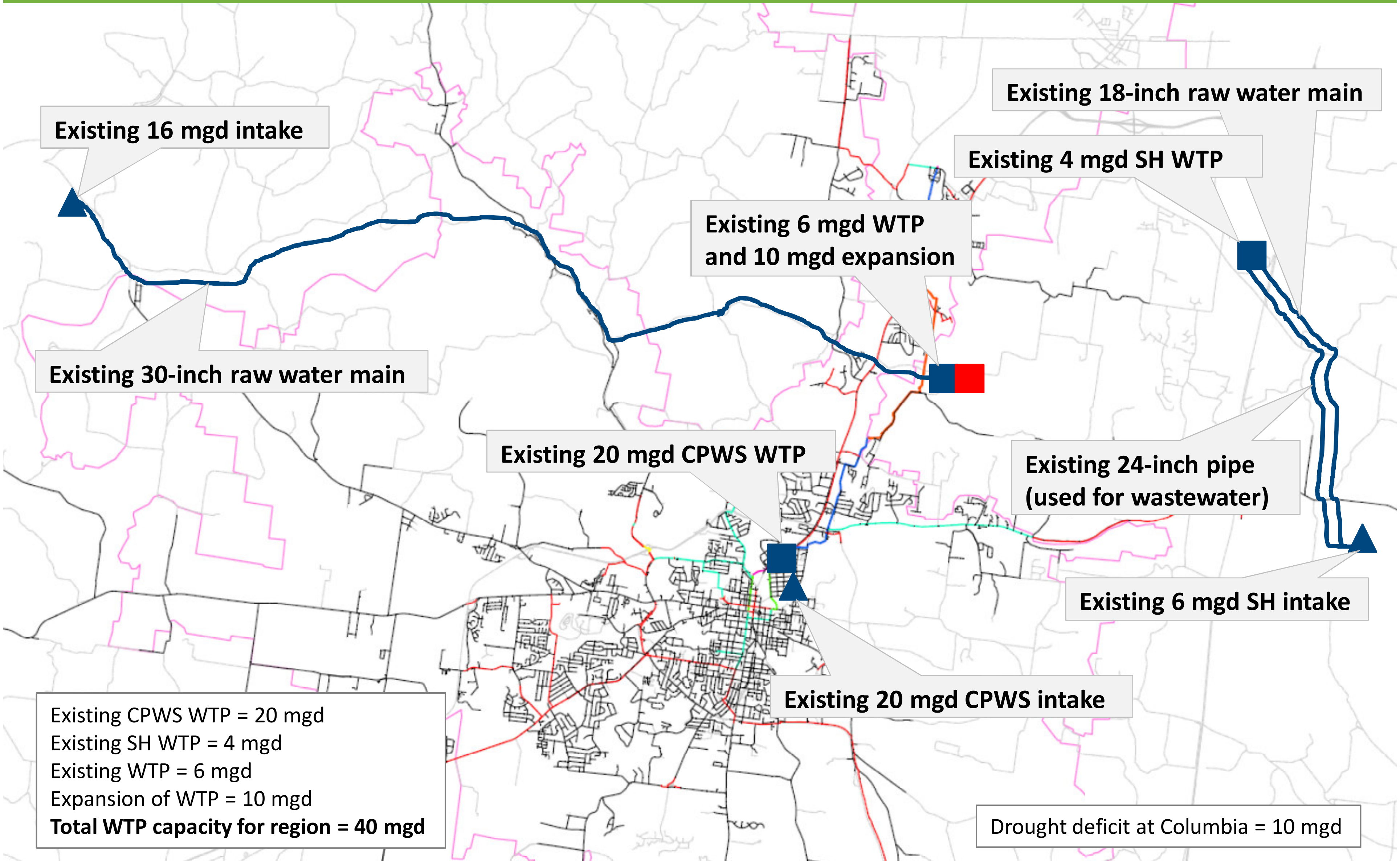
Alt. 8B

Water system at 40 mgd (2060):

Expand WTP to 16 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Existing WTP = 6 mgd
Expansion of WTP = 10 mgd
Total WTP capacity for region = 40 mgd

Drought deficit at Columbia = 10 mgd

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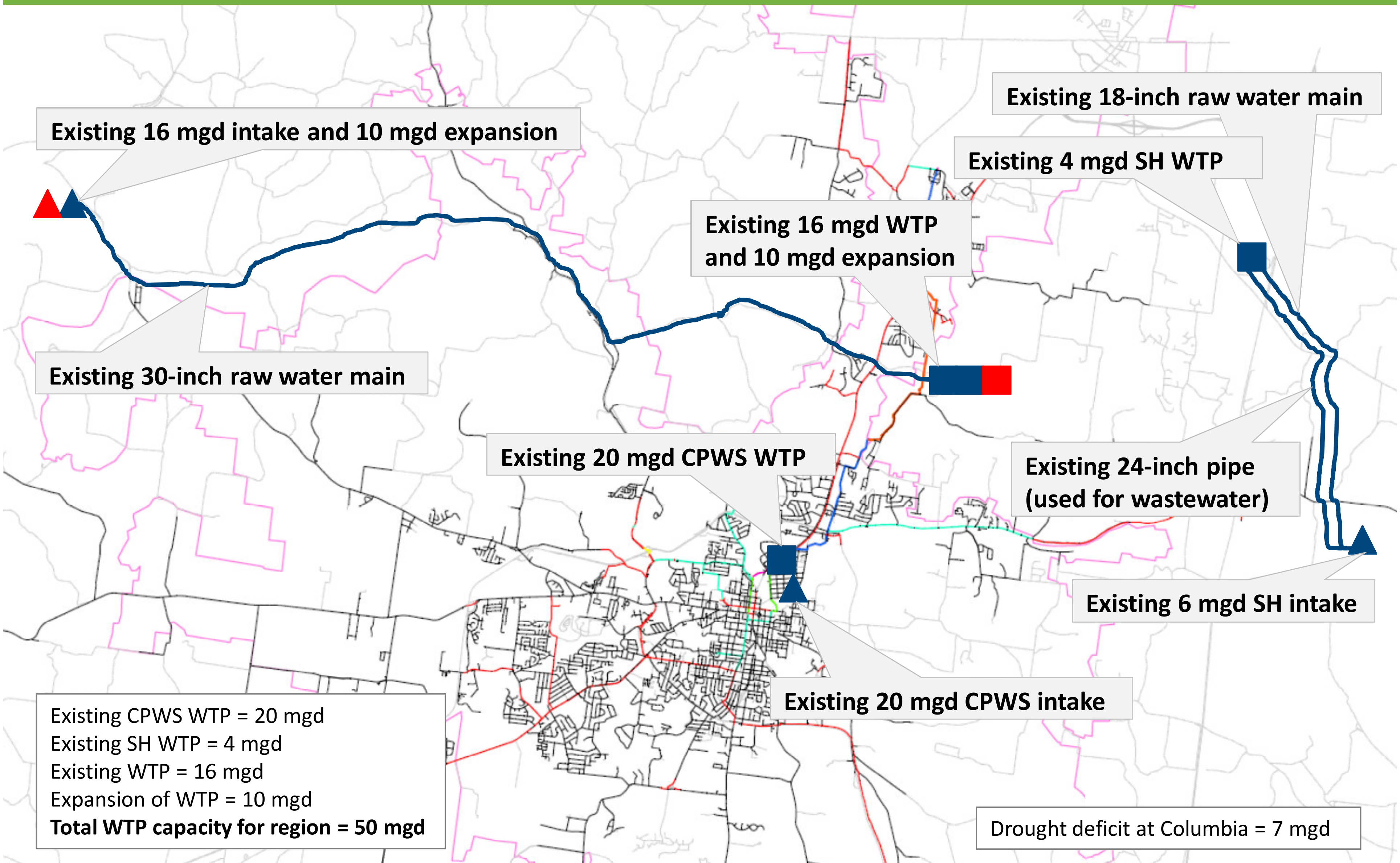
Alt. 8C

Water system at 50 mgd (2080):

Expand WTP to 26 mgd, retain CPWS WTP at 20 mgd, and retain SH WTP at 4 mgd



Existing CPWS WTP = 20 mgd
Existing SH WTP = 4 mgd
Existing WTP = 16 mgd
Expansion of WTP = 10 mgd
Total WTP capacity for region = 50 mgd

Drought deficit at Columbia = 7 mgd

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Draft 12/12/14

Alternatives Summary Matrix – Maury County Regional Water Supply Strategic Plan

Alternatives	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
Description	• Retain existing CPWS WTP at 20 mgd • Retain existing CPWS intake at 20 mgd • Retain existing SH WTP at 4 mgd • Retain existing SH intake at 6 mgd • Construct new 26 mgd WTP near Cartersville • Construct new 26 mgd raw water intake and pumping station on Duck River near Cartersville • Construct new 30-inch finished water pipe from WTP near Cartersville to existing 30/36-inch finished water pipe along Nashville Hwy (Route 31) • Addresses improvements to SH WWTP separate from water supply program	• Decommission existing CPWS WTP • Decommission existing CPWS intake • Retain existing SH WTP at 4 mgd • Retain existing SH intake at 6 mgd • Construct new 46 mgd WTP near Cartersville • Construct new 46 mgd raw water intake and pumping station on Duck River near Cartersville • Construct new 42-inch finished water pipe from WTP near Cartersville to existing 30/36-inch finished water pipe along Nashville Hwy (Route 31) • Addresses improvements to SH WWTP separate from water supply program	• Retain existing CPWS WTP at 20 mgd • Retain existing CPWS intake at 20 mgd • Expand SH WTP from 4 mgd to 10 mgd • Decommission existing SH intake • Construct new 30 mgd WTP along Nashville Hwy (Route 31) • Construct new 30 mgd raw water intake and pumping station on Duck River near Cartersville • Construct new 30-inch raw water pipe from intake near Cartersville to WTP along Nashville Hwy (Route 31) • Construct new 24-inch raw water pipe from WTP along Nashville Hwy (Route 31) to SH WTP • Use existing 18-inch SH raw water pipe and construct new 18-inch pipe for conveyance of SH wastewater discharge to Duck River	• Retain existing CPWS WTP at 20 mgd • Retain existing CPWS intake at 20 mgd • Expand SH WTP from 4 mgd to 10 mgd • Expand existing SH intake from 6 mgd to 10 mgd • Construct new 20 mgd WTP along Nashville Hwy (Route 31) • Construct new 20 mgd raw water intake and pumping station on Duck River near Cartersville • Construct new 30-inch raw water pipe from river intake near Cartersville to new WTP along Nashville Hwy (Route 31) • Construct new 24-inch raw water pipe from SH intake to SH WTP • Use existing 18-inch SH raw water pipe and construct new 18-inch pipe for conveyance of SH wastewater discharge to Duck River	• Retain existing CPWS WTP at 20 mgd • Retain existing CPWS intake at 20 mgd • Expand SH WTP from 4 mgd to 10 mgd • Expand existing SH intake from 6 mgd to 10 mgd • Construct new 20 mgd WTP near Parsons Bend • Construct new 20 mgd raw water intake and pumping station on Duck River near Parsons Bend • Construct new 24-inch finished water pipe from WTP near Parsons Bend to existing 30/36-inch finished water pipe along Nashville Hwy (Route 31) • Construct new 24-inch finished water pipe from WTP near Parsons Bend to existing water pipes in vicinity of Carmack Blvd • Construct new 24-inch raw water pipe from SH intake to SH WTP • Use existing 18-inch SH raw water pipe and construct new 18-inch pipe for conveyance of SH wastewater discharge to Duck River	• Retain existing CPWS WTP at 20 mgd • Retain existing CPWS intake at 20 mgd • Expand SH WTP from 4 mgd to 14 mgd • Expand existing SH intake from 6 mgd to 14 mgd • Construct new 16 mgd WTP near Parsons Bend • Construct new 20 mgd raw water intake and pumping station on Duck River near Parsons Bend • Construct new 24-inch finished water pipe from WTP near Parsons Bend to existing water pipes in vicinity of Carmack Blvd • Construct new 24-inch raw water pipe from SH intake to SH WTP • Use existing 18-inch SH raw water pipe and construct new 18-inch pipe for conveyance of SH wastewater discharge to Duck River	• Retain existing CPWS WTP at 20 mgd • Expand existing CPWS intake from 20 mgd to 30 mgd • Expand SH WTP from 4 mgd to 14 mgd • Decommission existing SH intake • Construct new 16 mgd WTP along Nashville Hwy (Route 31) • Construct new 20 mgd raw water intake and pumping station on Duck River near Parsons Bend • Construct new 30-inch raw water pipe from intake near Parsons Bend to existing CPWS WTP and extending to new WTP along Nashville Hwy (Route 31) • Construct new 24-inch raw water pipe from new WTP along Nashville Hwy (Route 31) to SH WTP • Use existing 18-inch SH raw water pipe and construct new 18-inch pipe for conveyance of SH wastewater discharge to Duck River	• Retain existing CPWS WTP at 20 mgd • Retain existing CPWS intake at 20 mgd • Retain existing SH WTP at 4 mgd • Retain existing SH intake at 6 mgd • Construct new 26 mgd WTP along Nashville Hwy (Route 31) • Construct new 46 mgd raw water intake and pumping station on Duck River near Cartersville • Construct new 30-inch raw water pipe from river intake near Cartersville to new WTP along Nashville Hwy (Route 31) • Construct new 24-inch pipe for conveyance of SH wastewater discharge to Duck River

Evaluation	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets approximately 60% of 2060 projected drought deficit of 32 mgd at Columbia. - 24 mgd of treatment at existing SH and CPWS WTPs meets 2050 average day demand for region if single, long finished water main is out-of-service (i.e., loss of 26 mgd of treatment at Cartersville). • **Water quality**: WTP in Cartersville is distant from customers so compared to raw water options, conveying finished water through 17 miles of pipe from Cartersville increases water age and DBPs. • **Project Cost:** $199 million • **Flexibility**: Minimal opportunity for phasing of improvements because long pipe required in initial phase. • **Environmental**: Compared to current Duck River flow conditions at Columbia, no change in flow downstream of Columbia and no environmental benefits. • **Ease of Implementation**: Minimal difficulty obtaining permits and approvals.	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets 2060 projected drought deficit of 32 mgd at Columbia. - 4 mgd of treatment at existing SH WTP does not meet current average day demand for region if single, long finished water main is out-of-service (i.e., loss of 46 mgd of treatment at Cartersville). • **Water quality**: WTP in Cartersville is distant from customers so compared to raw water options, conveying finished water through 17 miles of pipe from Cartersville increases water age and DBPs. • **Project Cost:** $321 million • **Flexibility**: Minimal opportunity for phasing of improvements because long pipe required in initial phase. • **Environmental**: Compared to current Duck River flow conditions at Columbia, flow downstream of Columbia increased by 20 mgd when demand in region is 50 mgd due to decommissioning of CPWS intake. • **Ease of Implementation**: Minimal difficulty obtaining permits and approvals.	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets approximately 80% of 2060 projected drought deficit of 32 mgd at Columbia. - 20 mgd of treatment at existing CPWS WTP meets 2040 average day demand for region if single, long raw water main is out-of-service (i.e., loss of 30 mgd of treatment at Nashville Hwy and SH WTPs). • **Water quality**: WTPs located in demand centers so water age is minimized compared to other alternatives. • **Project Cost**: $169 million • **Flexibility**: Minimal opportunity for phasing of improvements because long pipe required in initial phase, but allows SH use of 18-inch raw water line to Duck River for other purposes such as wastewater discharge. • **Environmental**: - Eliminates SH withdrawal from Duck River upstream of Columbia. - Supplements flow in Duck River upstream of Columbia if SH returns treated wastewater to Duck River and addresses SH discharge limit concerns for Rutherford Creek. - Additional flow in segment of Duck River upstream of Columbia WWTP designated as Critical Habitat (additional 16 mgd when region demand is 50 mgd). - Additional flow in Duck River for wasteload assimilation at Columbia's WWTP. • **Ease of Implementation**: May be difficult to obtain permits and approvals for discharge from SH WWTP to Duck River downstream of SH water intake.	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets approximately 50% of 2060 projected drought deficit of 32 mgd at Columbia. - 30 mgd of treatment at existing SH and CPWS WTPs meets 2070 average day demand for region if single, long raw water main is out-of-service (i.e., loss of 20 mgd of treatment at Nashville Hwy). • **Water quality**: WTPs located in demand centers so water age is minimized compared to other alternatives. • **Project Cost**: $167 million • **Flexibility**: Significant opportunity for phasing of piping improvements and allows SH use of 18-inch raw water line to Duck River for other purposes such as wastewater discharge. • **Environmental**: - Increases SH withdrawal from Duck River upstream of Columbia. - Supplements flow in Duck River upstream of Columbia if SH returns treated wastewater to Duck River and addresses SH discharge limit concerns for Rutherford Creek. - Additional flow in segment of Duck River upstream of Columbia WWTP designated as Critical Habitat (additional 6 mgd when region demand is 50 mgd). - Additional flow in Duck River for wasteload assimilation at Columbia's WWTP. • **Ease of Implementation**: May be difficult to obtain permits and approvals for increase in SH water withdrawal and for discharge from SH WWTP to Duck River downstream of SH water intake.	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets approximately 70% of 2060 projected drought deficit of 32 mgd at Columbia. - 40 mgd of treatment at existing SH and CPWS WTPs average day demand for region beyond 2080 if single finished water main is out-of-service (i.e., loss of 10 mgd of treatment at Parsons Bend). • **Water quality**: WTP near Parsons Bend is somewhat distant from customers so compared to raw water options, conveying finished water through roughly 9 miles of pipe from Parsons Bend increases water age and DBPs. • **Project Cost**: $166 million • **Flexibility**: Significant opportunity for phasing of piping improvements and allows SH use of 18-inch raw water line to Duck River for other purposes such as wastewater discharge. • **Environmental**: - Increases SH withdrawal from Duck River upstream of Columbia. - Supplements flow in Duck River upstream of Columbia if SH returns treated wastewater to Duck River and addresses SH discharge limit concerns for Rutherford Creek. - Additional flow in segment of Duck River upstream of Columbia WWTP designated as Critical Habitat (additional 6 mgd when region demand is 50 mgd). • **Ease of Implementation**: May be difficult to obtain permits and approvals for: - Increase in SH water withdrawal from SH intake. - Discharge from SH WWTP to Duck River downstream of SH water intake.	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets approximately 70% of 2060 projected drought deficit of 32 mgd at Columbia. - 34 mgd of treatment at existing SH and CPWS WTPs meets 2080 average day demand for region if single finished water main is out-of-service (i.e., loss of 16 mgd of treatment at Parsons Bend). • **Water quality**: WTP near Parsons Bend is somewhat distant from customers so compared to raw water options, conveying finished water through roughly 9 miles of pipe from Parsons Bend increases water age and DBPs. • **Project Cost**: $149 million • **Flexibility**: Significant opportunity for phasing of piping improvements and allows SH use of 18-inch raw water line to Duck River for other purposes such as wastewater discharge. • **Environmental**: - Increases SH withdrawal from Duck River upstream of Columbia. - Supplements flow in Duck River upstream of Columbia if SH returns treated wastewater to Duck River and addresses SH discharge limit concerns for Rutherford Creek. - Additional flow in segment of Duck River upstream of Columbia WWTP designated as Critical Habitat (additional 2 mgd when region demand is 50 mgd). • **Ease of Implementation**: May be difficult to obtain permits and approvals for: - Increase in SH water withdrawal from SH intake. - Discharge from SH WWTP to Duck River downstream of SH water intake.	• **Reliability**: - Meets long-range peak day water supply need for region (50 mgd). - Meets 2060 projected drought deficit of 32 mgd at Columbia. - 30 mgd of intake capacity and 50 mgd of treatment at SH, CPWS, and Nashville Hwy WTPs meets 2070 average day demand for region if single raw water main is out-of-service (i.e., loss of 20 mgd of intake capacity Parsons Bend). • **Water quality**: WTPs located in demand centers so water age is minimized compared to other alternatives. • **Project Cost**: $160 million • **Flexibility**: Significant opportunity for phasing of piping improvements and allows SH use of 18-inch raw water line to Duck River for other purposes such as wastewater discharge. • **Environmental**: - Eliminates SH withdrawal from Duck River upstream of Columbia. - Supplements flow in Duck River upstream of Columbia if SH returns treated wastewater to Duck River and addresses SH discharge limit concerns for Rutherford Creek. - Increases withdrawal from existing CPWS intake. - Additional flow in segment of Duck River upstream of Columbia WWTP designated as Critical Habitat (additional 6 mgd when region demand is 50 mgd). • **Ease of Implementation**: May be difficult to obtain permits and approvals for: - Expansion and use of the CPWS intake for CPWS and SH withdrawals. - Discharge from SH WWTP to Duck River downstream of SH water intake.	• **Reliability**: - Meets long-range future peak day water supply need for region (50 mgd). - Meets approximately 90% of 2060 projected 32 mgd drought deficit at Columbia. - 24 mgd of treatment at existing SH and CPWS WTPs meets 2050 average day demand for region if single, long raw water main is out-of-service (i.e., loss of 26 mgd of intake capacity at Cartersville). • **Water quality**: WTPs located in demand centers so water age is minimized compared to other alternatives. • **Project Cost:** $171 million • **Flexibility**: Minimal opportunity for phasing of improvements because long pipe required in initial phase. • **Environmental**: - Retains SH withdrawal from Duck River upstream of Columbia. - Supplements flow in Duck River upstream of Columbia if SH returns treated wastewater to Duck River and addresses SH discharge limit concerns for Rutherford Creek. - Additional flow in segment of Duck River upstream of Columbia WWTP designated as Critical Habitat (additional 12 mgd when region demand is 50 mgd). • **Ease of Implementation**: May be difficult to obtain permits and approvals to discharge from SH WWTP to Duck River downstream of SH water intake.

Alternative Scorecard - Raw Scoring
(5 = Best, 1 = Worst)

Duck River Agency - Maury County Strategic Plan
2-Dec-14

	Raw Score							
Alternatives Evaluation Criteria	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8
Reliability	2	1	2	3	5	4	5	4
Water Quality	1	1	5	5	3	3	5	5
Cost	2	1	4	4	3	4	5	3
Flexibility	1	1	2	4	3	3	4	2
Environmental	1	5	4	4	4	4	5	5
Ease of Impelementation	3	3	3	3	3	3	3	3
Totals	10	12	20	23	21	21	27	22
Cumulative Project Costs (50 mg	$199	$321	$169	$167	$166	$149	$160	$171

Reliability – addresses ability to meet projected water demands under drought and non-drought conditions and interruption of water supplies
Water Quality – addresses predicted finished water quality including water age and DBPs
Cost - address project costs and SH WWTP costs
Flexibility – provides opportunity to defer capital over time, spread costs, and repurpose SH intake and pipe for wastewater discharge
Environmental Benefits – augments Duck River flows in Designated Critical Habitat Area
Ease of Implementation – ability to secure permits and approvals