

CHAPTER 6: SERVICE AREAS AND POTENTIAL PROJECTS

6.1 Introduction

This chapter presents information related to the identification of potential service areas, and the development of conceptual treatment and conveyance alternatives for each service area. Following identification of reclaimed water service areas, an initial, screening-level evaluation of probable cost, based on reclaimed water source, was performed. With the exception of the Eastern and Western System service areas (defined in the following section), two source alternatives were considered for each service area. One alternative considered constructing a water recycling center (WRC) within the service area and one alternative considered conveying treated wastewater from either the Village Creek WWTP (VCWWTP) or the Trinity River Authority's Denton Creek Regional Wastewater System (DCRWS) to the service area. Results of this initial economic evaluation are discussed in this chapter. Based on this initial evaluation, a preferred alternative was selected for each service area and was then used as the basis for the more detailed feasibility evaluation discussed in Chapter 7.

6.2 Reclaimed Water Service Areas

The identification and ranking of potential reclaimed water customers is presented in Chapter 4. The potential customers were evaluated based on location and ranking to identify areas with the potential for high reclaimed water use. Emphasis was placed on locating large customers and clusters of smaller customers. Individual projects to serve the potential customers were then conceptualized and grouped together to form reclaimed water service areas. The following five reclaimed water service areas were identified, and are generally shown on Figure 6-1:

1. Central System
2. Eastern System
3. Northern System
4. Southern System
5. Western System

Within each of these service areas, the potential reclaimed water customers were identified, and are included in Tables 6-1 through 6-5. The annual average water demand and required system capacity are listed in each of these tables. The required system capacity was determined based upon which flow rate (peak month, peak day, or peak hour) that the system is designed to convey to each user. The potential reclaimed water demands for each customer, and peaking factors, are as developed in Chapter 4. Based on the projected demands, conceptual design alternatives were developed for each of the reclaimed water service areas. The assumptions for available storage capacity and system pressure requirements are also listed in these tables. At all golf courses, and a few other potential customers, it is assumed that existing ponds could be used for storage and that the customer would supply additional pumping capacity to achieve the desired system pressure. For most users, other than golf courses, a minimum system pressure of 60 psi is provided.



Figure 6-1
City of Fort Worth
Reclaimed Water Service Areas

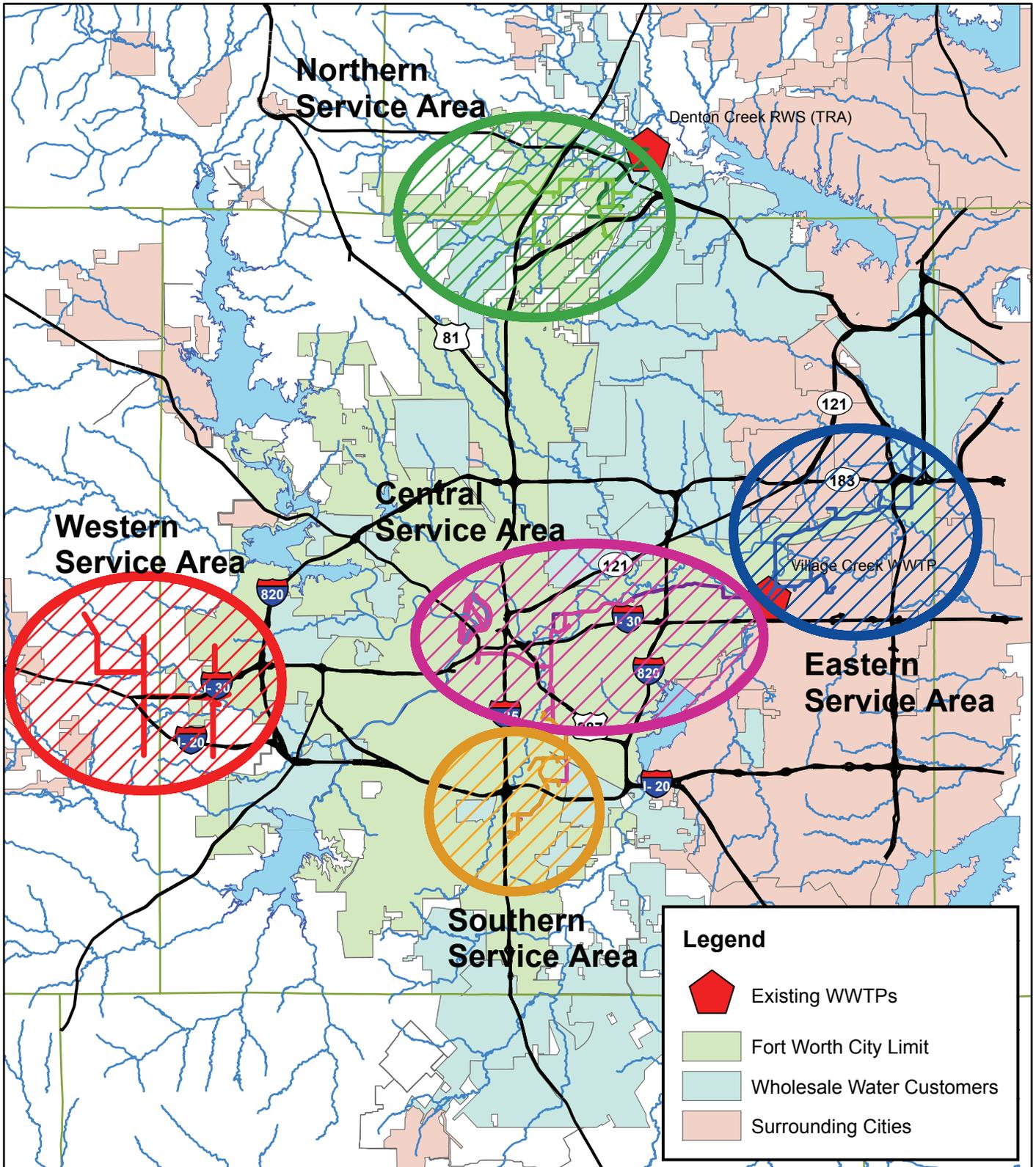


Table 6-1: Central System Reclaimed Water Service Area Demands

Potential Customer	Ann. Avg. Water Demand	System Capacity	Required System Pressure	Available Storage
	(MGD)	(MGD)	(psi)	
Cobb Park ⁽¹⁾	0.17	3.96	60	No
Gateway Park	0.05	1.21	60	No
Harris Methodist Hospital	0.05	0.05	60	No
Meadowbrook GC	0.06	1.73	0	Yes
Sycamore Creek GC	0.03	0.74	0	Yes
Sycamore Park	0.04	0.86	60	No
Trinity River Vision Project ⁽²⁾	0.76	7.50	17 ⁽³⁾	No
Woodhaven GC	0.09	1.16	0	Yes
Total	1.25	17.20		

(1) Cobb Park is also included in the Southern System Service Area

(2) The water demands for the Trinity River Vision Project include evaporative make-up water only, and could be expanded in the future to include irrigation water demand, once that data is available from the developers.

(3) The required pressure is that amount required to fill a ground storage tank at the Trinity River Vision Project site.

Table 6-2: Eastern System Reclaimed Water Service Area Demands

Potential Customer	Ann. Avg. Water Demand	System Capacity	Required System Pressure	Available Storage
	(MGD)	(MGD)	(psi)	
American Airlines	0.03	0.52	60	No
City of Arlington				
<i>JW Dunlop Sports Center</i>	<i>0.01</i>	<i>0.10</i>	<i>60</i>	<i>No</i>
<i>River Legacy Park</i>	<i>0.04</i>	<i>0.40</i>	<i>0</i>	<i>Yes</i>
<i>Chester Ditto Golf Course</i>	<i>0.17</i>	<i>0.50</i>	<i>0</i>	<i>Yes</i>
City of Euless				
<i>Texas Star Golf Course</i>	<i>0.52</i>	<i>3.33</i>	<i>0</i>	<i>Yes</i>
<i>Texas Star</i>	<i>0.21</i>	<i>2.00</i>	<i>60</i>	<i>No</i>
<i>Softball World</i>	<i>0.02</i>	<i>0.50</i>	<i>60</i>	<i>No</i>
D/FW International Airport	1.53	6.06	0	Yes
Riverside GC	0.24	1.28	0	Yes
Total	2.77	14.69		

Table 6-3: Northern System Reclaimed Water Service Area Demands

Potential Customer	Ann. Avg. Water Demand	System Capacity	Required System Pressure	Available Storage
	(MGD)	(MGD)	(psi)	
Alliance Center East Assoc.	0.36	0.95	0	Yes
Alliance Center West Assoc.	1.12	2.96	0	Yes
Alliance Gateway Phase I Assoc.	0.24	0.62	10	Yes
Alliance Gateway Phase II Assoc.	0.44	1.17	10	Yes
Alliance Gateway Phase III Assoc.	0.56	1.48	10	Yes
Alliance Lonestar Association	0.43	1.13	0	Yes
Circle T Ranch / Westlake	0.96	2.53	0	Yes
Frac Water (Gas Drilling)	0.05	0.05	0	N/A
Texas Motor Speedway	0.03	0.07	0	Yes
Total	4.19	10.97		

Table 6-4: Southern System Reclaimed Water Service Area Demands

Potential Customer	Ann. Avg. Water Demand	System Capacity	Required System Pressure	Available Storage
	(MGD)	(MGD)	(psi)	
Alcon Laboratories	0.38	3.00	60	No
Ball Metal Container	0.01	0.01	60	No
Cobb Park ⁽¹⁾	0.17	3.96	60	No
Glen Garden GC	0.09	0.46	0	Yes
Miller Brewing Co.	0.19	0.25	60	No
Mrs. Bairds Bakeries	0.10	0.10	60	No
Rolling Hills Soccer	0.15	3.65	60	No
Tarrant County College	0.01	0.31	60	No
Total	1.09	11.73		

(1) Cobb Park is also included in the Central System Service Area

Table 6-5: Western System Reclaimed Water Service Area Demands

Potential Customer	Ann. Avg. Water Demand ⁽¹⁾	System Capacity ⁽²⁾	Required System Pressure	Available Storage
	(MGD)	(MGD)	(psi)	
Blue Haze Elementary	0.01	0.15	60	No
East of Walsh Ranch	0.16	3.92	60	No
Leonard Golf Links	0.05	1.15	0	Yes
Lost Creek GC	0.18	0.93	0	Yes
New Commercial	0.14	2.25	60	No
New Golf Course	0.74	3.89	0	Yes
New Park	0.20	4.72	60	No
New Public Facility	0.04	0.86	60	No
New Residential	2.07	32.84	60	No
New School	0.13	3.06	60	No
Tannahill Intermediate	0.01	0.29	60	No
West of Walsh Ranch	0.06	1.52	60	No
Total	3.79	10.00		

(1) Annual average water demands as reported in the June 2004 Draft Feasibility Study for the Mary’s Creek Water Recycling Center

(2) Intermediate storage tanks and booster pump stations are included in the Western System Service Area to meet system pressure requirements and reduce overall system capacity requirements.

6.3 Sources of Reclaimed Water

The source of reclaimed water for each of the service areas is treated effluent from either an existing wastewater treatment plant (WWTP) or a proposed Water Recycling Center (WRC). With the exception of the Eastern System, which only considered Village Creek WWTP as a source and the Western System which only considered a WRC, alternatives for each service area were evaluated using a WWTP and a WRC as the source of supply.

6.3.1 Existing Wastewater Treatment Plants

The City of Fort Worth owns and operates the Village Creek WWTP, which currently treats an average of approximately 110 million gallons per day (MGD). This flow is adequate to supply all of the reclaimed water demands in the City. As discussed in Chapter 5, the effluent quality of the Village Creek WWTP is appropriate for either Type I or Type II uses.

The Denton Creek Regional Wastewater System (DCRWS) is owned and operated by the Trinity River Authority (TRA). As discussed in Chapter 5, flow projections for the average daily flow, average daily dry weather flow, and diurnal flow were evaluated to determine the amount of reclaimed water that could be potentially available. This information indicated that DCRWS is currently discharging approximately 3 MGD on an annual average basis. By 2013 the average annual

discharge is projected to be 12 MGD. The minimum flow available (for dry weather, minimum diurnal flow conditions) is estimated to be approximately 2 MGD under current conditions and is projected to increase to about 6.2 MGD by 2013. These flows are adequate to supply the projected reclaimed water demands in the Northern System service area.

6.3.2 Water Recycling Centers

Water recycling centers (WRCs) are small treatment facilities located near an existing trunk sewer that can treat a portion of the flow in the line and deliver it to a nearby recycled water user. Solids are typically returned to the collection system and handled at the main WWTP. The use of WRCs can have several advantages, including:

- WRCs can be located close to the point of service;
- They can treat only the flow needed for reclaimed water sales;
- They can defer the need to expand existing WWTPs.

Within each service area, potential WRC sites were located in the general proximity of potential customers and adjacent to existing wastewater interceptors. Site selection was based on evaluation of aerial maps, sites considered in other City of Fort Worth studies, and input from City staff. Detailed site evaluations were not performed. Alternatives using a WRC were developed for every service area, except the Eastern System service area, which was assumed to be served by VCWWTP. WRCs were sized to provide enough capacity to meet the projected reclaimed water demands for the service area. In all cases it was assumed that the solids would be returned to the collection system and treated at either VCWWTP or DCWRS.

6.4 Screening-Level Evaluation of Service Area Conceptual Projects

An initial, screening-level evaluation of conceptual treatment and conveyance projects for each service area was performed. The purpose of this screening-level evaluation was to determine whether each service area could be served more economically from a WRC or an existing WWTP. However, since the Eastern System is located close to VCWWTP, no alternative with a WRC was considered for this service area. Similarly, since the Western System is located so far away from an existing WWTP, no alternative using an existing WWTP was considered for this service area. The following section presents each of the alternatives considered and summarizes the screening-level economic evaluation performed to identify the preferred alternative in each service area. Screening-level costs were based on an evaluation of each system and on the demand projections presented in Section 6.2. Proposed pipeline and treatment plant sizing for these alternatives is included in the detailed cost sheets included in Appendix E. In addition, a memorandum summarizing the assumptions used for the costs is provided in Appendix F. All costs are based on a capital recovery period of 20 years and an annual interest rate of 5.5%. In developing the cost analysis, it was assumed that the City would be responsible for construction of all pump stations, storage tanks, water recycling centers, and pipelines measuring 10-inches in diameter or larger. It is assumed that any pipelines less than 10-inches in diameter will be constructed by the respective customer. In some cases, larger pipelines are assumed to be constructed by the customer as well, and these are discussed in the detailed descriptions of each alternative provided in Section 6.5. For the screening evaluation, all costs for constructing and operating the WRCs are included in order to compare the WRC alternatives with the

alternatives that receive water from an existing WWTP. However, as will be discussed in Chapter 7, the WRC costs are not included in the total reclaimed water system costs for the feasibility evaluation, as they are assumed to be costs that are supported by the wastewater system.

6.4.1 Central and Southern System Service Areas

Although initially considered separately, alternatives that take advantage of shared pipelines to provide reclaimed water to both the Central and Southern service areas were also evaluated, and determined to be more cost effective. Therefore, alternatives for these service areas are considered together in this section.

The Central System service area extends west from the Village Creek WWTP to the downtown Fort Worth area near the IH-35W and IH-30 intersection, and as far south as Cobb Park. Potential reclaimed water customers in this area include several parks and golf courses, Harris Methodist Hospital, and the Trinity River Vision project corridor. Each customer and its annual average water demand is listed in Table 6-1.

The largest potential customer in the Central System is the Trinity River Vision Central City Project. Although not anticipated until around 2015, the Central City Project may provide many opportunities for reclaimed water use through irrigation and evaporation make-up water. Make-up water is primarily needed to maintain a constant water surface elevation in the planned urban lake, but can also be used to replace any water lost to evaporation in water features such as fountains and decorative ponds.

The Southern System service area is generally located along IH-35W, south of IH-20, with only a couple of customers located north of IH-20. This area is mainly an industrial area, and the primary customer is Alcon Laboratories. Other potential reclaimed water customers include Miller Brewing Company, Rolling Hills Soccer Complex, Mrs. Baird's Bakery, Glen Garden Golf Course, Tarrant County Junior College, and the Ball Metal Container Corporation. A complete listing of customers in the Southern System Service Area is included in Table 6-4.

A map showing the alternatives considered for the Central System and Southern System service areas is provided in Figure 6-2. As mentioned above, initially these service areas were evaluated separately. However, early in this evaluation it was determined that a combined Central/Southern System was more economical for providing service to the entire area. A total of three alternatives are summarized here. The first two consider service to the entire Central/Southern service areas from either a WRC located at the abandoned City of Fort Worth Riverside WWTP near Gateway Park, or from VCWWTP. A separate WRC alternative for the Southern System is also presented. Each of these alternatives is summarized below:

6.4.1.1 Central System Alternative 1 (C1)

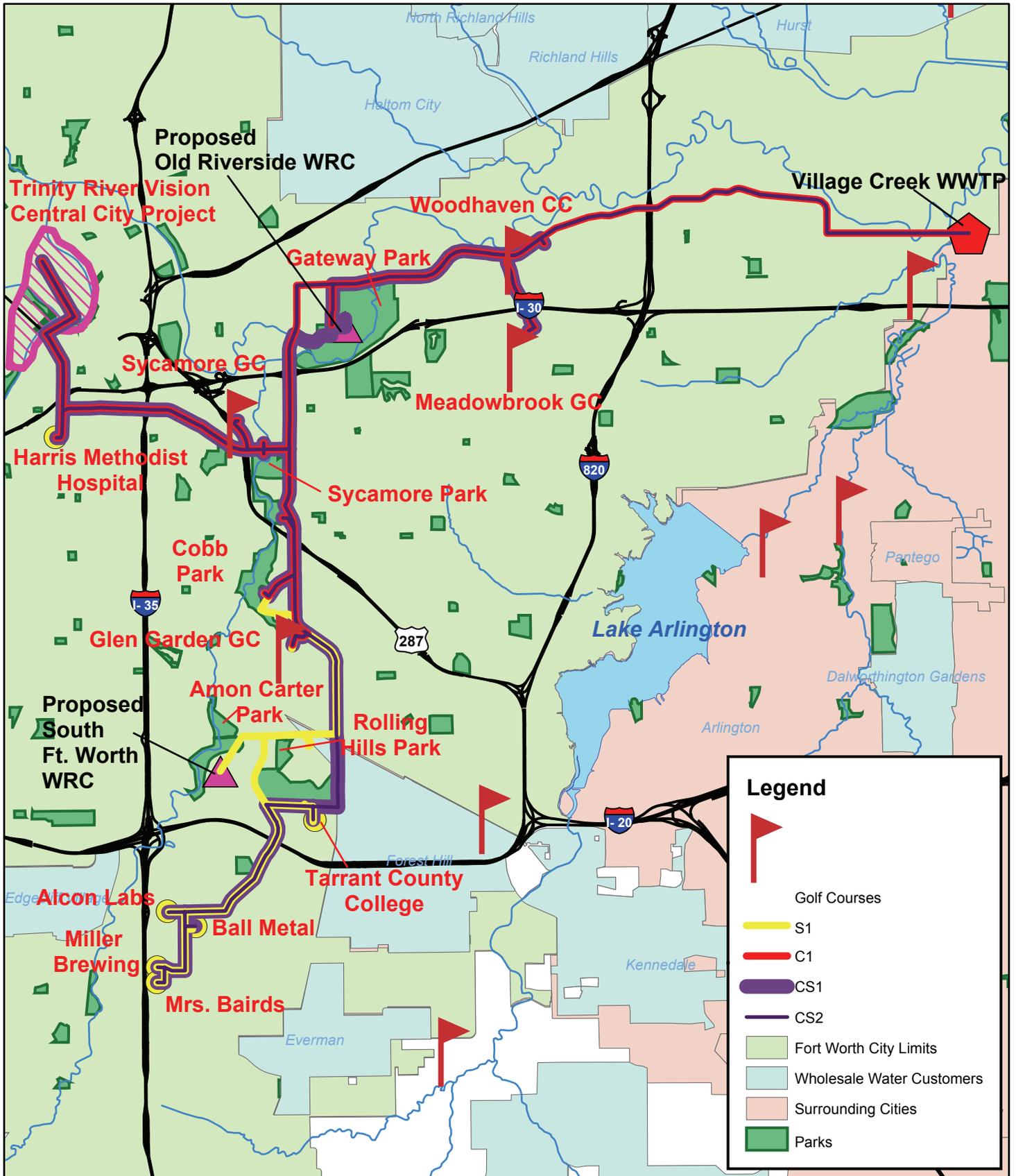
Alternative C1 serves the Central System customers only, from the VCWWTP, as shown on Figure 6-2.

6.4.1.2 Southern System Alternative 1 (S1)

Alternative S1 serves the Southern System customers only, from a proposed WRC located near Amon Carter Park, east of IH-35 and north of IH-20, as shown in Figure 6-2.



Figure 6-2
Central/Southern Alternatives



6.4.1.3 Central/Southern System Alternative 1 (CS1)

Alternative CS1 includes a proposed WRC at the site of the abandoned City of Fort Worth Riverside WWTP. Treated effluent from the WRC would serve all customers within the Central and Southern service areas, as shown on Figure 6-2.

6.4.1.4 Central/Southern System Alternative 2 (CS2)

Alternative CS2 uses treated effluent from VCWWTP to serve all customers within the Central and Southern service areas, as shown on Figure 6-2.

6.4.1.5 Preferred Central/Southern System Alternative

Table 6-6 summarizes the opinion of probable cost for each of the Central/Southern System alternatives presented here. The lowest cost alternative is CS2. However, while Alternative S1 has not been evaluated in further detail as a recommended alternative, this screening evaluation indicates that it is still economically viable. If desired, it could be implemented much more quickly to provide reclaimed water to the Southern service area than a combined alternative. In addition, Alternative S1 may be more attractive in the future as technology for WRCs advances and more cost-effective treatment facilities become available.

Table 6-6: Summary of Costs, Central/Southern System Alternatives (without benefits)

Alt.	Annual Avg. Demand	Peak System Demand	Capital Cost ¹	Debt Service	O&M	Energy	Purchase Cost	Overall Unit Cost
	MGD	MGD	\$MM	\$/yr	\$/yr	\$/yr	\$/1000G	\$/1000G
C1	1.25	17.21	\$32.70	\$2,736,000	\$316,000	\$60,000	N/A	\$3.22
S1	1.10	11.74	\$21.75	\$1,820,000	\$176,000	\$221,000	N/A	\$2.87
CS1	2.18	19.47	\$56.93	\$4,764,000	\$398,000	\$439,000	N/A	\$3.45
CS2	2.18	14.47	\$40.75	\$3,410,000	\$412,000	\$135,000	N/A	\$2.40

¹ Net Present Value of capital cost after accounting for interest during construction.

Based on the evaluation of probable costs presented in Table 6-6, the preferred alternative for the Central and Southern service areas is Alternative CS2, which provides reclaimed water to both areas from VCWWTP.

6.4.2 Eastern System Service Area

The Eastern System service area extends east from the Village Creek WWTP into the City of Arlington, and northeast into the City of Euless, Centreport and D/FW International Airport. Potential reclaimed water customers in this area include the Cities of Arlington and Euless, D/FW International Airport, American Airlines, and the Riverside Golf Course. Each customer and its annual average water demand are listed in Table 6-2.

The largest potential customers in the Eastern System are the Cities of Arlington and Euless, and the D/FW International Airport. Both Arlington and Euless have expressed an immediate interest in developing reclaimed water sources to supply irrigation water to some of their City-owned parks and golf courses. Likewise, D/FW International Airport has expressed an interest in using reclaimed water for irrigation of the Bear Creek Golf Course and other areas. Preliminary discussions with

developers in the Centreport area, near D/FW Airport indicate that there may be potential for use of reclaimed water in this area as well.

Since the Eastern System is so close to VCWWTP, no alternative with a WRC was evaluated for this service area. Therefore, only one alternative was considered, and is summarized below. A map of this alternative is shown in Figure 6-3.

6.4.2.1 Eastern System Alternative 1 (E1)

Alternative E1 uses treated effluent from VCWWTP to serve customers in the Cities of Arlington, Euless and Grand Prairie, as well as the Centreport and D/FW areas (see Figure 6-3).

6.4.2.2 Preferred Eastern System Alternative

Since only one alternative was considered for the Eastern System, Alternative E1 is the preferred alternative. Table 6-7 summarizes the opinion of probable costs for this alternative.

Table 6-7: Summary of Costs, Eastern System Alternative (without benefits)

Alt.	Annual Avg. Demand	Peak System Demand	Capital Cost ¹	Debt Service	O&M	Energy	Purchase Cost	Overall Unit Cost
	MGD	MGD	\$MM	\$/yr	\$/yr	\$/yr	\$/1000G	\$/1000G
E1	2.77	14.69	\$15.52	\$1,298,000	\$215,000	\$95,000	N/A	\$0.82

¹ Net Present Value of capital cost after accounting for interest during construction.

6.4.3 Northern System Service Area

The Northern System Service Area is located in northern Tarrant County around the Alliance Gateway industrial area and extends from IH-35W to SH-377 and from SH-170 to SH-114. Potential reclaimed water customers in this area include several industrial zones in the Alliance Gateway area, Texas Motor Speedway, and “frac” water for gas drilling operations. The Northern System is projected to supply the most reclaimed water of any of the alternatives considered in this study. Each customer and its annual average water demand is listed in Table 6-3.

The largest potential customers in the Northern System are the various associations within the Alliance industrial area. The Alliance area is a large industrial area being developed by Hillwood Properties. Hillwood Properties was contacted and provided input during the development of the Northern System Service Area alternative. Reclaimed water could be used in these areas for commercial irrigation and make-up water for water features. The various industrial areas within the Alliance development will have multiple water features (ponds and fountains) to which reclaimed water can be supplied.

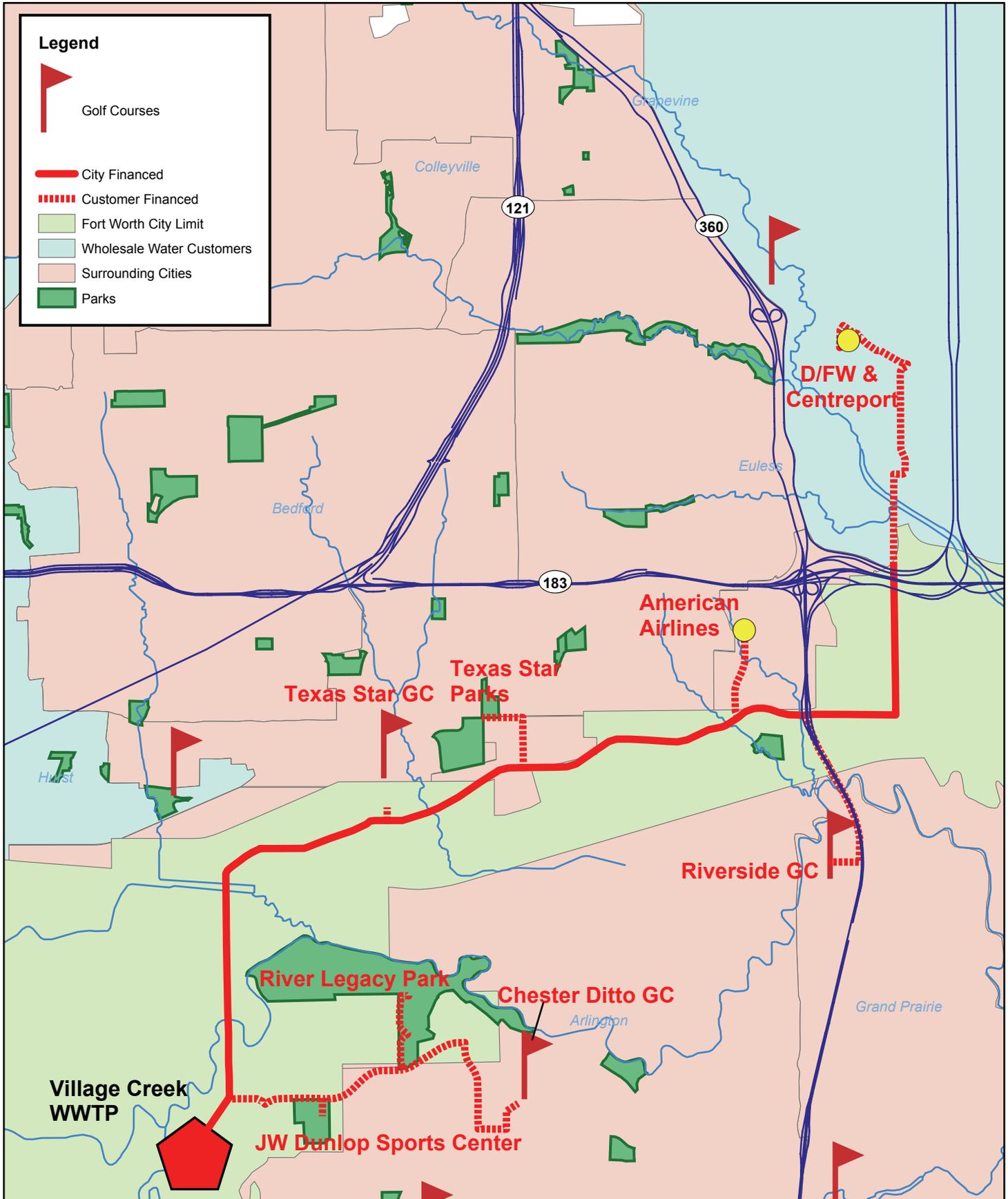
A map showing the alternatives considered for the Northern System Service Area is provided as Figure 6-4. Two alternatives were evaluated and are described below.

6.4.3.1 Northern System Alternative 1 (N1)

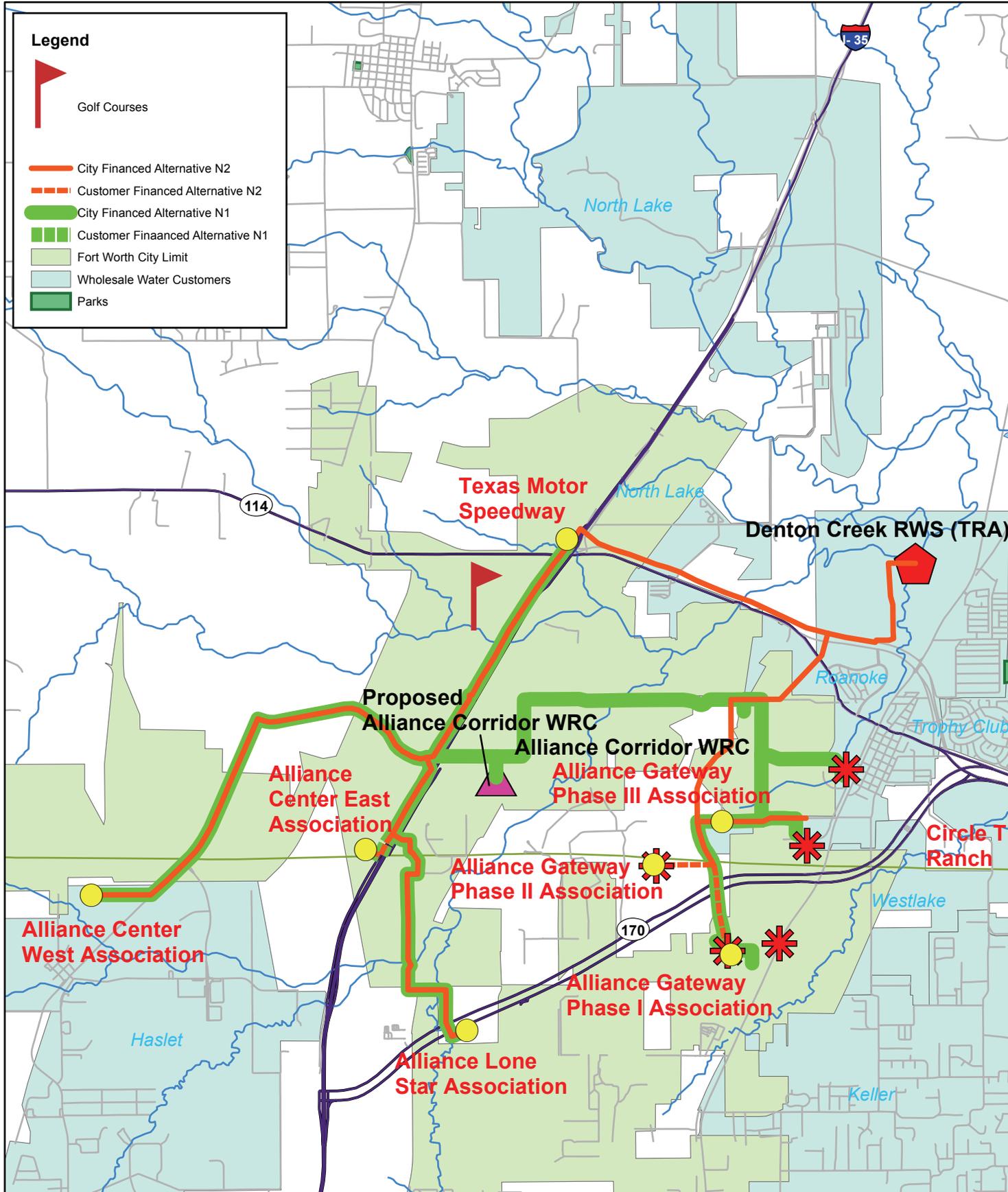
Alternative N1 serves the Northern System customers from a WRC located east of IH-35, as shown in Figure 6-4.



Figure 6-3 Eastern System Alternative



**Figure 6-4
Northern System Alternatives**



6.4.3.2 Northern System Alternative 2 (N2)

Alternative N2 serves the Northern System customers from the TRA Denton Creek Regional Wastewater System (DCRWS), as shown in Figure 6-4.

6.4.3.3 Preferred Northern System Alternative

Table 6-8 summarizes the opinion of probable cost for the Northern System alternatives. Due to the close proximity of this service area to DCRWS, providing reclaimed water from this facility is significantly more economical than constructing a WRC. Therefore, Alternative N2 is the preferred alternative for this service area.

Table 6-8: Summary of Costs, Northern System Alternatives (without benefits)

Alt.	Annual Avg. Demand	Peak System Demand	Capital Cost ¹	Debt Service	O&M	Energy	Purchase Cost	Overall Unit Cost
	MGD	MGD	\$MM	\$/yr	\$/yr	\$/yr	\$/1000G	\$/1000G
N1	4.19	11.07	\$54.45	\$4,556,000	\$304,000	\$679,000	N/A	\$1.84
N2	4.19	11.07	\$17.09	\$1,430,000	\$188,000	\$103,000	\$0.25	\$0.81

¹ Net Present Value of capital cost after accounting for interest during construction.

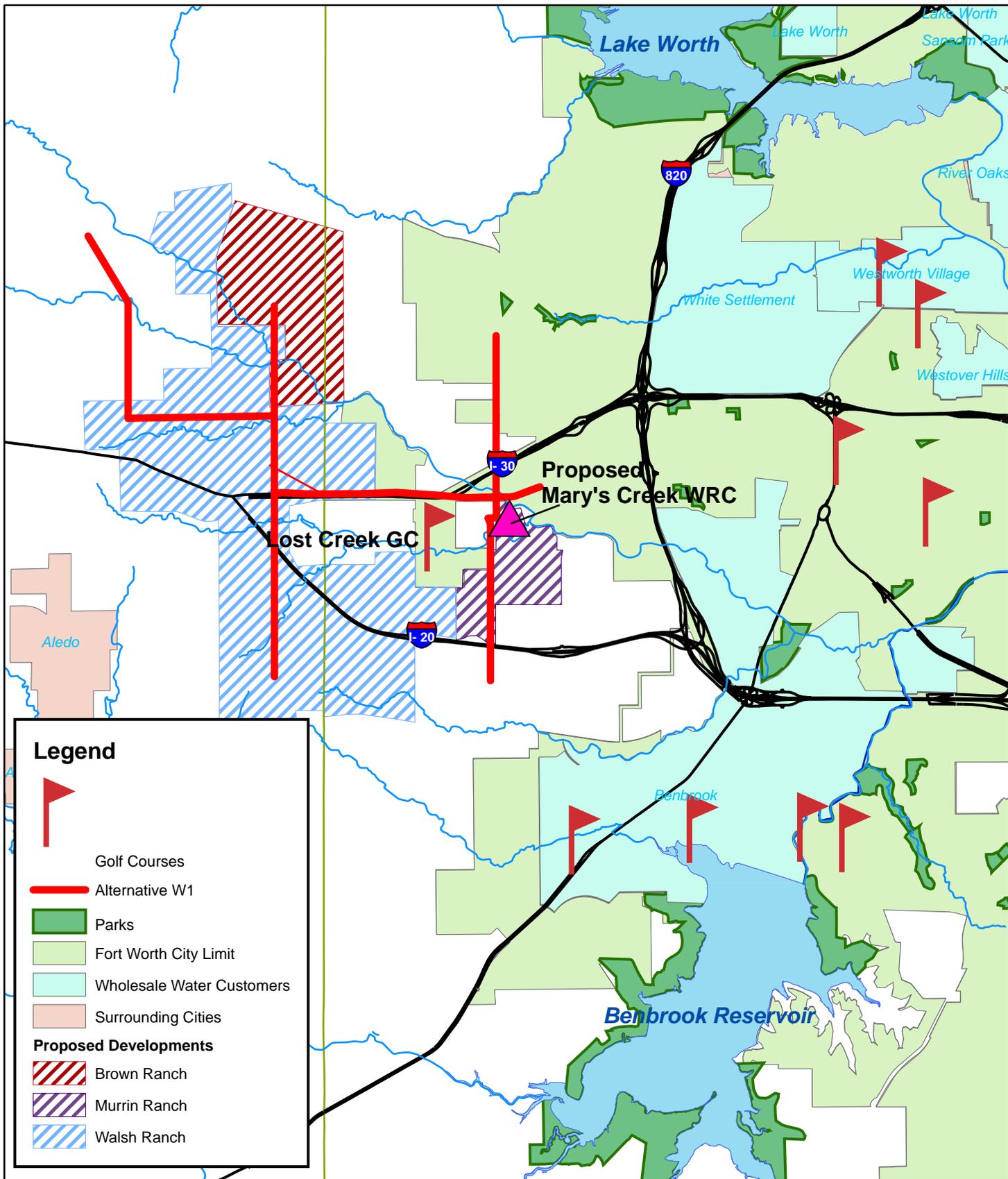
6.4.4 Western System Service Area

The Western System Service Area is located in the western portion of Fort Worth around the Mary's Creek Basin, including Walsh Ranch, Brown Ranch and Murrin Ranch. This area extends west of West Loop 820 and covers a large area north and south of IH-20 and IH-30. Since this area is mostly undeveloped at this time, there is an opportunity to install a dual water supply system as land is developed. As discussed in Chapter 2, the City is concurrently conducting a preliminary study of this region, and the initial findings of that study have been incorporated into the development of the Western System.

Potential reclaimed water users in this service area include large areas of commercial and residential irrigation, golf courses or green spaces, schools, as well as other public facilities. Potential reclaimed water customers, type of water usage, and peak flow supply are included in Table 6-5.

Since the Western System Service Area is so far from existing WWTPs, no existing WWTP alternative was considered for this system. Therefore, only one alternative has been evaluated, and is described below. A map of the Western System is provided in Figure 6-5.

**Figure 6-5
Western Alternative**



6.4.4.1 Western System Alternative 1 (W1)

Alternative W1 serves the proposed developments within the Mary’s Creek Basin from a WRC located between IH-20 and IH-30, as shown in Figure 6-5. As will be discussed in a later section, due to timing of flow availability in this area, it is anticipated that initially raw water from a TRWD raw water line will be used to provide nonpotable water service to this area. It should also be noted that initially, Alternative W1 included service to Z Boaz Park, Z Boaz Golf Course and Hawks Creek Golf Course. Service to these areas increased the unit cost of service significantly and, therefore, was eliminated from the alternative. However, these customers could be considered for service in the future.

6.4.4.2 Preferred Western System Alternative

Since only one alternative was considered for the Western System, Alternative W1 is the preferred alternative. Table 6-9 summarizes the opinion of probable costs for this alternative.

Table 6-9: Summary of Costs, Western System Alternative (without benefits)

Alt.	Annual Avg. Demand	Peak System Demand	Capital Cost ¹	Debt Service	O&M	Energy	Purchase Cost	Overall Unit Cost
	MGD	MGD	\$MM	\$/yr	\$/yr	\$/yr	\$/1000G	\$/1000G
W1	3.79	18.12	\$72.79	\$6,091,000	\$455,000	\$772,000	N/A	\$3.03

¹ Net Present Value of capital cost after accounting for interest during construction.

6.4.5 Summary of Screening-Level Evaluation

Table 6-10 presents a summary of the opinions of probable cost for all alternatives considered in the screening-level evaluation to identify the preferred alternative in each service area. Alternatives N2 and E1 provide reclaimed water at the lowest unit cost, primarily due to the proximity of these service areas to existing wastewater treatment facilities.

Table 6-10: Summary of Costs for All Service Areas (without benefits)

Alt.	Annual Avg. Demand	Peak System Demand	Capital Cost ¹	Debt Service	O&M	Energy	Purchase Cost	Overall Unit Cost
	MGD	MGD	\$MM	\$/yr	\$/yr	\$/yr	\$/1000G	\$/1000G
C1	1.25	17.21	\$32.70	\$2,736,000	\$316,000	\$60,000	N/A	\$3.22
S1	1.10	11.74	\$21.75	\$1,820,000	\$176,000	\$221,000	N/A	\$2.87
CS1	2.18	19.47	\$56.93	\$4,764,000	\$398,000	\$439,000	N/A	\$3.45
CS2	2.18	14.47	\$40.75	\$3,410,000	\$412,000	\$135,000	N/A	\$2.40
E1	2.77	14.69	\$15.52	\$1,298,000	\$215,000	\$95,000	N/A	\$0.82
N1	4.19	11.07	\$54.45	\$4,556,000	\$304,000	\$679,000	N/A	\$1.84
N2	4.19	11.07	\$17.09	\$1,430,000	\$188,000	\$103,000	\$0.25	\$0.81
W1	3.79	18.12	\$72.79	\$6,091,000	\$455,000	\$772,000	N/A	\$3.03

¹ Net Present Value of capital cost after accounting for interest during construction.

6.5 Preferred Alternative Facilities and Phasing

This section describes the planned facilities and proposed project phasing for each of the preferred alternatives identified in Section 6.4. Construction to be completed by the City has been separated into phases denoted by a number (i.e. Phase 1, 2, etc.). Pipelines to be constructed by a customer are included as separate phases denoted by a number and character (i.e. Phase 2a, 2b, etc.).

6.5.1 Central/Southern System Service Area

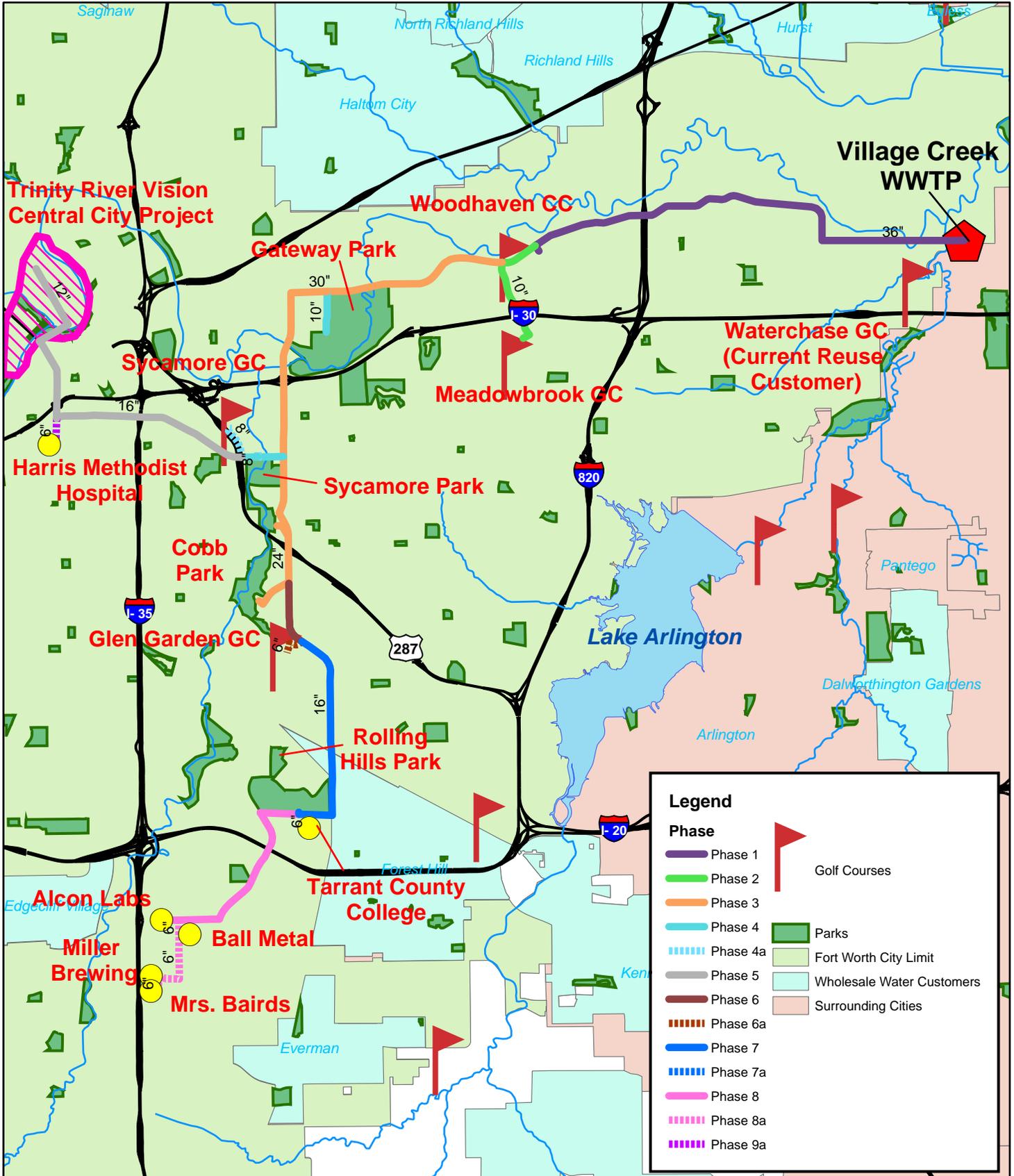
As discussed above, implementation of the Southern System Service Area was determined to be more cost effective if constructed as part of the Central System Service Area. Therefore, the Central System Service Area was expanded to include the Southern System Service Area.

The main trunk line of the Central/Southern System is an 11.1-mile long, 36/30-inch diameter transmission main constructed primarily within existing City easements and right-of-way (ROW). The Central/Southern System is proposed to be constructed in nine phases. Refer to Figure 6-6 for a map of the phasing for the Central/Southern System Service Area.

- Phase 1 includes a 14.5-MGD pump station constructed at the Village Creek WWTP, 5.8 miles of 36-inch transmission main along Randol Mill Road, and a 10-inch pipeline to the Woodhaven Golf Course.
- Phase 2 includes a 0.5-mile long, 30-inch diameter extension of the transmission main along Randol Mill Road, and a 10-inch pipeline to the Meadowbrook Golf Course.
- Phase 3 includes the remaining 4.8 miles of 30-inch transmission main along 1st Street and Beach/Mitchell Street, and a 16-inch pipeline to Cobb Park along Berry Street.
- Phase 4 includes a 0.3-mile long, 16-inch transmission main along Vickery Blvd., and a 10-inch pipeline to provide reclaimed water to Gateway Park.
 - Phase 4A includes 8-inch pipelines, to be constructed by others, to distribute reclaimed water to Sycamore Park and the Sycamore Golf Course.
- Phase 5 includes construction of a 2.4-mile long, 16-inch transmission main along Vickery Blvd, and a 12-inch pipeline along Henderson Street and Main Street to provide reclaimed water to the Trinity River Vision project corridor. A 2-MG ground storage tank and 7.5-MGD booster pump station will be constructed at the Trinity River Vision project location. Construction of a ground storage tank will allow for a decreased pumping and pipeline capacity from VCWWTP. The savings in reduced pipeline and pumping costs was determined to more than compensate for the additional cost of a ground storage tank and booster pump station.
- Phase 6 includes a 0.8-mile long extension of the 16-inch transmission main along Mitchell Street.
 - Phase 6A, to be constructed by the Glen Garden Golf Course, includes a 6-inch pipeline to supply reclaimed water to the Glen Garden Golf Course.



Figure 6-6
Central/Southern Alternative (Alt. CS2) Phasing



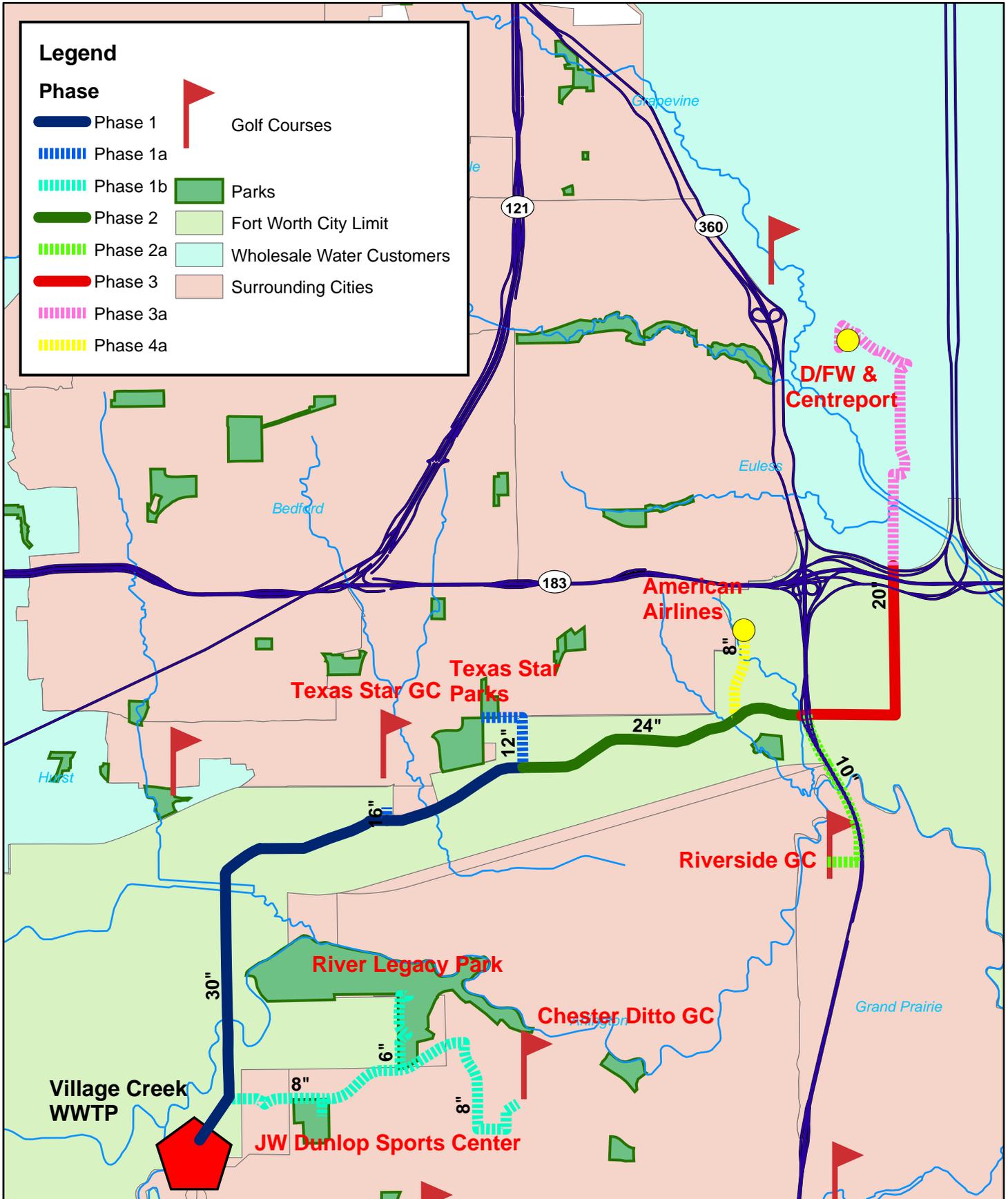
- Phase 7 includes a 16-inch pipeline along Mitchell and Wichita Streets, and construction of a 7-MGD booster pump station near Rolling Hills Park. A 0.1-mile long, 20-inch transmission main will then extend from the booster pump station towards the west with a short 16-inch pipeline to serve Rolling Hills Park.
 - Phase 7A, to be constructed by Tarrant County College (TCC), includes a 6-inch pipeline to supply Tarrant County College on E. Seminary Dr.
- Phase 8 includes 2.08 miles of 16-inch transmission main along Campus Drive to Alcon Laboratories.
 - Phase 8A, to be constructed by others, includes 6-inch pipelines to supply reclaimed water to Ball Metal Container Corporation, Miller Brewery, and Mrs. Baird's Bakery.
- Phase 9A, to be constructed by Harris Methodist Hospital, is a 6-inch pipeline from the Phase 5 pipeline to the Harris Methodist Hospital on Pennsylvania Road.

6.5.2 Eastern System Service Area

To take advantage of an existing pump station and storage tank at the Village Creek WWTP, the Eastern System was developed as two separate systems. The City of Arlington would be on a separate pipeline system from the remaining customers, and would be supplied using an existing 4-MGD pump station at Village Creek WWTP. The remaining customers would be supplied using a second transmission main and pump station. The Eastern System is proposed to be constructed in four phases. Refer to Figure 6-7 for a map of the Eastern System Service Area.

- Phase 1 includes a 14-MGD pump station constructed at the Village Creek WWTP, and 2.1 miles of 30-inch transmission main north along Greenbelt Road and east along Trinity Blvd. Phase 1 also includes two sub-phases, 1A and 1B, to be constructed by the Cities of Arlington and Euless.
 - Phase 1A includes 16-inch and 12-inch pipelines, constructed by the City of Euless, to convey reclaimed water from the Phase 1 pipeline to the Texas Star, Softball World, and the Texas Star Golf Course.
 - Phase 1B includes 8-inch and 6-inch pipelines, constructed by the City of Arlington, to convey reclaimed water from the Village Creek WWTP to the J.W. Dunlop Sports Center, River Legacy Park, and Chester Ditto Golf Course.
- Phase 2 includes 1.8 miles of 24-inch, and 0.8 miles of 20-inch, transmission main to Grand Prairie along Trinity Rd.
 - Phase 2A is a 10-inch pipeline, constructed by the City of Grand Prairie to supply reclaimed water to the Riverside Golf Course on Hwy 360.

Figure 6-7 Eastern Alternative Phasing



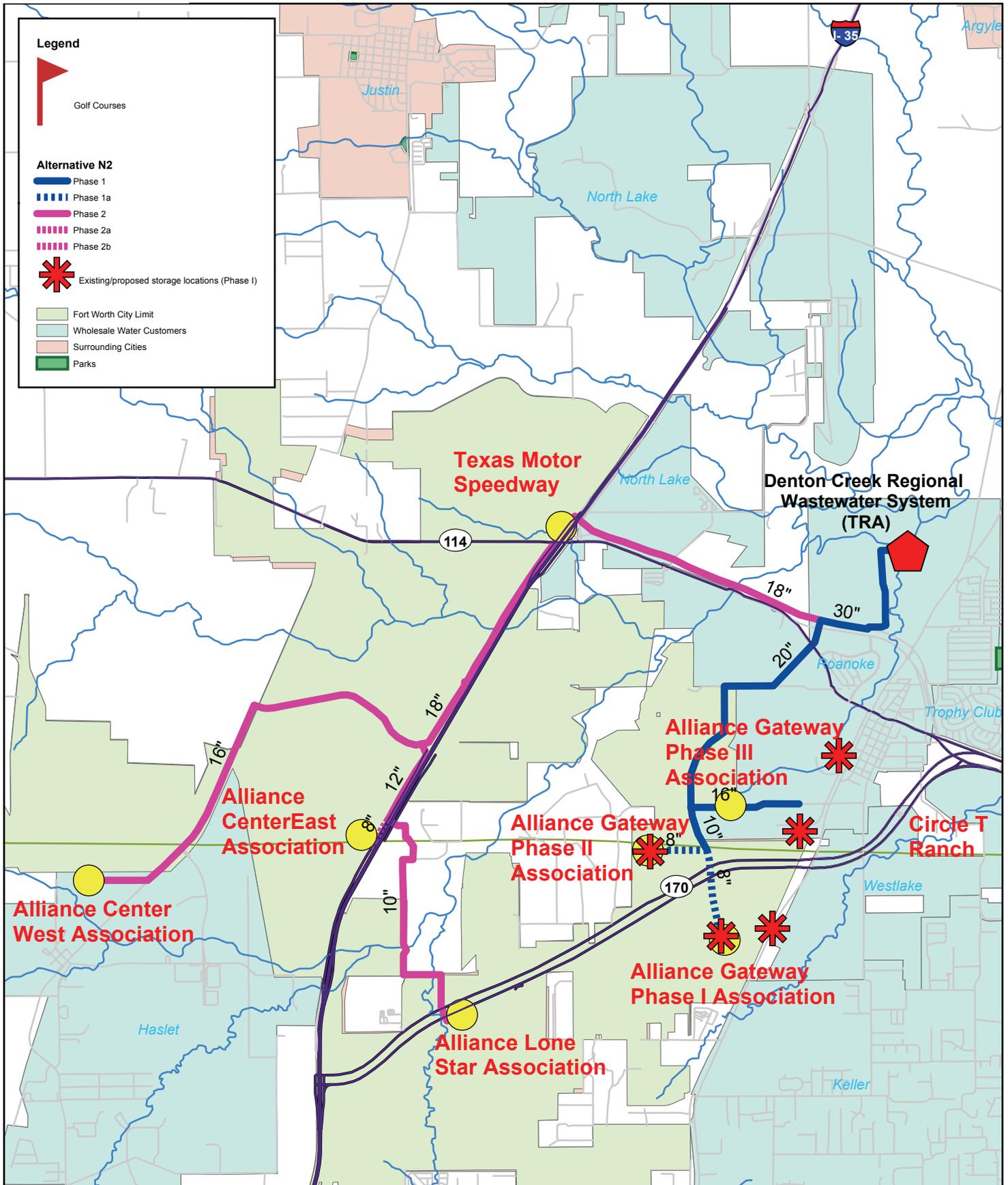
- Phase 3 includes a 20-inch pipeline to the D/FW International Airport.
 - Phase 3A is a 20-inch pipeline, constructed by the D/FW International Airport, from the Phase 3 pipeline to Trigg Lake and along S. Airfield Drive to the Bear Creek Golf Course.
- Phase 4A, to be constructed by American Airlines, includes an 8-inch pipeline to supply reclaimed water to American Airlines on American Blvd. from the Phase 2 pipeline.

6.5.3 Northern System Service Area

For this service area, the screening-level evaluation of alternatives determined that it is more cost effective to purchase reclaimed water from the TRA DCRWS than to construct a WRC. A description of the Northern System is presented below. Refer to Figure 6-8 for a map of the Northern System Service Area.

- Phase 1 includes construction of an 11-MGD pump station and a 0.5-MGD storage tank at the DCRWS facility, and the following pipelines to serve the Alliance Gateway Associations and the Circle T Ranch:
 - A 1.4-mile long, 30-inch transmission main from the DCRWS to SH-114;
 - A 2.3-mile long, 20-inch transmission main along future roadways from SH-114 to Henrietta Creek Road;
 - A 1.2-mile long, 16-inch transmission main constructed along Independence Parkway to the Alliance Gateway Phase 1 Association;
 - A 16-inch pipeline to supply Alliance Gateway Phase 3 Association and Circle T Ranch;
 - A 10-inch pipeline to supply the Alliance Gateway Phase 1 and Phase 2 Associations; and
 - Phase 1a includes 8-inch pipelines to supply Alliance Gateway Phase 1 and 2 Associations.
- Phase 2 includes construction of a 4.9-mile long, 18-inch transmission main along SH-114 and IH-35W to supply reclaimed water to the Alliance Lone Star and Alliance Center Associations, as well as to the Texas Motor Speedway. The 18-inch transmission main on SH-114 and IH-35W distributes water by:
 - Construction of a 4.9-mile long, 18-inch transmission main along SH-114 and IH-35W;
 - Construction of a 16-inch pipeline along Eagle Parkway and FM Road 158 to the Alliance Center West Association;

Figure 6-8 Northern System Alternative Phasing



- Construction of a 12-inch pipeline along IH-35W to the Alliance Center East Association; and
- Construction of a 10-inch pipeline along Old Denton Road to supply reclaimed water to the Alliance Lone Star Association on SH-170.

Phase 2 also includes two sub-phases, to be constructed by the customers:

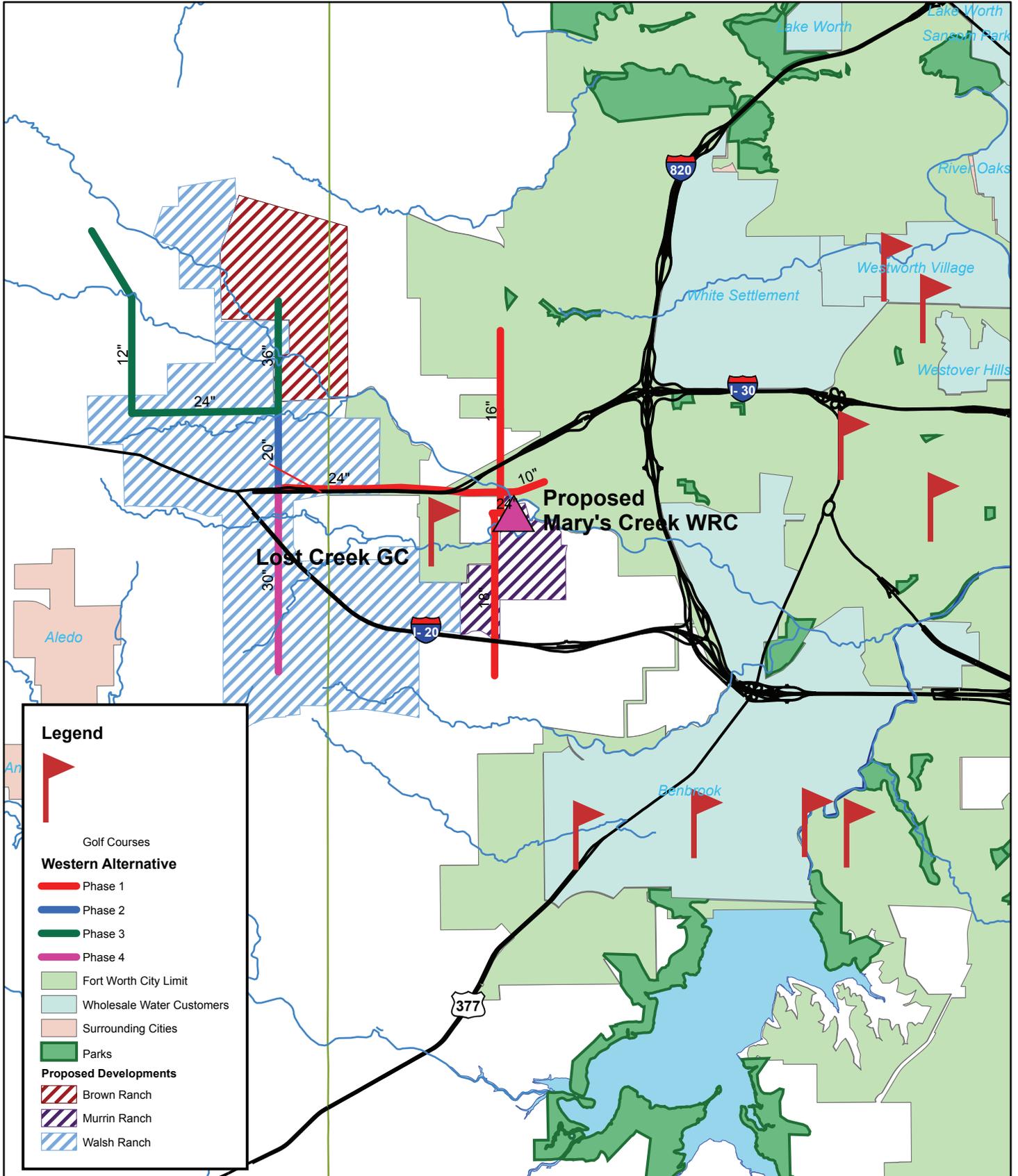
- Phase 2A includes a 6-inch pipeline to supply reclaimed water to the Texas Motor Speedway from IH-35W.
- Phase 2B includes an 8-inch pipeline to supply reclaimed water to the Alliance Center East Association from IH-35W.

6.5.4 Western System Service Area

As discussed in Section 6.4, due to the long distance between the Village Creek WWTP and the Western System Service Area, a new WRC is proposed to be constructed in the Mary's Creek Basin to serve the Western System. Construction of the Western System has been split into six phases. Refer to Figure 6-9 for a map of the Western System Service Area.

- Phase 1 includes construction of an 18.5-MGD pump station and a 2.5-MG storage tank at the proposed site for the Mary's Creek WRC. The Mary's Creek Basin area is still an undeveloped area; thus sufficient wastewater flows do not exist to supply the potential reclaimed water customers. Therefore, construction of the WRC has been delayed and initially, water would be supplied from a Tarrant Regional Water District (TRWD) raw water pipeline. The existing TRWD raw water pipeline is located adjacent to, and east of, the proposed WRC site. Raw water (and following Phase 5, reclaimed water) will then be distributed to potential customers nearest the proposed WRC site through the following:
 - A 0.3-mile long, 30-inch transmission main from the proposed WRC site to Camp Bowie Blvd.;
 - A 10-inch pipeline to supply reclaimed water to potential customers to the east along Camp Bowie Blvd.;
 - A 16-inch pipeline to supply reclaimed water to potential customers immediately north of the proposed WRC site;
 - An 18-inch pipeline to supply reclaimed water to potential customers immediately south of the proposed WRC site; and
 - A 2.8-mile long, 24-inch transmission main to supply reclaimed water to potential customers immediately west of the proposed WRC along Camp Bowie Blvd. and IH-30.
- Phase 2 includes constructing a 21-MGD booster pump station (BPS1) and a 2-MG storage tank at the end of the Phase 1 24-inch pipeline on IH-30, and a 1.0-mile long, 20-inch pipeline to deliver reclaimed water to potential customers immediately north.

**Figure 6-9
Western System Alternative Phasing**



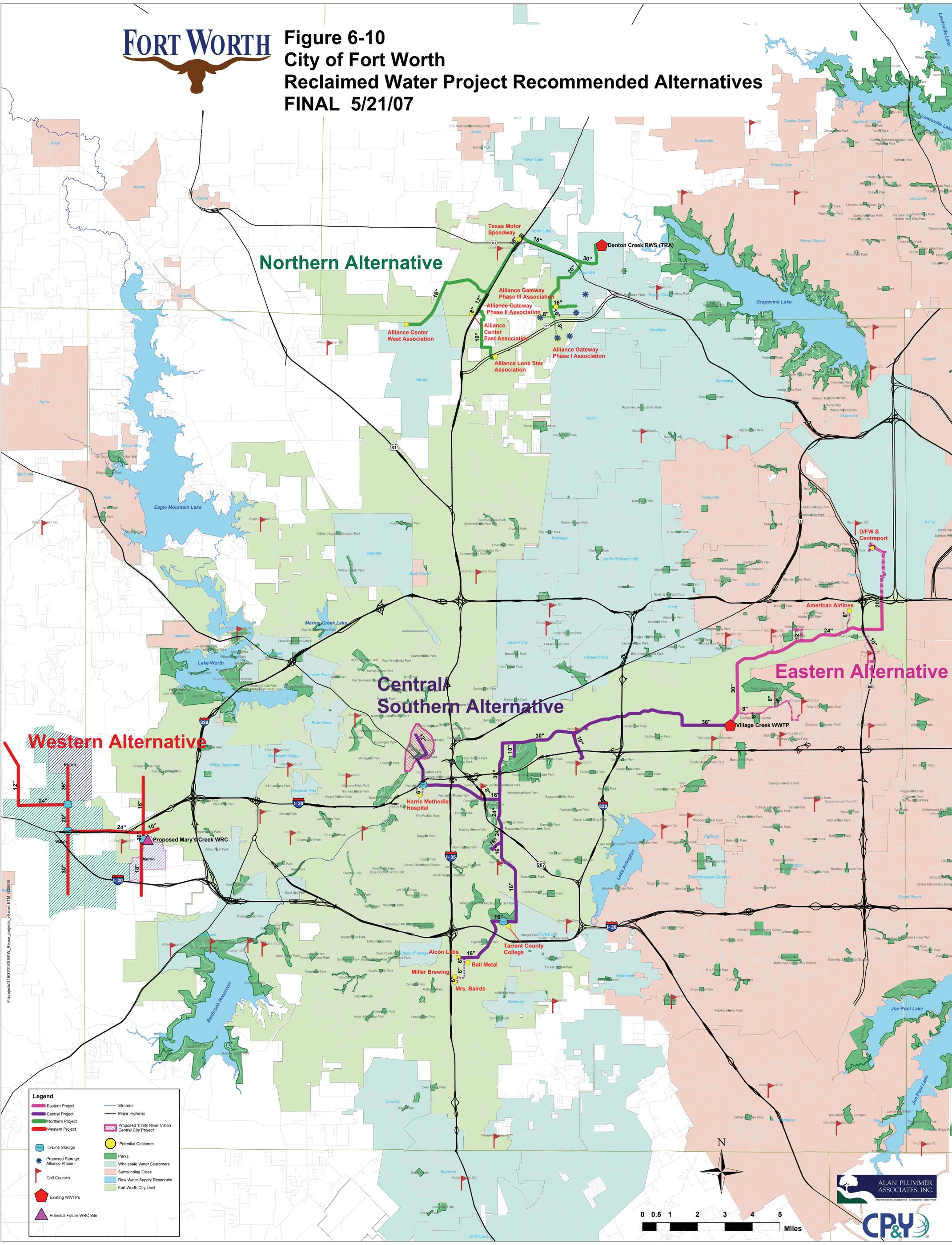
Legend

- Golf Courses
- Western Alternative**
 - Phase 1
 - Phase 2
 - Phase 3
 - Phase 4
- Fort Worth City Limit
- Wholesale Water Customers
- Surrounding Cities
- Parks
- Proposed Developments**
 - Brown Ranch
 - Murrin Ranch
 - Walsh Ranch

- Phase 3 includes construction of a 30-MGD booster pump station (BPS2) and a 4.0-MG storage tank at the end of the Phase 2 pipeline, and the following pipelines:
 - A 1.2-mile long, 36-inch pipeline to the north from BPS2; and
 - A 2.0-mile long, 24-inch pipeline to the west from BPS2, and then a 2.2-mile long, 12-inch pipeline extending to the north
- Phase 4 includes construction of a 2.1-mile long, 30-inch pipeline from BPS1 to potential customers in the south.
- Phase 5 includes construction of the first phase of the proposed WRC to supply 5 MGD of reclaimed water. The TRWD raw water pipeline will still be used to provide additional water as the Mary's Creek Basin area continues to develop.

Phase 6 includes construction of the second phase of the proposed WRC to expand its capacity to a total of 10 MGD. Once completed, raw water from the TRWD pipeline will no longer be needed.

Figure 6-10 shows all of the proposed Fort Worth reclaimed water projects (see insert).



Legend

- Eastern Project
- Central Project
- Northern Project
- Western Project
- In-Line Storage
- Proposed Storage, Alliance Phase I
- Golf Courses
- Existing WWTPs
- Potential Future WRC Site
- Streams
- Major Highway
- Proposed Trinity River Vision Central City Project
- Potential Customer
- Parks
- Wholesale Water Customers
- Surrounding Cities
- Raw Water Supply Reservoirs
- Fort Worth City Limit

0 0.5 1 2 3 4 5 Miles

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