



Region C
Water Planning Group

Freese and Nichols, Inc.
Alan Plummer Associates, Inc.
CP&Y, Inc.
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MEMORANDUM

To: Mr. Kevin Patteson, Executive Director TWDB

From: Thomas C. Gooch, Freese and Nichols, Inc.

Re: Errata in the *2011 Region C Water Plan* - Submittal of Errata #4

Date: January 19, 2015

Several errata in the *2011 Region C Water Plan* (Plan) have come to our attention. The text below and Table 1 of this memorandum summarize these errata. Affected tables from the *2011 Region C water Plan* have been included in this memorandum with the changes highlighted.

- The Lake Ralph Hall and Reuse strategy cost was incorrect in Table 4D.3.
- The projected demands and conservation WMS amounts in Table 4E.7 have been updated.
- Supply amounts for Indirect Reuse and Lake Ralph Hall in Table 6.6 have been updated.
- Changes to costs in Tables Q-14 (New water treatment plants) and Q-15 (Water treatment plant expansions) were made.
- A number of unit costs and table references were in error or omitted from Tables in Sections 4E and 4F. (See Table 2 of this memorandum.)
- Several typographical errors.

Table 1 is a summary of the changes to the plan. The errata are described in more detail below.

Table 1 - Summary of Changes to 2011 Region C Water Plan

Pages	Location	Description
4D.6	Table 4D.2	The capital cost for the Lake Ralph Hall and Reuse strategy in Table 4D.2 of <i>2011 Region C Water Plan</i> should be corrected to be \$286,401,000. (Other tables of the <i>2011 Region C Water Plan</i> correctly showed the capital cost of \$286,401,000.)
4D.21	Table 4D.3	The cost for the Lake Ralph Hall and Reuse strategy and the Region C total cost should be corrected as shown in Table 4D.3 of this memo. The unit cost with debt service in Table 4D.2 should be \$1.45 (\$/1000 gal). (Other tables of the <i>2011 Region C Water Plan</i> correctly showed the capital cost of \$286,401,000.)
4E.26	Table 4E.7	Amounts shown should be corrected as shown in Table 4E.7 of this memo. (All changed values represent no more than a 250 acre-feet per year change from values shown in the <i>2011 Region C Water Plan</i> .)
4E.42	Table 4E.14	Change the reference for the Ennis Indirect Reuse (through TRA) strategy in Table 4E.14 from “Included in Ennis costs in Table 43.43” to “Included in Ennis costs in Table 4E.43”
6.34	Table 6.6	Supply amounts for Indirect Reuse of Lake Ralph Hall Water should be revised as shown in Table 6.6 of this memo. (The supply amounts shown in other tables of the <i>2011 Region C Water Plan</i> were correct.)
6.47	Section 6.10, 1 st Paragraph	“Section 11.1721(e) of the Water Code” should read “Section 11.1271(e)”
Appendix Q	Tables Q-14 & Q-15	Data should be corrected as shown in Tables Q-14 and Q-15 of this memo.
Multiple	Tables in Section 4E. & 4F	Data in Tables from Sections 4E and 4F should be corrected based on Table 2 of this memorandum.

Table 4D.3 - UPDATED
Recommended Major Water Management Strategies for Region C

Strategy	Supplier	Supply (Ac-Ft/Yr)	Supplier Capital Cost	Supplier Unit Cost (\$/1000 gal.)	
				With Debt Service	After Debt Paid
Toledo Bend Reservoir	NTMWD	200,000	\$1,239,762,000	\$2.24	\$0.86
	TRWD	200,000	\$1,937,420,000	\$3.43	\$1.27
Marvin Nichols Reservoir	NTMWD	174,840	\$830,894,000	\$1.45	\$0.39
	TRWD	280,000	\$2,371,116,000	\$2.63	\$0.74
	UTRWD	35,000	\$225,628,000	\$1.99	\$0.56
TRWD Integrated Pipeline	TRWD	179,000*	\$702,008,000	\$1.36	\$0.48
Lower Bois d'Arc Creek Reservoir	NTMWD	123,000	\$615,498,000	\$1.33	\$0.21
Oklahoma Water	NTMWD	50,000	\$208,624,000	\$1.43	\$0.49
	TRWD	50,000	\$441,548,000	\$2.77	\$0.79
	Irving	25,000	\$194,825,000	\$2.49	\$0.75
	UTRWD	15,000	\$96,083,000	\$2.04	\$0.61
Lake Palestine	DWU	111,776	\$887,954,000	\$2.37	\$0.60
New Lake Texoma (Blend)	NTMWD	113,000	\$336,356,000	\$0.93	\$0.27
Wright Patman Lake - Raise Flood Pool	DWU	112,100	\$896,478,000	\$2.34	\$0.56
TRWD Wetlands	TRWD	105,500	\$212,416,000	\$0.63	\$0.18
Tawakoni Pipeline	DWU	77,994	\$496,243,000	\$1.71	\$0.29
Lake Ralph Hall and Reuse	UTRWD	52,437	\$286,401,000	\$1.45	\$0.23
Main Stem Trinity River Pump Station	DWU and NTMWD	41,029	\$142,567,000	\$0.94	\$0.16
Region C Total		1,766,676	\$12,121,821,000		

Note: The costs and unit costs in Table 4D.3 may be different from those in Table 4D.2 because the amounts and participants may be different. * The TRWD Integrated Pipeline is not a new supply to the region and is not included in the Region C Total supply.

Table 4E.7 - UPDATED
Summary of Recommended Water Management Strategies for NTMWD

Planned Supplies (Ac-Ft/Yr)	2010	2020	2030	2040	2050	2060
Projected Demands (including losses for Treatment & Delivery)	387,574	492,634	580,720	667,921	736,274	789,676
<i>Existing</i>						
<i>Lake Lavon</i>	112,033	110,767	109,500	108,233	106,967	105,700
<i>Lake Texoma</i>	77,300	77,300	77,300	77,300	77,300	77,300
<i>Lake Chapman</i>	47,132	47,132	47,132	47,132	47,132	47,132
<i>Wilson Creek Reuse</i>	50,000	60,941	71,882	71,882	71,882	71,882
<i>Lake Bonham</i>	5,340	5,340	5,340	5,340	5,340	5,340
<i>East Fork Reuse (with Ray Hubbard Pass through)</i>	51,790	67,148	87,102	102,000	102,000	102,000
<i>Interim GTUA</i>	15,500	0	0	0	0	0
<i>Upper Sabine Basin</i>	49,718	29,646	9,573	9,501	9,428	9,356
<i>Direct Reuse for Irrigation (Collin & Rockwall Co)</i>	2,695	2,695	2,695	2,695	2,695	2,695
Total Available Supplies	411,508	400,968	410,524	424,083	422,744	421,405
Need (Demand-Supply)	0	91,665	170,196	243,838	313,530	368,271
Water Management Strategies						
Conservation (Wholesale Customers)	5,180	27,103	45,756	58,958	70,559	80,398
Texoma Pump Station Expansion	0	0	0	0	0	0
Additional Direct Reuse - Rockwall Co. Irrigation	64	64	64	64	64	64
Renewed Interim GTUA		21,900	21,900	21,900		
Main Stem PS (additional East Fork)		34,900	15,100	0	0	0
Chapman Booster Pump Station	0	0	0	0	0	0
Planned Supplies (Ac-Ft/Yr)	2010	2020	2030	2040	2050	2060
Lower Bois d'Arc Creek Res.		56,050	120,200	118,000	115,800	113,600
Additional Lake Texoma - Blend with new Supplies			69,200	68,500	113,000	113,000
Fannin County Water Supply System		0	0	0	0	0
Marvin Nichols			87,400	87,400	174,800	174,800
Toledo Bend Phase 1					100,000	100,000
Oklahoma						50,000
Total Supplies from Strategies	5,244	140,017	359,620	354,822	574,223	631,862
Total Supplies	416,752	540,986	770,144	778,905	996,967	1,053,267
Reserve or (Shortage)	29,178	48,352	189,424	110,984	260,693	263,591

Table 6.6
Recommended Reuse Projects in Region C*
 - Values in Acre-Feet per Year -

Provider	Project Name	Type	County ^(a)	2010	2020	2030	2040	2050	2060
Athens	Athens Fish Hatchery	direct	Henderson	0	2,872	2,872	2,872	2,872	2,872
Cooke County	Direct Reuse	direct	Cooke	0	70	70	70	70	70
Cooke County Mining	Mining Reuse	direct	Cooke	0	99	67	71	74	77
DWU	Direct Reuse	direct	Dallas	0	20,458	20,458	20,458	20,458	20,458
DWU/NTMWD	NTWMD WWTP Discharges to the Lake Ray Hubbard Watershed	indirect	Dallas/Kaufman/Collin/Rockwall	0	31,612	35,872	39,459	40,244	41,029
Ennis	Indirect Reuse	indirect	Ellis	0	0	0	333	2,521	3,696
Fort Worth	Village Creek Direct Reuse	direct	Tarrant	1,552	3,469	3,526	3,526	3,526	3,526
Fort Worth/TRA	Alliance Corridor Direct Reuse	direct	Tarrant	0	1,120	4,694	4,694	4,694	4,694
Fort Worth	Fort Worth Future Direct Reuse	direct	Tarrant	0	0	3,460	7,979	7,979	7,979
Frisco	Collin/Denton County Direct Reuse	direct	Collin/Denton	0	2,240	3,360	5,650	5,650	5,650
Jacksboro	Indirect Reuse (Jack County mining)	indirect	Jack	385	385	385	385	385	385
Irving/TRA	Irving Direct Reuse	direct	Dallas	0	6,000	8,000	8,000	8,000	8,000
NTMWD	Additional Supplies from Dallas for East Fork	indirect	Dallas/Kaufman/Collin/Rockwall	0	34,900	15,100	0	0	0
Tarrant County SEP	Tarrant County SEP	direct	Tarrant	0	0	1,528	2,360	2,360	2,360
TRA	Tarrant County Indirect Reuse	indirect	Tarrant	0	7,500	7,500	7,500	7,500	7,500
TRA	Dallas County Direct Reuse	direct	Dallas	0	0	6,760	6,760	6,760	6,760

* NOTE: Lists recommended reuse strategies for Region C and does not include existing reuse projects.

(a) County reflects location of reuse project.

Table 6.6* (continued)

Provider	Project Name	Type	County ^(a)	2010	2020	2030	2040	2050	2060
TRA	Joe Pool Lake Indirect Reuse (New WWTP)	indirect	Dallas	0	4,368	4,368	4,368	4,368	4,368
TRA	Ellis County Direct Reuse	direct	Ellis	0	0	0	0	0	2,200
TRA	Freestone County Direct Reuse	indirect	Freestone	0	0	0	0	6,760	6,760
TRA	Kaufman County Direct Reuse	indirect	Kaufman	0	1,000	1,000	1,000	1,000	1,000
TRA	Las Colinas Direct Reuse	direct	Dallas	0	7,000	7,000	7,000	7,000	7,000
TRA	Tarrant and Denton Counties Direct Reuse	direct	Tarrant/ Denton	0	7,500	7,500	7,500	7,500	7,500
TRWD	Trinity River Indirect Reuse - Richland Chambers	indirect	Navarro	0	53,000	53,000	53,000	53,000	53,000
TRWD	Trinity River Indirect Reuse - Cedar Creek	indirect	Henderson/ Kaufman	0	52,500	52,500	52,500	52,500	52,500
UTRWD	Indirect Reuse of Lake Ralph Hall Water	indirect	Fannin	0	6,129	12,258	18,387	18,387	18,387
UTRWD	Direct Reuse	direct	Denton	0	0	560	1,121	2,240	2,240
Wise County Mining Reuse	Wise County Mining Reuse	direct	Wise	0	14,133	22,428	19,652	24,648	28,520
Total				1,937	256,355	274,266	274,645	290,496	298,531

* NOTE: Lists recommended reuse strategies for Region C and does not include existing reuse projects.

(a) County reflects location of reuse project.

Table Q-14
Cost Estimates for New Water Treatment Plants

WUG	Water Management Strategies	County	New MGD	Capital Costs (including engineering, contingencies & interest)					
				2010	2020	2030	2040	2050	2060
Lewisville	New WTP of 10 MGD	Denton	10				\$31,621,000		
Fairfield	New 0.7 MGD WTP on Richland-Chambers Reservoir	Freestone	0.7	Superseded by Q-184			\$6,151,000		
East Cedar Creek FWSD	New WTP of 2 MGD	Henderson	2			\$11,576,000			
Gun Barrel City	New WTP of 2 MGD	Henderson	2		\$11,576,000				
Chatfield WSC - Alternative WMS*	New WTP of 2 MGD on Richland-Chambers Reservoir	Navarro	2		\$4,000,000				
Chatfield WSC - Alternative WMS*	New WTP of 2 MGD on Cedar Creek Reservoir	Navarro	2		\$4,500,000				
M E N WSC - Alternative WMS*	New WTP of 2 MGD on Richland-Chambers Reservoir	Navarro	2		\$4,000,000				
M E N WSC - Alternative WMS*	New WTP of 2 MGD on Cedar Creek Reservoir	Navarro	2		\$4,500,000				
Corsicana**	New WTP of 8 MGD - Lake Halbert/Richland-Chambers (to replace existing 4 MGD WTP)	Navarro	8		\$32,388,000				
Dawson	New WTP of 0.1 MGD on Navarro Mills Reservoir	Navarro	0.1		\$1,044,000				
Walnut Creek SUD	New WTP of 2 MGD	Parker	2			\$11,576,000			
Springtown	New WTP of 1 MGD	Parker	1		\$8,188,000				
Fort Worth	New West WTP 12 MGD	Tarrant	12		\$57,915,000				
Fort Worth	New Southwest WTP 25 MGD	Tarrant	25		\$42,702,000				
Mansfield	New WTP of 15 MGD	Tarrant	15		\$41,080,000				
Azle	New WTP of 3 MGD	Tarrant	3				\$14,964,000		
Bridgeport	New WTP of 2 MGD	Wise	2		\$11,576,000				
Wise County WSD (Decatur)	New WTP of 2 MGD	Wise	2			\$11,576,000			
West Wise SUD	New WTP of 0.5 MGD	Wise	0.5			\$4,871,000			

*Costs provided by WUG's engineer

**See Q-97 for details

Table Q-15 - UPDATED
Water Treatment Plant Expansions

WUG	Water Management Strategies	Number of expansions	County	Each Expansion (MGD)	Capital Costs (including engineering, contingencies & interest)					
					2010	2020	2030	2040	2050	2060
Denton	Ray Roberts WTP Exp. of 30 MGD	2	Denton	30			\$51,111,000		\$51,111,000	
Denton	Ray Roberts WTP Exp. of 20 MGD	2	Denton	20		\$37,367,000		\$37,367,000		
Denton	WTP expansion	2	Denton	25						\$88,478,000
Lewisville	WTP expansion	2	Denton	8	\$19,669,000	\$19,669,000				
Lewisville	New WTP expansion	1	Denton	5						\$14,328,000
Wortham	Plant rehabilitation and upgrades	1	Freestone	1.2	\$4,662,000					
Denison	WTP expansion	1	Grayson	2		\$7,270,000				
East Cedar Creek	WTP expansion	2	Henderson	2		\$7,270,000				\$7,270,000
Athens MWA	WTP expansion	1	Henderson	4						\$12,387,000
Mabank	WTP expansion	1	Kaufman	1			\$4,094,000			
MacBee WSC	WTP expansion	1	Kaufman	2		\$7,270,000				
West Cedar Creek MUD	WTP expansion	2	Kaufman	5			\$14,328,000			\$14,328,000
Corsicana* - Alternative WMS	WTP expansion	1	Navarro	8				\$14,548,000		
Weatherford	WTP expansion	2	Parker	7			\$18,211,000			\$18,211,000
Walnut Creek SUD	WTP expansion	7	Parker	2		\$7,270,000	\$14,540,000	\$14,540,000	\$7,270,000	\$7,270,000
Springtown	WTP expansion	1	Parker	1			\$4,094,000			
Cash SUD	WTP expansion	1	Rockwall	2			\$7,270,000			
Benbrook	WTP expansion	3	Tarrant	1.5		\$5,682,000		\$5,682,000	\$5,682,000	
Fort Worth	Eagle Mountain WTP Expansion of 35 MGD	1	Tarrant	35			\$58,126,000			
Fort Worth	Rolling Hills WTP Expansion	1	Tarrant	50		\$77,883,000				
Fort Worth	WTP expansion	5	Tarrant	50					\$155,766,000	\$233,649,000
Fort Worth	Eagle Mountain WTP Exp. of 70 MGD	1	Tarrant	70				\$103,367,000		
Fort Worth	New West WTP Exp. of 35 MGD	1	Tarrant	35				\$58,126,000		

Table Q-15 – UPDATED, Continued

Fort Worth	New Southwest WTP Exp. of 25 MGD	1	Tarrant	25					\$44,239,000	
Fort Worth	New West WTP Exp. of 23 MGD	1	Tarrant	23				\$41,490,000		
Mansfield	WTP expansion	4	Tarrant	15		\$59,008,000	\$29,504,000	\$29,504,000		\$29,504,000
Azle	WTP expansion	2	Tarrant	3		\$10,446,000			\$10,446,000	
Arlington	WTP expansion	1	Tarrant	32.5				\$54,618,000		
Bridgeport	WTP expansion	2	Wise	2				\$7,270,000		\$7,270,000
Wise County WSD (Decatur)	WTP expansion	2	Wise	2		\$7,270,000		\$7,270,000	\$7,270,000	\$7,270,000
Runaway Bay	WTP expansion	1	Wise	0.5		\$2,735,000				
West Wise SUD	WTP expansion	1	Wise	1						\$4,094,000

*See Q-96 for details

Section 4E and 4F Tables

A number errors or omissions from Tables in Sections 4E and 4F were found. Table 2 outlines the corrections to those tables.

Table 2 – Corrections to Section 4E and 4F Tables in the 2011 Region C Water Plan

WUG or WWP Name	Table in Plan	Strategy	Change				Table for Details
			Quantity (AcFt/Yr)	Capital Costs	Unit Cost w/ debt service (\$/1000 gal)	Unit Cost w/out debt service (\$/1000 gal)	
Grand Prairie	4E.52	Connection to Midlothian					Q-132
Grand Prairie	4E.52	Connection to Mansfield					Q-131
Grand Prairie	4E.52	Connection to Arlington					Q-133
Aledo	4F.288	Fort Worth (TRWD)			\$4.25	\$1.86	Q-214
Alvord	4F.364	West Wise Rural SUD (TRWD)			\$7.02	\$3.17	Q-234
Annetta	4F.288	Weatherford (TRWD)			\$4.12	\$2.76	Q-213
Annetta South	4F.288	Weatherford (TRWD)			\$6.87	\$3.04	Q-213
Aurora	4F.364	Rhome (TRWD through Walnut Creek SUD)			\$5.82	\$3.13	Q-235
Bridgeport	4F.364	Additional TRWD and Pump Station Capacity Increase	2,319	\$6,258,000	\$1.34	\$0.82	Q-236 & Q-237
Bridgeport	4F.364	New Water Treatment Plant		\$11,576,000	\$3.01	\$0.70	Q-14
Carrollton	4F.116	Additional DWU supplies			\$1.02	\$0.94	Q-129
Chico	4F.364	Additional West Wise Rural SUD			\$5.88	\$2.98	Q-238
Decatur	4F.364	Additional Wise County WSD			\$3.50	\$2.67	Q-239
Denton Co Other	4F.116	Additional groundwater			\$5.43	\$1.77	Q-147 & Q-148
Ellis SEP	4F.141	Waxahachie			\$1.50	\$0.78	Q-171
Freestone SEP	4F.172	TRA direct reuse ¹		\$0			None
Irving	4F.77	Oklahoma (Lake Hugo)			\$2.49	\$0.75	Q-137
Lewisville	4F.116	New WTP & Expansions			\$3.47	\$0.70	Q-14 & Q-15
Lewisville	4F.116	Additional DWU supplies			\$1.16	\$0.98	Q-129
Mansfield	4E.56	15 MGD NEW WTP and TRWD Supply			\$1.79		Q-14
New Fairview	4F.364	Rhome (TRWD through Walnut Creek SUD)			\$4.59	\$2.83	Q-240

Newark	4F.364	Rhome (TRWD through Walnut Creek SUD)			\$3.63	\$2.69	Q-241
North Richland Hills	4E.62	Supplemental wells		\$502,000	N/A	N/A	Q-13
Northlake	4F.116	Additional Fort Worth (TRWD) ³		\$3,774,000	\$2.37	\$1.98	Q-150
Ovilla	4F.141	Additional DWU supplies			\$2.82	\$0.88	Q-140
Parker Co Steam Electric	4F.288	Additional Weatherford			\$11.05	\$1.72	Q-217
Red Oak	4F.141	Additional DWU supplies			\$1.74	\$1.27	Q-112
Roanoke	4F.116	Additional Fort Worth			\$2.32	\$2.09	Q-150
Sardis Lone Elm	4F.141	Rockett SUD			\$2.23	\$1.37	Q-141
Springtown	4F.288	Additional TRWD			\$4.49	\$3.79	Q-216
Dallas Co. Irrigation	4F.77	Las Colinas Expansion ¹					
Dallas Co. Steam Electric	4F.77	TRA Reuse ¹					
The Colony	4F.116	Additional DWU supplies			\$1.23	\$1.02	Q-129
Trophy Club	4F.116	Additional Fort Worth (TRWD)			\$2.35	\$2.12	Q-150
Watauga	4F.344	Additional North Richland Hills ²		See North Richland Hills in Section 4E			
West Wise Rural	4F.364	Water Treatment Plant Expansion in 2060			\$2.05	\$0.70	Q-15
West Wise Rural	4F.364	Additional TRWD (New WTP in 2030)			\$4.58	\$0.70	Q-14
Willow Park	4F.288	Weatherford (TRWD)			\$3.69	\$2.70	Q-213
Wise Mining	4F.364	Additional Reuse	17,304				
Wise County SEP	4F.364	Additional TRWD		\$0			
Wise County SEP	4F.364	Reuse from Bridgeport	2,000	\$4,028,000	\$0.81	\$0.36	Q-242

¹Cost was shown under TRA in Table 4E.14 and does not need to be shown for this WUG.

²Cost was shown under North Richland Hills in Table 4E.62 and does not need to be shown for this WUG.

³Strategy was updated since last errata