APPENDIX E

COSTS

Duck River Comperhensive Regional Water Supply Plan
Cost Estimate, Master

Alternative		Proposed Timing	Dams and Reservoirs ($)	Treatment Plants ($)	PS + Intakes ($)	Pipes ($)	Storage Tanks ($)	Transportation ($)	Subtotal ($)	Contingencies (20% of Subtotal) ($)	Total Capital Cost ($)	Regulatory Permitting (% of Total Cap) ($)	Engineering Legal & Admin (20% of Total Cap) ($)	Upfront Capital Cost ($)	Total Project Cost ($)	Cumulative Project Cost ($)
Alternative 2 - Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels (add Alt. #10)																
		2010	0	0	2,000,000	0	0	0	2,000,000	400,000	2,400,000	1,000,000	480,000		**3,880,000**	**3,880,000**
Alterantive 5 - Raise Normandy Reservoir Winter/Spring Pool Level Without Raising Dam																
Raw		2010	0	0	0	0	0	0	0	0	0	1,500,000	0	7,000,000	**8,500,000**	**8,500,000**
Alternative 6 - Modify Normandy Reservoir Flood Rule Curve																
Raw		2010	0	0	0	0	0	0	0	0	0	1,500,000	0		**1,500,000**	**1,500,000**
Alterantive 8 - Modify River Constraints to Preserve Storage in Normandy Reservoir																
Raw		2010	0	0	0	0	0	0	0	0	0	2,000,000	0		**2,000,000**	**2,000,000**
Alternative 9 - Raise Normandy Dam																
Raw		2010	8,030,000	0	0	0	0	11,100,000	19,130,000	3,826,000	22,956,000	1,500,000	4,591,200	260,000	**29,307,200**	**29,307,200**
Alternative 12 - Construct Fountain Creek Reservoir																
Raw		2010	24,000,000	0	9,500,000	13,305,600	0	0	46,805,600	9,361,120	56,166,720	1,500,000	11,233,344		**68,900,064**	**68,900,064**
Alterantive 13 - Construct Fountain Creek Reservoir with Downstream Release																
Raw		2010	24,000,000	0	5,000,000	0	0	0	29,000,000	5,800,000	34,800,000	1,500,000	6,960,000		**43,260,000**	**43,260,000**
Alternative 15 - Build Offstream Storage Reservoir along Duck River (Pond 15)																
Raw		2010	4,296,000	0	9,000,000	9,504,000	0	0	22,800,000	4,560,000	27,360,000	1,000,000	5,472,000	14,000,000	**47,832,000**	**47,832,000**
Alterantive 16 - Utilize Quarries																
Raw		2010	0	0	1,750,000	104,000	0	0	1,854,000	370,800	2,224,800	1,000,000	444,960		**3,669,760**	**3,669,760**
Alternative 17 - Construct Pipeline from Tennessee River																
Raw		2010	0	0	14,600,000	99,792,000	0	0	114,392,000	22,878,400	137,270,400	1,000,000	27,454,080		**165,724,480**	**165,724,480**
Alternative 18 - Construct Pipeline from Tims Ford Reservoir																
Raw		2010	0	0	6,500,000	10,137,600	0	0	16,637,600	3,327,520	19,965,120	1,000,000	3,993,024		**24,958,144**	**24,958,144**
Alterantive 19 - Discharge Arnold Cooling Water to Normandy Reservoir																
Raw		2010	0	0	0	5,702,400	0	0	5,702,400	1,140,480	6,842,880	1,000,000	1,368,576		**9,211,456**	**9,211,456**
Finished		2020	0	6,600,000	0	3,168,000	0	0	9,768,000	1,953,600	11,721,600	234,432	2,344,320		**14,300,352**	**14,300,352**
Alternative 20 - Purchase Water from Nearby Systems																
Raw		2010	0	0	0	0	0	0	0	0	0	0	0		**0**	**0**
Alterantive 22 - Pump Treated Wastewater from Columbia WWTP to Columbia Dam																
Raw		2010	0	0	3,000,000	5,702,400	0	0	8,702,400	1,740,480	10,442,880	1,000,000	2,088,576		**13,531,456**	**13,531,456**
Alternative 24 - Construct New Water Intake for Maury County near Williamsport																
Raw		2010	0	0	9,800,000	16,156,800	0	0	25,956,800	5,191,360	31,148,160	1,000,000	6,229,632		**38,377,792**	**38,377,792**
Finished		2020	0	11,500,000	9,800,000	14,256,000	0	0	35,556,000	7,111,200	42,667,200	1,000,000	8,533,440		**52,200,640**	**52,200,640**
Alternative 25 - Construct New Water Intake near Williamsport and Pump Back to Columbia Dam Pool																
Raw		2010	0	0	9,800,000	28,274,400	0	0	38,074,400	7,614,880	45,689,280	1,000,000	9,137,856		**55,827,136**	**55,827,136**
Alterantive 26 - Construct Infrastructure to Return Treated Water from Tullahoma WWTP to Normandy Reservoir																
Raw		2010	0	3,000,000	1,500,000	5,702,400	0	0	10,202,400	2,040,480	12,242,880	1,500,000	2,448,576		**16,191,456**	**16,191,456**

Alternative		Dams and Reservoirs			
		Unit	Quantity	Unit Cost ($)	Cost ($)
Alternative 2 - Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels (add Alt. #10)					
Phase 1					
Phase 2					
Alterantive 5 - Raise Normandy Reservoir Winter/Spring Pool Level Without Raising Dam					
Phase 1		acres	-	5,000	-
Phase 2					
Alternative 6 - Modify Normandy Reservoir Flood Rule Curve					
Phase 1		acres	-	5,000	-
Phase 2					
Alterantive 8 - Modify River Constraints to Preserve Storage in Normandy Reservoir					
Phase 1					
Phase 2					
Alternative 9 - Raise Normandy Dam					
Phase 1		Lump Sum	1	8,030,000	8,030,000
Phase 2					
Alternative 12 - Construct Fountain Creek Reservoir					
Phase 1		Lump Sum	1	24,000,000	24,000,000
Phase 2					
Alterantive 13 - Construct Fountain Creek Reservoir with Downstream Release					
Phase 1		Lump Sum	1	24,000,000	24,000,000
Phase 2					
Alternative 15 - Build Offstream Storage Reservoir along Duck River (Pond 15)					
Phase 1		Lump Sum	1	4,296,000	4,296,000
Phase 2					
Alterantive 16 - Utilize Quarries					
Phase 1					
Phase 2					
Alternative 17 - Construct Pipeline from Tennessee River					
Phase 1					
Phase 2					
Alternative 18 - Construct Pipeline from Tims Ford Reservoir					
Phase 1					
Phase 2					
Alterantive 19 - Discharge Arnold Cooling Water to Normandy Reservoir					
Phase 1					
Phase 2					
Alternative 20 - Purchase Water from Nearby Systems					
Phase 1					
Phase 2					
Alterantive 22 - Pump Treated Wastewater from Columbia WWTP to Columbia Dam					
Phase 1					
Phase 2					
Alternative 24 - Construct New Water Intake for Maury County near Williamsport					
Phase 1					
Phase 2					
Alternative 25 - Construct New Water Intake near Williamsport and Pump Back to Columbia Dam Pool					
Phase 1					
Phase 2					
Alterantive 26 - Construct Infrastructure to Return Treated Water from Tullahoma WWTP to Normandy Reservoir					
Phase 1					
Phase 2					

Alternative	Description	Treatment Plant				
		Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)
Alternative 2 - Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels (add Alt. #10)						
Phase 1						
Phase 2						
Alternative 5 - Raise Normandy Reservoir Winter/Spring Pool Level Without Raising Dam						
Phase 1						
Phase 2						
Alternative 6 - Modify Normandy Reservoir Flood Rule Curve						
Phase 1						
Phase 2						
Alternative 8 - Modify River Constraints to Preserve Storage in Normandy Reservoir						
Phase 1						
Phase 2						
Alternative 9 - Raise Normandy Dam						
Phase 1						
Phase 2						
Alternative 12 - Construct Fountain Creek Reservoir						
Phase 1						
Phase 2						
Alternative 13 - Construct Fountain Creek Reservoir with Downstream Release						
Phase 1						
Phase 2						
Alternative 15 - Build Offstream Storage Reservoir along Duck River (Pond 15)						
Phase 1						
Phase 2						
Alternative 16 - Utilize Quarries						
Phase 1						
Phase 2						
Alternative 17 - Construct Pipeline from Tennessee River						
Phase 1						
Phase 2						
Alternative 18 - Construct Pipeline from Tims Ford Reservoir						
Phase 1						
Phase 2						
Alternative 19 - Discharge Arnold Cooling Water to Normandy Reservoir						
Phase 1						
Phase 2			Lump Sum	1	6,600,000	6,600,000
Alternative 20 - Purchase Water from Nearby Systems						
Phase 1						
Phase 2						
Alternative 22 - Pump Treated Wastewater from Columbia WWTP to Columbia Dam						
Phase 1			Lump Sum	1	-	-
Phase 2						
Alternative 24 - Construct New Water Intake for Maury County near Williamsport						
Raw						-
Finished			Lump Sum	1	11,500,000	11,500,000
Alternative 25 - Construct New Water Intake near Williamsport and Pump Back to Columbia Dam Pool						
Phase 1						
Phase 2						
Alternative 26 - Construct Infrastructure to Return Treated Water from Tullahoma WWTP to Normandy Reservoir						
Phase 1			Lump Sum	1	3,000,000	3,000,000
Phase 2						

Pumping Stations and Intakes

		River Pumping Station					Reservoir Pumping Station					Miscellaneous Pumping Station					River Intake					Reservoir Intake					Total
Alternative	Description	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Total Cost ($)
Alternative 2 - Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels (add Alt. #10)																											
Phase 1								Lump Sum	1	2,000,000	2,000,000																2,000,000
Phase 2																											-
Alterantive 5 - Raise Normandy Reservoir Winter/Spring Pool Level Without Raising Dam																											
Phase 1																											-
Phase 2																											-
Alterantive 6 - Modify Normandy Reservoir Flood Rule Curve																											
Phase 1																											-
Phase 2																											-
Alterantive 8 - Modify River Constraints to Preserve Storage in Normandy Reservoir																											
Phase 1																											-
Phase 2																											-
Alternative 9 - Raise Normandy Dam																											
Phase 1																											-
Phase 2																											-
Alternative 12 - Construct Fountain Creek Reservoir																											
Phase 1							30	MG	30	150,000	4,500,000											30	Lump Sum	1	5,000,000	5,000,000	9,500,000
Phase 2																											-
Alterantive 13 - Construct Fountain Creek Reservoir with Downstream Release																											
Phase 1																						30	Lump Sum	1	5,000,000	5,000,000	5,000,000
Phase 2																											-
Alternative 15 - Build Offstream Storage Reservoir along Duck River (Pond 15)																											
Phase 1							30	MG	30	150,000	4,500,000	10	MG	10	150,000	1,500,000						30	Lump Sum	1	3,000,000	3,000,000	9,000,000
Phase 2																											-
Alterantive 16 - Utilize Quarries																											
Phase 1		5	MG	5	150,000	750,000											5	Lump Sum	1	1,000,000	1,000,000						1,750,000
Phase 2																											-
Alternative 17 - Construct Pipeline from Tennessee River																											
Phase 1		32	MG	32	150,000	4,800,000						32	MG	32	150,000	4,800,000	32	Lump Sum	1	5,000,000	5,000,000						########
Phase 2																											-
Alternative 18 - Construct Pipeline from Tims Ford Reservoir																											
Phase 1							10	MG	10	150,000	1,500,000											10	Lump Sum	1	5,000,000	5,000,000	6,500,000
Phase 2																											-
Alterantive 19 - Discharge Arnold Cooling Water to Normandy Reservoir																											
Phase 1																											-
Phase 2																											-
Alterantive 20 - Purchase Water from Nearby Systems																											
Phase 1																											-
Phase 2																											-
Alterantive 22 - Pump Treated Wastewater from Columbia WWTP to Columbia Dam																											
Phase 1												20	MG	20	150,000	3,000,000											3,000,000
Phase 2																											-
Alternative 24 - Construct New Water Intake for Maury County near Williamsport																											
Raw		32	MG	32	150,000	4,800,000											32	Lump Sum	1	5,000,000	5,000,000						9,800,000
Finished		32	MG	32	150,000	4,800,000											32	Lump Sum	1	5,000,000	5,000,000						9,800,000
Alternative 25 - Construct New Water Intake near Williamsport and Pump Back to Columbia Dam Pool																											
Phase 1		32	MG	32	150,000	4,800,000											32	Lump Sum	1	5,000,000	5,000,000						9,800,000
Phase 2																											-
Alterantive 26 - Construct Infrastructure to Return Treated Water from Tullahoma WWTP to Normandy Reservoir																											
Phase 1												10	MG	10	150,000	1,500,000											1,500,000
Phase 2																											-

Pipelines

Alternative	Description	Segment 1					Segment 2					Segment 3					Segment 4					Total
		Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Capacity (mgd)	Unit	Quantity	Unit Cost ($)	Cost ($)	Total Cost ($)
Alternative 2 - Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels (add Alt. #10)																						
Phase 1																						-
Phase 2																						-
Alterantive 5 - Raise Normandy Reservoir Winter/Spring Pool Level Without Raising Dam																						
Phase 1																						-
Phase 2																						-
Alterantive 6 - Modify Normandy Reservoir Flood Rule Curve																						
Phase 1																						-
Phase 2																						-
Alterantive 8 - Modify River Constraints to Preserve Storage in Normandy Reservoir																						
Phase 1																						-
Phase 2																						-
Alterantive 9 - Raise Normandy Dam																						
Phase 1																						-
Phase 2																						-
Alterantive 12 - Construct Fountain Creek Reservoir																						
Phase 1		42	ft	42,240	315	########																########
Phase 2																						-
Alterantive 13 - Construct Fountain Creek Reservoir with Downstream Release																						
Phase 1																						-
Phase 2																						-
Alterantive 15 - Build Offstream Storage Reservoir along Duck River (Pond 15)																						
Phase 1		30	ft	52,800	180	9,504,000																9,504,000
Phase 2																						-
Alterantive 16 - Utilize Quarries																						
Phase 1		16	ft	1,300	80	104,000																104,000
Phase 2																						-
Alterantive 17 - Construct Pipeline from Tennessee River																						
Phase 1		42	ft	316,800	315	########																########
Phase 2																						-
Alterantive 18 - Construct Pipeline from Tims Ford Reservoir																						
Phase 1		24	ft	84,480	120	########																########
Phase 2																						-
Alterantive 19 - Discharge Arnold Cooling Water to Normandy Reservoir																						
Raw		24	ft	47,520	120	5,702,400																5,702,400
Finished		24	ft	26,400	120	3,168,000																3,168,000
Alterantive 20 - Purchase Water from Nearby Systems																						
Phase 1																						-
Phase 2																						-
Alterantive 22 - Pump Treated Wastewater from Columbia WWTP to Columbia Dam																						
Phase 1		36	ft	26,400	216	5,702,400																5,702,400
Phase 2																						-
Alterantive 24 - Construct New Water Intake for Maury County near Williamsport																						
Raw		30	ft	89,760	180	########																########
Finished		30	ft	79,200	180	########																########
Alterantive 25 - Construct New Water Intake near Williamsport and Pump Back to Columbia Dam Pool																						
Phase 1		42	ft	89,760	315	########																########
Phase 2																						-
Alterantive 26 - Construct Infrastructure to Return Treated Water from Tullahoma WWTP to Normandy Reservoir																						
Phase 1		24	ft	47,520	120	5,702,400																5,702,400
Phase 2																						-

Alternative	Description	Transportation			
		Unit	Quantity	Unit Cost ($)	Cost ($)
Alternative 2 - Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels (add Alt. #10)					
Phase 1					
Phase 2					
Alterantive 5 - Raise Normandy Reservoir Winter/Spring Pool Level Without Raising Dam					
Phase 1					
Phase 2					
Alterantive 6 - Modify Normandy Reservoir Flood Rule Curve					
Phase 1					
Phase 2					
Alterantive 8 - Modify River Constraints to Preserve Storage in Normandy Reservoir					
Phase 1					
Phase 2					
Alternative 9 - Raise Normandy Dam					
Phase 1		Lump Sum	1	11,100,000	11,100,000
Phase 2					
Alterantive 12 - Construct Fountain Creek Reservoir					
Phase 1					
Phase 2					
Alterantive 13 - Construct Fountain Creek Reservoir with Downstream Release					
Phase 1					
Phase 2					
Alternative 15 - Build Offstream Storage Reservoir along Duck River (Pond 15)					
Phase 1					
Phase 2					
Alterantive 16 - Utilize Quarries					
Phase 1					
Phase 2					
Alterantive 17 - Construct Pipeline from Tennessee River					
Phase 1					
Phase 2					
Alterantive 18 - Construct Pipeline from Tims Ford Reservoir					
Phase 1					
Phase 2					
Alterantive 19 - Discharge Arnold Cooling Water to Normandy Reservoir					
Phase 1					
Phase 2					
Alterantive 20 - Purchase Water from Nearby Systems					
Phase 1					
Phase 2					
Alterantive 22 - Pump Treated Wastewater from Columbia WWTP to Columbia Dam					
Phase 1					
Phase 2					
Alterantive 24 - Construct New Water Intake for Maury County near Williamsport					
Phase 1					
Phase 2					
Alterantive 25 - Construct New Water Intake near Williamsport and Pump Back to Columbia Dam Pool					
Phase 1					
Phase 2					
Alterantive 26 - Construct Infrastructure to Return Treated Water from Tullahoma WWTP to Normandy Reservoir					
Phase 1					
Phase 2					