

Appendix E: Alternatives Analysis Project Cost Opinions

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin
Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Alternative 1: Surface Water, Purchase Finished Water from Raleigh Water
Implementation Schedule: 20 to 30 years, use 20 years for start of construction

2044

Improvement	Quantity	Unit	Estimated Construction Cost 2024\$	Estimated Project Cost 2024\$	Estimated Project Cost in 2044\$	Comments
New reservoir on Middle Creek (Town funds 50% of reservoir)						
Property acquisition	1,100	acres		\$ 44,000,000	\$ 52,051,500	\$40,000 per acre (some properties have structures), includes administrative and technical costs
Dam and Foundation	1	LS	\$ 20,975,747	\$ 31,359,000	\$ 37,097,500	\$13.6M escalated from Raleigh Water Little River EIS Middle Creek alternative
Clearing and Grubbing	914	acres	\$ 26,231,800	\$ 39,217,000	\$ 46,393,000	\$28,700/acre from Johnston County 210 WWTF Schedule of Values (\$172,000 for 6 acres)
Wetland and Stream Mitigation	1	LS		\$ 25,999,100	\$ 30,756,500	From EIS Section 5
New Bridge over HW 42	1	LS	\$ 6,500,000	\$ 9,718,000	\$ 11,496,500	Estimated from NCDOT data
New raw water intake and pump station (22.6 mgd) (Town funds 50%)	1	LS	\$ 13,786,000	\$ 20,610,000	\$ 24,381,500	Unit costs based on Sanford Design
New raw water transmission main, 7.14 miles (Town funds 50%)	37,699	feet	\$ 40,715,136	\$ 60,869,000	\$ 72,007,000	36-inch diameter
Expansion of Dempsey E. Benton WTP, 20 to 42.6 mgd (Town funds 50%)	1	LS		\$ 316,400,000	\$ 374,297,000	Includes property acquisition and engineering
New finished water transmission main, 9.41 miles	49,685	feet	\$ 44,716,320	\$ 66,851,000	\$ 158,168,000	30-inch diameter
New booster pump station	1	LS	\$ 3,250,000	\$ 4,859,000	\$ 11,496,000	Estimated from Sanford Conveyance
New elevated water tank	1	LS	\$ 5,000,000	\$ 7,475,000	\$ 17,686,000	1 MG
Instream Flow Study (Town funds 50%)	1	LS		\$ -	\$ 1,000,000	From EIS Section 1.5
				\$ -	\$ -	
				\$ -	\$ -	
				\$ -	\$ -	
				\$ -	\$ -	
TOTAL			\$ 161,200,000	\$ 627,400,000	\$ 836,800,000	

Notes:
Contingency per AACE Class 5 estimate 30%
Engineering Factor (Design and Construction Phase Services) 15%

Escalation
Baseline year 2024
Planning year end 2044
Number of years 20
Interest Rate, 30 years 4.40% EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation 2.366 (F/P, i%, n) = (1 + i%)^n

Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

2034

Notes:
Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Baseline year
Planning year end
Number of years

Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.538	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin
Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Alternative 3:	Surface Water, Town of Fuquay-Varina Independent Water Supply in Neuse River Basin
Implementation Schedule:	20 to 30 years, use 20 years for start of construction

2044

			Estimated	Estimated	Estimated	
Improvement	Quantity	Unit	Construction Cost 2024\$	Project Cost 2024\$	Project Cost in 2044\$	Comments
New reservoir on Middle Creek						
Property acquisition	679	acres		\$ 27,140,000	\$ 64,213,000	\$40,000 per acre (some properties have structures), includes administrative and technical costs
Dam and Foundation	1	LS	\$ 20,975,747	\$ 31,359,000	\$ 74,195,000	\$13.6M escalated from Raleigh Water Little River EIS Middle Creek alternative
Clearing and Grubbing	334	acres	\$ 9,585,800	\$ 14,331,000	\$ 33,907,000	\$28,700/acre from Johnston County 210 WWTF Schedule of Values (\$172,000 for 6 acres)
Wetland and Stream Mitigation	1	LS		\$ 14,627,600	\$ 34,609,000	From EIS Section 5
New Bridge over HW 42	1	LS	\$ 10,900,000	\$ 16,296,000	\$ 38,556,000	Estimated from NCDOT data
New raw water intake and pump station (13 mgd)	1	LS	\$ 7,930,000	\$ 11,855,000	\$ 28,049,000	Unit costs based on Sanford WTP Design
New raw water transmission line, 1.78 miles	9,398	feet	\$ 8,458,560	\$ 8,459,000	\$ 20,014,000	30-inch dia
New WTP (Town of Fuquay-Varina), 13 mgd	1	LS		\$ 182,000,000	\$ 430,607,000	Includes property acquisition and engineering
New finished water transmission main, 4.51 miles	23,813	feet	\$ 21,431,520	\$ 32,040,000	\$ 75,806,000	30-inch dia
Instream Flow Study	1	LS		\$ -	\$ 2,000,000	From EIS Section 1.5
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TOTAL			\$ 79,300,000	\$ 338,100,000	\$ 802,000,000	

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Escalation

Baseline year	2024	
Planning year end	2044	
Number of years	20	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	2.366	$(F/P, i\%, n) = (1 + i\%)^n$

Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Notes:
Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Baseline year
Planning year end
Number of years

Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.295	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin

Alternative 5: Surface Water, Purchase Finished Water from Harnett County
Implementation Schedule: 5 to 8 years (use 6 years)

			Estimated	Estimated	Estimated	
Improvement	Quantity	Unit	Construction Cost 2024\$	Project Cost 2024\$	Project Cost in 2030\$	Comments
New finished water transmission main, 13.3 miles	70,224	feet	\$ 63,201,600	\$ 94,486,000	\$ 122,341,000	30-inch dia
Expansion of raw water pump station and intake (42 to 55 mgd)	1	LS	\$ 7,930,000	\$ 11,855,000	\$ 15,350,000	Unit costs based on Sanford WTP Design
Expansion of Harnett County Regional WTP (42 to 55 mgd)	1	LS		\$ 182,000,000	\$ 235,654,000	Includes property acquisition and engineering
Instream Flow Study	1	LS		\$ -	\$ 2,000,000	From EIS Section 1.5
Wetland and Stream Mitigation	1	LS		\$ 133,300	\$ 173,000	From EIS Section 5
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				\$ -	\$ -	
TOTAL			\$ 71,100,000	\$ 288,500,000	\$ 375,500,000	

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Escalation

Baseline year	2024	
Planning year end	2030	
Number of years	6	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.295	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin

Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Alternative 6: Surface Water, Raw Water from Jordan Lake (Cary/Apex)
Implementation Schedule: 10 years

2034

			Estimated	Estimated	Estimated	
Improvement	Quantity	Unit	Construction Cost 2024\$	Project Cost 2024\$	Project Cost in 2034\$	Comments
New raw water intake and pump station	1	LS	\$ 7,930,000	\$ 11,855,000	\$ 18,235,000	Unit costs based on Sanford WTP Design
New raw water transmission main, 17.5 miles	92,400	feet	\$ 83,160,000	\$ 124,324,000	\$ 191,232,000	30-inch dia
New booster pump station	1	LS	\$ 3,250,000	\$ 4,859,000	\$ 7,474,000	Estimated from Sanford Conveyance
New WTP (Town of Fuquay-Varina), 13 mgd	1	LS		\$ 182,000,000	\$ 279,947,000	Includes property acquisition and engineering
Wetland and Stream Mitigation	1	LS		\$ 106,600	\$ 164,000	From EIS Section 5
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				\$ -	\$ -	
TOTAL			\$ 94,300,000	\$ 323,100,000	\$ 497,100,000	

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Escalation

Baseline year	2024	
Planning year end	2034	
Number of years	10	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.538	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin
Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Alternative 7: Surface Water, Raw Water from Jordan Lake (Western Intake Partnership)
Implementation Schedule: 10 years

Improvement	Quantity	Unit	Estimated Construction Cost 2024\$	Estimated Project Cost 2024\$	Estimated Project Cost in 2034\$	Comments
New raw water intake and pump station	1	LS	\$ 7,930,000	\$ 11,855,000	\$ 18,235,000	Unit costs based on Sanford WTP Design
New raw water transmission main, 23.72 miles	125,136	feet	\$ 112,622,400	\$ 168,370,000	\$ 258,982,000	30-inch dia
New booster pump station	1	LS	\$ 3,250,000	\$ 4,859,000	\$ 7,474,000	Estimated from Sanford Conveyance
New WTP (Town of Fuquay-Varina), 13 mgd	1	LS		\$ 182,000,000	\$ 279,947,000	Includes property acquisition and engineering
Wetland and Stream Mitigation	1	LS		\$ 266,500	\$ 410,000	From EIS Section 5
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TOTAL			\$ 123,800,000	\$ 367,400,000	\$ 565,000,000	

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Escalation

Baseline year	2024	
Planning year end	2034	
Number of years	10	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.53%	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin

Alternative 8A:	Surface Water, Town of Fuquay-Varina Intake on the Cape Fear River with Return of Water to Cape Fear River Basin (Cape Fear)	
Implementation Schedule:	10 years	2034

			Estimated	Estimated	Estimated	
Improvement	Quantity	Unit	Construction Cost 2024\$	Project Cost 2024\$	Project Cost in 2034\$	Comments
New raw water intake and pump station	1	LS	\$ 7,930,000	\$ 11,855,000	\$ 18,235,000	Unit costs based on Sanford WTP Design
New raw water transmission main, 11.79 miles	62,251	feet	\$ 56,026,080	\$ 83,759,000	\$ 128,836,000	30-inch dia
New WTP (Town of Fuquay-Varina), 13 mgd	1	LS	\$	\$ 182,000,000	\$ 279,947,000	Includes property acquisition and engineering
Effluent Pump Station at Terrible Creek WWTP	1	LS	\$ 3,600,000	\$ 5,382,000	\$ 8,278,000	Planning level unit cost \$0.50/gallon
New disinfection facility (chlor and dechlor)	1	LS	\$ 6,000,000	\$ 8,970,000	\$ 13,797,000	From Johnston County Schedule of Values, includes bonds, insurance, general conditions, escalation, etc.
New effluent force main to Cape Fear River, 19 miles	100,320	feet	\$ 90,288,000	\$ 134,981,000	\$ 207,624,000	30-inch dia
Water quality modeling in Cape Fear Basin	1	LS	\$	\$ -	\$ 500,000	
Instream Flow Study	1	LS	\$	\$ -	\$ 2,000,000	From EIS Section 1.5
Wetland and Stream Mitigation	1	LS	\$	\$ 586,400	\$ 902,000	From EIS Section 5
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			\$	\$ -	\$ -	
			\$	\$ -	\$ -	
TOTAL			\$ 163,800,000	\$ 427,500,000	\$ 660,100,000	

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Escalation

Baseline year	2024	
Planning year end	2034	
Number of years	10	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.538	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin

Alternative 8B:	Surface Water, Town of Fuquay-Varina Intake on the Cape Fear River with Return of Water to Cape Fear River Basin (Kenneth Creek)	
Implementation Schedule:	10 years	2034

			Estimated	Estimated	Estimated	
Improvement	Quantity	Unit	Construction Cost 2024\$	Project Cost 2024\$	Project Cost in 2034\$	Comments
New raw water intake and pump station	1	LS	\$ 7,930,000	\$ 11,855,000	\$ 18,235,000	Unit costs based on Sanford WTP Design
New raw water transmission main, 11.79 miles	62,251	feet	\$ 56,026,080	\$ 83,759,000	\$ 128,836,000	30-inch dia
New WTP (Town of Fuquay-Varina), 13 mgd	1	LS		\$ 182,000,000	\$ 279,947,000	Includes property acquisition and engineering
Effluent Pump Station at Terrible Creek WWTP	1	LS	\$ 3,600,000	\$ 5,382,000	\$ 8,278,000	Planning level unit cost \$0.50/gallon
New disinfection facility (chlor and dechlor)	1	LS	\$ 6,000,000	\$ 8,970,000	\$ 13,797,000	From Johnston County Schedule of Values, includes bonds, insurance, general conditions, escalation, etc.
New effluent force main to Kenneth Creek (6.5 miles)	34,320	feet	\$ 30,888,000	\$ 46,178,000	\$ 71,030,000	30-inch dia
Water quality modeling in Cape Fear Basin	1	LS		\$ -	\$ 500,000	
Instream Flow Study	1	LS		\$ -	\$ 1,500,000	From EIS Section 1.5
Wetland and Stream Mitigation	1	LS		\$ 453,100	\$ 697,000	From EIS Section 5
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				\$ -	\$ -	
TOTAL			\$ 104,400,000	\$ 338,600,000	\$ 522,800,000	

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

30%
15%

\$	1,014,184
\$	1,103,004

Escalation

Baseline year
Planning year end
Number of years
Interest Rate, 30 y
Escalation

2024
2034
10

4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
1.538	$(F/P, i\%, n) = (1 + i\%)^n$

Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

2024

Escalation		
Baseline year	2024	
Planning year end	2024	
Number of years	0	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.000	$(F/P, i\%, n) = (1 + i\%)^n$

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin
Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Alternative 9C: Surface Water, Purchase Finished Water from City of Sanford with Return of Water to Cape Fear River
Implementation Schedule: 10 years 2034

[illegible]

Notes:

Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Escalation

Baseline year	2024	
Planning year end	2034	
Number of years	10	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.538	(F/P, i%, n) = (1 + i%) ⁿ

Environmental Impact Statement: IBT Cape Fear River Basin to Neuse River Basin

Alternative 9D:	Surface Water, Purchase Finished Water from City of Sanford with Return of Water to Cape Fear River via Western Wake Regional WRF	
Implementation Schedule:	5 to 8 years (use 6 years)	2030

[illegible]

Notes:

Contingency per AACE Class 5 estimate	30%	Association for the Advancement of Cost Engineering International for a Class 5 level of estimation (concept screening with capacity factors), +100 percent to -50 percent
Engineering Factor (Design and Construction Phase Services)	15%	

Escalation

Baseline year	2024	
Planning year end	2030	
Number of years	6	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.295	$(F/P, i\%, n) = (1 + i\%)^n$

Opinion of Probable Construction and Project Costs - Conceptual Level Estimate

Implementation Schedule: 100 wells by 2036; 200 wells by 2046; 362 wells by 2056

Improvement	Quantity	Unit	Estimated Construction Cost 2024\$	Estimated Project Cost 2024\$	Estimated Project Cost		Comments
388 wells total. Assume 100 wells by 2035	100	each	\$ 25,000,000	\$ 37,375,000	\$ 62,660,000		\$250k per well (easements, well house, pipe, GW yield study, etc.)
388 wells total. Assume 200 wells by 2045	100	each	\$ 25,000,000	\$ 37,375,000	\$ 96,381,000		\$250k per well (easements, well house, pipe, GW yield study, etc.)
388 wells total. Assume all 388 wells by 2055	162	each	\$ 40,500,000	\$ 60,548,000	\$ 240,168,000		\$250k per well (easements, well house, pipe, GW yield study, etc.)
New WTP (Town of Fuquay-Varina), 13 mgd	1	LS		\$ 182,000,000	\$ 305,125,000		Includes property acquisition and engineering
Raw water transmission main	211,200	feet	\$ 76,032,000	\$ 113,668,000	\$ 190,565,000		Assume 40 miles of pipe network, 12-inch dia
Wetland and Stream Mitigation	1	LS		\$ 1,000,000	\$ 2,579,000		Estimate based on other alternatives, used 2045 as planning year
				\$ -	\$ -		-
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TOTAL			\$ 166,500,000	\$ 432,000,000	\$ 897,500,000		

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Contingency per AACE Class 5 estimate
Engineering Factor (Design and Construction Phase Services)

Baseline year

Baseline year	2024	
Planning year end	2036	
Number of years	12	
Interest Rate	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	1.677	$(F/P, i\%, n) = (1 + i\%)^n$

Baseline year

Baseline year	2024	
Planning year end	2046	
Number of years	22	
Interest Rate, 30 years	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	2.57%	$(F/P, i\%, n) = (1 + i\%)^n$

Baseline year

Baseline year	2024	
Planning year end	2056	
Number of years	32	
Interest Rate	4.40%	EPA 2025 Nominal Interest Rates Circular A-94 (M-25-08)
Escalation	3.967	$(F/P, i\%, n) = (1 + i\%)^n$