

**Summary Cost Estimates
Waukesha Supply and Return Alternatives**

	2013 Costs				
	Capital Cost(1)	O&M \$/yr.(2)	20-Year Present Worth(3)	50-Year Present Worth(3)	
Alternative 1 - Deep and Shallow Aquifers	\$211,000,000	\$7,200,000	\$294,000,000	\$325,000,000	
Alternative 2 - Lake Michigan Supply from Oak Creek and Root River Return (corridor sharing with Root River return flow)	\$205,000,000	\$8,000,000	\$298,000,000	\$333,000,000	
Alternative 3 - Shallow Aquifers and Fox River Alluvium	\$217,000,000	\$8,900,000	\$320,000,000	\$358,000,000	
Alternative 4 - Shallow Aquifers and Lake Michigan Supply from Oak Creek and Root River Return (corridor sharing with Root River return flow)	\$301,000,000	\$8,200,000	\$396,000,000	\$431,000,000	
Alternative 5 - Unconfined Deep Aquifers	\$234,000,000	\$6,400,000	\$308,000,000	\$335,000,000	
Alternative 6 - Multiple Sources	\$323,000,000	\$7,300,000	\$407,000,000	\$439,000,000	

Notes

- 1 Some capital costs generated by scaling previous estimates to ENR Index June 2013 dollars. Capital costs June 2013 construction start.
- 2 15.7 mgd supply capacity, 10.1 mgd average capacity, 11.7 mgd average return flow.
- 3 Interest rate = 6%

Alternative 1 - Deep and Shallow Wells

Capital Cost

	Quantity	Unit Cost	Total
Shallow Aquifer Wellfield			<i>2013 Costs</i>
Well houses and pumps	12	\$ 334,500	\$ 4,014,000
Land, acres	12	\$ 178,416	\$ 2,141,000
Roads, ft	30,000	\$ 27.9	\$ 837,000
Interconnecting pipe, 8" to 20", ft	30,000	\$ 185	\$ 5,535,000
Electrical (10% of well houses, pumps, land)			\$ 616,000
Shallow Aquifer Supply Pipeline to Waukesha			
11 mi of 24" pipe, mixed rural and urban, ft	58,080	\$ 357	\$ 20,707,000
Shallow Aquifer Treatment Plant and Pump Station			
One groundwater treatment plant @ 16.7 mgd	16,700,000	\$ 1.59	\$ 26,553,000
Land	1	\$ 2,230,000	\$ 2,230,000
Deep Well Treatment Plant			
3 RO plants for Wells 6,8,10 @ 5.35 mgd including land built in 2020	5,350,000	\$ 4.57	\$ 24,460,000
Distribution System Improvements			
4.3 mi of 16", 24", and 30" pipes	22,500	\$ 413	\$ 9,289,000
5.1 mi of 16" pipe for blending, ft	26,928	\$ 323	\$ 8,698,000
Wastewater Forcemain			
5 mi of 6" forcemain, ft	26,400	\$ 141	\$ 3,715,000
Subtotal			\$ 108,795,000
3% markup for Bonds & Insurance			\$3,264,000
5% markup for Mob/Demob			\$5,440,000
8% markup for Contractors Overhead			\$9,400,000
4% markup for Contractors profit			\$4,700,000
25% Contingency			\$32,900,000
Subtotal Markups and Contingency			\$ 55,704,000
Total Project Construction Costs			\$ 164,499,000
8% allowance for engineering and design			\$13,160,000
12% allowance for permitting, legal and admin.			\$19,740,000
8% allowance for engr services during construction			\$13,160,000
Subtotal Other Project Costs			\$46,060,000
TOTAL PROJECT CAPITAL COST			\$ 210,560,000

Alternative 1 - Deep and Shallow Wells

Operating and Maintenance Cost

Source of Supply	Units	Quantity	Unit Cost	\$/yr	Total
Deep Well pumping/maintenance	\$/1000 gal	1,642,500	\$ 0.350	\$ 574,875	
Shallow Well Pumping/Maintenance	\$/1000 gal	2,044,000	\$ 0.140	\$ 286,160	
					\$ 861,000
Treatment/Pumping					
Deep Wells 6,7,8 starting in 2020	\$/1000 gal	821,250	\$ 0.61	\$ 500,963	
Shallow Wells	\$/1000 gal	2,044,000	\$ 1.09	\$ 2,225,916	
Residuals	\$/1000 gal	164,068	\$ 4	\$ 656,270	
					\$ 3,383,000
Home Softening					
Salt/Equipment/Replacment	\$/customer/yr	13,683	\$ 209	\$ 2,859,747	
					\$ 2,860,000
Transmission					
Operation and Maintenance	\$/ft/yr	137,280	\$ 0.52	\$ 71,386	
					\$ 71,386
Alternative 1 Total O&M (\$/yr.)					\$ 7,200,000

PRESENT WORTH (6%, 20 yrs)	\$ 83,000,000
PRESENT WORTH (6%, 50 yrs)	\$ 113,000,000
Total Present Worth (6%, 20 years)	\$ 293,560,000
Total Present Worth (6%, 50 years)	\$ 323,560,000

Alternative 2 - Lake Michigan Supply

From Oak Creek. Return to Root River.

Capital Cost

	Quantity	Unit Cost	Total
Lake Michigan Supply Pump Station (27th and Puetz Rd)			
16.7 mgd	1	\$ 8,830,125	\$ 8,831,000
Lake Michigan Supply Pipeline			
19 miles of 30"	100,320	\$ 429	\$ 43,084,000
Return Pump Station and Pipeline to Root River (60th and Oakwood)			
16.7 mgd	1	\$ 9,042,000	\$ 9,042,000
20.1 miles of 30"	106,128	\$ 382	\$ 40,578,000
Distribution System Improvements			
5 mi of 24" pipes	24,800	\$ 206	\$ 5,109,000
Subtotal			\$ 106,644,000
3% markup for Bonds & Insurance			\$3,200,000
5% markup for Mob/Demob			\$5,333,000
8% markup for Contractors Overhead			\$9,215,000
4% markup for Contractors profit			\$4,608,000
25% Contingency			\$32,250,000
Subtotal Markups and Contingency			\$ 54,606,000
Total Project Construction Costs			\$ 161,250,000
8% allowance for engineering and design			\$12,900,000
12% allowance for permitting, legal and admin.			\$19,350,000
8% allowance for engr services during construction			\$12,900,000
Subtotal Other Project Costs			\$45,150,000
TOTAL PROJECT CAPITAL COST			\$ 206,400,000

Alternative 2 - Lake Michigan Supply

Operating and Maintenance Cost

Source of Supply	Units	Quantity	Unit Cost	Ext. Cost	Total
Purchased water	\$/1000 gal	3,686,500	\$ 1.830	\$ 6,746,295	
					\$ 6,746,000
Treatment/Pumping					
Lake Michigan Pumping Energy	\$/kWh	6,176.619	\$ 0.06	\$ 370,597	
Lake Michigan Pump Station O&M	%	\$ 8,831,000	2%	\$ 176,620	
Return Flow Pumping Energy	\$/kWh	7,280.875	\$ 0.06	\$ 436,852	
Return Flow Pump Station O&M	%	\$ 9,042,000	2%	\$ 180,840	
					\$ 1,165,000
Transmission					
Operation and Maintenance	\$/ft/yr	142,560	\$ 0.52	\$ 74,131	
					\$ 74,131
Alternative 1 Total O&M (\$/yr.)					\$ 8,000,000

PRESENT WORTH (6%, 20 yrs)	\$ 92,000,000
PRESENT WORTH (6%, 50 yrs)	\$ 126,000,000
Total Present Worth (6%, 20 years)	\$ 298,400,000
Total Present Worth (6%, 50 years)	\$ 332,400,000

Alternative 3 - Fox Alluvium and Shallow Aquifer

Capital Cost

	Quantity	Unit Cost	Total
Shallow Aquifer Wellfield			
Well houses and pumps	12	\$ 334,500	\$ 4,014,000
Land, acres	12	\$ 178,416	\$ 2,141,000
Roads, ft	30,000	\$ 27.9	\$ 837,000
Interconnecting pipe, 8" to 20", ft	30,000	\$ 185	\$ 5,535,000
Electrical (10% of well houses, pumps, land)	\$ 6,155,000	10%	\$ 616,000
Fox River Alluvium Wellfield			
Well houses and pumps	\$ 4	\$ 805,000	\$ 3,220,000
Land, acres	\$ 4	\$ 276,000	\$ 1,104,000
Roads, ft	4,800	\$ 27.9	\$ 128,340
Interconnecting pipe, 12" to 10", ft	4,000	\$ 172	\$ 791,200
Electrical (10% of well houses, pumps, land)	\$ 4,324,000	10%	\$ 432,000
Treatment Plant and Pump Station			
One lime softening surface water treatment plant @ 16.7 mgd	16,700,000	\$ 4.20	\$ 70,140,000
Distribution System Improvements			
7 mi of 16", 20", 24", and 30" pipes	36,800	\$ 525	\$ 19,320,000
Wastewater Forcemain			
5 mi of 6" forcemain, ft	26,400	\$ 141	\$ 3,715,000
Subtotal			\$ 111,993,540
3% markup for Bonds & Insurance			\$3,360,000
5% markup for Mob/Demob			\$5,600,000
8% markup for Contractors Overhead			\$9,677,000
4% markup for Contractors profit			\$4,839,000
25% Contingency			\$33,868,000
Subtotal Markups and Contingency			\$ 57,344,000
Total Project Construction Costs			\$ 169,337,540
8% allowance for engineering and design			\$13,548,000
12% allowance for permitting, legal and admin.			\$20,321,000
8% allowance for engr services during construction			\$13,548,000
Subtotal Other Project Costs			\$47,417,000
TOTAL PROJECT CAPITAL COST			\$ 216,750,000

Alternative 3 - Fox Alluvium and Shallow Aquifer

Operating and Maintenance Cost

Source of Supply	Units	Quantity	Unit Cost	\$/yr	Total
Wells Pumping/Maintenance	\$/1000 gal	3,686,500	\$ 0.140	\$ 516,110	
					\$ 516,000
Treatment/Pumping					
Lime Softening Water Treatment Plant	\$/1000 gal	3,686,500	\$ 2.17	\$ 7,999,705	
Residuals	\$/1000 gal	73,730	\$ 4	\$ 294,920	
					\$ 8,295,000
Transmission					
Operation and Maintenance	\$/ft/yr	108,281	\$ 0.52	\$ 56,306	
					\$ 56,306
Alternative 1 Total O&M (\$/yr.)					\$ 8,900,000

PRESENT WORTH (6%, 20 yrs)	\$ 102,000,000
PRESENT WORTH (6%, 50 yrs)	\$ 140,000,000
Total Present Worth (6%, 20 years)	\$ 318,750,000
Total Present Worth (6%, 50 years)	\$ 356,750,000

Alternative 4 - Lake Michigan and Shallow wells

Capitai Cost

	Quantity	Unit Cost	Total
Shallow Aquifer Wellfield			<i>2013 Costs</i>
Well houses and pumps	12	\$ 334,500	\$ 4,014,000
Land, acres	12	\$ 178,416	\$ 2,141,000
Roads, ft	30,000	\$ 27.9	\$ 837,000
Interconnecting pipe, 8" to 20", ft	30,000	\$ 185	\$ 5,535,000
Electrical (10% of well houses, pumps, land)	\$ 6,155,000.00	10%	\$ 616,000
Shallow Aquifer Supply Pipeline to Waukesha			
11 mi of 24" pipe	58,080	\$ 357	\$ 20,707,000
Shallow Aquifer Treatment Plant and Pump Station			
One groundwater treatment plant @ 16.7 mgd	16,700,000	\$ 1.59	\$ 26,553,000
Land	1	\$ 2,230,000	\$ 2,230,000
Lake Michigan Supply Pump Station (27th and Puetz Rd)			
7.6 mgd	1	\$ 4,971,000	\$ 4,971,000
Lake Michigan Supply Pipeline			
19 miles of 24"	100,320	\$ 357	\$ 35,766,000
Return Pump Station and Pipeline to Root River (60th and Oakwood)			
7.6 mgd	1	\$ 5,341,000	\$ 5,341,000
20.1 miles of 24"	106,128	\$ 318	\$ 33,749,000
Distribution System Improvements			
4.3 mi of 16", 24", and 30" pipes	22,500	\$ 413	\$ 9,289,000
Wastewater Forcemain			
5 mi of 6" forcemain, ft	26,400	\$ 141	\$ 3,715,000
Subtotal			\$ 155,464,000
3% markup for Bonds & Insurance			\$4,664,000
5% markup for Mob/Demob			\$7,774,000
8% markup for Contractors Overhead			\$13,433,000
4% markup for Contractors profit			\$6,717,000
25% Contingency			\$47,013,000
Subtotal Markups and Contingency			\$ 79,601,000
Total Project Construction Costs			\$ 235,065,000
8% allowance for engineering and design			\$18,800,000
12% allowance for permitting, legal and admin.			\$28,208,000
8% allowance for engr services during construction			\$18,806,000
Subtotal Other Project Costs			\$65,820,000
TOTAL PROJECT CAPITAL COST			\$ 300,890,000

Alternative 4 - Lake Michigan and Shallow wells

Operating and Maintenance Cost

Source of Supply	Units	Quantity	Unit Cost	Ext. Cost	Total
Purchased water	\$/1000 gal	1,642,500	\$ 1.830	\$ 3,005,775	
Shallow Well Pumping/Maintenance	\$/1000 gal	2,044,000	\$ 0.140	\$ 286,160	
					\$ 3,292,000
Treatment/Pumping					
Lake Michigan Pumping Energy	\$/kWh	1,536,853	\$ 0.06	\$ 92,211	
Shallow Wells Pumping Energy	\$/1000 gal	2,044,000	\$ 1.09	\$ 2,225,916	
Residuals	\$/1000 gal	186,150	\$ 4.00	\$ 744,600	
Return Flow Pumping Energy	\$/kWh	947,652	\$ 0.06	\$ 56,859	
Lake Michigan Pump Station O&M	%	\$ 4,971,000	2%	\$ 99,420	
Return Flow Pump Station O&M	%	\$ 5,341,000	2%	\$ 106,820	
					\$ 3,326,000
Home Softening					
Salt/Equipment/Replacement	\$/customer/yr	13,683	\$ 116	\$ 1,585,602	
					\$ 1,586,000
Transmission					
Operation and Maintenance	\$/ft/yr	137,280	\$ 0.52	\$ 71,386	
					\$ 71,386
Alternative 1 Total O&M (\$/yr.)					\$ 8,300,000

PRESENT WORTH (6%, 20 yrs)	\$ 95,000,000
PRESENT WORTH (6%, 50 yrs)	\$ 131,000,000
Total Present Worth (6%, 20 years)	\$ 395,890,000
Total Present Worth (6%, 50 years)	\$ 431,890,000

Alternative 5 - Unconfined Deep Aquifer

Capital Cost

	Quantity	Unit Cost	Total
Unconfined Deep Aquifer Wellfield			2013 Costs
New wells @ 1.5 mgd each	12	\$ 557,500	\$ 6,690,000
Well houses and pumps	12	\$ 334,500	\$ 4,014,000
Land	12	\$ 334,500	\$ 4,014,000
Roads, ft	47,520	\$ 27.9	\$ 1,324,620
Interconnecting pipe, 12" to 24", ft	47,520	\$ 167	\$ 7,947,720
Electrical (10% of well houses, pumps, and land)	14,718,000	10%	\$ 1,471,800
Unconfined Deep Aquifer Supply Pipeline to Waukesha			
15 miles 36", rural	79,200	\$ 390	\$ 30,907,800
5 miles 36", urban	26,400	\$ 669	\$ 17,661,600
Unconfined Deep Aquifer Treatment Plant and Pump Station			
One @ 16.7 mgd	16,700,000	\$ 1.95	\$ 32,585,875
Land	1	\$ 1,115,000	\$ 1,115,000
Distribution System Improvements			
4.3 mi of 16", 24", and 30" pipes	22,500	\$ 413	\$ 9,289,000
Wastewater Forcemain			
5 mi of 6" forcemain, ft	26,400	\$ 141	\$ 3,715,000
Subtotal			\$ 120,736,415
3% markup for Bonds & Insurance			\$3,623,000
5% markup for Mob/Demob			\$6,037,000
8% markup for Contractors Overhead			\$10,432,000
4% markup for Contractors profit			\$5,216,000
25% Contingency			\$36,512,000
Subtotal Markups and Contingency			\$ 61,820,000
Total Project Construction Costs			\$ 182,556,415
8% allowance for engineering and design			\$14,605,000
12% allowance for permitting, legal and admin.			\$21,907,000
8% allowance for engr services during construction			\$14,605,000
Subtotal Other Project Costs			\$51,117,000
TOTAL PROJECT CAPITAL COST			\$ 233,670,000

Alternative 5 - Unconfined Deep Aquifer

Operating and Maintenance Cost

Source of Supply	Units	Quantity	Unit Cost	\$/yr	Total
Wells Pumping/Maintenance	\$/1000 gal	3,686,500	\$ 0.350	\$ 1,290,275	\$ 1,290,000
Treatment/Pumping					
Groundwater Water Treatment Plant	\$/1000 gal	3,686,500	\$ 0.50	\$ 1,843,250	
Residuals	\$/1000 gal	73,730	\$ 4	\$ 294,920	\$ 2,138,000
Home Softening					
Salt/Equipment/Replacment	\$/customer/yr	13,683	\$ 209	\$ 2,859,747	\$ 2,860,000
Transmission					
Operation and Maintenance	\$/ft/yr	137,280	\$ 0.52	\$ 71,386	\$ 71,386
Alternative 1 Total O&M (\$/yr.)					\$ 6,400,000

PRESENT WORTH (6%, 20 yrs)	\$ 73,000,000
PRESENT WORTH (6%, 50 yrs)	\$ 101,000,000
Total Present Worth (6%, 20 years)	\$ 306,670,000
Total Present Worth (6%, 50 years)	\$ 334,670,000

Alternative 6 - Multiple Sources

Capital Cost

	Quantity	Unit Cost	Total
Deep Well Treatment Plant			
3 RO plants for Wells 6,8,10 @ 5.35 mgd including land built in 2020	5,350,000	\$ 4.57	\$ 24,460,000
Shallow Aquifer Water Treatment Plant			
One @ 2.5 mgd	2,500,000	\$ 4.46	\$ 11,150,000
5 mi of 6" force main, ft	26,400	\$ 141	\$ 3,715,000
Land	1	\$ 2,230,000	\$ 2,230,000
Shallow Aquifer Wellfield			
new wells and wellhouses @ 1.5 mgd each	3	\$ 780,500	\$ 2,341,500
Land	3	\$ 278,750	\$ 836,250
Roads, ft	7,000	\$ 27.9	\$ 195,125
Interconnecting pipe, 12", ft	10,000	\$ 161	\$ 1,605,600
Electrical (10% of well houses, pumps, and land)	3,177,750	10%	\$ 317,775
Shallow Aquifer Supply Pipeline to Waukesha			
10 miles of 16" for 4 mgd	52,800	\$ 262	\$ 13,834,920
Unconfined Deep Aquifer Treatment Plant			
One @ 3.2 mgd	3,200,000	\$ 2	\$ 7,136,000
Land	1	\$ 557,500	\$ 557,500
Unconfined Deep Aquifer Wellfield			
3 new wells and wellhouses @ 1.5 mgd each	3	\$ 1,338,000	\$ 4,014,000
Land	3	\$ 334,500	\$ 1,003,500
Roads, ft	10,560	\$ 28	\$ 294,360
Interconnecting pipe, 12", ft	10,560	\$ 161	\$ 1,695,514
Electrical (10% of well houses, pumps, and land)	5,017,500	10%	\$ 501,750
Unconfined Deep Aquifer Supply Pipeline to Waukesha			
12 miles 20", rural	63,360	\$ 201	\$ 12,716,352
5 miles 20", urban	26,400	\$ 368	\$ 9,713,880
Quarry Water Treatment Plant			
intakes @ 2 mgd each	4	\$ 1,672,500	\$ 6,690,000
Intake pump stations	2	\$ 557,500	\$ 1,115,000
Land	1	\$ 557,500	\$ 557,500
One water plant @ 5 mgd	5,000,000	\$ 4	\$ 22,300,000
4" Sludge pipeline	21,120	\$ 85	\$ 1,789,709
Quarry Supply Pipeline to Waukesha			
7 miles 10", rural	36,960	\$ 158	\$ 5,851,677
Silurian Dolomite Aquifer Treatment Plant			
One @ 2 mgd	2,000,000	\$ 2.23	\$ 4,460,000
Land	1	\$ 557,500	\$ 557,500
Silurian Dolomite Aquifer Wellfield			
5 new wells and wellhouses @ .5 mgd each	5	\$ 780,500	\$ 3,902,500
Land	5	\$ 334,500	\$ 1,672,500
Roads, ft	10,560	\$ 27.9	\$ 294,360
Interconnecting pipe, 6", ft	21,120	\$ 80.3	\$ 1,695,514
Interconnecting pipe, 12", ft	10,560	\$ 81.4	\$ 859,531
Electrical (10% of well houses, pumps, and land)	5,575,000	10%	\$ 557,500
Silurian Dolomite Aquifer Supply Pipeline to Waukesha			
2 mile 12", urban	10,560	\$ 191	\$ 2,013,422
Distribution System Improvements			
4.3 mi of 16", 24", and 30" pipes	22,704	\$ 413	\$ 9,373,000

2.7 mi of 16" pipe for blending, ft	14,256	\$ 323	\$ 4,605,000
Subtotal			\$ 166,613,938
3% markup for Bonds & Insurance			\$4,999,000
5% markup for Mob/Demob			\$8,331,000
8% markup for Contractors Overhead			\$14,396,000
4% markup for Contractors profit			\$7,198,000
25% Contingency			\$50,385,000
Subtotal Markups and Contingency			\$ 85,309,000
Total Project Construction Costs			\$ 251,922,938
8% allowance for engineering and design			\$20,154,000
12% allowance for permitting, legal and admin.			\$30,231,000
8% allowance for engr services during construction			\$20,154,000
Subtotal Other Project Costs			\$70,539,000
TOTAL PROJECT CAPITAL COST			\$ 322,460,000

Alternative 6 - Multiple Sources

Operating and Maintenance Cost

Source of Supply	Units	Quantity	Unit Cost	\$/yr	Total
Deep Well pumping/maintenance	\$/1000 gal	1496500	\$ 0.35	\$ 523,775	
Shallow Well Pumping/Maintenance	\$/1000 gal	876000	\$ 0.14	\$ 122,640	
Quarry pumping/Maintenance	\$/1000 gal	876000	\$ 0.14	\$ 122,640	
Dolomite well pumping/Maintenance	\$/1000 gal	438000	\$ 0.14	\$ 61,320	
					\$ 830,000
Treatment/Pumping					
Deep Wells 6,7,8 starting in 2020	\$/1000 gal	821,250	\$ 0.61	\$ 500,963	
Shallow Wells and Quarry	\$/1000 gal	1,752,000	\$ 1.11	\$ 1,944,720	
Unconfined Wells	\$/1000 gal	730,000	\$ 0.50	\$ 365,000	
Residuals	\$/1000 gal	103842.5	\$ 4	\$ 415,370	
Dolomite Wells	\$/1000 gal	438,000	\$ 0.50	\$ 219,000	
					\$ 3,445,000
Home Softening					
Salt/Equipmon/Raplacmont	\$/customer/yr	13,683	\$ 209	\$ 2,859,747	
					\$ 2,860,000
Transmission					
Operation and Maintenance	\$/lf/yr	290,400	\$ 0.52	\$ 151,008	
					\$ 151,008
Alternative 1 Total O&M (\$/yr.)					
					\$ 7,300,000

PRESENT WORTH (6%, 20 yrs)	\$ 84,000,000
PRESENT WORTH (6%, 50 yrs)	\$ 115,000,000
Total Present Worth (6%, 20 years)	\$ 406,460,000
Total Present Worth (6%, 50 years)	\$ 437,460,000