Appendix Q - Schematic Diagrams of Proposed Operational Scenarios
Figure Q-1

Project: Madison Well 31
Subject: Energy Analysis - Scenario 1
Date: 12/8/14 By: JJB SEH #: Madison 129083
Checked by: Date: Office: File #:
Sheet No: Of:

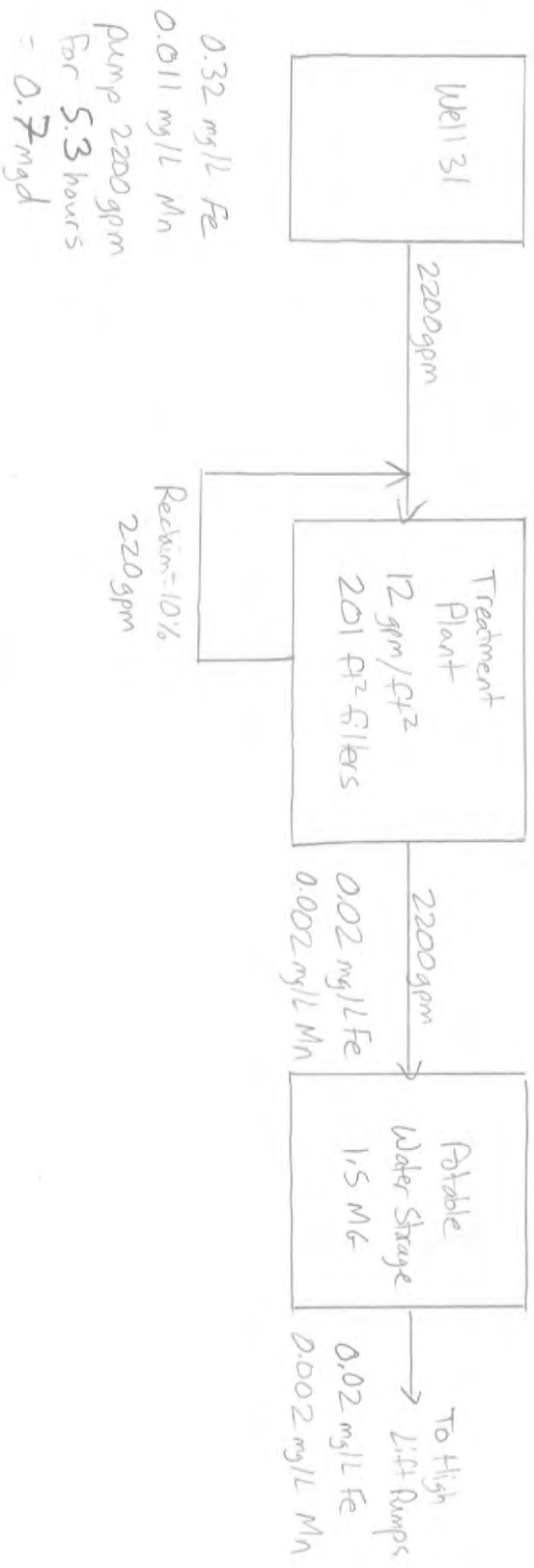

Figure Q-1: Scenario 1 - Pump 2200 gpm from Existing Well 31 treat all flow to 0.02 mg/L Fe

Appendix Q - Schematic Diagrams of Proposed Operational Scenarios
Figure Q-2

Project: Madison Well 31
Subject: Energy Analysis - Scenario 2
Date: 12/8/14 By: JJB SEH #: Madwu 129083
Checked by: Date: Office: File #:
Sheet No: Of:

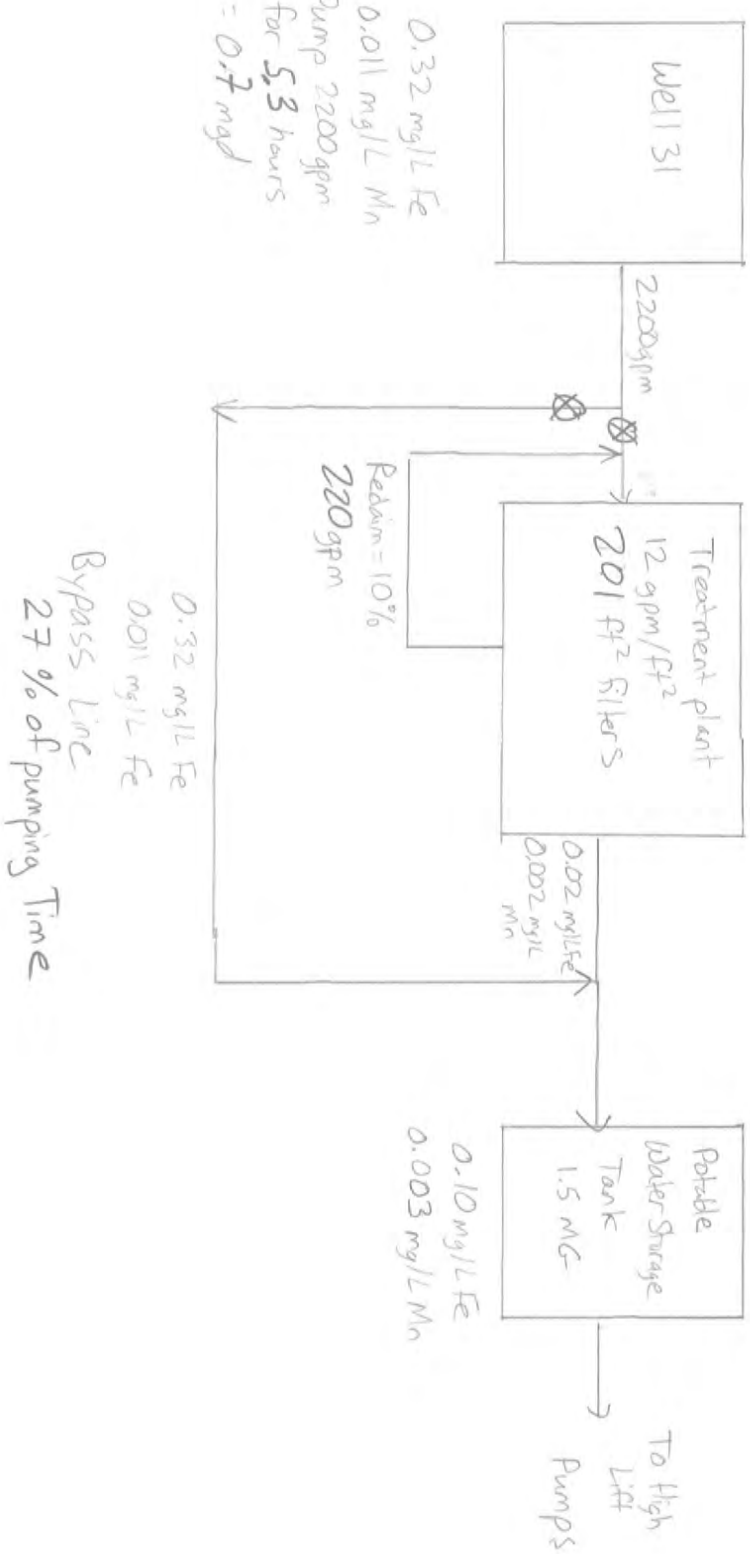

Figure Q-2 : Scenario 2 - Pump 2200 gpm from Existing Well 31
Treat 1613 gpm and mix to 0.1 mg/L Fe

Appendix Q - Schematic Diagrams of Proposed Operational Scenarios
Figure Q-3

Project: Madison Well 31
Subject: Energy Analysis - Scenario 3
Date: 12/16/14 By: Joshua Bohnert SEH #: Madwa 129083
Checked by: Date: Office: File #:
Sheet No: Of:

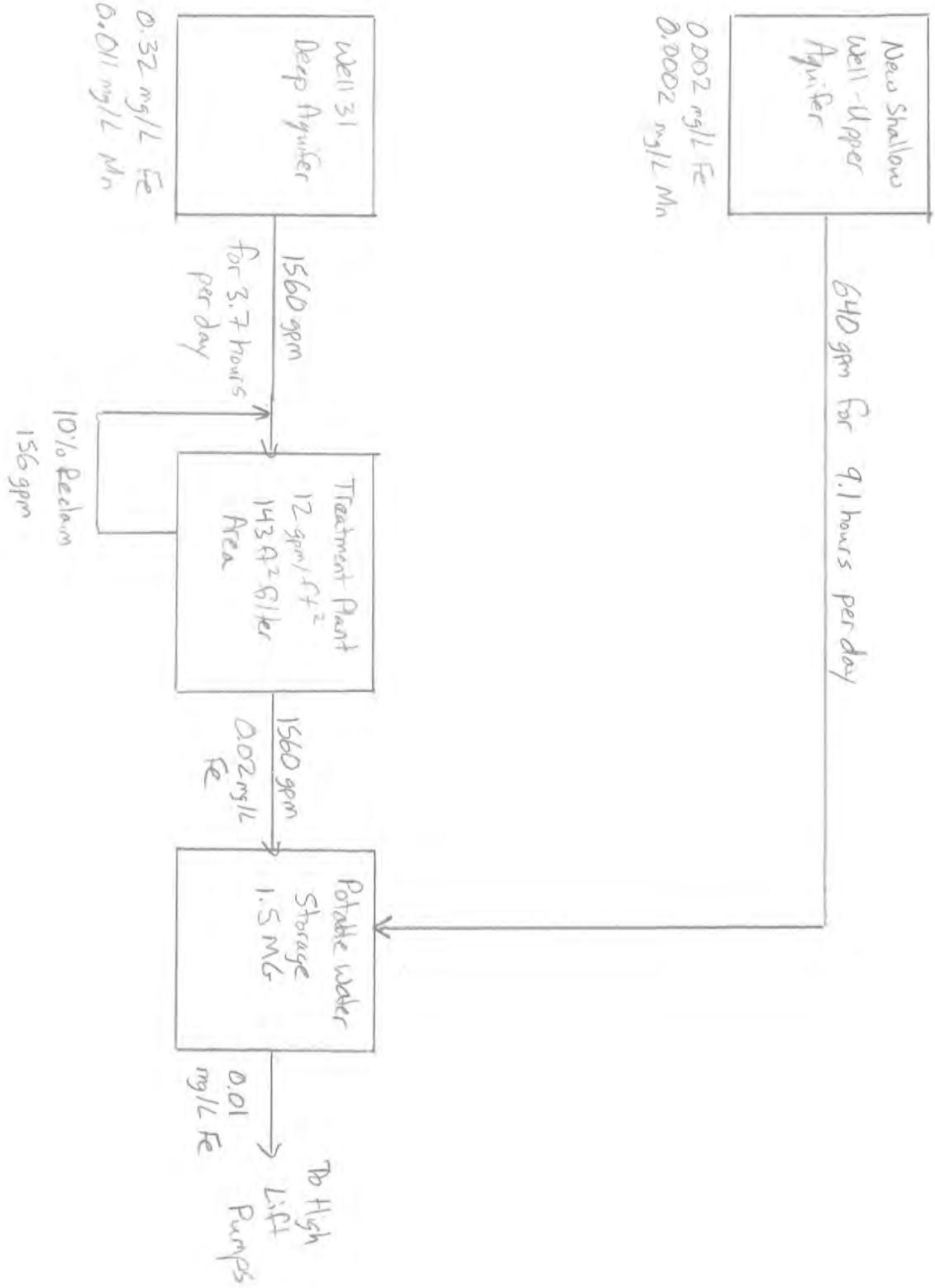

Figure Q-3: Scenario 3 - Drill New Shallow Well and Mix with treated lower Aquifer water 1:1

Appendix Q - Schematic Diagrams of Proposed Operational Scenarios
Figure Q-4

Project: Madison Well 31
Subject: Energy Analysis - Scenario 4
Date: 12/9/14 By: JJB SEH #: Madwu 129083
Checked by: Date: Office: File #:
Sheet No: Of:

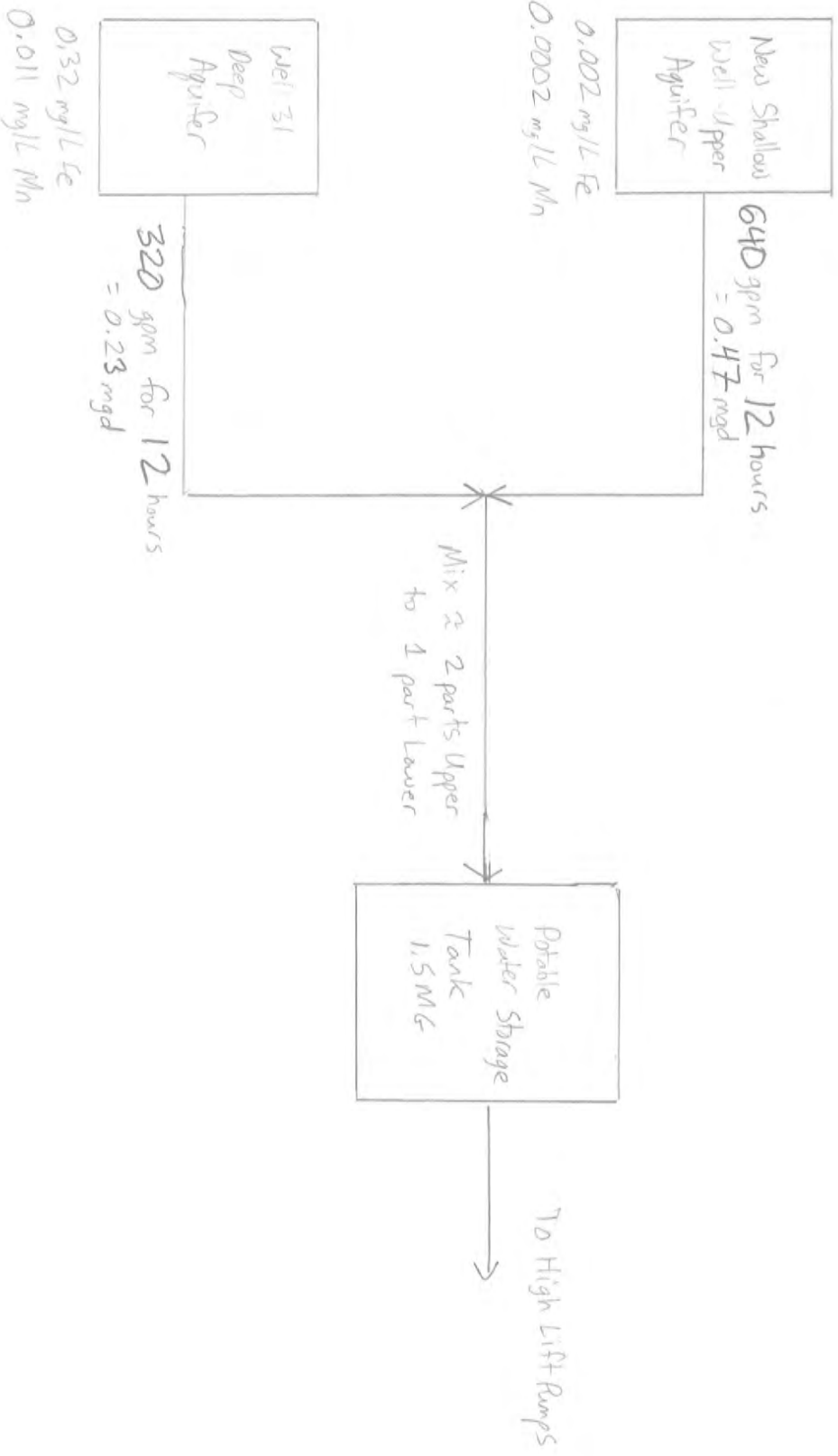

Figure Q-4 Scenario 4 - Drill New Shallow Well and Mix with Lower Aquifer to 0.1 mg/L Iron 2:1

Appendix R - Anticipated Energy Costs by Operational Scenario

CITY OF MADISON - UNIT WELL NO.31 TABLE R-1: SCENARIO 1

SYSTEM OPERATION				ENERGY COSTS				
EQUIPMENT LOAD	TIME OF YEAR OPERATION	VFD RATED HORSEPOWER	AVERAGE POWER USE IN KW	HOURS PER DAY	AVERAGE COST PER KWH	DAILY OPERATING COST	SEASONAL OPERATION	ANNUAL OPERATING COST
LOWER WELL PUMP (THROUGH FILTERS)	SUMMER - PEAK	340	243	2.4	$0.10446	$62	54%	$12,100
LOWER WELL PUMP (THROUGH FILTERS)	SUMMER - OFF PEAK	340	243	2.9	$0.05500	$38	54%	$7,500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$100**		**$19,600**
LOWER WELL PUMP (THROUGH FILTERS)	WINTER - PEAK	340	243	2.4	$0.09224	$54	46%	$9,200
LOWER WELL PUMP (THROUGH FILTERS)	WINTER - OFF PEAK	340	243	2.9	$0.05500	$38	46%	$6,500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$93**		**$15,700**
HIGH SERVICE PUMP	SUMMER - PEAK	180	118	2.4	$0.10446	$30	54%	$5,900
HIGH SERVICE PUMP	SUMMER - OFF PEAK	180	118	2.9	$0.05500	$19	54%	$3,700
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$49**		**$9,600**
HIGH SERVICE PUMP	WINTER - PEAK	180	118	2.4	$0.09224	$26	46%	$4,500
HIGH SERVICE PUMP	WINTER - OFF PEAK	180	118	2.9	$0.05500	$19	46%	$3,100
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$45**		**$7,600**
TOTAL ANNUAL ENERGY COST								**$53,000**

CUSTOMER SERVICE RATES FROM MADISON GAS & ELECTRIC, RATE STRUCTURE Cg-2

PUMPS AND MOTOR ASSEMBLIES ARE ASSUMED TO BE 70 PERCENT EFFICIENT. "AVERAGE POWER USE IN KW" IS THUS INCREASED BY 1/0.7 OR 1.43 FROM 100 PERCENT EFFICIENCY

"AVERAGE POWER USE IN KW" ASSUMES AN AVERAGE OF A RANGE OF HEAD CONDITIONS VERSUS APPLYING THE MAXIMUM LOAD FOR ALL OPERATING TIMES

OFF PEAK RATES ARE $0.055 PER KWH FOR BOTH SUMMER AND WINTER. SUMMER RATES APPLY TO 54 PERCENT OF FLOWS ACCORDING TO MONTHLY DEMAND IN 2013 PSC ANNUAL REPORT

ON PEAK PERIOD 1 IS FROM 10 AM TO 1 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10037 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.
AN AVERAGE RATE IS TAKEN INTO ACCOUNT FOR ALL 3 ON-PEAK RATES FOR CALCULATION PURPOSES. THUS PEAK HOURS OCCUR 11 HOURS PER DAY, OR 46 PERCENT OF PUMPING TIME.

ON PEAK PERIOD 2 IS FROM 1PM TO 6 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10854 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

ON PEAK PERIOD 3 IS FROM 6 PM TO 9 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10037 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

A CUSTOMER CHARGE PER DAY OF $6.27288 APPLIES AND A CUSTOMER MAXIMUM 15 MINUTE DEMAND PER KW PER DAY @ $0.09863 APPLIES FOR BOTH THE SUMMER AND WINTER RATES.
THIS IS NOT REFLECTED IN THE COSTS SHOWN.

A MAXIMUM MONTHLY ON-PEAK 15 MINUTE DEMAND PER KW @ $0.41100 FOR SUMMER AND $0.33520 FOR WINTER APPLIES. THIS IS NOT REFLECTED IN THE COSTS SHOWN.

Appendix R - Anticipated Energy Costs by Operational Scenario

CITY OF MADISON - UNIT WELL NO.31 TABLE R-2: SCENARIO 2

SYSTEM OPERATION				ENERGY COSTS				
EQUIPMENT LOAD	TIME OF OPERATION	VFD RATED HORSEPOWER	AVERAGE POWER USE IN KW	HOURS PER DAY	AVERAGE COST PER KWH	DAILY OPERATING COST	SEASONAL OPERATION	ANNUAL OPERATING COST
LOWER WELL PUMP (THROUGH FILTERS)	SUMMER - PEAK	340	243	1.8	$0.10446	$45	54%	$8,900
LOWER WELL PUMP (THROUGH FILTERS)	SUMMER - OFF PEAK	340	243	2.1	$0.05500	$28	54%	$5,500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$73**		**$14,400**
LOWER WELL PUMP (BYPASS FILTERS)	SUMMER - PEAK	340	205	0.6	$0.10446	$14	54%	$2,700
LOWER WELL PUMP (BYPASS FILTERS)	SUMMER - OFF PEAK	340	205	0.8	$0.05500	$9	54%	$1,700
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$23**		**$4,400**
LOWER WELL PUMP (THROUGH FILTERS)	WINTER - PEAK	340	243	1.8	$0.09224	$40	46%	$6,700
LOWER WELL PUMP (THROUGH FILTERS)	WINTER - OFF PEAK	340	243	2.1	$0.05500	$28	46%	$4,700
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$68**		**$11,400**
LOWER WELL PUMP (BYPASS FILTERS)	WINTER - PEAK	340	205	0.6	$0.09224	$12	46%	$2,100
LOWER WELL PUMP (BYPASS FILTERS)	WINTER - OFF PEAK	340	205	0.8	$0.05500	$9	46%	$1,500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$21**		**$3,600**
HIGH SERVICE PUMP	SUMMER - PEAK	180	118	2.4	$0.10446	$30	54%	$5,900
HIGH SERVICE PUMP	SUMMER - OFF PEAK	180	118	2.9	$0.05500	$19	54%	$3,700
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$49**		**$9,600**
HIGH SERVICE PUMP	WINTER - PEAK	180	118	2.4	$0.09224	$26	46%	$4,500
HIGH SERVICE PUMP	WINTER - OFF PEAK	180	118	2.9	$0.05500	$19	46%	$3,100
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$45**		**$7,600**
TOTAL ANNUAL ENERGY COST								**$51,000**

CUSTOMER SERVICE RATES FROM MADISON GAS & ELECTRIC, RATE STRUCTURE Cg-2

PUMPS AND MOTOR ASSEMBLIES ARE ASSUMED TO BE 70 PERCENT EFFICIENT. "AVERAGE POWER USE IN KW" IS THUS INCREASED BY 1/0.7 OR 1.43 FROM 100 PERCENT EFFICIENCY

"AVERAGE POWER USE IN KW" ASSUMES AN AVERAGE OF A RANGE OF HEAD CONDITIONS VERSUS APPLYING THE MAXIMUM LOAD FOR ALL OPERATING TIMES

OFF PEAK RATES ARE $0.055 PER KWH FOR BOTH SUMMER AND WINTER. SUMMER RATES APPLY TO 54 PERCENT OF FLOWS ACCORDING TO MONTHLY DEMAND IN 2013 PSC ANNUAL REPORT

ON PEAK PERIOD 1 IS FROM 10 AM TO 1 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10037 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.
AN AVERAGE RATE IS TAKEN INTO ACCOUNT FOR ALL 3 ON-PEAK RATES FOR CALCULATION PURPOSES. THUS PEAK HOURS OCCUR 11 HOURS PER DAY, OR 46 PERCENT OF PUMPING TIME.

ON PEAK PERIOD 2 IS FROM 1PM TO 6 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10854 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

ON PEAK PERIOD 3 IS FROM 6 PM TO 9 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10037 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

A CUSTOMER CHARGE PER DAY OF $6.27288 APPLIES AND A CUSTOMER MAXIMUM 15 MINUTE DEMAND PER KW PER DAY @ $0.09863 APPLIES FOR BOTH THE SUMMER AND WINTER RATES.
THIS IS NOT REFLECTED IN THE COSTS SHOWN.

A MAXIMUM MONTHLY ON-PEAK 15 MINUTE DEMAND PER KW @ $0.41100 FOR SUMMER AND $0.33520 FOR WINTER APPLIES. THIS IS NOT REFLECTED IN THE COSTS SHOWN.

Appendix R - Anticipated Energy Costs by Operational Scenario

CITY OF MADISON - UNIT WELL NO.31 TABLE R-3: SCENARIO 3

SYSTEM OPERATION				ENERGY COSTS				
EQUIPMENT LOAD	TIME OF YEAR OPERATION	VFD RATED HORSEPOWER	AVERAGE POWER USE IN KW	HOURS PER DAY	AVERAGE COST PER KWH	DAILY OPERATING COST	SEASONAL OPERATION	ANNUAL OPERATING COST
LOWER WELL PUMP (THROUGH FILTERS)	SUMMER - PEAK	190	135	1.7	$0.10446	$24	54%	$4,700
LOWER WELL PUMP (THROUGH FILTERS)	SUMMER - OFF PEAK	190	135	2.0	$0.05500	$15	54%	$3,000
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$39**		**$7,700**
UPPER WELL PUMP (UNTREATED)	SUMMER - PEAK	55	40	4.2	$0.10446	$17	54%	$3,400
UPPER WELL PUMP (UNTREATED)	SUMMER - OFF PEAK	55	40	4.9	$0.05500	$11	54%	$2,100
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$28**		**$5,500**
LOWER WELL PUMP (THROUGH FILTERS)	WINTER - PEAK	190	135	1.7	$0.09224	$21	46%	$3,600
LOWER WELL PUMP (THROUGH FILTERS)	WINTER - OFF PEAK	190	135	2.0	$0.05500	$15	46%	$2,500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$36**		**$6,100**
UPPER WELL PUMP (UNTREATED)	WINTER - PEAK	55	40	4.2	$0.09224	$15	46%	$2,600
UPPER WELL PUMP (UNTREATED)	WINTER - OFF PEAK	55	40	4.9	$0.05500	$11	46%	$1,800
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$26**		**$4,400**
HIGH SERVICE PUMP	SUMMER - PEAK	180	118	2.4	$0.10446	$30	54%	$5,900
HIGH SERVICE PUMP	SUMMER - OFF PEAK	180	118	2.9	$0.05500	$19	54%	$3,700
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$49**		**$9,600**
HIGH SERVICE PUMP	WINTER - PEAK	180	118	2.4	$0.09224	$26	46%	$4,500
HIGH SERVICE PUMP	WINTER - OFF PEAK	180	118	2.9	$0.05500	$19	46%	$3,100
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$45**		**$7,600**
TOTAL ANNUAL ENERGY COST								**$41,000**

CUSTOMER SERVICE RATES FROM MADISON GAS & ELECTRIC, RATE STRUCTURE Cg-2

PUMPS AND MOTOR ASSEMBLIES ARE ASSUMED TO BE 70 PERCENT EFFICIENT. "AVERAGE POWER USE IN KW" IS THUS INCREASED BY 1/0.7 OR 1.43 FROM 100 PERCENT EFFICIENCY

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ON PEAK PERIOD 3 IS FROM 6 PM TO 9 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10037 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

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THIS IS NOT REFLECTED IN THE COSTS SHOWN.

A MAXIMUM MONTHLY ON-PEAK 15 MINUTE DEMAND PER KW @ $0.41100 FOR SUMMER AND $0.33520 FOR WINTER APPLIES. THIS IS NOT REFLECTED IN THE COSTS SHOWN.

Appendix R - Anticipated Energy Costs by Operational Scenario

CITY OF MADISON - UNIT WELL NO.31 TABLE R-4: SCENARIO 4

SYSTEM OPERATION				ENERGY COSTS				
EQUIPMENT LOAD	TIME OF YEAR OPERATION	VFD RATED HORSEPOWER	AVERAGE POWER USE IN KW	HOURS PER DAY	AVERAGE COST PER KWH	DAILY OPERATING COST	SEASONAL OPERATION	ANNUAL OPERATING COST
LOWER WELL PUMP (UNTREATD)	SUMMER - PEAK	12	9	5.2	$0.10446	$5	54%	$1,000
LOWER WELL PUMP (UNTREATED)	SUMMER - OFF PEAK	12	9	6.1	$0.05500	$3	54%	$600
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$8**		**$1,600**
UPPER WELL PUMP (UNTREATED)	SUMMER - PEAK	55	40	5.8	$0.10446	$24	54%	$4,700
UPPER WELL PUMP (UNTREATED)	SUMMER - OFF PEAK	55	40	6.8	$0.05500	$15	54%	$3,000
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$39**		**$7,700**
LOWER WELL PUMP (UNTREATD)	WINTER - PEAK	12	9	5.2	$0.09224	$4	46%	$700
LOWER WELL PUMP (UNTREATED)	WINTER - OFF PEAK	12	9	6.1	$0.05500	$3	46%	$500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$7**		**$1,200**
UPPER WELL PUMP (UNTREATED)	WINTER - PEAK	55	40	5.8	$0.09224	$21	46%	$3,600
UPPER WELL PUMP (UNTREATED)	WINTER - OFF PEAK	55	40	6.8	$0.05500	$15	46%	$2,500
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$36**		**$6,100**
HIGH SERVICE PUMP	SUMMER - PEAK	180	118	2.4	$0.10446	$30	54%	$5,900
HIGH SERVICE PUMP	SUMMER - OFF PEAK	180	118	2.9	$0.05500	$19	54%	$3,700
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$49**		**$9,600**
HIGH SERVICE PUMP	WINTER - PEAK	180	118	2.4	$0.09224	$26	46%	$4,500
HIGH SERVICE PUMP	WINTER - OFF PEAK	180	118	2.9	$0.05500	$19	46%	$3,100
TOTAL DAILY COST OF OPERATION @ AVERAGE KWH						**$45**		**$7,600**
TOTAL ANNUAL ENERGY COST								**$34,000**

CUSTOMER SERVICE RATES FROM MADISON GAS & ELECTRIC, RATE STRUCTURE Cg-2

PUMPS AND MOTOR ASSEMBLIES ARE ASSUMED TO BE 70 PERCENT EFFICIENT. "AVERAGE POWER USE IN KW" IS THUS INCREASED BY 1/0.7 OR 1.43 FROM 100 PERCENT EFFICIENCY

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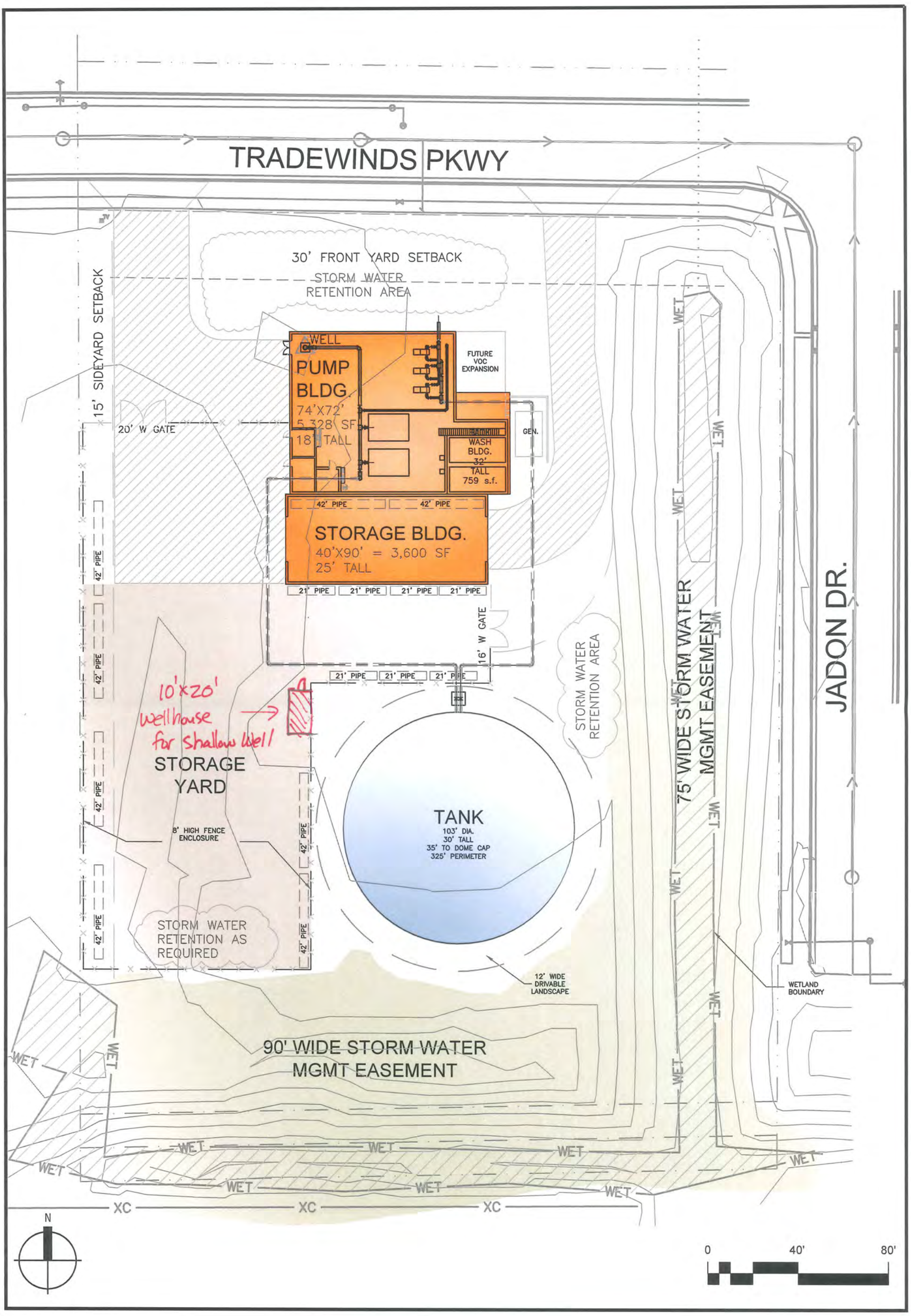
AN AVERAGE RATE IS TAKEN INTO ACCOUNT FOR ALL 3 ON-PEAK RATES FOR CALCULATION PURPOSES. THUS PEAK HOURS OCCUR 11 HOURS PER DAY, OR 46 PERCENT OF PUMPING TIME.

ON PEAK PERIOD 2 IS FROM 1PM TO 6 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10854 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

ON PEAK PERIOD 3 IS FROM 6 PM TO 9 PM, MONDAY THROUGH FRIDAY USING A SUMMER RATE ADDER OF $0.10037 PER KWH AND A WINTER RATE OF $0.9224 PER KWH.

A CUSTOMER CHARGE PER DAY OF $6.27288 APPLIES AND A CUSTOMER MAXIMUM 15 MINUTE DEMAND PER KW PER DAY @ $0.09863 APPLIES FOR BOTH THE SUMMER AND WINTER RATES.
THIS IS NOT REFLECTED IN THE COSTS SHOWN.

A MAXIMUM MONTHLY ON-PEAK 15 MINUTE DEMAND PER KW @ $0.41100 FOR SUMMER AND $0.33520 FOR WINTER APPLIES. THIS IS NOT REFLECTED IN THE COSTS SHOWN.



UNIT WELL 31 - OPTION 1A

MADISON WATER UTILITY

10/06/2014

Appendix S - Proposed Upper Aquifer Well Location on Well 31 Site Plan

Madison Water Utility

SEH

Potter Lawson
Success by Design

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Energy Analysis - Scenario 1
Table T-1: Same Costs as Option 1A

Water Treatment Facility; 31

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
SITE WORK (GRADING, PAVING, LANDSCAPING)	LS	1	$125,000	$125,000
WATERMAIN	LS	1	$25,000	$25,000
SANITARY SEWER	LS	1	$10,000	$10,000
STORM SEWER	LS	1	$40,000	$40,000
GENERAL BUILDING CONSTRUCTION	SF	4052	$127	$514,604
(WALLS, ROOF, FLOOR, ARCHITECTURAL FINISHES ETC)				
MECHANICAL & PLUMBING	LS	1	$75,000	$75,000
ELECTRICAL (Exterior Generator & Enclosure)	LS	1	$1,000,000	$1,000,000
ABOVE GROUND INDOOR BACKWASH TANK (100,000 GAL)	LS	1	$275,000	$275,000
FILTRATION EQUIPMENT (16 FILTERS)	LS	1	$375,000	$375,000
PUMPING EQUIPMENT	LS	3	$70,000	$210,000
WELL PUMP AND MOTOR (2200GPM)	LS	1	$150,000	$150,000
PROCESS PIPING, VALVES, SMALL PUMPS ETC.	LS	1	$200,000	$200,000
CHEMICAL FEED EQUIPMENT	LS	1	$100,000	$100,000
SCADA/SURVALIENCE Automated Control	LS	1	$485,000	$485,000
SUBTOTAL				$3,584,600
CONTINGENCY - 5%				$179,230
TOTAL ESTIMATED WATERMAIN CONSTRUCTION COST				$3,763,830

1.5MG Wire Wound Concrete Tank

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
1.5 MG wire wound tank (15 week construction schedule)	LS	1	$995,000	$995,000
Architecture Treatment (Partial Treatment)	SF	3000	$62	$186,000
Site work MH, Process Piping and Valves	LS	1	$30,000	$30,000
Mixing System	LS	1	$50,000	$50,000
Hydrant and Valve	EACH	1	$4,000	$4,000
EXCAVATION	LS	1	$50,000	$50,000
SUBTOTAL				$1,315,000
TOTAL ESTIMATED COST				$1,315,000

Storage Facility

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
STORAGE FACILITY	SF	3900	$100	$390,000
SUBTOTAL				$390,000
TOTAL ESTIMATED COST				**$390,000**

TOTAL ESTIMATED COST	**$5,470,000**

Appendix T - Estimated Capital Costs by Operational Scenario

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Energy Analysis - Scenario 2
Table T-2: Same Costs as Option 1A

Water Treatment Facility; 31

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
SITE WORK (GRADING, PAVING, LANDSCAPING)	LS	1	$125,000	$125,000
WATERMAIN	LS	1	$25,000	$25,000
SANITARY SEWER	LS	1	$10,000	$10,000
STORM SEWER	LS	1	$40,000	$40,000
GENERAL BUILDING CONSTRUCTION	SF	4052	$127	$514,604
(WALLS, ROOF, FLOOR, ARCHITECTURAL FINISHES ETC)				
MECHANICAL & PLUMBING	LS	1	$75,000	$75,000
ELECTRICAL (Exterior Generator & Enclosure)	LS	1	$1,000,000	$1,000,000
ABOVE GROUND INDOOR BACKWASH TANK (100,000 GAL)	LS	1	$275,000	$275,000
FILTRATION EQUIPMENT	LS	1	$375,000	$375,000
PUMPING EQUIPMENT	LS	3	$70,000	$210,000
WELL PUMP AND MOTOR (2200GPM)	LS	1	$150,000	$150,000
PROCESS PIPING, VALVES, SMALL PUMPS ETC.	LS	1	$200,000	$200,000
CHEMICAL FEED EQUIPMENT	LS	1	$100,000	$100,000
SCADA/SURVALIENCE Automated Control	LS	1	$485,000	$485,000
SUBTOTAL				$3,584,600
CONTINGENCY - 5%				$179,230
TOTAL ESTIMATED WATERMAIN CONSTRUCTION COST				$3,763,830

1.5MG Wire Wound Concrete Tank

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
1.5 MG wire wound tank (15 week construction schedule)	LS	1	$995,000	$995,000
Architecture Treatment (Partial Treatment)	SF	3000	$62	$186,000
Site work MH, Process Piping and Valves	LS	1	$30,000	$30,000
Mixing System	LS	1	$50,000	$50,000
Hydrant and Valve	EACH	1	$4,000	$4,000
EXCAVATION	LS	1	$50,000	$50,000
SUBTOTAL				$1,315,000
TOTAL ESTIMATED COST				$1,315,000

Storage Facility

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
STORAGE FACILITY	SF	3900	$100	$390,000
SUBTOTAL				$390,000
TOTAL ESTIMATED COST				**$390,000**

TOTAL ESTIMATED COST	**$5,470,000**

Appendix T - Estimated Capital Costs by Operational Scenario

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Table T-3: Energy Analysis - Scenario 3

Water Treatment Facility; 31

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
SITE WORK (GRADING, PAVING, LANDSCAPING)	LS	1	$125,000	$125,000
WATERMAIN	LS	1	$25,000	$25,000
SANITARY SEWER	LS	1	$10,000	$10,000
STORM SEWER	LS	1	$40,000	$40,000
GENERAL BUILDING CONSTRUCTION	SF	4052	$127	$514,604
(WALLS, ROOF, FLOOR, ARCHITECTURAL FINISHES ETC)				
MECHANICAL & PLUMBING	LS	1	$75,000	$75,000
ELECTRICAL (Exterior Generator & Enclosure)	LS	1	$1,000,000	$1,000,000
ABOVE GROUND INDOOR BACKWASH TANK (100,000 GAL)	LS	1	$275,000	$275,000
FILTRATION EQUIPMENT (12 CELLS)	LS	1	$280,000	$280,000
PUMPING EQUIPMENT	LS	3	$70,000	$210,000
WELL 31 PUMP AND MOTOR (1560GPM)	LS	1	$100,000	$100,000
PROCESS PIPING, VALVES, SMALL PUMPS ETC.	LS	1	$100,000	$100,000
CHEMICAL FEED EQUIPMENT	LS	1	$75,000	$75,000
SCADA/SURVALIENCE Automated Control	LS	1	$425,000	$425,000
SUBTOTAL				$3,254,600
CONTINGENCY - 5%				$162,730
TOTAL ESTIMATED WATERMAIN CONSTRUCTION COST				$3,417,330

New Shallow Well

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
SITE WORK (GRADING, PAVING, LANDSCAPING)	LS	1	$25,000	$25,000
WATERMAIN	LF	150	$80	$12,000
SANITARY SEWER	LS	1	$5,000	$5,000
GENERAL BUILDING CONSTRUCTION(10'x20')	SF	200	$200	$40,000
(WALLS, ROOF, FLOOR, ARCHITECTURAL FINISHES ETC)				
MECHANICAL & PLUMBING	LS	1	$35,000	$35,000
ELECTRICAL (Generator not included)	LS	1	$150,000	$150,000
WELL PUMP AND MOTOR (640GPM)	LS	1	$70,000	$70,000
280-FOOT WELL DRILLING, CASING	LS	1	$195,000	$195,000
PROCESS PIPING, VALVES, SMALL PUMPS ETC.	LS	1	$35,000	$35,000
CHEMICAL FEED EQUIPMENT	LS	1	$50,000	$50,000
SCADA/SURVALIENCE Automated Control	LS	1	$30,000	$30,000
SUBTOTAL				$647,000
CONTINGENCY - 5%				$32,350
TOTAL ESTIMATED WATERMAIN CONSTRUCTION COST				$679,350

1.5MG Wire Wound Concrete Tank

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
1.5 MG wire wound tank (15 week construction schedule)	LS	1	$995,000.00	$995,000.00
Architecture Treatment (Partial Treatment)	SF	3000	$62.00	$186,000.00
Site work MH, Process Piping and Valves	LS	1	$30,000.00	$30,000.00
Mixing System	LS	1	$50,000.00	$50,000.00
Hydrant and Valve	EACH	1	$4,000.00	$4,000.00
EXCAVATION	LS	1	$50,000.00	$50,000.00
SUBTOTAL				$1,315,000.00
TOTAL ESTIMATED COST				$1,315,000.00

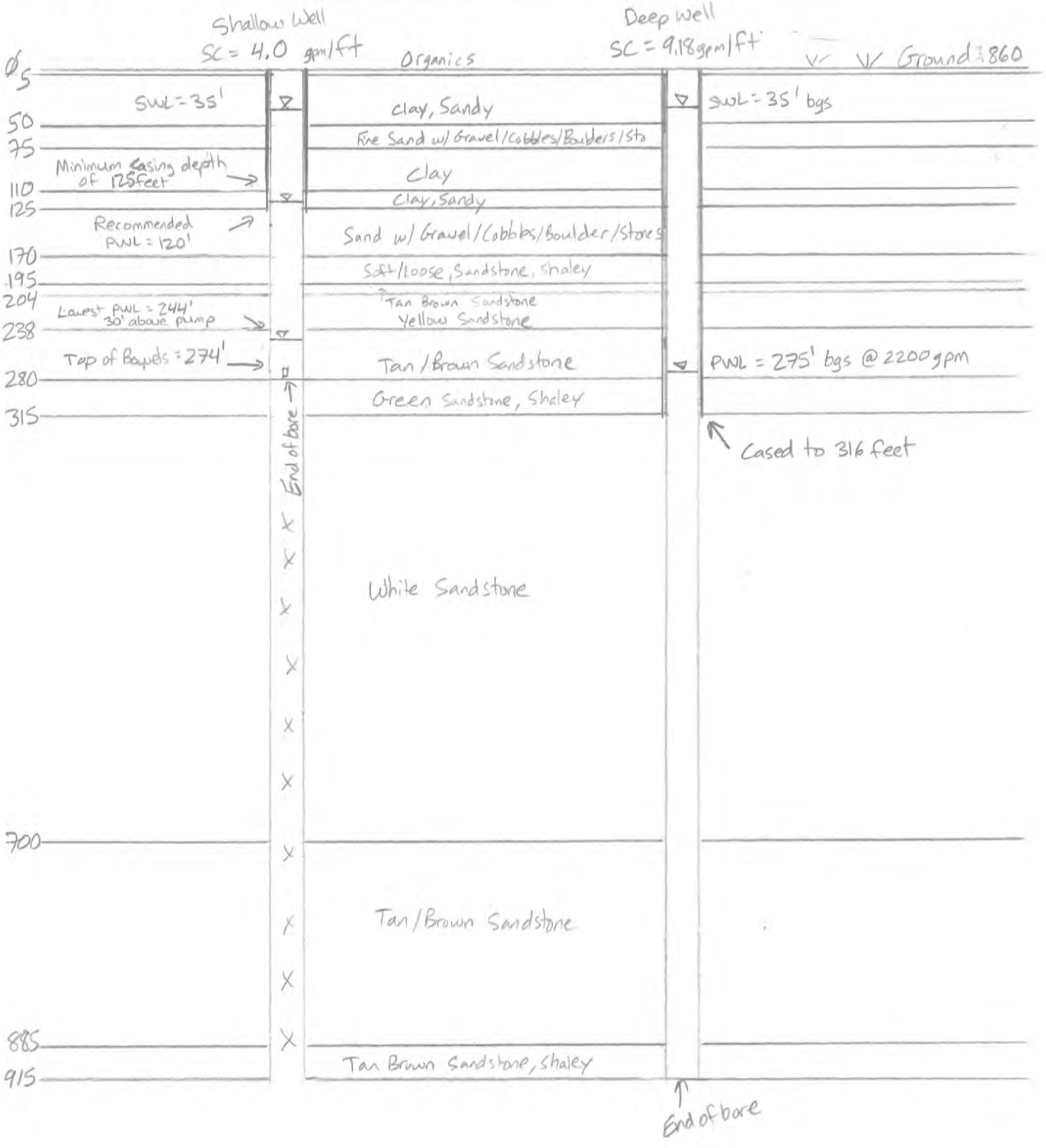
Storage Facility

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
STORAGE FACILITY	SF	3900	$100.00	$390,000.00
SUBTOTAL				$390,000.00
TOTAL ESTIMATED COST				**$390,000.00**

TOTAL ESTIMATED COST	**$5,802,000**

Appendix U - Geologic Cross Section of Proposed Well 31 Site

Project: Madison Well 31
Subject: New Shallow Well Profile
Date: 12/10/14 By: JJB SEH #: Madwn 129083
Checked by: Date: Office: File #:
Sheet No: Of:



Appendix V - Estimated Operational & Maintenance Costs by Operational Scenario

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Table V-1 - Scenario 1

Operational & Maintenance Costs

Updated 12/17/14

No.	Description	Units	Quantity	Unit Price	Total Cost
1	Daily Equipment Check Labor	Hrs	270	$40.00	$10,800.00
2	Periodic Maintenance Labor	Hrs	100	$50.00	$5,000.00
3	Flushing Distribution System (FE)	Hrs	0	$40.00	$0.00
4	Chlorine (Pre & Post)	Cylinders	54	$100.00	$5,400.00
5	Floride	Gallons	1000	$4.00	$4,000.00
6	Equipment Repairs	Number/Year	4	$2,500.00	$10,000.00
			Subtotal		$35,200.00
			Contingencies		$8,800.00
			Project Total		$44,000.00
		Annual Operational & Maintenance Cost			$44,000.00

Project Assumptions
Data Input

Time Period	1	Yrs
Daily Equipment Check Labor	0.75	Hrs/day
Periodic Maintenance Labor	2	Hrs/Week
Flushing Distribution System (FE)	0	Hrs/Month
Equipment Repairs	$2,500.00	$/Year
Number of 150 lbs Chlorine Cylinders Per Month	4.5	150 lb Cyl/Month
Floride	85	gal/moths

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Appendix V - Estimated Operational & Maintenance Costs by Operational Scenario

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Table V-2- Scenario 2

Operational & Maintenance Costs

Updated 12/17/14

No.	Description	Units	Quantity	Unit Price	Total Cost
1	Daily Equipment and Blending Operational Labor	Hrs	370	$40.00	$14,800.00
2	Periodic Maintenance Labor	Hrs	100	$50.00	$5,000.00
3	Flushing Distribution System (FE)	Hrs	96	$40.00	$3,840.00
4	Chlorine (Pre & Post)	Cylinders	42	$100.00	$4,200.00
5	Floride	Gallons	1000	$4.00	$4,000.00
6	Equipment Repairs	Number/Year	4	$2,500.00	$10,000.00
			Subtotal		$41,840.00
			Contingencies		$10,160.00
			Project Total		$52,000.00
		Annual Operational & Maintenance Cost			$52,000.00

Project Assumptions
Data Input

Time Period	1	Yrs
Daily Equipment and Blending Operational Labor	1	Hrs/day
Periodic Maintenance Labor	2	Hrs/Week
Flushing Distribution System (FE)	8	Hrs/Month
Equipment Repairs	$2,500.00	$/Year
Number of 150 lbs Chlorine Cylinders Per Month	3.5	150 lb Cyl/Month
Floride	85	gal/moths

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Appendix V - Estimated Operational & Maintenance Costs by Operational Scenario

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Table V-3- Scenario 3

Operational & Maintenance Costs

Updated 12/17/14

No.	Description	Units	Quantity	Unit Price	Total Cost
1	Daily Equipment Check Labor	Hrs	460	$40.00	$18,400.00
2	Periodic Maintenance Labor	Hrs	100	$50.00	$5,000.00
3	Flushing Distribution System (FE)	Hrs	0	$40.00	$0.00
4	Chlorine (Pre-Post)	Cylinders	36	$100.00	$3,600.00
5	Floride	Gallons	1000	$4.00	$4,000.00
6	Equipment Repairs	Number/Year	5	$2,500.00	$12,500.00
			Subtotal		$43,500.00
			Contingencies		$10,500.00
			Project Total		$54,000.00
		Annual Operational & Maintenance Cost			$54,000.00

Project Assumptions
Data Input

Time Period	1	Yrs
Daily Equipment Check Labor	1.25	Hrs/day
Periodic Maintenance Labor	2	Hrs/Week
Flushing Distribution System (FE)	0	Hrs/Month
Equipment Repairs	$2,500.00	$/Year
Number of 150 lbs Chlorine Cylinders Per Month	3	150 lb Cyl/Month
Floride	85	gal/moths

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Appendix V - Estimated Operational & Maintenance Costs by Operational Scenario

PRELIMINARY CONSTRUCTION COST ESTIMATE
Madison Water Utility (MADWU)
Unit Well 31
Table V-4- Scenario 4

Operational & Maintenance Costs

Updated 12/17/14

No.	Description	Units	Quantity	Unit Price	Total Cost
1	Daily Equipment and Blending Operational Labor	Hrs	550	$40.00	$22,000.00
2	Periodic Maintenance Labor	Hrs	52	$50.00	$2,600.00
3	Flushing Distribution System (FE)	Hrs	96	$40.00	$3,840.00
4	Chlorine (Post)	Cylinders	24	$100.00	$2,400.00
5	Floride	Gallons	1000	$4.00	$4,000.00
6	Equipment Repairs	Number/Year	3	$2,500.00	$7,500.00
			Subtotal		$42,340.00
			Contingencies		$10,660.00
			Project Total		$53,000.00
		Annual Operational & Maintenance Cost			$53,000.00

Project Assumptions
Data Input

Time Period	1	Yrs
Daily Equipment and Blending Operational Labor	1.5	Hrs/day
Periodic Maintenance Labor	1	Hrs/Week
Flushing Distribution System (FE)	8	Hrs/Month
Equipment Repairs	$2,500.00	$/Year
Number of 150 lbs Chlorine Cylinders Per Month	2	150 lb Cyl/Month
Floride	85	gal/moths

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