

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY 1

2.0 BACKGROUND 3

 2.1 Project Area Background 3

 2.2 Water Supply Feasibility Study Objectives 4

 2.3 Homeowner Study Area Questionnaire Responses 4

 2.4 Drinking Water Regulations 5

 2.4.1 Introduction 5

 2.4.2 Current Water Quality Regulations 6

 2.4.3 Contaminant Candidate List 7

3.0 GROUNDWATER CONDITIONS 8

 3.1 Regional Geology and Hydrogeology 8

 3.2 Study Area Geology and Hydrogeology 11

 3.3 Project Area Groundwater Use 12

 3.4 Existing Well Groundwater Quality 13

 3.4.1 Well Information 13

 3.4.2 Existing Well Water Quality Data 13

 3.5 Background Well Water Quality Data 16

 3.6 Battlefield Golf Course Groundwater Quality 20

4.0 WATER SUPPLY ALTERNATIVES 21

 4.1 Alternative 1 - Extend City of Chesapeake Water Distribution System 21

 4.1.1 Water Main Extension 22

 4.1.2 Water Service Connections 23

 4.1.3 Distribution Supply/ Fire Protection 24

 4.1.4 Other Considerations 24

 4.1.5 Advantages/Disadvantages 24

 4.2 Alternative 2 - New Community Water Supply System 25

 4.2.1 Community Water Demand 26

 4.2.2 Raw Water Development: Proposed Aquifer Source 26

 4.2.3 Proposed Well Information 26

 4.2.4 Aquifer Water Quality and Treatment Requirements 27

 4.2.5 Reverse Osmosis Treatment 27

 4.2.6 Pre-Treatment Processes 28

 4.2.7 Permitting Requirements 29

 4.2.8 Post Treatment Water Conditioning 30

 4.2.9 Disinfection/Fluoridation Requirements 30

 4.2.10 Distribution System Requirements 30

 4.2.11 Water Storage Facilities – Fire Protection 30

 4.2.12 Land Acquisition 31

4.2.13	O&M Issues	31
4.2.14	Other Considerations.....	31
4.2.15	Advantages/Disadvantages	32
4.3	Alternative 3 – Individual Point of Entry (POE) Treatment System for Existing Wells	33
4.3.1	Housing Requirements	33
4.3.2	Brine Handling.....	34
4.3.3	O&M Issues	34
4.3.4	Other Considerations.....	34
4.3.5	Advantages/Disadvantages	35
4.4	Alternative 4 – Development and Installation of New Individual Home Owner Supply Wells.....	35
4.4.1	Current Groundwater Conditions and Ongoing Investigations.....	35
4.4.2	New Well Installation	36
4.4.3	Permitting Requirements.....	36
4.4.4	Other Considerations.....	37
4.4.5	Advantages/Disadvantages	37
5.0	COST EVALUATION AND RECOMMENDATIONS	38
5.1	Present Worth Opinion of Cost evaluations.....	38
5.2	Alternative Evaluation Matrix.....	39
5.3	Recommended Alternative.....	41
6.0	REFERENCES	43

TABLES

		<u>Page</u>
Table 1	DEQ Observation Wells Summary	17
Table 2	Surficial Aquifer Water Quality	18
Table 3	Yorktown-Eastover Aquifer Water Quality	19

FIGURES

		<u>Following Page</u>
Figure 1	Site Location	4
Figure 2	Past Sample Locations	9
Figure 3	General Hydrogeologic Section	9
Figure 4	Residential Sampling Locations	11

EXHIBITS

Exhibit 1	Extend City Water Distribution System	22
Exhibit 2	Community Well System	26

APPENDICES

APPENDIX A Resident Questionnaire

APPENDIX B Virginia Water Quality Standards

APPENDIX C National Primary and Secondary Drinking Water Standards

APPENDIX D The Second Contaminant Candidate List (EPA, 2005)

APPENDIX E The Third Contaminant Candidate List (Draft, EPA, 2008)

APPENDIX F Schnabel: Installed Monitoring Wells (MW-1 & MW-2) Report

APPENDIX G Existing Well Groundwater Quality Data

APPENDIX H Vicinity Groundwater Quality Data from VDEQ

APPENDIX I Battlefield Golf Course Groundwater Quality Data

APPENDIX J 2007 City of Chesapeake Water Quality Report

APPENDIX K Water Storage Requirement for Alternative 2

APPENDIX L City of Chesapeake Public Utility Charges

APPENDIX M Reverse Osmosis for Community Water System

APPENDIX N Point of Entry Reverse Osmosis System

APPENDIX O Present Worth Comparison of Alternative Evaluation

APPENDIX P Alternative Evaluation Matrix