STATE OF RHODE ISLAND

PUBLIC UTILITIES COMMISSION

IN RE: PROVIDENCE WATER SUPPLY BOARD – DOCKET NO. 4994

DIRECT TESTIMONY
of
JOHN F. GUASTELLA

On behalf of the

SMITHFIELD WATER SUPPLY BOARD

October 8, 2021

Q. Please state your name and business address.

A. John F. Guastella, Guastella Associates, LLC, 725 N. Highway A1A, Suite B103, Jupiter, Florida 33477.

Q. By whom are you employed?

A. I am President of Guastella Associates, LLC.

Q. Please describe Guastella Associates, LLC.

A. Guastella Associates, LLC provides utility management, valuation, and rate consulting services to both regulated and unregulated utilities.

Q. Have you provided a statement of your qualifications and experience?

A. Yes, it is set forth in Appendix A.

Q. What is the nature of your involvement in this proceeding?

A. Guastella Associates, LLC has been retained by the Smithfield Water Supply Board ("SWSB") to examine the wholesale rate proposed by the Providence Water Supply Board ("PWSB") to be charged to the SWSB, and the cost allocation and rate design or cost of service study ("COSS") submitted on behalf of the PWSB in support of its proposed rates.

Q. Have you undertaken your examination?

A. Yes. I have examined the PWSB's COSS prepared by Harold J. Smith of Raftelis Financial Consulting PA, and its revisions, as well as related discovery responses, and the

technical presentation on behalf of the PWSB. I have also discussed findings and options with representatives of the SWSB.

Q. What is the objective of a COSS study?

A. The objective of a COSS is to estimate the cost of serving each class of customer and to design rates that reasonably recover those costs.

Q. Why does a COSS produce an estimated instead of actual costs to serve each customer class?

A. Of the total cost of providing water service to all customers, there are few costs that are directly identifiable with specific customer classes. Accordingly, most costs must be allocated to customer classes on the basis of considerable judgment as to allocation methods and factors that, while reasonably determined, nonetheless produce only good estimates of costs applicable to each class. During the nearly 5 decades when I worked first at the New York Public Service Commission and then as a utility consultant and utility manager, it is abundantly clear to me that each water system I have examined has unique characteristics and demands placed upon it, while generally having some things in common.

Generally, sound water systems are designed and operated to meet both that system's average and maximum demands which reflect the diversity of the demands of all customers and not all customers or customer classes impose their maximum demands at the same time. Customer demands also vary in terms of total quantity for any period. The allocation factors for any particular system, therefore, require judgment that is applied to a complex array of design criteria, operational and water supply characteristics,

demand data, and voluminous accounting and billing data. The data must be organized to reflect the functions for which the water system is designed and operated, recognizing that various facilities serve multiple functions. Customer class allocations are then made by applying the varying consumption patterns of the different customer classes, some of which must be estimated. Moreover, it is not uncommon that the direct results of cost allocations must be adjusted in implementing a tariff design in order to reflect various policies of the utility and its regulator. That is often one reason why tariff design typically differs from pure cost of service results.

Q. What was the cost basis for Mr. Smith's COSS?

A. In response to Smithfield's discovery request 1-1, the PWSB stated that the revenue requirement for the New COSS is for the second rate year ending June 30, 2022 (FY 2022).

Q. What method did Mr. Smith use to perform his COSS?

A. His COSS is based on a widely used and accepted Base-Extra Capacity method. This method, which is described and illustrated in the American Water Works Association ("AWWA") Water Rates Manual (M-1), identifies and classifies the various cost components which comprise the revenue requirement, functionalizes those cost components according to the general design criteria and operation of a water utility, and allocates the functionalized costs among the customer classes. It also incorporates a fire service cost allocation within the format of the study.

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Q. Do you agree with the PWSB's proposed rate increase to the SWSB as contained in Mr. Smith's COSS?

A. No. While I disagree with certain allocations in Mr. Smith's COSS, my primary concern is that the magnitude of the proposed rate increase to the SWSB is likely more costly on an annual basis than if the SWSB were to obtain its own source of water supply.

Q. Has the SWSB explored the potential for the development of its own water supply?

A. Yes. Mr. Gene Allen, Director of Public Works /Water Commissioner, obtained a report from the engineering firm BETA, dated October 4, 2021, addressing the potential for new water supply exploration. He also obtained another report from BETA entitled Water System Modeling that provided a draft peak hour shaving analysis. These reports have been provided as SWSB Exhibit 1 and SWSB Exhibit 2, respectively.

Q. Have you reviewed these reports?

A. Yes.

Q. What do you conclude with respect to SWSB Exhibit 1 that addresses the potential for the SWSB's to develop its own water source?

A. The report indicates that, although finding that there is not an abundance of areas with promising locations for wells within Smithfield, some do exist where it is possible to site wells with adequate yields, up to about one million gallons per day. The report recommends that, if interested, the Town should embark on the process to further explore the development of a new drinking water supply. The SWSB's current annual cost of purchasing water from the PWSB is over $600,000 and proposed to increase to over $1.0

million. From a rate setting perspective, the SWSB could easily fund $3 million to $6 million or more of capital costs for the installation of its own wells and related facilities. Without a $600,000 to $1 million PWSB annual water bill, and after paying debt service for the funding of its own well supply, the SWSB would have hundreds of thousands of dollars available to operate the wells.

Q. What do you conclude with respect to SWSB Exhibit 2 with respect to peak hour shaving?

A. The BETA analysis of peak hour shaving concluded that with the installation of larger pumps to fill SWSB's storage tanks quicker, it may be possible to limit its peak demands, but BETA would seek further information on how peak hour rates are calculated by the PWSB to complete its analysis. A reduction of the SWSB's peak demands would benefit the PWSB'S water system. Assuming the SWSB does reduce its peaking demands on the PWSB's system, the load factors for maximum day and peak hour that the PWSB's COSS applied to the SWSB on a projected basis should be eliminated or at least significantly reduced.

Aside from COSS considerations, if the SWSB obtains its own wells, the reduction of SWSB's peak demand requirements would improve the operation of its own well supply, and possibly reduce the level of capacity needed from the new well supply.

Q. Do you agree with the PWSB's COSS with respect to the allocation of costs to fire service?

A. No. In my opinion, the separate inch-mile analysis, itself, used in the COSS failed to allocate any mains to fire service demands, thereby increasing the cost of mains allocated

to other classes of customer. Although a small portion of inch-miles of mains was allocated to fire service in other sections of the COSS, it was based on a portion of the inch-miles previously allocated to retail service, resulting in an insufficient allocation of mains. In addition, the fire demand used in PWSB's COSS is based on a fire demand of 6,000 gallons per minute (gpm) for a duration of 6 hours, which in my opinion is not adequate for a system the size of PWSB's. A publication by the National Board of Fire Underwriters (NBFU), now the Insurance Services Office, provides required fire flows for cities and towns with various populations. If the population of the PWSB service area is about 200,000, required fire flow would be 12,000 gpm with a duration of 10 hours, plus another 2,000 gpm for a second fire. SWSB Exhibit 3 is a copy of the NBFU fire flow table.

It has been my experience that for large water utilities, the allocation to fire service in in the range of about 10 to 15 percent of revenues. For example, the fire service revenues as a percentage of total revenues for a few of my clients are: for Aquarion Water Comp[any of New Hampshire 18.7%, for Artesian Water Company 10.7%, and for Middlesex Water Company 12.8% The allocation of fire service in the PWSB's COSS results in a significantly lower percentage of fire service revenue to total revenues, less than 7%.nt. This is an unreasonable result for a water utility of the size of the PWSB.

Q. **What do you conclude with respect to the allocation of costs to the SWSB?**

A. The proposed rates for the SWSB should not be accepted using the existing COSS provided by the PWSB. Moreover, given the magnitude of the existing rates applicable to the SWSB and the large percentage of the proposed increase, as well as the SWSB's

ongoing steps to obtain its own source of water supply, it is my recommendation that no further increase applicable to the SWSB be allowed by the Division of Public Utilities ("Division"). I would also recommend that the Division encourage the PWSB and the SWSB to try to find a mutually beneficial solution that is in the best interests of the customers of both the SWSB and the PWSB. It would be in the best interests of the customers of the SWSB if the Town develops wells that result in lower costs than it would incur under the rates proposed by the PWSB. It would also be in the best interests of the customers of the PWSB if it does not lose all or a substantial portion of the revenues provided by the SWSB.

Q. Does that conclude your testimony at this time?

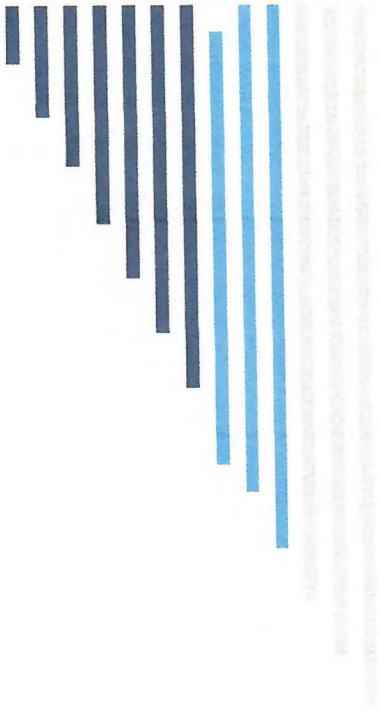
A. Yes.

APPENDIX A

Appendix A

Guastella Associates, LLC

Qualifications & Experience



Rate Setting
Valuation
Management
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INTRODUCTION
GUASTELLA ASSOCIATES, LLC

Guastella Associates, LLC ("formerly John F. Guastella Associates, Inc.") is a consulting firm that specializes in providing utility rate setting, valuation and management services for public and privately-owned water and wastewater utilities.

John F. Guastella established Guastella Associates in 1978. Previously, Mr. Guastella was Director of the Water Division of the New York Public Service Commission. The Water Division provided the New York Commission with technical assistance in regulating the rates and service provided by approximately 450 privately-owned utilities. During the period from 1987 through 1991, Mr. Guastella also managed a 5,500 customer water utility in New York State. In 1989, Guastella Associates acquired the rates and valuation section of Coffin & Richardson, Inc., a general consulting firm that also provided a full range of services to water and wastewater utilities. Since 2009, Guastella Associates has served as the general manager of Daufuskie Island Utility Company, Inc. ("DIUC"), responsible for its day-to-day operations, billing, bookkeeping, financing, capital improvement projects and regulatory relations. DIUC provides water and wastewater service to some 550 connected customers and 600 availability customers located on Daufuskie Island, South Carolina. Guastella Associates also manages the Kiawah River Utility Company which provides wastewater services to a new development in South Carolina.

Key staff members have many years of combined experience in virtually every aspect of utility rate setting and valuation. The technical expertise of key staff, combined with their former employment by real estate and utility companies, a regulatory agency, and the management of water utilities, provides a total perspective towards addressing the rates and valuation needs of today's water and wastewater utilities.

Guastella Associates has assisted the largest privately-owned utilities with respect to the most challenging issues, performing complex studies and providing expert testimony in administrative hearings as well as court proceedings. In addition, our client base has included hundreds of small water and wastewater utilities - - obtaining rate increases that turn operating losses into profits, posturing them for financing, correcting record keeping errors and, for some, negotiating their sale at multiples of their original cost net investment rate base. Some of our most successful assignments have been to help establish new developer-related water and wastewater utilities, applying the correct principles at the outset in order to develop fully compensatory initial rates, record keeping procedures and asset management, so they are structured to become self-sustaining utilities that will achieve the highest possible profit and ultimate market value.

Our wide-range of experience and expertise has enabled us to successfully address the special needs of large investor-owned utilities in rate cases and condemnation proceedings.

OUTLINE OF SERVICES
GUASTELLA ASSOCIATES, LLC

Guastella Associates, LLC ("formerly John F. Guastella Associates, Inc.") is a consulting firm specializing in utility management, valuation, appraisals and rate determinations. Guastella Associates has been providing professional services to regulated and unregulated utilities since 1978.

Specific areas of expertise includes:

I. RATE ANALYSIS

A. Revenue Requirements

1. Examination of books and records -- revenues, expenses and capital investment.

2. Determination of the cost of providing service (revenue requirement) -- normalize historical data, establish known changes and perform projections.

B. Rate Design

1. Perform cost allocation studies to establish cost of service for residential, commercial, industrial, wholesale and fire protection customers, and for other special users.

2. Develop rate structures -- combine billing analyses and cost allocations to form usage rates, flat rates, minimum service and facilities charges, and such other special charges as connection fees, availability rates, etc.

C. Reports

1. Investor-owned utilities -- prepare complete rate filings for submission to regulatory agencies; prepare testimony, exhibits, and assist in all aspects of adjudication process.

2. Municipal utilities -- prepare detailed rate reports in support of rate increases for use by municipal officials and presentation at municipal hearings.

OUTLINE OF SERVICES
GUASTELLA ASSOCIATES, LLC

II. **VALUATIONS**

A. Appraisals

1. Eminent domain condemnation proceedings, negotiations for sale of utilities, damage claims for insurance and ad valorem tax and management purposes.

2. Determinations of original cost, replacement cost, reproduction cost and market value, including going concern value.

3. Calculation of the present value of cash flow under the income approach to market value determinations.

4. Analyses of market data under the sales comparison approach.

B. Depreciation

1. Actuarial studies using retirement rate or simulated plant balances methods to determine average service lives of physical property, theoretical depreciation reserve requirements and depreciation rates.

2. Establish affordable depreciation rates on the basis of comparative analyses of similar property of other utilities and practices of regulatory agencies and association

C. Feasibility Studies

1. Utility acquisitions by investors and municipalities.

2. Economic studies to establish extension of service costs and policy -- inside and outside service area.

3. Main extension agreements, guaranteed revenue contracts, refund provisions.

D. Financial Planning

1. Establish financing requirements for capital improvements.

2. Determine revenue and rate needs for various combinations of debt and equity financing.

3. Assist certain utilities in securing financing.

4. Establish financing needs, initial rates and regulatory approval of proposed new utilities.

III. **MANAGEMENT**

A. Operations

1. Provides general management of water and wastewater utilities.

2. Assist in day-to-day decisions as to utility accounting and related impact on rates.

3. Solve problems as to record keeping in accordance with regulatory requirements and prescribed systems of accounts.

4. Establish general policy and tariff provisions for customer service, billing, collecting, meter testing, complaint handling, and customer and regulatory relations.

B. Administrative

1. Coordinate activities with regulatory agencies to assure compliance with rules, regulations and orders.

2. Negotiations for purchase or sale of utility property and special contracts.

C. Training

1. On-the-job training for employees while working on various projects.
2. Special educational seminars on all aspects of utility rate settings, financing, valuation and rules.

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE
of
JOHN F. GUASTELLA

B.S., Mechanical Engineering, Stevens Institute of Technology, 1962

Member:

American Water Works Association, Lifetime Member
National Association of Water Companies
New England Water Works Association, Lifetime Member

Committees:

AWWA, Water Rates Committee (Water Rates Manual M-1, 1983 Edition)
National Association of Regulatory Utility Commissioners (NARUC) and NAWC, Joint-Committee on Rate Design
NAWC, Rates and Revenues Committee
NAWC, Small Water Company Committee

Mr. Guastella is President of Guastella Associates, LLC ("formerly John F. Guastella Associates, Inc.") which provides management, valuation and rate consulting services for municipal and investor-owned utilities, as well as regulatory agencies. His clients include utilities in the states of Alaska, Arizona, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Missouri, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, and Virginia. He has provided consulting services that include all aspects of utility regulation and rate setting, encompassing revenue requirements, revenues, operation and maintenance expenses, depreciation, taxes, return on investment, cost allocation and rate design. He has performed depreciation studies for the establishment of average service lives and depreciation rates of utility property. He has performed appraisals of utility companies for management purposes and in connection with condemnation proceedings. He has also negotiated the sale of utility companies. He directs the general management of a water and wastewater utility in South Carolina.

Mr. Guastella served for more than four years as President of Country Knolls Water Works, Inc., a water utility that served some 5,500 customers in Saratoga County, New York. He also served as a member of the Board of Directors of the National Association of Water Companies.

Mr. Guastella has qualified and testified as an expert witness before regulatory agencies and municipal jurisdictions in the states of Alaska, Arizona, California, Connecticut, Delaware, Florida, Georgia, Illinois, Kentucky, Indiana, Maryland, Massachusetts, Missouri, Montana, Nevada, New Hampshire, New Mexico, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas and Virginia.

Prior to establishing his own firm, Mr. Guastella was employed by the New York State Public Service Commission for sixteen years. For two years he was involved in the regulation of electric and gas utilities, with the remaining years devoted to the regulation of water utilities. In 1970, he was promoted to Chief of Rates and Finance in the Commission's Water Division. In 1972, he was made Assistant Director of the Water Division. In 1974, he was appointed by Alfred E. Kahn, then Chairman of the Commission, to be Director of the Water Division, a position he held until he resigned from the Commission in August 1978.

At the Commission, his duties included the performance and supervision of engineering and economic studies concerning rates and service of many public utilities. As Director of the Water Division, he was responsible for the regulation of more than 450 water companies in New York State and headed a professional staff of 32 engineers and three technicians. A primary duty was to attend Commission sessions and advise the Commission during its decision making process. In the course of that process, an average of about fifty applications per year would be reviewed and analyzed. The applications included testimony, exhibits and briefs

involving all aspects of utility valuation and rate setting. He also made legislative proposals and participated in drafting Bills that were enacted into law: one expanded the N.Y. Public Service Commission's jurisdiction over small water companies and another dealt specifically with rate regulation and financing of developer-related water systems.

In addition to his employment and client experience, Mr. Guastella served as Vice-Chairman of the Staff-Committee on Water of the National Association of Regulatory Utility Commissioners (NARUC). This activity included the preparation of the "Model Record-Keeping Manual for Small Water Companies," which was published by the NARUC. This manual provides detailed instruction on the kinds of operation and accounting records that should be kept by small water utilities, and on how to use those records.

Each year since 1974 he has prepared study material, assisted in program coordination and served as an instructor at the Eastern Annual Seminar on Water Rate Regulation sponsored over the years by the NARUC in conjunction with the University of South Florida, Florida Atlantic University, the University of Utah, Florida State University, the University of Florida and currently Michigan State University. In 1980 he was instrumental in the establishment of the Western NARUC Rate Seminar and has annually served as an instructor since that time. This course is recognized as one of the best available for teaching rate-setting principles and methodology. More than 8,000 students have attended this course, including regulatory staff, utility personnel and members of accounting, engineering, legal and consulting firms throughout the country.

Mr. Guastella served as an instructor and panelist in a seminar on water and wastewater regulation conducted by the Independent Water and Sewer Companies of Texas. In 1998, he prepared and conducted a seminar on basic rate regulation on behalf of the New England Chapter of the National Association of Water Companies. In 2000 and 2001, Mr. Guastella developed and conducted a special seminar for developer related water and wastewater utilities in conjunction with Florida State University, and again in 2003 in conjunction with the University of Florida. It provided essential training for the financial structuring of small water and wastewater utilities, rate setting, financing and the establishment of their market value in the event of a negotiated sale or condemnation. In 2004, he prepared and conducted a special workshop seminar on behalf of the Office of Regulatory Staff of South Carolina, covering rate setting, valuation and general regulation of water and wastewater utilities. In 2006, he participated in an expert workshop on full cost pricing conducted by the U. S. Environmental Protection Agency in coordination with the Institute of Public Utilities, Michigan State University. In 2006 and again in 2013, he prepared and conducted a special seminar on rate setting and valuation on behalf of the New York Chapter of the NAWC. In 2007 and again in 2015, he prepared and conducted a special seminar on rate setting and valuation on behalf of the New England Chapter of NAWC.

Mr. Guastella has made presentations on a wide variety of rate, valuation and regulatory issues at meetings of the National Association of Regulatory Utility Commissioners, the American Water Works Association, the New England Water Works Association, the National Association of Water Companies, the New England Conference of Public Utilities Commissioners, the Florida, New England, New Jersey and New York Chapters of NAWC, the Mid-America Regulatory Conference, the Southeastern Association of Regulatory Utility Commissioners, the Pennsylvania Environmental Conference, the Public Utility Law Section of the New Jersey Bar Association, the U.S. Environmental Protection Agency Expert Workshop, the NAWC Water Utility Executive Council, and the National Drinking Water Symposium.

John F. Guastella
List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1966	Sunhill Water Corporation	New York	23968
1967	Amagansett Water Company	New York	24210
1967	Worley Homes, Inc.	New York	24466
1968	Amagansett Water Company	New York	24718
1968	Amagansett Water Company	New York	24883
1968	Sunhill Water Corporation	New York	23968
1968	Worley Homes, Inc.	New York	Supreme Court
1969	Amagansett Water Supply	New York	24883
1969	Citizens Water Supply Co.	New York	25049
1969	Worley Homes, Inc.	New York	24466/24992
1970	Brooklyn Union Gas Company	New York	25448
1970	Consolidated Edison of New York	New York	25185
1971	Hudson Valley Water Companies	New York	26093
1971	Jamaica Water Supply Company	New York	26094
1971	Port Chester Water Works, Inc.	New York	25797
1971	U & I Corp. - Merrick District	New York	26143
1971	Wanakah Water Company	New York	25873
1972	Spring Valley Water Company	New York	26226
1972	U & I Corp. - Woodhaven District	New York	26232
1973	Citizens Water Supply Company	New York	26366
1978	Rhode Island DPU&C (Bristol County)	Rhode Island	1367A
1979	Candlewick Lake Utilities Co.	Illinois	76-0218
1979	Candlewick Lake Utilities Co.	Illinois	76-0347
1979	Candlewick Lake Utilities Co.	Illinois	78-0151
1979	Jacksonville Suburban Utilities	Florida	770316-WS
1979	New York Water Service Corporation	New York	27594
1979	Salem Hills Sewerage Disposal Corp. v. V. of Voorheesville	New York	Supreme Court

John F. Guastella
List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1979	Seabrook Water Corporation	New Jersey	7910-846
1979	Southern Utilities Corporation	Florida	770317-WS
1979	Township of South Brunswick	New Jersey	Municipal
1979	Westchester Joint Water Works	New York	Municipal
1979	Woodhaven Utilities Corporation	Illinois	77-0109
1980	Crestwood Village Sewer Company	New Jersey	BPU 802-78
1980	Crestwood Village Water Company	New Jersey	BPU 802-77
1980	Gateway Water Supply Corporation	Texas	Municipal
1980	GWW-Central Florida District	Florida	800004-WS
1980	Jamaica Water Supply Company	New York	27587
1980	Rhode Island DPU&C (Newport Water)	Rhode Island	1480
1981	Briarcliff Utilities, Inc.	Texas	3620
1981	Candlewick Lake Utilities Co.	Illinois	81-0011
1981	Caroline Water Company, Inc.	Virginia	810065
1981	GDU, Inc. - Northport	Florida	Municipal
1981	GDU, Inc. - Port Charlotte	Florida	Municipal
1981	GDU, Inc. - Port Malabar	Florida	80-2192
1981	Hobe Sound Water Company	Florida	8000776
1981	Lake Buckhorn Utilities, Inc.	Ohio	80-999
1981	Lake Kiowa Utilities, Inc.	Texas	3621
1981	Lakengren Utilities, Inc.	Ohio	80-1001
1981	Lorelei Utilities, Inc.	Ohio	80-1000
1981	New York Water Service Corporation	New York	28042
1981	Rhode Island DPU&C (Newport Water)	Rhode Island	1581
1981	Shawnee Hills Utility Company	Ohio	80-1002
1981	Smithville Water Company, Inc.	New Jersey	808-541
1981	Spring Valley Water Company, Inc.	New York	27936
1981	Spring Valley Water Company, Inc.	New York	27936
1981	Sunhill Water Corporation	New York	27903

John F. Guastella
List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1981	Swan Lake Water Corporation	New York	27904
1982	Chesterfield Commons Sewer Company	New Jersey	822-84
1982	Chesterfield Commons Water Company	New Jersey	822-83
1982	Crescent Waste Treatment Corp.	New York	Municipal
1982	Crestwood Village Sewer Company	New Jersey	821-33
1982	Crestwood Village Water Company	New Jersey	821-38
1982	Salem Hills Sewerage Disposal Corp.	New York	Municipal
1982	Township of South Brunswick	New Jersey	Municipal
1982	Woodhaven Utilities Corporation	Illinois	82-0167
1983	Country Knolls Water Works, Inc.	New York	28194
1983	Heritage Hills Water Works Corp.	New York	28453
1984	Crestwood Village Sewer Company	New Jersey	8310-861
1984	Crestwood Village Water Company	New Jersey	8310-860
1984	Environmental Disposal Corp.	New Jersey	816-552
1984	GDU, Inc. - Port St. Lucie	Florida	830421
1984	Heritage Village Water (water/sewer)	Connecticut	84-08-03
1984	Hurley Water Company, Inc.	New York	28820
1984	New York Water Service Corporation	New York	28901
1985	Deltona Utilities (water/sewer)	Florida	830281
1985	J. Filiberto Sanitation, Inc.	New Jersey	8411-1213
1985	Sterling Forest Pollution Control	New York	Municipal
1985	Water Works Enterprise, Grand Forks	North Dakota	Municipal
1986	GDU, Inc. - Port Charlotte	Florida	Municipal
1986	GDU, Inc. - Sebastian Highlands	Florida	Municipal
1986	Kings Grant Water/Sewer Companies (settled)	New Jersey	WR8508-868
1986	Mt. Ebo Sewage Works, Inc.	New York	Municipal
1986	Sterling Forest Pollution Control	New York	Municipal
1987	Country Knolls Water Works, Inc.	New York	29443
1987	Crestwood Village Sewer Co. (settled)	New Jersey	WR8701-38

John F. Guastella
List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1987	Deltona Utilities – Marco Island	Florida	85151-WS
1987	Deltona Utilities, Inc. - Citrus Springs (settled)	Florida	870092-WS
1987	First Brewster Water Corp. v. Town of Southeast (settled)	New York	Supreme Court
1987	GDU, Inc. - Silver Springs Shores	Florida	870239-WS
1987	Ocean County Landfill Corporation	New Jersey	SR-8703117
1987	Palm Coast Utility Corporation	Florida	870166-WS
1987	Sanlando Utilities Corp. (settled)	Florida	860683-WS
1987	Township of South Brunswick	New Jersey	Municipal
1987	Woodhaven Utilities Corp. (settled)	Illinois	87-0047
1988	Crescent Estates Water Co., Inc.	New York	88-W-035
1988	Elizabethtown Water Co.	New Jersey	OAL PUC3464-88
1988	Heritage Village Water Company	Connecticut	87-10-02
1988	Instant Disposal Service, Inc.	New Jersey	SR-87080864
1988	J. Filiberto Sanitation v. Morris County Transfer Station	New Jersey	01487-88
1988	Ohio Water Service Co.	Ohio	86-1887-WW-CO1
1988	St. Augustine Shores Utilities	Florida	870980-WS
1989	Elizabethtown Water Co.	New Jersey	BPU WR89020132J
1989	GDU (FPSC generic proceeding as to rate setting procedures)	Florida	880883-WS
1989	Gordon's Corner Water Co.	New Jersey	OAL PUC479-89
1989	Heritage Hills Sewage Works	Connecticut	Municipal
1989	Heritage Village Water Company	Connecticut	87-10-02
1989	Palm Coast Utility Corporation	Florida	890277-WS
1989	Southbridge Water Supply Co.	Massachusetts	DPU 89-25
1989	Sterling Forest Water Co.	New York	PSC 88-W-263
1990	American Utilities, Inc. - United States Bankruptcy Court	New Jersey	85-00316
1990	City of Carson City	Nevada	Municipal
1990	Country Knolls Water Works, Inc.	New York	90-W-0458
1990	Elizabethtown Water Company	New Jersey	WR900050497J

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Year	Client	State	Regulatory Docket/Case Number
1990	Kent County Water Authority	Rhode Island	1952
1990	Palm Coast Utility Corporation	Florida	871395-WS
1990	Southern States Utilities, Inc.	Florida	Workshop
1990	Trenton Water Works	New Jersey	WR90020077J
1990	Waste Management of New Jersey	New Jersey	SE 87070552
1990	Waste Management of New Jersey	New Jersey	SE 87070566
1991	City of Grand Forks	North Dakota	Municipal
1991	Gordon's Corner Water Co.	New Jersey	OAL PUC8329-90
1991	Southern States Utilities, Inc.	Florida	900329-WS
1992	Elizabethtown Water Co.	New Jersey	WR 91081293J
1992	General Development Utilities, Inc. - Port Malabar Division	Florida	911030-WS
1992	General Development Utilities, Inc. - West Coast Division	Florida	911067-WS
1992	Heritage Hills Water Works, Inc.	New York	92-2-0576
1993	General Development Utilities, Inc. - Port LaBelle Division	Florida	911737-WS
1993	General Development Utilities, Inc. - Silver Springs Shores	Florida	911733-WS
1993	General Waterworks of Pennsylvania - Dauphin Cons. Water Supply	Pennsylvania	R-00932604
1993	Kent County Water Authority	Rhode Island	2098
1993	Southern States Utilities - FPSC Rulemaking	Florida	911082-WS
1993	Southern States Utilities - Marco Island	Florida	920655-WS
1994	Capital City Water Company	Missouri	WR-94-297
1994	Capital City Water Company	Missouri	WR-94-297
1994	Elizabethtown Water Company	New Jersey	WR94080346
1994	Elizabethtown Water Company	New Jersey	WR94080346
1994	Environmental Disposal Corp.	New Jersey	WR94070319
1994	General Development Utilities - Port Charlotte	Florida	940000-WS
1994	General Waterworks of Pennsylvania	Pennsylvania	R-00943152

John F. Guastella
List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1994	Hoosier Water Company - Mooresville Division	Indiana	39839
1994	Hoosier Water Company - Warsaw Division	Indiana	39838
1994	Hoosier Water Company - Winchester Division	Indiana	39840
1994	West Lafayette Water Company	Indiana	39841
1994	Wilmington Suburban Water Corporation	Delaware	94-149 (stld)
1995	Butte Water Company	Montana	Cause 90-C-90
1995	Heritage Hills Sewage Works Corporation	New York	Municipal
1996	Consumers Illinois Water Company	Illinois	95-0342
1996	Elizabethtown Water Company	New Jersey	WR95110557
1996	Palm Coast Utility Corporation	Florida	951056-WS
1996	PenPac, Inc.	New Jersey	OAL-00788-93N
1996	Southern States Utilities, Marco Island	Florida	950495-WS
1997	Crestwood Village Water Company	New Jersey	BPU 96100739
1997	Indiana American Water Co., Inc.	Indiana	IURC 40703
1997	Missouri-American Water Company	Missouri	WR-97-237
1997	South County Water Corp	New York	97-W-0667
1997	United Water Florida	Florida	960451-WS
1998	Consumer Illinois Water Company	Illinois	98-0632
1998	Consumers Illinois Water Company	Illinois	97-0351
1998	Heritage Hills Water Company	New York	97-W-1561
1998	Missouri-American Wastewater Company	Missouri	SR-97-238
1999	Consumers Illinois Water Company	Illinois	99-0288
1999	Environmental Disposal Corp.	New Jersey	WR99040249
1999	Indiana American Water Co., Inc.	Indiana	IURC 41320
2000	South Haven Sewer Works, Inc.	Indiana	Cause: 41410
2000	Utilities Inc. of Maryland	Maryland	CAL 97-17811
2001	Artesian Water Company	Delaware	00-649
2001	Citizens Utilities Company	Illinois	01-0001
2001	Elizabethtown Water Company	New Jersey	WR-0104205

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List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
2001	Kiawah Island Utility, Inc.	South Carolina	2001-164-W/S
2001	Placid Lakes Water Company	Florida	011621-WU
2001	South Haven Sewer Works, Inc.	Indiana	41903
2001	Southlake Utilities, Inc.	Florida	981609-WS
2002	Artesian Water Company	Delaware	02-109
2002	Consumers Illinois Water- Grant Park	Illinois	02-0480
2002	Consumers Illinois Water- Village Woods	Illinois	02-0539
2002	Valencia Water Company	California	02-05-013
2003	Consumers Illinois Water - Indianola	Illinois	03-0069
2003	Elizabethtown Water Company	New Jersey	WR-030-70510
2003	Golden Heart Utilities, Inc.	Alaska	U-02-13, 14 & 15
2003	Utilities, Inc. – Georgia	Georgia	CV02-0495-AB
2004	Aquarion Water Company	Connecticut	04-02-14
2004	Artesian Water Company	Delaware	04-42
2004	El Dorado Utilities, Inc.	New Mexico	D-101-CU-2004-
2004	Environmental Disposal Corp.	New Jersey	DPU WR 03 070509
2004	Heritage Hills Water Company	New York	03-W-1182
2004	Sun Valley Water & Washoe County Dept. of Water Revenues	Nevada	TMWA Municipal
2004	Jersey City MUA	New Jersey	Municipal
2004	Rockland Electric Company	New Jersey	EF02110852
2005	Aquarion Water Company	New Hampshire	DW 05-119
2005	Intercoastal Utilities, Inc.	Florida	04-0007-0011-0001
2005	Haig Point Utility Company, Inc.	South Carolina	2005-34-W/S
2005	South Central Connecticut Regional Water Auth.	Connecticut	Municipal
2006	Pennichuck Water Works, Inc.	New Hampshire	DW-04048
2006	Village of Williston Park	New York	Municipal
2006	Jersey City MUA	New Jersey	Municipal
2006	Groton Utilities	Connecticut	Municipal

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List of Proceedings in which
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Year	Client	State	Regulatory Docket/Case Number
2006	Connecticut Water Company	Connecticut	06-07-08
2006	Birmingham Utilities, Inc.	Connecticut	06-05-10
2006	Aqua Florida Utilities, Inc.	Florida	060368-WS
2007	Aquarion Water Company of CT	Connecticut	07-05-19
2007	Pennichuck Water Works, Inc.	New Hampshire	DW 04-048
2007	Aqua Indiana - Utility Center	Indiana	43331
2007	Environmental Disposal Corp.	New Jersey	WR 04 080760
2007	Aqua Florida Utilities, Inc.	Florida	07-0183
2007	Aqua Illinois, Inc. - Hawthorn Woods, Willowbrook & Vermilion	Illinois	07-0620/07-0621/08-0067
2008	Aqua Florida Utilities, Inc.	Florida	080121-WS
2008	Aquarion Water Company of MA	Massachusetts	D.P.U. 08-27
2008	Haig Point Utility Company, Inc.	South Carolina	2007-414-WS
2009	R.M.V. Land & C.M. Livestock, L.C.C.	New Jersey	EM02050313
2010	City of Griffin	Georgia	Civil Action No. 09V-2866
2010	Connecticut Water Company	Connecticut	09-12-11
2010	Montville WPCA	Connecticut	1400012464
2010	Milford Water Company	Massachusetts	DPU 10-78
2010	Arizona American Water Company	Arizona	W-01303A-10-0448
2011	Aqua Illinois	Illinois	ICC Docket (Consolidated)
2011	Artesian Water Company	Maryland	MPSC Case 9252
2011	Artesian Water Company	Delaware	PSC 11-207
2011	Kiawah Island Utility, Inc.	South Carolina	2011-317-WS
2012	Washington Gas Light	Maryland	Senate SB541
2012	Washington Gas Light	Maryland	House HB662
2012	Daufuskie Island Utility	South Carolina	2011-229-W/S
2012	Milford Water Company	Massachusetts	DPU 12-86
2013	Artesian Water Company	Pennsylvania	2:10-CV-07453-JP
2013	Aquarion Water Company - Oxford	Massachusetts	CA 09-00592E

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List of Proceedings in which
Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
2013	Water Management Services	Florida	110200-WU
2013	City of Fernandina Beach	Florida	Civil Action No. 13CA000485AXYX
2013	City of Elizabeth	New Jersey	Docket Nos. UNN-L-0556-10 and UNN-L-2608-11
2014	Daufuskie Island Utility Company, Inc.	South Carolina	Case No. 2013-CP-7-02255
2014	Artesian Water Company	Delaware	Docket No. PSC 14-132
2014	Aquarion Water Company - Hingham	New Hampshire	SUCU 2013-03159-BLS2
2015	EPCOR	Arizona	ACC Docket # WS-01303A-14-0010
2015	Mountain Water Company	Montana	Case # DV-14-352
2015	Daufuskie Island Utility Company, Inc.	South Carolina	Docket No. 2014-346-WS
2015	Housatonic Water Works	Massachusetts	D.P.U. 15-179
2016	Epcor Water Arizona	Arizona	Docket No. W501303A-16-0145
2016	Community Utilities of Indiana	Indiana	Case No. 44724
2016	Utilities Inc. of Florida	Florida	Docket No. 16101-WS
2017	Epcor Water Arizona	Arizona	Docket No. W10303A-17-0141
2017	Aquarion Water Company of Massachusetts	Massachusetts	D.P.U. 17-90
2017	Milford Water Company	Massachusetts	D.P.U. 17-107
2018	Water Services Corp. of Kentucky	Kentucky	Case No. 2018-00208
2018	Epcor Water New Mexico, Inc.	New Mexico	Case No. 18_00124-UT
2019	Daufuskie Island Utility Company, Inc.	South Carolina	Docket No. 2018-364
2020	Epcor-Johnson Utilities, LLC	Arizona	Docket No. WS-02987A-20
2020	Valley Water Systems, Inc.	Connecticut	Docket No. 20-11-14
2020	Aquarion Water Company of New Hampshire	New Hampshire	Docket No. DW 20-184
2021	EPCOR of Arizona Inc.	Arizona	Docket No. WS-01303A-20-0177
2021	Epcor Water Arizona, Inc, San Tan	Arizona	Docket No. WS-02987A-20-0025 WS-01303A-20-0025
2021	Middlesex Water Company	New Jersey	Docket No. WR21050813
2021	Gordon's Corner Water Company	New Jersey	Docket No. WR21070979

John F. Guastella
Papers and Presentations

Year	Title	Forum
1974 through 2020	1. Basics of Rate Setting 2. Cost Allocation and Rate Design 3. Revenue Requirements	Semi-annual seminars on utility rate regulation, National Association of Regulatory Utility Commissioners, sponsored by the University of South Florida, the University of Utah, Florida State University, The University of Florida and Michigan State University, and currently the NARUC Water Committee.
1974	Rate Design Studies: A Regulatory Point-of- View	Annual convention of the National Association of Water Companies, New Haven, Connecticut
1976	Lifeline Rates	Annual convention of the National Association of Water Companies, Chattanooga, Tennessee
1977	Regulating Water Utilities: The Customers' Best Interest	Annual symposium of the New England Conference of Public Utilities Commissioners, Mystic Seaport, Connecticut
1978	Rate Design: Preaching v. Practice	Annual convention of the National Association of Water Companies, Baton Rouge, Louisiana
1979	Small Water Companies	Annual symposium of the New England Conference of Public Utilities Commissioners, Newport, Rhode Island
1979	Rate Making Problems Peculiar to Private Water and Sewer Companies	Special educational program sponsored by Independent Water and Sewer Companies of Texas, Austin, Texas
1980	Water Utility Regulation	Annual meeting of the National Association of Regulatory Utility Commissioners, Houston, Texas
1981	The Impact of Water Rates on Water Usage	Annual Pennsylvania Environmental Conference, Harrisburg, Pennsylvania
1981	A Realistic Approach to Regulating Water Utilities	Mid-America Regulatory Conference, Clarksville, Indiana
1982	Issues in Water Utility Regulation	Annual symposium of the New England Conference of Public Utilities Commissioners, Rockport, Maine
1982	New Approaches to the Regulation of Water Utilities	Southeastern Association of Regulatory Utility Commissioners, Asheville, North Carolina
1983	Allocating Costs and Revenues Fairly and Effectively	Maryland Water and Sewer Finance Conference, Westminster, Maryland
1983	Lifeline and Social Policy Pricing	Annual conference of the American Water Works Association, Las Vegas, Nevada (published)
1984	The Real Cost of Service: Some Special Considerations	Annual New Jersey Section AWWA Spring Meeting, Atlantic City, New Jersey
1987	Margin Reserve: It's Not the Issue	Florida Waterworks Association Newsletter, April/May/June 1987 issue

John F. Guastella
Papers and Presentations

Year	Title	Forum
1987	A "Current" Issue: CIAC	NAWC - New England Chapter November 6, 1987 meeting
1988	Small Water Company rate Setting: Take It or Leave It	NAWC - New York Chapter June 14, 1988 meeting
1989	The Solution to all the Problems of Good Small Water Companies	NAWC Quarterly magazine, Winter issue
1989	Current Issues Workshop - Panel	New England Conference of Public Utilities Commissioners, Kennebunkport, Maine
1991	Alternative Rate Structures	New Jersey Section 1991 Annual Conference, AWWA, Atlantic City, New Jersey
1994	Conservation Impact on Water Rates	New England NAWC and New England AWWA, Sturbridge, Massachusetts
1996	Utility Regulation - 21st Century	NAWC Annual Meeting, Orlando, Florida
1997	Current Status Drinking Water State Revolving Fund	NAWC Annual Meeting, San Diego, California
1998	Small Water Companies - Problems and Solutions	NAWC Annual Meeting, Indianapolis, Indiana
1998	Basic Rate Regulation Seminar	New England Chapter - NAWC, Rockport, Maine
2000	Developer Related Water and Sewer Utilities Seminar	Florida State University, Orlando, Florida
2001	Developer Related Water and Sewer Utilities Seminar	Florida State University, Orlando, Florida
2002	Regulatory Cooperation - Small Company Education	New England Chapter - NAWC, Annual Meeting
2003	Developer Related Water and Sewer Utilities Seminar	University of Florida, Orlando, Florida
2004	Basic Regulation & Rate Setting Training Seminar	Office of Regulatory Staff, Columbia, South Carolina
2005	Municipal Water Rates	Nassau-Suffolk Water Commissioners Association, Franklin Square, New York
2005	Innovations in Rate Setting and Procedures	NAWC New York Chapter, West Point, New York

John F. Guastella
Papers and Presentations

Year	Title	Forum
2006	Basics of Rate Setting	The Connecticut Water Company, Clinton, Connecticut
2006	Innovations in Rate Setting and Procedures	NAWC New York Chapter, Catskill, New York
2006	Best Practices as Regulatory Policy	NAWC New England Chapter, Ogunquit, Maine
2006	Rate and Valuation Seminar	NAWC New York Chapter
2006	Full Cost Pricing	U.S. Environmental Protection Agency Expert Workshop, Lansing, Michigan
2006	Innovations in Rate Setting	NAWC New England Chapter, Portsmouth, New Hampshire
2007	Weather Sensitive Customer Demands	NAWC Water Utility Executive Council, Half Moon Bay, California
2007	Basics of Rate Setting and Valuation Seminar	NAWC New England Chapter, Ogunquit, Maine
2007	Small Company Characteristics	National Drinking Water Symposium, La Jolla, California
2013	Rate and Valuation Seminar	NAWC New York Chapter
2015	Rate and Valuation Seminar	NAWC New England Chapter

EXHIBIT 1

IMPROVING COMMUNITIES TOGETHER

October 4, 2021

Mr. Gene Allen, Director
Department of Public Works
3 Spragueville Road
Smithfield, RI 02917

Re: New Water Supply Exploration

Dear Mr. Allen:

The Town of Smithfield has been dealing the rising cost of water and is interested in how to position the Smithfield Water Supply Board (SWSB) for the future. This approach includes developing a strategy to begin the process of exploring for a new groundwater supply.

BETA Group, Inc. (BETA) working with our well development sub-consultant, Bristol Engineering Advisors, Inc. (Bristol) conducted a preliminary well exploration study that included a desk-top study of existing US Geological Survey mapping and available existing studies to identify potential areas that could be suitable for a municipal water supply. Additionally, at each area identified as having a potential for development as a gravel developed well, a preliminary evaluation of the surrounding land use identified potential sources of pollution.

Below represents the findings of the preliminary study.

BACKGROUND

The development of a new source of drinking water supply in Rhode Island is regulated under 216-RICR-50-05-1. These comprehensive regulations and guidelines provide a detailed roadmap for communities to follow.

Bristol performed a desk-top study of existing US Geological Survey mapping and available existing studies.

Some of the most productive aquifers in New England are the result of our geologic history of glaciations. The retreat of the glaciers 10,000 years ago left behind abundant sand and gravel aquifers that provide water to nearly half the people of southern New England. There are two types of sand and gravel aquifers: outwash plains such as those encountered in southern Rhode Island and Cape Cod, Mass; and valley-fill aquifers, such as those found – as the name suggests – in the valleys between hilly uplands.

The other geologic deposits associated with glaciers is referred to as "glacial till". Till is characterized by a poorly sorted mixture of clay, silt, sand, gravel and boulders; because it is not well sorted, the pore spaces between the particles is often extremely small and therefore does not transmit water freely.

FINDINGS

Smithfield is not, unfortunately, blessed with abundant glacial outwash deposits. The majority of town is underlain by till over bedrock. Similarly, the Woonasquatucket Reservoir and associated water bodies occupy much of the remaining land area. The areas in green in the composite Figure 1, below, are areas that have been mapped by the US Geological Survey as having valley-fill glacial outwash deposits. The pink covering the rest of town is glacial till that would be generally unsuitable for a municipal-scale public water

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supply well. There are, however, valley-fill deposits located in valley-fill deposits between the Woonasquatucket and Scituate reservoirs. These deposits appear to have sufficient thickness and characteristics that they may potentially support a municipal-scale public water supply well.

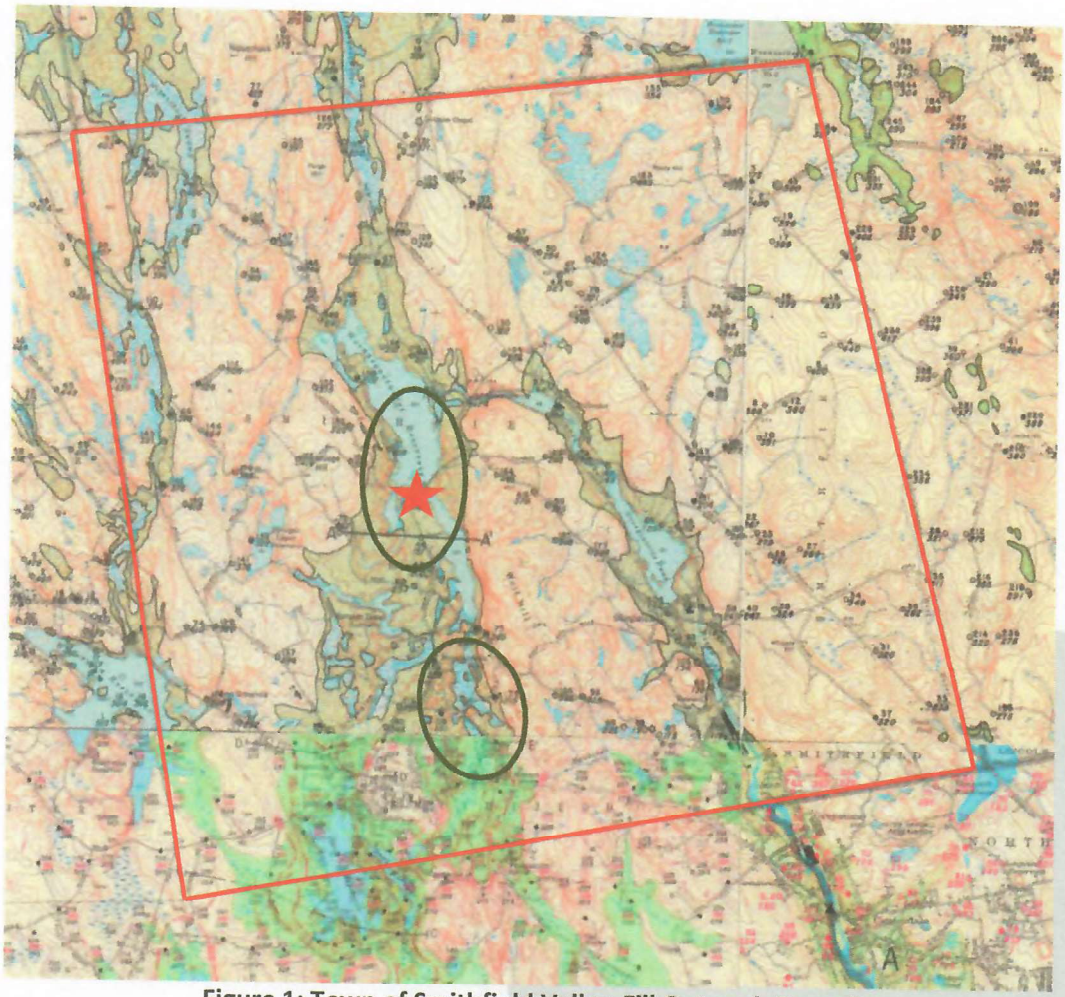

Figure 1: Town of Smithfield Valley-Fill Outwash Deposits

While there appears to be other areas of valley-fill outwash, the record of drilling in these areas suggests that the outwash in most of these areas is very thin. Till and/or bedrock is very near the surface, and without a significant thickness of outwash to store and transmit water, these areas are unlikely to be suitable.

The area – marked by the red star – however, appears to have sufficient aquifer thickness to support a municipal-scale public water supply well. At this location, it may be possible to construct a well with a yield of 250-300 gallons per minute. Perhaps multiple wells at this location could provide 0.5-0.75 million gallons per day. However, this area, which is coincident with the axis of the reservoir, is fairly developed and finding a parcel or contiguous parcels large enough to support the protective radius may prove a substantial challenge.

Smithfield does not have significant glacial outwash deposits. However, they do exist and at discrete locations within these deposits it may be possible to site wells with adequate yields. However, it appears unlikely that groundwater sources in excess of a million gallons per day will be developed within the Town of Smithfield.

RECOMMENDATION

Should the Town be interested in exploring the location identified in this document for public water supply potential, the Town should embark on the process to further explore the development of a new drinking water supply well. The process to conduct this exploration is defined below.

TYPICAL WELL DEVELOPMENT PROCESS AND COSTS

The development of a new source of drinking water supply in Rhode Island is regulated by the Department of Health under 216-RICR-50-05-1. These comprehensive regulations and guidelines provide a detailed roadmap for constructing and testing a new production well, but do not provide detail on the exploration process. In light of this, the scope below is based on industry practice and supplemented by the Massachusetts New Source Approval guidelines.

The Scope below consists of three phases. The first phase would be a desktop study that considers existing mapping and reports that typically identifies up to three (3) locations that warrant further field investigations. The next phase consists of field exploration activities at each of the three sites identified in the first phase. The final phase of the Scope is final design and permitting at the most favorable site. Since neither the location nor capacity of a suitable production well is known at this time, the Scope and Budget for Phase 3 is intended only to provide a rough estimate of the level of effort and cost to complete a final production well.

1. Site Specific Field Investigations

Prior to performing any field investigations, establish communications with the Rhode Island Water Resources Board (RIWRB) and the Department of Health (DOH) to inform them of the intention to explore for a new groundwater supply well.

Contract with a water well drilling firm with experience in conducting public water supply well investigations for the installation of up to 5 monitoring wells at each of the up to three (3) locations identified in Phase 1 above.

The geologic strata encountered during monitoring well installation will be logged, and each well rated to estimate water yield. An offset well will be installed at the most favorable location at each of the three sites for the purpose of conducting a preliminary yield rating test. Limited environmental sampling will be conducted at the conclusion of the rating test to evaluate for inorganic compounds, VOCs and PFAS.

Prepare a summary of the results of the field investigations, providing a recommendation, scope and budget for Phase 3 evaluation, if conditions warrant. The scope will be consistent with RIDOH regulations for siting a new groundwater supply.

2. Production Well Design, Permitting, and Construction

Using the framework provided in the RIDOH regulations, prepare specifications for the construction and testing of a public water supply well. In accordance with the regulations, the following items will be included:

- logs, data, and analyses performed to date at the site to be developed;
- Proposed well construction parameters – depth, diameter, screened interval, etc.;

- RIDOH-required well forms;
- Location of proposed monitoring locations;
- Identification of sensitive receptors in the vicinity of the site;
- Well testing protocol – duration, monitoring frequency, laboratory analytical sampling schedule;
- Method for determining stabilization;
- Post-test well recovery monitoring schedule.

Bidding for well construction and testing services, and coordinate all drilling and testing activities with the Smithfield Water Supply Board and drilling contractor.

Following completion of the test, prepare a report detailing the well development activities and provide a recommendation on well yield for sizing final pump and motor.

Typical Schedule

Phase 1 approximately twenty (20) weeks.

Phase 2 approximately eighteen (18) months from completion of Phase 1 and subsequent Notice to Proceed on Phase 2.

Typical Fees

Phase 1: Approximately $90,000 - $120,000.

Phase 2: Approximately $250,000 - $350,000. Please note that this amount is an estimate based on recent work performed of a similar nature. This estimate includes costs to install and test the well ONLY and it does NOT include additional infrastructure costs, including well pumps and motors, electrical service, water mains, SCADA implementation, chemical addition/treatment, or access roadway design or construction.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Andrew Dennehy, PE
Senior Associate

BETA

EXHIBIT 2

Town of Smithfield, Rhode Island

Water System Modeling

October 2021

PEAK HOUR SHAVING ANALYSIS (DRAFT)

BETA

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2nd Floor
Norwood, Massachusetts 02062
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Water System Modeling

Town of Smithfield, Rhode Island

PEAK HOUR SHAVING ANALYSIS (DRAFT)

Prepared by: BETA GROUP, INC.
Prepared for: Town of Smithfield

October 2021

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1.0 INTRODUCTION

The Town of Smithfield (hereafter referred to as the Town), has tasked BETA Group, Inc. (BETA) with developing an approach to document the ability to shave the peak hourly pumping rate from the Providence Water Supply system to potentially cut back Smithfield Water Supply Board's (SWSB) fee to Providence Water Supply Board (PWSB). The scope of the assignment was:

- Review existing water distribution model created by Pare Corporation. Model was not fully calibrated, and demands were not current. BETA updated demands in town and recalibrated model to make it dynamic.
- To manipulate model to ensure model provides extended duration scenarios. In our initial review of the model, the model was not set up for extended duration modeling, rather it looks to be static.
- Add existing controls to the model (tank control levels, pump control, and normal output and performance curves on the pumps).
- Compare model predictions to metered quantities from PWSB meter readings.
- Once model was set for extended duration, the model was run using average day, maximum day, and peak hour demands.

  The following scenarios were modeled:
  - ✓ Average day with Alpha Tank on-line
  - ✓ Maximum day with Alpha Tank on-line
  - ✓ Peak hour with Alpha Tank on-line
  - ✓ Average day with Rocky Hill Tank on-line
  - ✓ Maximum day with Rocky Hill on-line
  - ✓ Peak hour with Rocky Hill on-line

- Review seasonal variations in flow to determine if peak hour is affected by removing the large tank from service during lower demand periods.

BETA updated the current model by including water demands based on actual consumption in town per parcel and pump control data using performance curves acquired by pump distributor. The model was run using Bentley WaterGEMs v.10i. Results are analyzed in the next section below.

2.0 WATER MODEL SCENARIOS

Following the completion of model calibration, a years' worth of Supervisory Control and Data Acquisition (SCADA) data from the Town was analyzed to identify the average daily, maximum daily, and peak hour demand of the water system. **Table 1** below highlights these demand scenarios and their corresponding volume of water that were input to the model.

Table 1 – Demand Scenarios and Volume of Water

Demand Scenario	Volume of Water
Average Day	817,000 gpd
Maximum Day	1,850,000 gpd
Peak Hour	200,000 gph

Section 2.1 provides a breakdown of each demand scenario and corresponding results.

2.1 Daily Demand Scenarios

Three scenarios were conducted for each demand type: a 10-foot drop in tank level for Scenario 1, 15-foot drop in tank level for Scenario 2, and 20-foot drop in tank level for Scenario 3. All scenarios were run based on tank elevations for the Island Woods Tank (Alpha Tank) since this is currently what the Town's Longview Pump Station controls operate from. During the draining of the main tank, pumps were not run to gauge the amount of time it would take each daily demand to empty the tank to that scenario tank level. During max day scenarios, the lowest pressure measured in the system was 14 PSI near the Rocky Hill Tank when Alpha Tank reached the 20-foot drop in tank level. Otherwise, all other pressures in the system for every scenario run were at or above the ISO minimum distribution requirement of 20 PSI.

For each scenario, two pumps ran at both Longview and Limerock Pump Stations to best fit actual conditions. **Table 2** below highlights each scenario run and the time (in hours) required to drain Alpha Tank as well as to refill the tank using existing pump conditions and if pumps were updated to handle filling the tank within a 10-hour timeframe, assuming tanks would be filled overnight.

Table 2 – Alpha Tank Draining & Filling Scenarios

	Scenario 1 – 10 ft Drop in Tank Level			Scenario 2 – 15 ft Drop in Tank Level			Scenario 3 – 20 ft Drop in Tank Level		
	Avg. Day	Max Day	Peak Hour	Avg. Day	Max Day	Peak Hour	Avg. Day	Max Day	Peak Hour
	Hours			Hours			Hours		
Drain Tank – Pumps Off	23.5	18	6	34	20	12	45	23.5	14
Refill Tank – (Existing Pumps)	41.1	68	---	60	108	---	80	141.5	---
Refill Tank – (New Pumps)	10	14	---	14	20	---	20	28	---

To model the upsizing of existing pumps for Longview and Limerock stations, both were designed to meet the peak hour demand of 3338 gallons per minute (gpm). The pump design flow was input as 4,500 gpm and the model automatically assumed the respective shutoff head and maximum operating flow. As presented above, only Scenario 1 could meet the 10-hour period for filling the Alpha Tank once the tank level dropped below 10 feet or 510 feet in elevation. An additional scenario using existing control conditions was run to compare its performance with that of pump upgrades. These results are shown in **Table 3**.

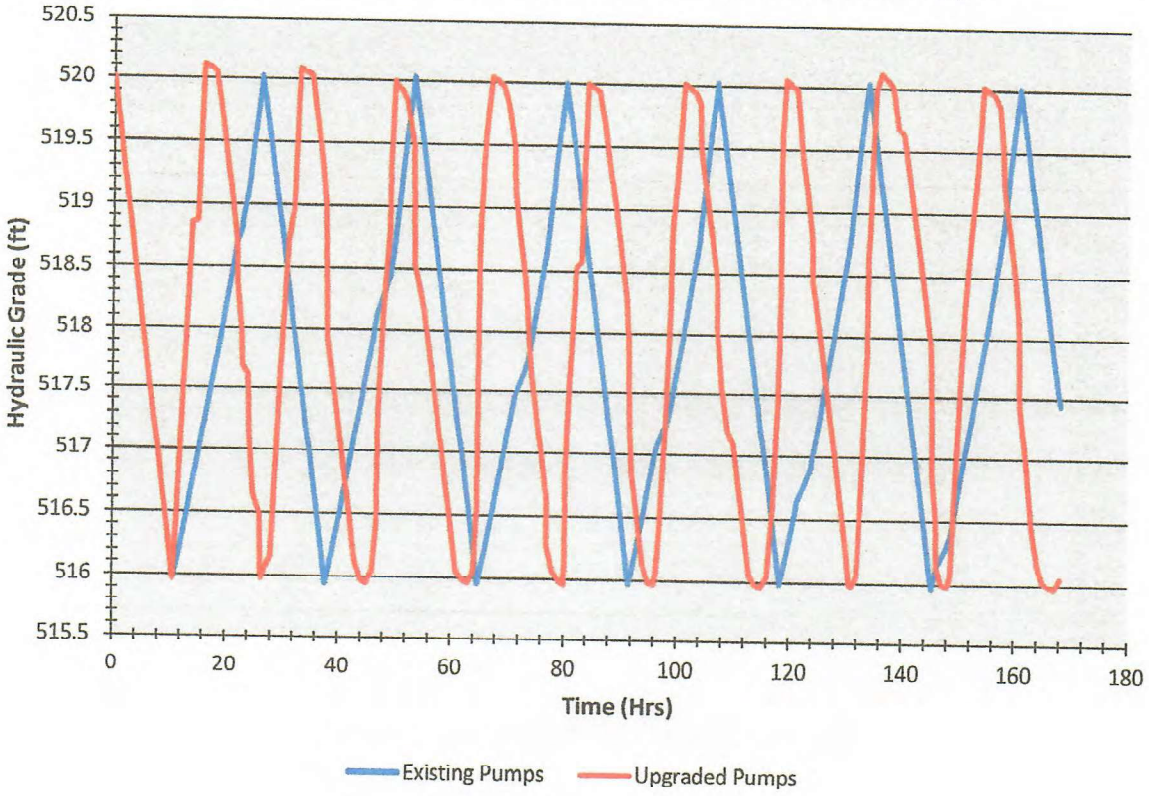
Table 3 – Upgraded Pump Performance Under Existing Pump Controls

	Existing Pump Controls – 4 ft Drop in Tank Level		
	Avg. Day (hrs)	Max Day (hrs)	Peak Hour (hrs)
	Hours		
Drain Tank – Pumps Off	11	8	1.9
Refill Tank – (Existing Pumps)	15	26	---
Refill Tank – (New Pumps)	7	8	---

Under existing operation, upgrading the pumps to a design flow of 4,500 gpm could potentially reduce refill times by over 50%, especially during a max day demand where runtime is decreased by nearly 70%. In all scenarios analyzed, peak hour was only used to get a basis for the amount of time it would take to drain Alpha Tank and for designing of larger pumps. Even with designed pumps at 4,500 gpm, running a peak hour scenario would still result in system tanks emptying within a 7-day period. The likelihood of peak hour occurring in the actual system is only 1-2 hours at most per year.

Figure 1 depicts the frequency of pump runs between current pumps in the system and upgraded pumps.

Figure 1 - Average Day Hydraulic Grade - Existing vs. Upgraded Pumps



The number of runs during existing conditions is roughly 6 per 7-day timeframe. In comparison the upgraded pumps would run 9 times in the same period, but actual running time of the pump would be over 50% less. Additional figures analyzing the scenarios discussed above can be found in **Appendix A**. For graphs examining the time for each tank to empty during different demands (i.e. average day, max day, and peak hour) see **Appendix B**.

3.0 Recommendations

Based on the water modeling conditions for Smithfield, the existing pump stations, Longview and Limerock, are currently running at roughly 13 hours per day. This value was calculated using SCADA data provided by the Town. The data was analyzed from October 2020 thru September 2021. **Table 4** shows a monthly average of hours per day run for each pump.

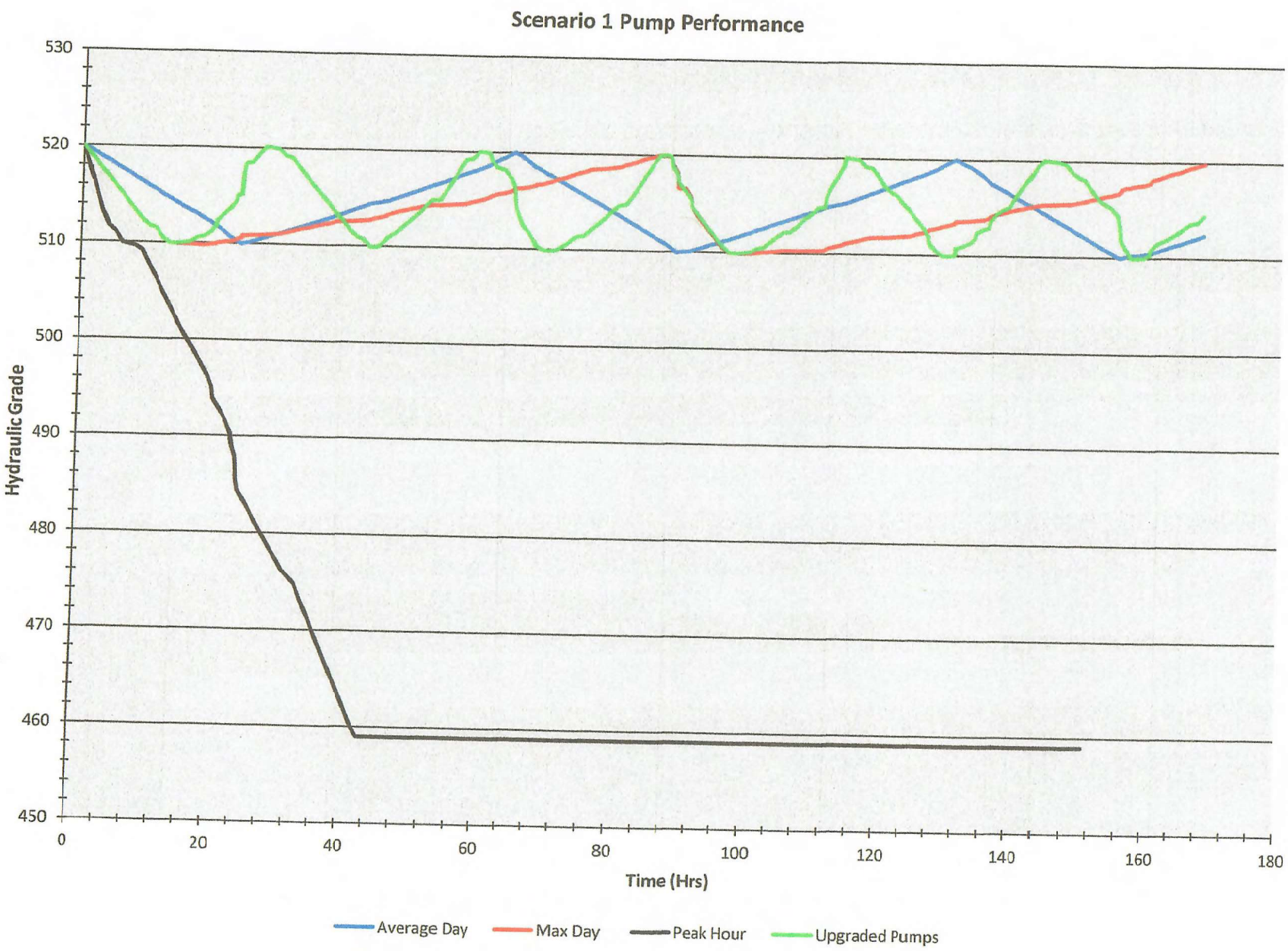
Table 4 – Average Hours Running per Month for Pumps

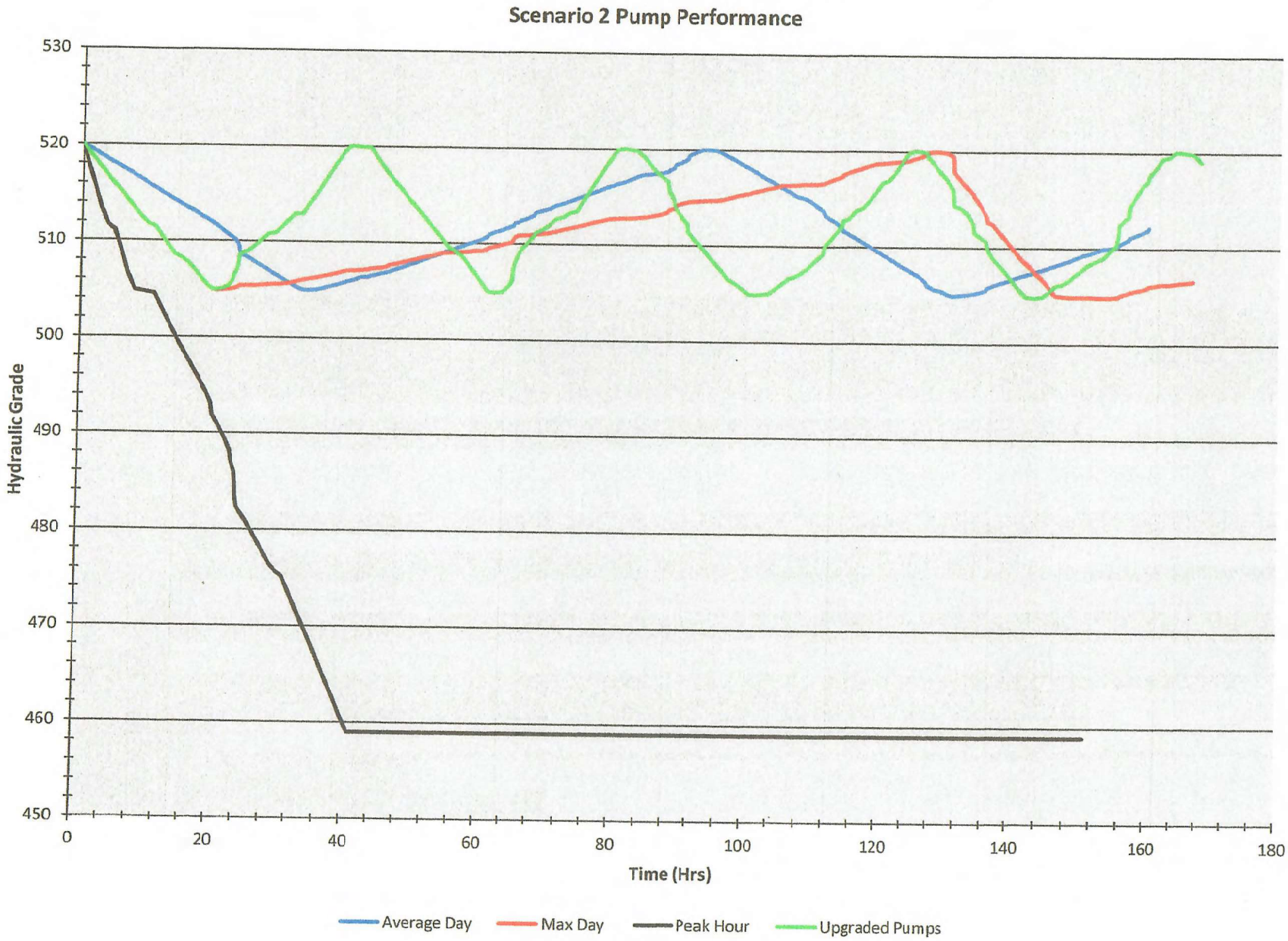
Month	Hours Run per Day on Average
October '20	15
November '20	10
December '20	8
January '21	9
February '21	11
March '21	11
April '21	11
May '21	15
June '21	18
July '21	16
August '21	17
September '21	15
Overall Average	**13**

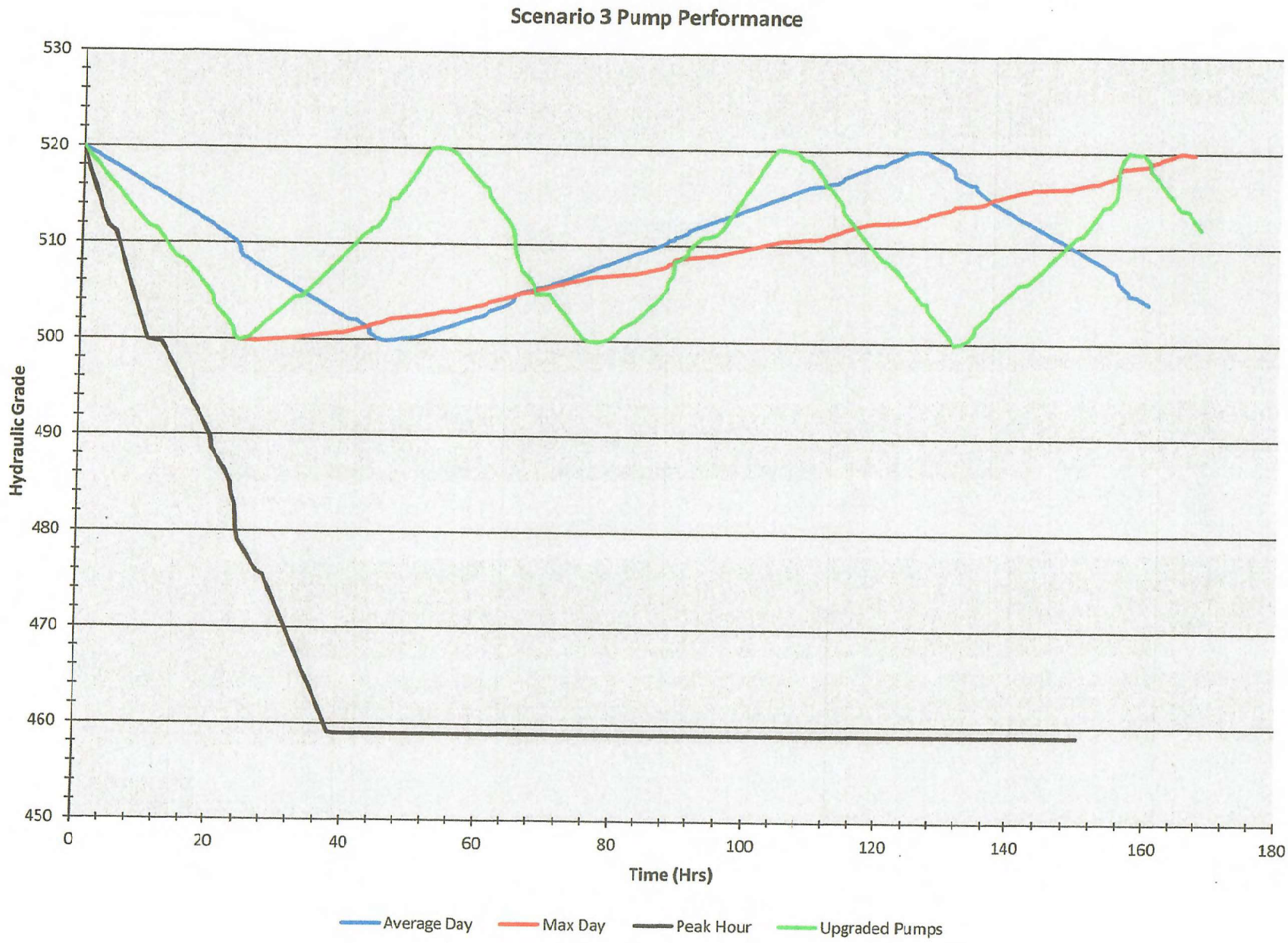
As noted in **Section 2.1**, BETA modeled a scenario in which the Town could upsize Longview and Limerock station pumps to handle the demand of water consumers in addition to filling the tanks within an 8-10 hour period (overnight) to ensure enough supply for a whole day without running pumps. In these modeling conditions we acknowledge that upgrading the pumps at both stations to a design flow of 4,500 gpm or more could theoretically fill the tanks within 7 hours using existing controls for Alpha Tank and at an average day demand. This being said, if pump controls were changed to allow the tank to drop to 10 feet (Scenario 1) instead of 4 feet, it would take the new pumps 10 hours to fill the tank. In Scenarios 2 and 3, run times increase to 14 and 20 hours, respectively, under average day demand. During the max day demand, filling the tank under each case would require 14, 20, and 28 hours.

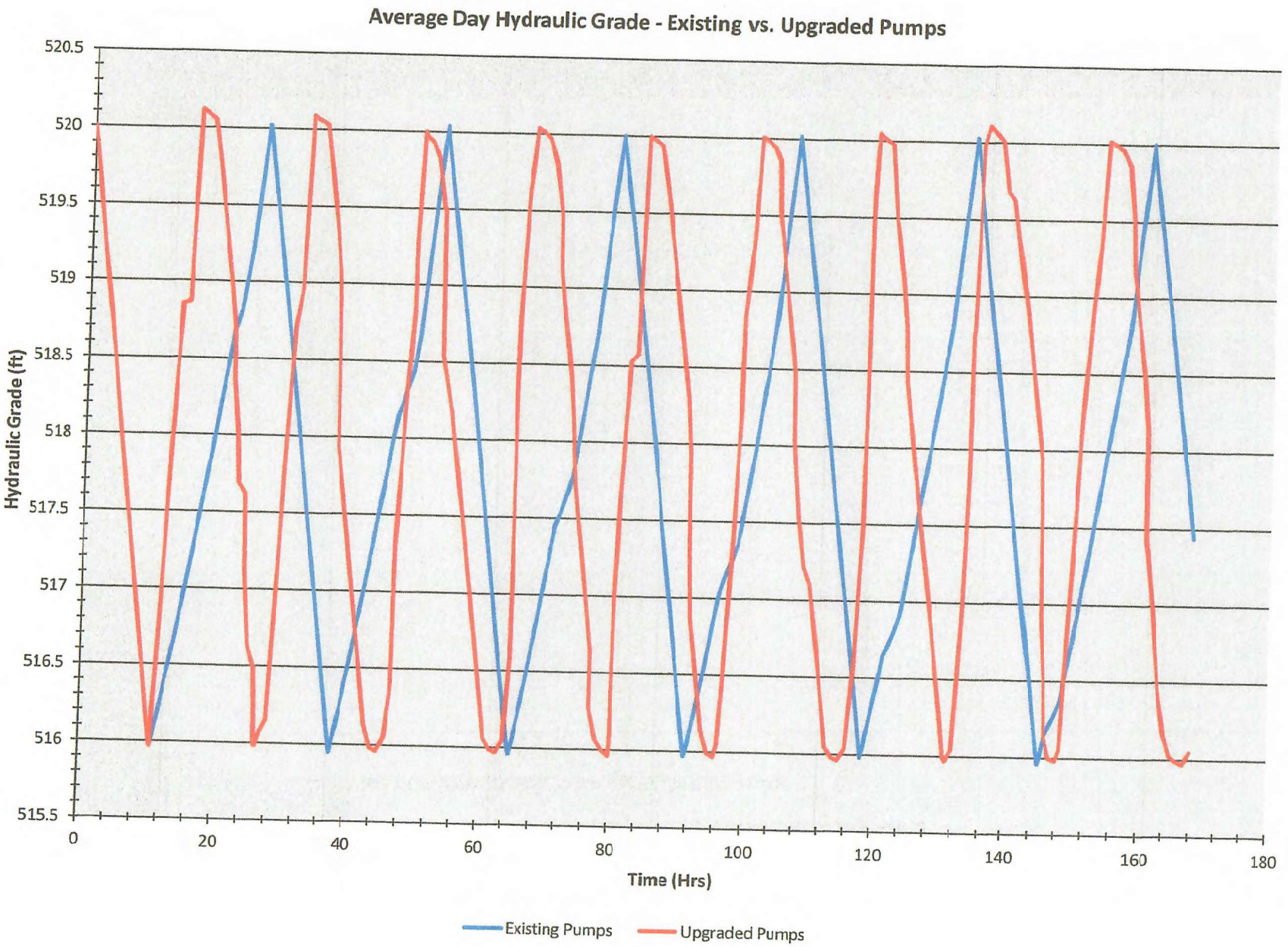
If provided further information on how peak hour rates are calculated through Smithfield's water provider, we could better pinpoint when the optimal time is to fill the tanks and/or run the pumps. If the Town chooses to fill their tanks overnight, larger pumps with an increased design flow would be required. This would allow the Town to rely more so on gravity fed storage from the existing tanks, rather than on the pumps meeting peak demands.

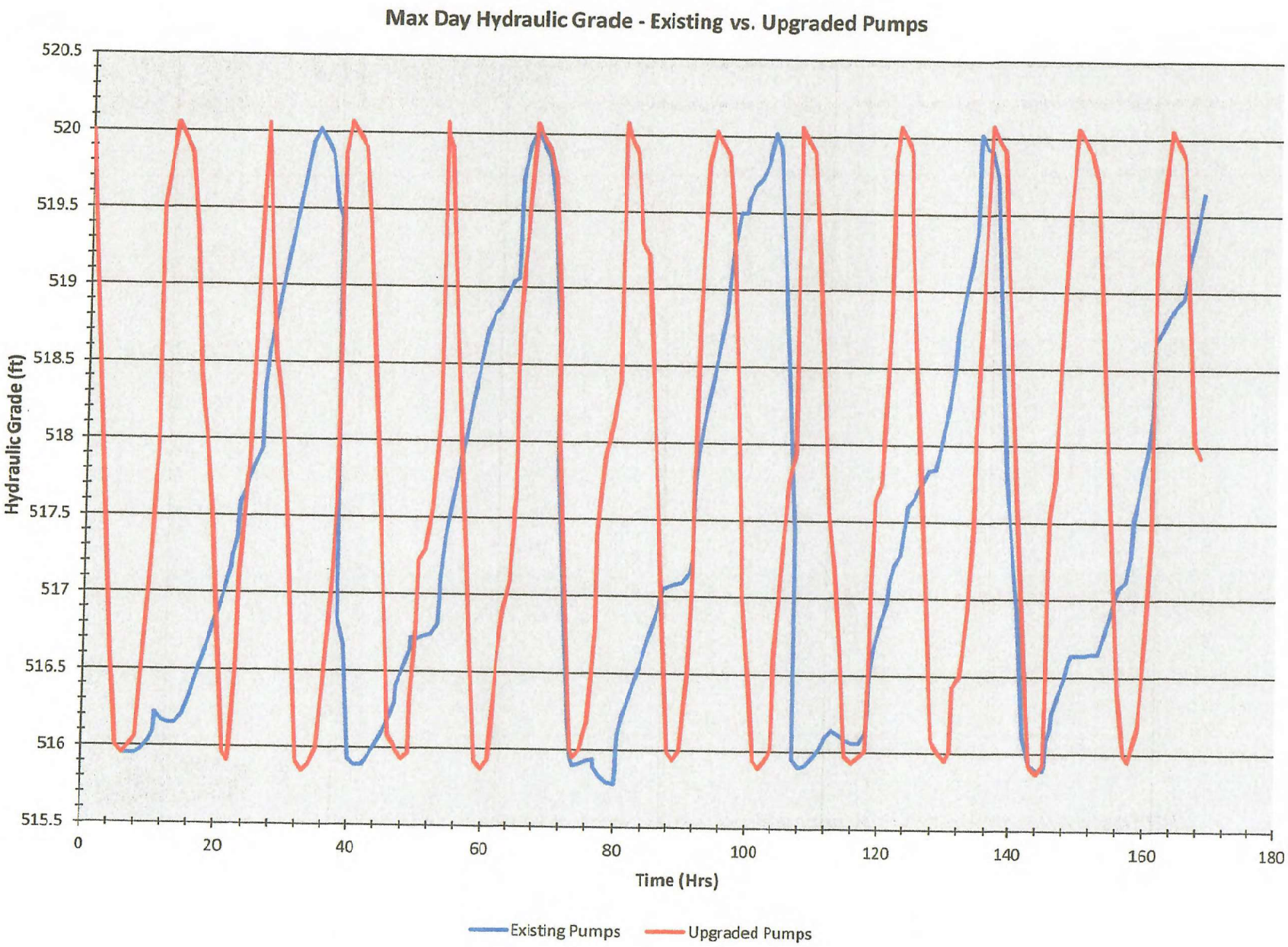
APPENDIX A – Pump Performance Figures Per Demand Scenario


Scenario 1 Pump Performance
530
520
510
500
490
480
470
460
450
Hydraulic Grade
0
20
40
60
80
100
120
140
160
180
Time (Hrs)
Average Day
Max Day
Peak Hour
Upgraded Pumps

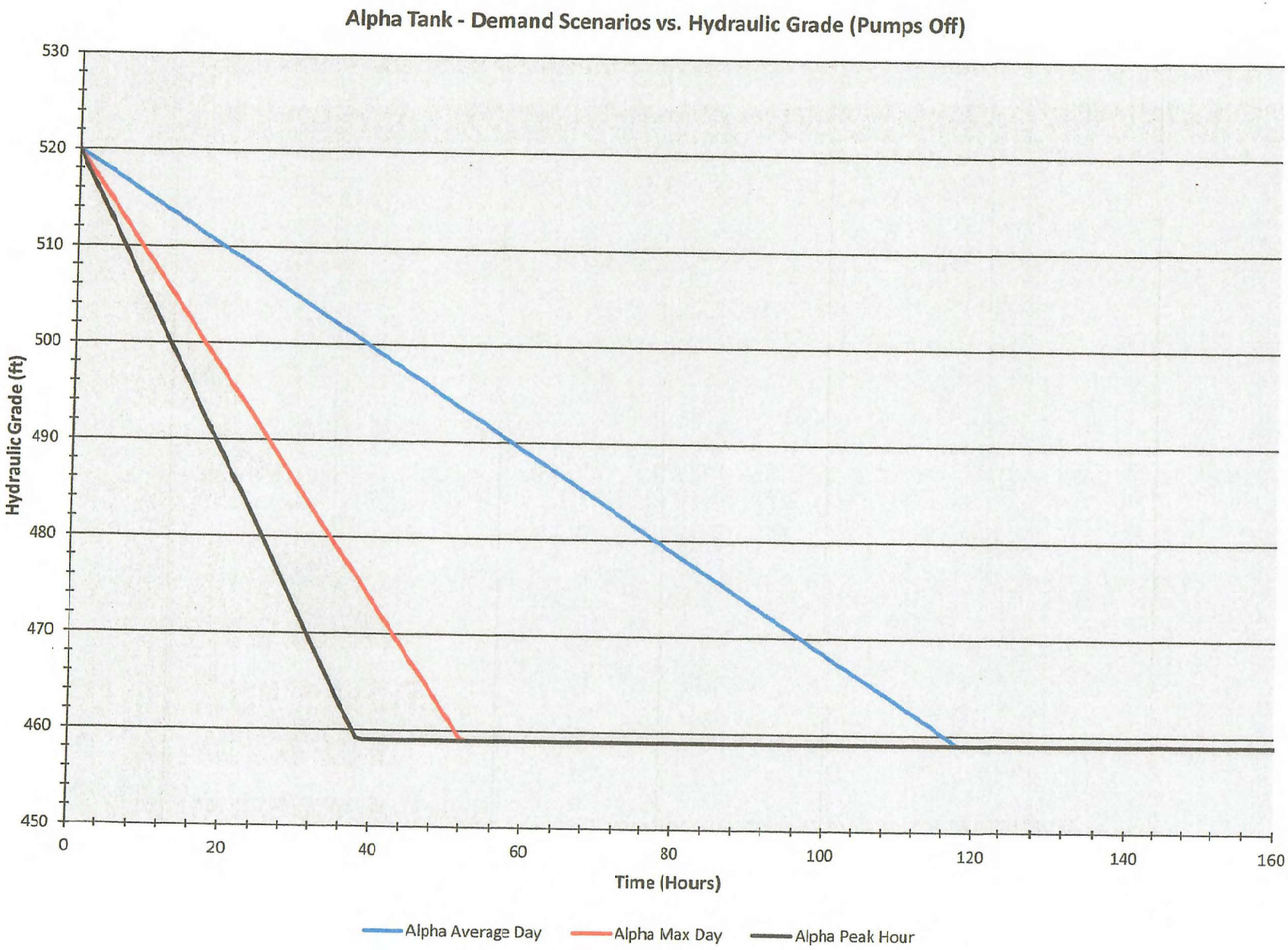

Scenario 2 Pump Performance
530
520
510
500
490
480
470
460
450
Hydraulic Grade
0
20
40
60
80
100
120
140
160
180
Time (Hrs)
Average Day
Max Day
Peak Hour
Upgraded Pumps

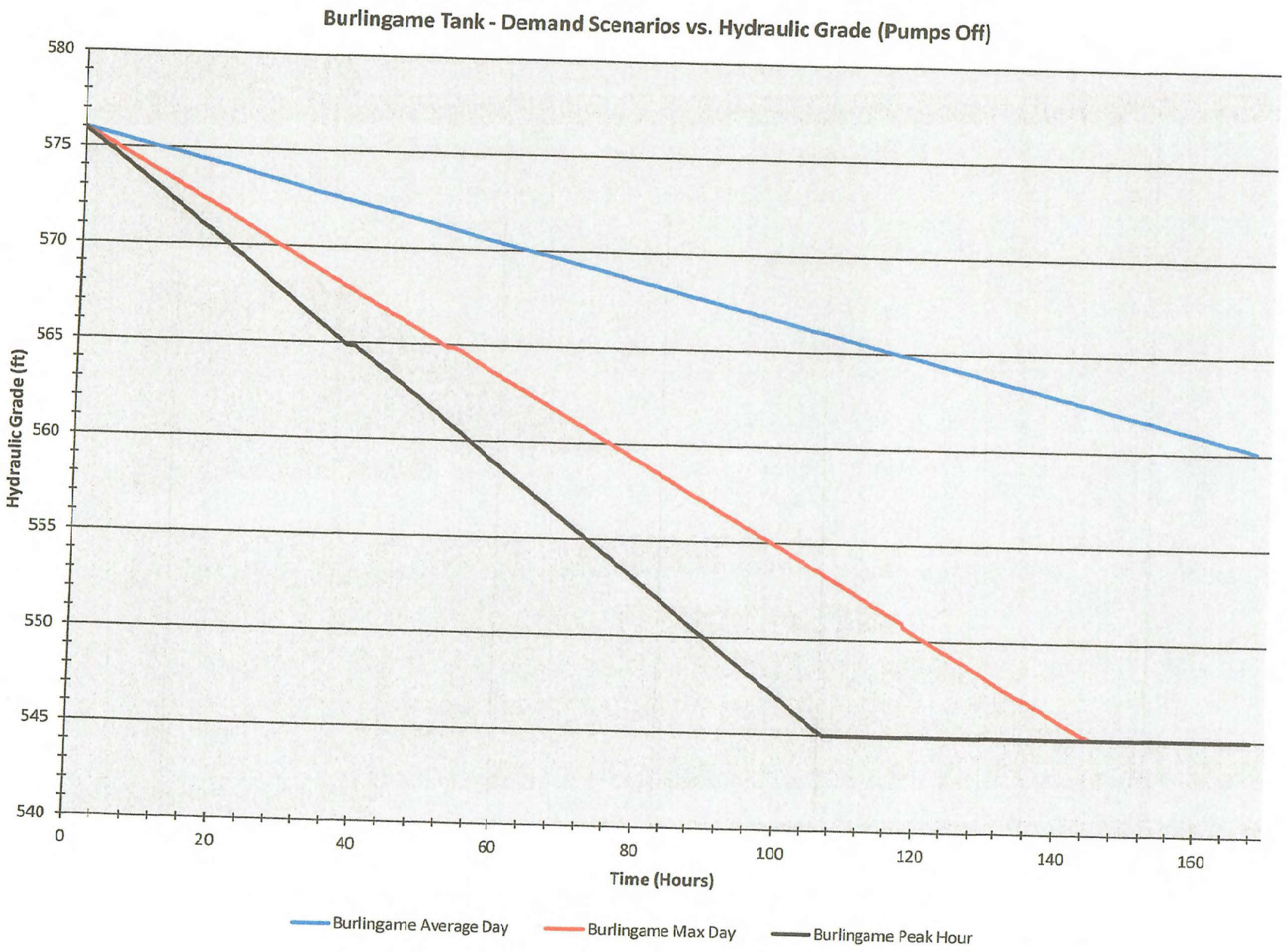

Scenario 3 Pump Performance
530
520
510
500
490
480
470
460
450
Hydraulic Grade
0
20
40
60
80
100
120
140
160
180
Time (Hrs)
Average Day
Max Day
Peak Hour
Upgraded Pumps

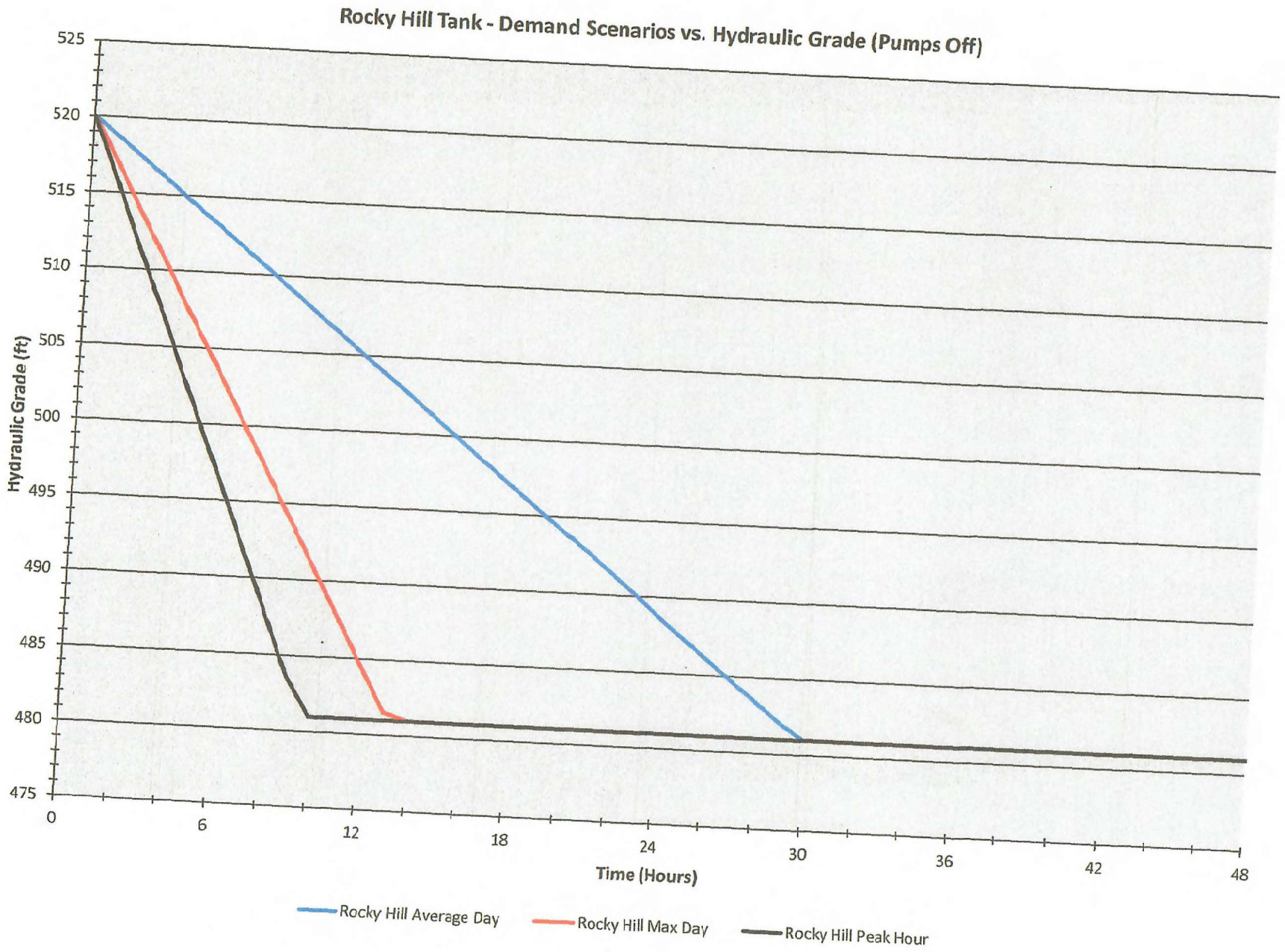

Average Day Hydraulic Grade - Existing vs. Upgraded Pumps
Hydraulic Grade (ft)
520.5
520
519.5
519
518.5
518
517.5
517
516.5
516
515.5
0
20
40
60
80
100
120
140
160
180
Time (Hrs)
Existing Pumps
Upgraded Pumps


Max Day Hydraulic Grade - Existing vs. Upgraded Pumps
Hydraulic Grade (ft)
520.5
520
519.5
519
518.5
518
517.5
517
516.5
516
515.5
0
20
40
60
80
100
120
140
160
180
Time (Hrs)
Existing Pumps
Upgraded Pumps

APPENDIX B – Tank Outflow Rate Figures Per Demand Scenario


Alpha Tank - Demand Scenarios vs. Hydraulic Grade (Pumps Off)
Hydraulic Grade (ft)
530
520
510
500
490
480
470
460
450
0
20
40
60
80
100
120
140
160
Time (Hours)
Alpha Average Day
Alpha Max Day
Alpha Peak Hour


Burlingame Tank - Demand Scenarios vs. Hydraulic Grade (Pumps Off)
Hydraulic Grade (ft)
580
575
570
565
560
555
550
545
540
0
20
40
60
80
100
120
140
160
Time (Hours)
Burlingame Average Day
Burlingame Max Day
Burlingame Peak Hour


Rocky Hill Tank - Demand Scenarios vs. Hydraulic Grade (Pumps Off)
Hydraulic Grade (ft)
525
520
515
510
505
500
495
490
485
480
475
0
6
12
18
24
30
36
42
48
Time (Hours)
Rocky Hill Average Day
Rocky Hill Max Day
Rocky Hill Peak Hour

STANDARD SCHEDULE

FOR

GRADING

CITIES AND TOWNS OF THE UNITED STATES

WITH REFERENCE

TO THEIR FIRE DEFENSES AND PHYSICAL CONDITIONS

NATIONAL BOARD OF FIRE UNDERWRITERS

New York, Chicago, San Francisco

Adopted, December 14, 1916

Edition of 1956

For residential districts only, the required duration may be reduced for required fire flows of 2,500 gpm and less, but in no case shall it be less than 50 per cent of that given in Table 6 for the corresponding required fire flow, and the minimum duration required in any case shall be 2 hours.

TABLE 5.

REQUIRED FIRE FLOW

Population	Required Fire Flow for Average City, gpm	mgd	Duration, hours	Population	Required Fire Flow for Average City, gpm	mgd	Duration, hours
1,000	1,000	1.44	4	22,000	4,500	6.48	10
1,500	1,250	1.80	5	27,000	5,000	7.20	10
2,000	1,500	2.16	6	33,000	5,500	7.92	10
3,000	1,750	2.52	7	40,000	6,000	8.64	10
4,000	2,000	2.88	8	55,000	7,000	10.08	10
5,000	2,250	3.24	9	75,000	8,000	11.52	10
6,000	2,500	3.60	10	95,000	9,000	12.96	10
10,000	3,000	4.32	10	120,000	10,000	14.40	10
13,000	3,500	5.04	10	150,000	11,000	15.84	10
17,000	4,000	5.76	10	200,000	12,000	17.28	10

Over 200,000 population, 12,000 gpm, with 2,000 to 8,000 gpm additional for a second fire, for a 10-hour duration.

Pressure. In grading a water supply the principal requirement considered is the ability to deliver water in sufficient quantity to permit pumpers of the Fire Department to obtain an adequate supply from hydrants. To overcome friction loss in the hydrant branch, hydrant, and suction hose, a minimum residual water pressure of 20 psi is required during flow, except that a minimum of 10 psi is permissible in districts where there is no deficiency in Items 28 or 29 and no deficiency for size of hydrants or hydrant connections in Item 31, where all hydrants are provided with at least one nominal 4½-inch outlet, and where the large outlet is normally used by the Fire Department.

Higher sustained pressure is of value in permitting direct supply to automatic sprinkler systems and building standpipe-and-hose systems, and in maintaining a water plane such that no portion of the protected area is without water. Such pressure may also be of value in enabling the Fire Department to use satisfactory hose streams direct from hydrants.

For communities requiring not more than 2,500 gpm fire flow and with not more than 10 buildings exceeding 3 stories in height, a residual pressure of 60 psi, and for other places a residual pressure of not less than 75 psi, maintained under fire demand, will permit the Fire Department to use effective streams direct from hydrants if hydrant spacing is such as to allow short hose lines; in thinly built residential sections and in small village mercantile districts having buildings of small area and not exceeding 2 stories, a residual pressure of 50 psi may be satisfactory.

The value of higher pressures is recognized in Items 6c, 20, 21, 22, and 23, Water Supply, Items 13 and 14, Fire Department, and Item 2, Credits.

1. APPOINTMENT OF EMPLOYEES

Employees of municipal systems shall be under adequate civil service rules or the equivalent, properly administered, with tenure of office secure. Long tenure of office and an efficient organization may be considered the equivalent.

For inadequate provisions for appointment and tenure:

Use 1/10 Deficiency Scale.

2. QUALIFICATIONS OF EXECUTIVES

The superintendent or chief engineer and his assistants shall be qualified by experience, preferably supplemented by education and professional registration, to perform their respective duties efficiently.

For executives not qualified:

Use 1/10 Deficiency Scale.

GRADING SCHEDULE

WATER SUPPLY

An adequate and reliable water supply is an essential part of the fire-fighting facilities of a municipality.

Minimum Recognized Water Supply. In order to be recognized for grading purposes, a water supply shall be capable of delivering at least 250 gpm for a period of 2 hours, or 500 gpm for one hour, for fire protection plus consumption at the maximum daily rate. Any water supply which cannot meet this minimum requirement shall not be graded, and a deficiency of 1,950 points shall be assigned.

Adequacy and Reliability. A water supply is considered to be adequate if it can deliver the required fire flow for the number of hours specified in Table 4, with consumption at the maximum daily rate; if this delivery is possible under certain emergency or unusual conditions, the water supply is also considered to be reliable.

TABLE 4.

REQUIRED DURATION FOR FIRE FLOW

Required Fire Flow gpm	Required Duration Hours
10,000 and greater	10
9,500	9
9,000	9
8,500	8
8,000	8
7,500	7
7,000	7
6,500	6
6,000	6
5,500	5
5,000	5
4,500	4
4,000	4
3,500	3
3,000	3
2,500 and less	2

In order to provide reliability, duplication of some or all parts of a water supply system will be necessary, the need for duplication being dependent upon the extent to which the various parts may reasonably be expected to be out of service as a result of maintenance and repair work, an emergency, or some unusual condition. The introduction of storage, either as part of the supply works or on the distribution system, may partially or completely offset the need for duplicating various parts of the system; the value of the storage depends upon its amount, location, and availability.