Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING P. A.

High Bridge Water System Asset Management Plan

High Bridge, Hunterdon County, New Jersey

February 2019

Prepared For

Borough of High Bridge
97 West Main Street
High Bridge, NJ 08829

Prepared By

Maser Consulting P.A.
Shelbourne at Hunterdon
53 Frontage Road, Suite 110
Hampton, NJ 08827
908.238.0900

William H. Burr, IV, P.E.
N.J. Professional Engineer License No. 47029

MC Project No. HIB-045

www.maserconsulting.com

TABLE OF CONTENTS

SECTION 1.0 – INTRODUCTION 3
1.1 Background Information 3
1.2 Purpose and Scope 3
1.3 Methodology 3
1.4 Level of Service Goals 5

SECTION 2.0 – SUPPLY 6
2.1 Description and Inventory 6
2.2 Condition Assessment 8
2.3 Recommended Improvements 9

SECTION 3.0 – TREATMENT 10
3.1 Description and Inventory 10
3.2 Condition Assessment 11
3.3 Recommended Improvements 12

SECTION 4.0 – STORAGE 12
4.1 Description and Inventory 12
4.2 Condition Assessment 13
4.3 Recommended Improvements 14

SECTION 5.0 – DISTRIBUTION SYSTEM 15
5.1 Distribution System Description and Inventory 15
5.2 Condition Assessment 15
5.3 Recommended Maintenance Improvements 16
5.4 Recommended Capital Improvements 17

SECTION 6.0 – SUMMARY AND PHASING OF RECOMMENDATIONS 18
6.1 Criticality and Prioritization 18
6.2 Life Cycle Costing 21
6.3 Long Term Funding Strategy 22
6.4 Conclusions 22

Appendices

Appendix A – Water Quality Accountability Act
Appendix B – Distribution System Asset Map
Appendix C – Above Grade Asset Inventory
Appendix D – Selected Asset Photographs
Appendix E – Level of Service Goal Tracker
Appendix F - High Bridge Water Allocation Permit
Appendix G – Water Main Priority Replacement Map
Appendix H – Fire Department Hydrant Testing Results
Appendix I – Water System Elevation & Pressure Zone Map
Appendix J – Budgetary Cost Estimates

TABLES

Table 1 – Well and Water Allocation Summary
Table 2 – Well Testing Results
Table 3 – Project Prioritization
Table 4 – Capital Improvement Cost Summary

FIGURES

Figure 1 – Risk Matrix

Document Control			
Revision No.	**Year**	**Description**	**Date Issued**
1	2019	Draft Asset Management Plan for Review	02/04/19
2	2019	Final 2019 Iteration	
3	2020		

SECTION 1.0 – INTRODUCTION

1.1 Background Information

The Borough of High Bridge is situated in northwest New Jersey within Hunterdon County along the South Branch of the Raritan River. The Borough primarily consists of residential communities bounded by deciduous forest. Based on a 2010 census, the Borough's population was 3,648, yielding a decrease of 3.4% from the 2000 census.

The Borough owns and operates the existing potable water system that is contained within the municipal boundary. Only small portions of the distribution system extend into the neighboring Clinton Township and Lebanon Township. Generally, the system consists of five (5) active source wells, unit process treatment equipment with associated facilities, two (2) storage standpipes, approximately 23 miles of distribution piping, and approximately 1,472 customers. The various system components vary in age with some assets approaching 100-years old.

1.2 Purpose and Scope

Proper asset management is essential to promote and document responsible maintenance, investment, and rehabilitation of distribution systems to ensure water systems meet customer service expectations, as well as meet applicable permit conditions. This Asset Management Plan has been prepared with the intent to assess the current state of all potable water related assets and create a phased plan for implementation of recommended improvements. Furthermore, the contents of this Asset Management Plan have been developed to satisfy current and future compliance with the Water Quality Accountability Act (WQAA) enacted by the New Jersey Department of Environmental Protection (NJDEP) on July 21, 2017, effective October 19, 2017. A copy of the WQAA has been included with this report as Appendix A.

This report includes an inventory of all potable water related assets, a condition and criticality assessment of each asset, and recommendations for maintenance and capital improvement projects. The Borough of High Bridge does not have any internet-based components within the water system. As such, an evaluation of cybersecurity is not included within this report. This assessment is limited to potable water assets owned and operated by the Borough. The evaluation of each asset was largely based on visual inspection and review of relevant documentation. Given the age of the system, as-built plans and documentation for installation and materials were not available for all assets. In addition, all inspections were strictly visual, and no testing of system components was performed. This plan sets forth an action plan to rehabilitate the aging system; however, further evaluation of specific components and equipment may be necessary. It is recommended this asset management plan be evaluated and updated annually.

1.3 Methodology

The Borough of High Bridge water system asset management program has been developed utilizing the five core components of asset management as defined by the United States Environmental Protection Agency (USEPA) and NJDEP. The five core components of asset management are as follows:

1. Asset Inventory, Mapping, and Condition Assessment;
2. Defining Level of Service Goals;
3. Criticality and Prioritization – Risk Assessment;
4. Establishing Life Cycle Costs; and
5. Long Term Funding Strategy.

The below descriptions outline how each asset management component was addressed:

1. Inventory, Mapping and Condition Assessment - Throughout April and May of 2018, Maser Consulting collected the geographic locations of all distribution system assets utilizing centimeter-grade global positioning system (GPS) equipment in accordance with the WQAA. Technical staff traveled the municipal right-of-way and easements to locate all fire hydrants, distribution system valves, source wells, storage facilities, and treatment facilities to catalog the exact coordinates of each asset. This data has been post-processed and mapped into the asset location figures contained in Appendix B. All above grade assets were inventoried and cataloged in the spreadsheet contained in Appendix C. During the collection of all the GPS data, updated photos of all assets were taken to aid in the assessment of condition. Photos of select assets are contained in Appendix D.

In order to further assess the condition of potable water assets, Maser Consulting reviewed all relevant documentation and met with Department of Public Works (DPW) personnel to discuss operation history and system performance. In addition, on May 22, 2018, Maser Consulting performed an inspection of the source wells, treatment facilities and storage facilities, while soliciting input on performance and operations from High Bridge DPW personnel. A subsequent meeting was also held on January 15, 2019 with the Borough's new DPW Director and Interim Water Operator.

2. Level of Service Goals - Setting level of service goals is essential to measure the efficacy of the asset management program and to adapt the program over time. The level of service goals were developed and centered around public health and safety, customer service, system maintenance, water loss/drought and demand management, utility management, and internal goals.

3. Criticality and Prioritization - Determining the criticality of assets is essential to justify timely and prioritized investments. The Business Risk Exposure (BRE) rating is a metric developed by USEPA and used to describe the overall criticality of a given asset. The method of determining BRE describes the nature and level of risk a utility is likely to confront through potential failure of assets. The BRE rating is defined as the following:

Criticality (BRE) Rating = Probability of Failure (PoF) X Consequence of Failure (CoF)

The PoF and the CoF are assigned numerical values through detailed engineering analysis. The product of the two ratings represents an assets overall criticality and can be used to rank capital projects and gauge urgency. The PoF rating describes how likely an asset is to fail based on parameters such as asset age, work order history, and environmental conditions. The PoF rating

not only takes into account assets that fail operationally, but also assets that perform below level or service goals and/or become financially inefficient. The CoF rating describes the severity of impact as a result of failure of an asset. The CoF rating is based on the resulting loss of service and impacts to the environment, public health, safety and cost. Each asset was assigned a risk value and evaluated on the below matrix.

Figure 1 – Risk Matrix

Consequence of Failure (CoF)						
	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
	Probability of Failure (PoF)					

4. Life Cycle Costing – Based on the criticality analysis performed, Maser Consulting developed and prioritized a schedule for maintenance, repair, replacement of assets as well as proposed capital improvements. At this time, projects have been ordered into high, medium, and low priority and budgetary cost estimates were developed for the highest priority projects. The highest priority projects are to be included in the 5-year capital improvement plan. A more detailed maintenance and capital improvement schedule should be included in subsequent iterations of the Asset Management Plan

5. Long Term Funding Strategy – An appropriate long-term funding strategy is essential to ensure adequate funding is available for current and planned capital improvements that support the continued effort to meet or exceed level of service goals. Based on the budgetary cost estimates prepared for the highest priority projects, a desired level of funding was established and available funding sources were evaluated.

1.4 Level of Service Goals

The specific level of service goals for the 2019 Asset Management Plan iteration are listed below. The level of service goals are not a complete listing or requirements for compliance and or permitting. The goals are to be used to measure the efficacy of the asset management program. Appendix E contains a goal tracker which details the current status and timeline for each goal

1. Provide Customers with finished water that meets or exceeds all Maximum Contaminant Level Goals (MCLGs) 100% of the time.

2. Maintain compliance with all water allocation permit requirements and reporting.

3. Maintain compliance with the requirements set forth in the Water Quality Accountability Act and update the Asset Management Plan annually. Develop a capital improvement plan that meets the level of service goals at a sustainable life cycle cost.

4. Main line breaks to be fixed within 8 hours of discovery 90% of the time. Service line breaks to be fixed within 16 hours of discovery 90% of the time.

5. Improve record keeping related to water distribution system integrity. Leaks and breaks per mile of pipe is to be tracked annually and reported to identify strategic area in need of replacement.

6. Perform an annual water loss audit and bring unaccounted for water below 30% in the next 3 years, with a long-term goal of less than 15% within the next 10 years.

SECTION 2.0 – SUPPLY

2.1 Description and Inventory

The Borough's potable water system contains five (5) active source wells (Well Nos. 2-5 and 8). The active source wells are located within Planning Area No. 10 – Raritan River, as designated by the New Jersey Water Supply Master Plan. Source Well Nos. 1, 6, and 7 have been abandoned, decommissioned, or are inactive. The currently effective Water Allocation Permit (WAP) – Permit No. 5242, has been included as Appendix F. The conditions of the permit are also outlined in Appendix F. The current WAP has an effective start date of June 1, 2013 and expires May 31, 2023. Table 1 below details a summary of the maximum allocation from each source.

Table 1 – Well and Water Allocation Summary

Well No.	**2**	**3**	**4**	**5**	**8**
Date Constructed	10/1/36	10/15/38	6/10/45	11/24/50	3/28/85
Depth (ft)	287	330	230	239	115
Pump Capacity (gpm)	100	100	140	160	500
Max Allocation (mgm)	8				12
Max Allocation (mgy)	96				108
Max Combined Allocation Total (gpm)	1000				
Max Combined Allocation Total (mgm)	19.13				
Max Combined Allocation Total (mgy)	186				

The monitoring and reporting requirements for compliance with the current WAP are summarized as the following:

- Static water levels for each well shall be monitored and recorded monthly;

- Diversion from each source shall be monitored and recorded monthly;
- A log book of month end meter readings for each source shall be maintained on site;
- A quarterly report shall be submitted to NJDEP with the above-mentioned monitoring results, submitted within 30 days of the end of each quarter;
- Submittal of an unaccounted-for water report addressing actions taken to identify and repair leaks within 3 years of the effective date of the permit;
- Submittal of a Water Conservation and Drought Management Plan (NJDEP Form) prior to September 30, 2014 and every two years thereafter; and
- Submission of a WAP renewal application 3 months prior to expiration of the current permit (on May 31, 2023).

Well Nos. 2 through 5 are located along Buffalo Hollow Road in Lebanon Township within the Highlands Preservation Area and draw from the Horneblend Granite Formation. This site is herein referred to as the Bunnvale Well Site. The four wells are dispersed on a single parcel of land with above grade piping to convey raw water to the air stripper and clearwell facility. The 6" ductile iron piping (DIP) from each well is supported by concrete masonry unit (CMU) blocks and is pitched such that any residual volume in the pipe flows by gravity into the treatment building. The piping is insulated but not heat traced. Inside the treatment building, there are two adjacent storage tanks for raw water and finished water (pre and post air stripper). The well pumps are controlled by tank level within the clearwell and are operated such that up to three pumps are called on in parallel with one standby. The pump controller alternates which three pumps are operating to ensure even pump run time.

Wells 2, 3, and 5 are housed in plastic lockable enclosures while Well 4 is contained within a small on-site control building which houses the main transfer switch, pump controllers, motor starters, and other miscellaneous electrical equipment related to Wells No. 2 through 5. Immediately adjacent to the controls shed is an emergency diesel generator with a steel enclosure and the following specifications:

Diesel Generator

- Manufacturer: Cummins Power
- Model: DGFA - 4962257
- Rated KW: 150
- Rated KVA: 187.5
- Fuel: Belly tank

Well No. 8 is located along Grayrock Road immediately adjacent to the South Branch of the Raritan River in the Township of Clinton. This site is herein referred to as the Grayrock Well site. Well 8 is contained within the Highlands Planning Area and draws from the Kittatinny Limestone formation. The physical well is contained in a small wood structure raised on a concrete pad above the flood elevation of the South Branch of the Raritan River.

Raw water from Well 8 is pumped below grade approximately 250 feet north to a small concrete masonry block building for metering and chlorination. Following metering and chlorination, the water flows directly into the distribution system through the 10" DIP within West Main Street

(County Route 513) under the head of the well pump. Operation of the pump is intended to be controlled by the pressure of the discharge main within West Main Street. However, the Cla-Valve (control valve) has not been operational for a significant amount of time. Currently, Well 8 operation is controlled manually and typically runs constantly until otherwise turned off by Borough personnel.

2.2 Condition Assessment

The well sites and equipment were found to be in fair condition. A summary of the approximate pump replacement dates and results of the recent well testing can be found in Table 2 below.

Table 2 – Well Testing Results

Well No.	2	3	4	5	8
Last Pump Replacement*	2015	2014	2011	2012	2018
Static Level (when constructed)	unknown	0	0	25	8
Static Level (2012)	23	29	28	32	6.5
Yield (gpm)**	No Data	118	140	210	500
Drawdown (ft)**		62	140	58	27
Capacity (gpm/ft drawdown)		1.9	1	3.78	19

*Pump replacement dates are approximate based on conversations with DPW staff
** Data from well records at the time of construction of each well

The static levels shown at the construction of each well, and the continued monitoring of static levels show strong indications that natural replenishment of groundwater is occurring. Since the observed fluctuations in static level do not show a continued downward trend, it is anticipated that the current wells have the potential to fulfill the current allocation and demand, with the potential to supply additional capacity in the future.

The above grade piping at the Bunnvale Well Site from each well to the air stripper facility was found to be in fair condition. This piping is sloped such that any residual water in the pipe flows by gravity to the raw water holding tank to prevent freezing. A section of piping from Well 5 has a significant sag where the concrete block pipe support has settled. As a result, issues with freezing were reported by DPW personnel in this piping run. All the above grade piping has notable chipping of the exterior coating/paint. The CMU block supports for the above grade piping show a fair amount of deterioration. The piping discharges from above the surface of the clearwell and is causing turbulence. This turbulence is causing the high-level float to open and close which in turn causes rapid on/off and restarts of the pump motor starters. This likely will cause failures in both the motor starters and motors themselves.

The electrical equipment serving Wells 2 through 5 and the air stripper facility is significantly aged and outdated. It appears the pump control panel, motor starters, and transfer switch have been recently replaced. However, the overall electrical service equipment and distribution panel appear to be the original equipment. The typical lifespan of electrical service equipment is approximately 20-30 years but varies greatly depending on the conditions the equipment is exposed to throughout its service. The electrical distribution equipment consists of a duct bank

with six (6) conduits from the control building to the clear well building. A portion of this duct bank is exposed as it crosses the drainage swale toward the building.

The generator serving the site was found to be in good condition. While the generator itself was found in good condition, it has been noted the generator load bank is no longer operational.

The Bunnvale Well Site is enclosed by a chain-link fence topped with barbed wire which was all found to be in adequate condition. As an added measure of security, it is important that all buildings within the fenced in areas remain locked at all times.

At the Grayrock site, the above grade valving for the wells was found to be in poor condition. Significant corrosion was noted, and the Cla-valve has been out of service for a significant amount of time. Consequently, Well pump 8 requires manual and constant operation. The pressure in the system at the point of discharge of Well 8 is upwards of 225 psi. Continuous operation of the well pump to maintain this pressure results in a significant energy cost and is likely causing a higher risk of main breaks while exacerbating water loss within the system.

2.3 Recommended Improvements

At this time, the data supports that the existing wells have the capacity to continue to supply the Borough's current allocation. Given that the High Bridge population is showing a slight decrease, it is assumed this allocation is sufficient moving forward. This should continue to be evaluated at the time of each WAP renewal. The current WAP expires May 31, 2023. In accordance with the existing WAP and NJDEP requirements, the Borough will be required to submit a renewal application no later than 3 months prior to expiration of the current permit. At that time, if any changes to the permit are desired, a major/minor modification application can be submitted.

Static level of each well should continue to be monitored, and all monitoring and sampling procedures outlined in the WAP should be continued. Currently static level is measured by hand which is labor intensive. It is recommended pressure transducers be installed in each well with read outs back to the controls building. This will make reporting and monitoring easier and more accurate.

The date of the most recent calibration of each source meter was September 13, 2012. Each flow meter needs to be recalibrated prior to applying for the next WAP renewal. The current turbine meters are sufficient, but it is recommended on the next replacement cycle that digital read flow meters be installed for ease of reporting and monitoring. It is also recommended that the sag in the piping associated with Well No. 5 be repaired. When condition necessitates replacement of the entire piping runs, below grade piping from each well should be considered. In addition, within the piping of each well, it is required by NJDEP that each well have a backflow preventer downstream of the raw water tap where sampling takes place. This should be confirmed for each source well and backflow preventers should be installed as necessary.

Given that no major issues were reported with the well pumps themselves, the pumps should be considered for replacement individually based on age. The typical lifespan of this type of pump

is approximately 7-10 years, depending on run times. Pumps 4 and 5 are currently the oldest; performance and run times should be evaluated to determine the timeline for replacement.

In accordance with N.J.A.C. 7:27-19.11, the on-site generator must be exercised once per month. A log book should be kept on site or on a computer detailing the dates and times of start-up and shut down, total operating time, and the name of the operator. Records are to be kept for a minimum of 5 years and are to be available upon request of the NJDEP. The generator should be tested under full expected load for the duration recommended by the manufacturer. While it is noted the generator load bank is not currently functional, the replacement/repair of this item is believed to be an unnecessary expenditure at this time. The generator can be exercised without a load and/or tested with the load from the building and wells as necessary. In addition to exercising, a weekly visual inspection of the generator should take place to check all piping, oil levels, and air filters. It is also recommended that operation and maintenance (O&M) manuals and standard operating procedures (SOPs) be developed for all equipment at this site and throughout the system. This will help bring any new staff up to speed and ensure equipment operation and longevity.

At this time, it is recommended the overall electrical service equipment serving the site with Wells 2-5 be replaced. The equipment to the site is significantly aged and failure of the equipment could result in failure of the entire facility. The criticality of the wells and treatment processes render this a high priority. A more detailed inspection of the electrical equipment should be performed as soon as possible to determine the exact scope of work and equipment to be replaced. The exposed duct bank at this swale crossing should also be evaluated at this time and remedied as required. The floats within the clearwell that control pump on/off can be replaced with a pressure transducer to eliminate turbulence and stop the rapid on/off which is currently causing a noticeable “knocking” at the motor starters and control building.

Given the condition, it is recommended the above grade valving and Cla-valve at the Grayrock facility serving Well 8 be replaced. This will yield drastic reduction in energy usage and add longevity to the well pump.

It is understood that installation of a supervisory control and data acquisition system (SCADA) has been discussed. Given the high initial capital cost, Maser Consulting does not recommend implementation of a SCADA system at this time. Considering the size and age of the system, installation of such a system is thought to be a nonessential expenditure, and the system would be better served by allocating these funds elsewhere. However, it is recommended that an updated alarm system and auto-dialers be installed on the well pumps during electrical upgrades. This will quickly alert DPW & Borough staff when a pump fails to operate and yield much quicker response times to any issues that arise.

SECTION 3.0 – TREATMENT

3.1 Description and Inventory

The treatment unit processes for the water system consist of chemical feed systems and an air stripper. There are two locations of sodium hypochlorite addition for disinfection, and no

chemical addition is necessary for pH adjustment. The air stripper facility was put in place to mitigate volatile organic compounds (VOCs) that leached into the groundwater from a gas station that was previously located adjacent to Wells 2 through 5.

The air stripper is located at the Bunnvale Well Site within a concrete masonry building that also houses the raw water and finished water holding tank. The air stripper is a low profile, multiple sieve-tray style air stripper manufactured by Carbonair. Flow from each well is pumped to the raw water holding tank. From the holding tank, water is pumped to the top of the air stripper and passes through the stacked trays by gravity. Air from a blower is pumped upwards through the trays and creates extreme turbulence and facilitates mass transfer for organic volatilization. Following the air stripper, the water is conveyed by gravity to the finished water clearwell where it enters the distribution system by gravity.

The first chemical feed system is located in a concrete masonry building adjacent to the 1,000,000 gallon storage tank located along Fairview Avenue (County Route 513); which receives water from Wells 2 through 5. In this building, flow into the distribution system is metered and chemical injection of sodium hypochlorite is accomplished with an adjustable output, peristaltic metering pump manufactured by Stenner. Also provided in the building is a 50-gallon polyethylene sodium hypochlorite storage tank and chlorine residual monitoring equipment.

The second chemical feed system is located in a concrete masonry building approximately 250 feet north of Well 8, along Grayrock Road. This building contains valving, flow metering equipment, and chemical feed equipment. Chemical injection of sodium hypochlorite is accomplished with a mechanical diaphragm metering pump manufactured by Pulsafeeder. The chemical feed system also includes a 150-gallon polyethylene storage tank and chlorine residual monitoring equipment.

3.2 Condition Assessment

The air stripper equipment was found to be in fair condition with no major operational issues reported by DPW staff. It has been noted that up to four (4) of the flapper valves are broken or in need of replacement. Effluent water samples are taken and analyzed by Eurofins Laboratory to ensure compliance with permit requirements. Based on continued sampling, the air stripper continues to meet or exceed removal requirements for the VOCs found in the source water. The roof over the air stripper room and clearwell room is a wood A-frame structure. The wood appears to be aging and is warped in select locations. Minor holes in the roof were observed visually and it was reported the roof is failing due to leaks.

The chemical feed pumps and associated appurtenances were found to be in good condition. It appears the Pulsafeeder pump serving Well 8 was recently purchased. At each location only one pump is provided. The valving contained in the chlorination building for Well 8 is significantly aged and should be considered for replacement.

3.3 Recommended Improvements

It is recommended that routine maintenance of the air stripper equipment continue to be performed in accordance with manufacturer guidelines. Within the next five (5) years, it is recommended the manufacturer inspect the equipment to ensure longevity. Currently only effluent sampling is performed to ensure permit compliance. It is recommended that influent water samples also be collected to analyze the concentrations of VOCs in the source water. Given that significant time has passed since the gas station was in operation, it is possible that the concentration of the VOCs found in the groundwater may have significantly decreased. Upon review of the preliminary test results, they indicate that there is potential to remove the air stripper from service. It is recommended that the Borough pursue this with NJDEP and seek a modification of the Borough's existing NJDEP permit. Repair of the flapper valves would likely require disassembly of the unit and potentially removal of the building roof for access. Given that it is possible the unit may no longer be necessary, no improvements or repairs to the air stripper of flapper valves are recommended at this time. It is recommended that if the air stripper system is evaluated for removal, the required storage capacity of the clearwell also be evaluated. It may also be possible to reduce the capacity of the clearwell or to remove it from service.

Given the proximity and impact on finished water, it is recommended that the failing roof of the treatment plant be inspected and replaced as soon as possible. At the time of the roof replacement, it is also recommended that a structural evaluation of the wood trusses and A-frame be performed and upgraded as necessary. The clearwell will need to either be covered during this work or removed from service temporarily to ensure no debris enter the finished water.

At each chemical feed location, only one pump is provided. It is recommended that a second redundant pump be installed with an alternating lead and lag operation. At a minimum, a redundant pump should be available on site to be installed in the event of pump failure. Duplicate manufacturer and models should be provided for uniformity.

SECTION 4.0 – STORAGE

4.1 Description and Inventory

The Borough's potable water system contains three storage facilities:

- One (1) compartmentalized raw water / finished water clearwell;
- One (1) 1,000,000 gallon steel standpipe; and
- One (1) 150,000 gallon steel standpipe.

The raw water and finished water storage tank associated with Well Nos. 2 through 5 is located in the treatment building that houses the air stripper at the Bunnvale Well Site. The shallow below grade concrete tank has two compartments that contains a concrete wall to separate raw water and finished water following the air stripper. The concrete tank is covered with a flexible composite liner that is not bonded directly to the concrete surface. The liner is bolted along the top of the tank and the weight of the water keeps the liner in place. The tank is equipped with all associated piping and maintains transducers and floats to control well operation.

The 1,000,000 gallon steel standpipe is located along Fairview Avenue (County Route 513) set back behind residential homes within the Borough limits. The tank serves as bulk storage and provides additional flow for fire protection for the overall system. The tank was constructed in 1980 by the Pittsburgh Des Moines Steel Company and is 55 feet in diameter and 57 feet in height with an overflow height of 49 feet. The tank receives flow by gravity directly from the finished water clearwell. Tank level is monitored by pressure transducers within the tank and can be read in the adjacent chlorine building. The supply line that feeds the Fairview standpipe is a 12" cast iron (CI) pipe that travels approximately three miles through dense wooded areas from the Bunnvale site. Currently, the Borough has a general idea of the location of the main, but a more accurate and detailed location is needed moving forward.

The 150,000 gallon steel standpipe is set back in the woods approximately 200 feet between both Deer Run Drive and Timber Ridge Drive. The tank serves as bulk storage and provides additional fire protection flow exclusively for the Solitude Village Area. The tank is assumed to also be manufactured by the Pittsburgh Des Moines Steel Company in approximately 1973 at the inception of Solitude Village. Given that the Solitude Village is at a significantly higher elevation, a booster pump station is provided in a below grade pit at the base of Solitude Village along Northwood Avenue. Flow from the booster pump station is directed upgrade to the standpipe to maintain tank level and pressure throughout the development. Tank level is monitored by a pressure transducer and can be viewed directly on a display outside the standpipe.

4.2 Condition Assessment

Overall, the storage tanks were found to be in fair condition based on visual inspection. No major issues with the tank foundation or tank coatings were evident and no operational issues were reported by DPW staff. The date of the last tank inspection for both tanks is unknown. An annual service contract with Corrpro® is maintained for inspection and maintenance of the cathodic protection system serving the 1,000,000 gallon tank. In a recent NJDEP inspection on June 5, 2018, it was identified that the 1,000,000 gallon tank is missing an overflow and low level alarm. The condition and exact location of the 12" CI main is largely unknown. Given this is the only main from the Bunnvale site to the system, this presents a significant risk.

The booster pumps associated with the 150,000 gallon tank were found to be in good working condition. Previously, all of the electrical controls were contained in the below grade vault. Recently, a sump pump failed to operate and all the electrical equipment was submerged and damaged beyond repair. In May 2018, all new above grade controls and electrical equipment were installed by an outside contractor.

The raw water storage tank and clearwell were found to be in fair condition. No major defects were reported, and the tank liner appears to be holding with no leaks reported or known; however, the liner appears to be significantly aged and should be considered for replacement (see below). The age of the concrete tank and liner could not be confirmed.

4.3 Recommended Improvements

While no major issues were reported with the operation of both elevated standpipes, both tanks should be inspected by a water storage tank specialist. Each standpipe should have a video inspection and cleaning annually. A more detailed inspection for required capital improvements and rehabilitation can be completed approximately every 3 to 5 years. In the past, Maser Consulting has utilized Mumford Bjorkman Associates, Inc. as a subcontractor for this work. At a minimum, the detailed tank inspection shall include the following:

- Lead testing;
- Immediate repair recommendations;
- Foundation and structural evaluation and recommendations;
- Tank coatings evaluation and recommendations;
- A ten (10) year maintenance projection; and
- Cost estimates for recommended work.

Based on the above mentioned NJDEP inspection, the 1,000,000 gallon tank is not equipped with an overflow and low level alarm. This item needs corrective action immediately. Further evaluation is needed to assess if any new equipment is required. It is possible that the existing level transducer and associated equipment may simply need to be reprogrammed to include the additional alarm setpoints.

Given that the condition and location of the 12" CI main feeding the Fairview standpipe is unknown, it is recommended a formal evaluation of this pipe be performed. Test pits and other investigative measures can be used to locate and assess the condition of the main. Alternatively, a new feed main could be considered that would follow County Road 513. This would make future maintenance much easier and would drastically reduce response time in an emergency situation related to this main. If a new feed line where to be installed, the existing main could be decommissioned and/or potentially used as a redundant backup.

It is understood that the 1,000,000 gallon tank located on Fairview Avenue (Co. Rt. 513) does not go through formal fill cycles and the tank level remains relatively constant at 47 feet. Given this, and the fact that the overall system demand is significantly lower than the storage volume of the tank, it is likely that the water in the tank is beyond the optimal age. NJDEP recommends a 3 to 5 day complete water turnover rate. If secondary water quality parameters such as taste and odor become a problem in the future, it is recommended manual turnover of the tank be induced minimum weekly. The level of the tank can be brought down to a minimum allowable level to maintain system pressure and then refilled. As an alternate option, or if the lowering of tank level presents critical pressure loss, it is recommended a tank mixing system be installed to ensure adequate mixing and lower potential residence times.

Regarding the raw water storage tank and clearwell, it is recommended that the existing liner be replaced. The existing material appears to be a significantly aged composite rubber liner, and it cannot be confirmed that this liner meets the standard for National Sanitation Foundation (NSF) 61 certification required for potable water purposes. This is a certification that is provided to

equipment to ensure that the materials of construction will not affect the quality of potable water. It is recommended that this liner be replaced with an NSF-61 approved material. While the existing liner is removed, the existing concrete chambers can be evaluated and rehabilitated as necessary.

SECTION 5.0 – DISTRIBUTION SYSTEM

5.1 Distribution System Description and Inventory

The High Bridge distribution system consists of approximately 23 miles of water main that range in size from 4" to 10". The vast majority of the mains in the system are cast iron or ductile iron. A small amount of transite (asbestos concrete) mains are also still in service. Given the age of the system, proper as-built documentation is not available for majority of the system. However, from available information, it is believed much of the cast iron mains are original mains and vary in age anywhere from 40 to 100 years old. Much of the ductile iron pipe was installed during a water main renewal program in the late 1980's. Based on available mapping and GPS collection of the assets, the system also contains approximately 151 fire hydrants and 430 valves.

5.2 Condition Assessment

The water distribution system is aging, and the Borough is experiencing frequent main breaks requiring emergency repairs. The Borough needs to initiate a plan to perform significant main replacement, similar to what was performed in the 1980's. In addition, drastic changes in elevation throughout the Borough results in sections of main operating at extreme pressures in excess of 225 psi. A notable area operating at these high pressures is the discharge mains of Well 8. The well pumps and chemical feed pumps need to overcome this high pressure to pump into the distribution system. The system does not contain specific valving to mitigate this pressure and/or create isolated pressure zones. High pressures in the system result in a greater likelihood of main breaks, and makes repair of breaks significantly more challenging, dangerous, and costly. Currently the Borough estimates it is spending approximately $40,000 per year to mitigate water main breaks and that number is likely to significantly increase over the coming years.

A large number of main breaks are reoccurring in specific problem areas. Based on conversations with DPW staff, these problem areas are largely due to age and/or poor installation. It is believed a large amount of main installed in the 1970's/1980's was installed with improper bedding and/or backfill material. The lack of support underneath the pipe, coupled with unsuitable fill material above the pipe, is likely to be causing the main breaks in these locations. Specific problem areas that have been identified are shown on the mapping provided in Appendix G, which shows the location of recent main breaks.

The distribution system also suffers from significantly high amounts of unaccounted-for water. This metric compares metered amounts of source water from the wells, to the actual total volume billed to the customers. The discrepancy between the two figures represents water that is lost in the system due to leaks or calibration error of metering equipment. Any water lost as a result of leaks is exacerbated in areas with excessive pressure.

Previous WAP requirements set forth by NJDEP stipulated the unaccounted-for water needed to be brought below 15% by 2008. In 2011, unaccounted water was approximated and reported by the Borough at 35%. The unaccounted-for water statistic is likely to increase if significant work is not completed. This is a statistic that NJDEP will continue to monitor and should be addressed by the Borough.

Currently the system contains approximately 1,472 customers, all of which are metered. As water meters age, the reliability and accuracy decreases. Aging meters typically read values below the accurate value, which represents lost revenue for the Borough and significantly contributes to the amount of unaccounted-for water. In addition, all the meters contained in the system are direct read. Based on conversations with DPW staff, it takes an employee approximately two to three weeks to collect all the meter readings every quarter. This equates to roughly three months of man hours required to collect meter data for billing on an annual basis.

5.3 Recommended Maintenance Improvements

Based on the WQAA, it is necessary to implement a valve inspection and exercising program. Valves 12" or greater in size should be inspected at a minimum once every two years. All other valves should be inspected at a minimum once every four years. Valve inspections shall include at a minimum the following:

- Clearing of the area around the valve to ensure full access.
- Cleaning out of the valve box.
- Dynamic testing of the valve, by opening and closing the valve based on the following number of turns:
    - The number of turns recommended by the valve manufacturer to constitute a credible test; or
    - The number of turns that constitutes 15 percent of the total number of turns necessary to completely open or completely close the valve.
- Repair or replace any valve found to be broken or not operational.

It is understood there are several sections of main that have pressures exceeding 100 psi and even 200 psi. Testing the valves along these sections of main may pose risk to the system and workers performing the work. These valves should be evaluated and tested with extreme caution. These valves should have high priority to be replaced individually or in conjunction with water main replacement, if it coincides. The asset maps shown in Appendix B creates a numbering system for the valves if one is not already in place.

Based on the WQAA, it is also necessary to implement an annual fire hydrant testing program to determine operability of every hydrant and dead end within the system. The hydrant testing program should coincide with the testing of each hydrant. The records of each inspection, testing, and flushing shall be kept for a minimum period of six years. In addition, each hydrant should be marked in accordance with the following:

- Initials of its name, abbreviation of its name, corporate symbol, or other distinguishing mark or code by which ownership may be readily ascertained;
- Number or symbol, or both, by which the location of the hydrant may be determined on the existing records; and
- The markings may be made with paint, brand, or with a soft metal plate, and shall be sized and so spaced as to be easily read.

It is understood that the Borough Fire Department has been engaged by the Borough to conduct hydrant testing. The Borough should be provided with a copy of the results of the annual testing and flushing program. The results of the most recent round of testing is included as Appendix H. It appears the Fire Department is performing more extensive testing than required by the WQAA. The WQAA only require that each hydrant be tested for functionality by testing accessibility, valves, caps and the hydrants flushed, not to determine the available fire flow at each hydrant.

5.4 Recommended Capital Improvements

The problem areas identified in Section 5.2 are recommended to be replaced as soon as possible. The mains should be replaced with the appropriate class of DIP, and all associated valving, hydrants, and appurtenances should also be replaced at that time. Once replacement of the above-mentioned mains is complete, it is recommended that the remaining distribution system piping be replaced in an order dictated by install date, prioritizing older sections of main. In locations where install dates are unknown, it is recommended prioritizing by material of construction ordering ACP mains first, followed by cast iron mains, and lastly the ductile iron mains. A map ranking the priority of main replacement can be found in Appendix G. Priority was based on historical breaks and problems areas, as well as presumed condition from material data and approximate install dates. Based on this mapping, the following linear footages have been approximated:

High Priority:	**39,400 LF**
Medium Priority:	**46,150 LF**
Low Priority:	**35,250 LF**

This replacement of mains can be phased out over several years as funding permits. The system also contains a critical 12” main that extends from the finished clearwell that serves Wells 2-5, all the way to the 1,000,000 gallon tank (as discussed in Section 4 above). The condition and age of this main is not currently known. Given the critical nature of this main, it is recommended that a formal evaluation and inspection be performed to ascertain its location and condition.

In anticipation of the main replacement, it is recommended that a leak detection study be performed to identify additional problem areas throughout the distribution system and help prioritize main replacement. Identification and repair of any major leaks can also have drastic improvement on the unaccounted-for water mentioned above. It is also recommended that isolation valves and/or pressure reducing valves be installed throughout the system to mitigate extreme pressures and create isolated pressure zones. Appendix I shows an overall water system map with topographic information. Based on these elevations, preliminary pressure zones and

valve locations are proposed. It is recommended a hydraulic model be created of the overall system to refine these pressure zones before installation of the valves and examine the effects on the system. The hydraulic model will allow multiple scenarios to be simulated and pinpoint the optimal locations for isolation valves and pressure reducing valves.

Creating these isolated pressure zones will significantly reduce the frequency and intensity of main breaks, while minimizing the safety concerns for repairing any main breaks that do occur. With lower pressures, any unaccounted-for water in the system due to leaks will be minimized. In addition, this can have benefits for the Well No. 8 pump and associated chemical feed pump. Currently, these pumps require high discharge pressures to overcome the pressure in the distribution system. With this pressure reduced, the discharge head of each pump can be reduced at the time of the next pump replacement. This will lead to drastically lower horsepower pumps and in turn, lower replacement costs and energy costs. Overall, this will allow for greater system reliability, control and lower operating costs.

Currently, all the meters in place are direct read. This means the DPW needs to physically go to each home and take the reading off the meter for billing purposes, which is extremely time consuming and inefficient. In addition, it is likely these meters have significant leaks and vary in accuracy due to age. This is likely contributing to a large portion of the unaccounted-for water. These meters also have a large annual cost associated with the manhours required to read each meter directly. It is recommended that the Borough initiate a meter replacement program to install new remote read meters throughout town.

SECTION 6.0 – SUMMARY AND PHASING OF RECOMMENDATIONS

6.1 Criticality and Prioritization

As described in Section 1.3, assets were evaluated and prioritized based on an evaluation of condition, criticality and risk. Based on visual inspection and operational history, assets were assigned a PoF ratings of 1 through 5 (5 being most likely to fail). In addition, assets were given CoF ratings of 1 through 5 (5 being greatest consequence). The two ratings are then multiplied to yield the overall BRE rating. This analysis was completed for all above grade assets and is summarized in the spreadsheet enclosed in Appendix C. This analysis was also completed throughout the distribution system to the extent possible. Due to lack of as-built documentation, install dates, materials of construction, etc., this analysis was not feasible for all areas. The main replacement prioritization map contained in Appendix G reflects an effort to assess risk in the system based on PoF and CoF, but is largely based on operation history, breaks/leaks, and presumed condition based on approximate age and material.

Based on the criticality evaluation, the following repairs and or replacement projects are recommended. The projects have been separated into low, medium and high priority based on BRE ratings. It is recommended the high priority projects be incorporated into a 5-year capital improvement plan. High priority main replacement may be can be spread out over a longer timeframe as required or necessitated by funding.

Table 3 – Project Prioritization

High Priority Projects		
Project	**BRE**	**Timetable**
Addition of an overflow & low-level alarm at 1,000,000 gal. standpipe.	N/A	Immediate
Replacement / Upgrade of Electrical Service Equipment (Bunnvale).	15	1-2 years
Replacement / Repair of Bunnvale Treatment Building Roof.	15	1 year
Meter Replacement (All).	N/A	1-2 years
Replacement of control valves and above grade piping (Well 8 Grayrock).	12	1-2 years
Inspection and associated capital improvements of both standpipes.	12	1-3 years
High Priority Main Replacement	N/A	1-5 years
Replacement of Well Pump 4 & 5.	12	2-3 years
Well Piping and CMU block support replacement (Well 2-5 Bunnvale).	12, 9, 9, 9	3-5 years
Perform a water main leak study.	N/A	1-5 years
Hydraulic model creation and installation of PRVs throughout the system.	N/A	1-5 years
Medium Priority Projects		
Project	**BRE**	**Timetable**
Replacement of Well Pump 2 & 3 (Bunnvale) & 8 (Grayrock)	9	5-7 years
Replacement of Clearwell Liner / Concrete Rehab as Necessary	9	5-7 years
Rehabilitation / Replacement of Control Buildings (Bunnvale & Grayrock)	6, 9	5-10 years
Replacement of Generator Load Bank	10	5-10 years
Medium Priority Main Replacement	N/A	5-10 years
Installation of a Tank Mixing System (1,000,000 Gallon Standpipe)	N/A	5-10 years
Purchase of redundant chemical feed pumps	N/A	1-10 years
Project	**BRE**	**Timetable**
Low Priority Main Replacement	N/A	10+ years

Beyond the above repair and replacement projects, various upgrades or capital improvements have been recommended throughout the various sections of this report. For budgeting and funding purposes, the recommended improvements have been organized into capital improvement projects based on facility and project type, and are summarized below.

Bunnvale Upgrades

- Repair/replacement of treatment building roof and support structure.
- Replacement/upgrade of necessary electrical service equipment.
- Replacement of well piping and turbine flow meters with magnetic flow meters with digital output and totalizers.
- Addition of pressure transducers for well static level monitoring and reporting.
- Replace raw water clearwell float system with a pressure transducer to eliminate pump motor starter issues.
- Repair/mitigate risk associated with exposed conduit duct bank across swale.
- Update alarm systems/auto-dialers.

- **Optional Additions:** Well Pump replacement as necessary; replacement of clearwell liner at the time of roof repair/replacement; decommission air stripper unit.

Meter Replacement Project

- Replace approximately 1,472 direct read meters throughout the system with remote read meters.

Grayrock Upgrades

- Repair/Replacement of all above grade valving from Well 8.
- Well pump replacement as necessary.
- Electrical Upgrades as necessary.
- Miscellaneous building upgrades/rehabilitation.
- Install emergency generator.

Water Main Replacement Project(s)

- Perform a water main leak and breaks study to prioritize further the high priority areas.
- Replace all high priority main as funding allows.
- Evaluation and/or replacement of 12" CI supply line from Bunnvale to the Fairview standpipe.

Pressure Reducing Valve Project

- Create a hydraulic model of the distribution system to evaluate optimal locations for PRVs and the resulting impacts to the system.
- Install PRVs as applicable.

Standpipe Rehabilitation

- Perform formal tank inspection and cleaning.
- Perform capital improvements and painting/coatings as recommended from tank inspection.

Beyond the above projects, maintenance recommendations or stipulations from the WQAA are summarized below.

- Exercise Cummins Diesel Generator weekly;
- Air stripper maintenance in conformance with manufacturer guidelines;
- Recalibration of source well meters prior to application for WAP renewal;
- Well testing and monitoring in conformance with WAP;
- Valve inspection and exercising program every four (4) years in accordance with WQAA;
- Creation of SOPs and O&M manuals; and
- Annual hydrant inspection and flushing program in accordance with WQAA.

6.2 Life Cycle Costing

Maser Consulting has prepared the order of magnitude cost estimates for the above referenced recommendations for budgetary purposes. A breakdown of the cost estimates for each recommended high priority capital improvement is contained in Appendix J. The estimated costs for each priority ranking are summarized in Table 4 below.

Table 4 – Recommended Improvement Cost Summary

High Priority Projects	
Project	**Budgetary Cost**
Bunnvale Upgrades - Roof Replacement; Electrical Service Equipment, Pump 4 & 5 Replacement, Well Piping, Flow Meters, Pressure Transducers, Auto - dialers, Duct Bank Repair.	$497,350
Meter Replacement Project	$870,000
Grayrock Upgrades – Pump Replacement, Replacement of Piping/Valving, Building Upgrades, Auto-Dialers.	$133,000
Water Main Replacement (All High Priority - 39,400 L.F – See Appendix G.)	$8,302,000
12" Supply Line Replacement	$2,247,000
Pressure Reducing Valve Project	$196,000
Standpipe Inspection / Cleaning	$24,000
Standpipe Capital Improvements	TBD
High Priority Total	**$12,269,350**
Medium Priority Projects	
Project	**Budgetary Cost**
Replacement of Well Pump 2 & 3 (Bunnvale)	$28,000
Replacement of Clearwell Liner / Concrete Rehab as necessary	$105,000
Replacement of Generator Load Bank	$9,600
Medium Priority Main Replacement (46,150 L.F. – See Appendix G)	$9,691,500
Installation of a Tank Mixing System (1,000,000 Gallon Standpipe)	$42,000
Purchase of redundant chemical feed pumps	$18,000
Medium Priority Total	**$9,894,100**
Low Priority Projects	
Project	**Budgetary Cost**
Low Priority Main Replacement (35,250 L.F.- See Appendix G)	$7,402,500
Low Priority Total	**$7,402,500**

The quantities used for the cost estimates contained in Appendix J are approximate and are not intended to represent exact quantities to be constructed. In addition, the unit prices are approximate and have been taken from estimates and bids on similar projects and may not represent the actual cost to the Borough.

6.3 Long Term Funding Strategy

It is recommended the Borough begin budgeting of the necessary funds to complete the capital improvement projects listed herein. Based on the budgetary cost estimates of the highest priority projects, internal funding will likely not be sufficient to fund the necessary rehabilitation and upgrades to the system. It is recommended these projects be financed through the New Jersey Water Bank (NJWB). The NJWB administers the New Jersey State Revolving fund and is a partnership between the NJDEP and the New Jersey Environmental Infrastructure Trust (NJEIT). The NJWB utilizes market rate financing, combined with zero percent interest loans from NJDEP. The result is low cost financing for the design, engineering, legal, bond counsel, and construction of projects that maintain and improve water quality.

All of the capital improvement projects recommended within this report are eligible for funding through the NJWB. Funding could be pursued for multiple projects at once and projects be grouped by facility or type. It is more economical and recommended to borrow a minimum of $500,000 to $1,000,000 at a time.

In addition, funding opportunities may be available through the USDA Rural Development - Water & Waste Disposal Loan & Grant Program.

6.4 Conclusions

Overall, the High Bridge Water System was found to be operating satisfactorily but is significantly aged and in need of upgrades. The water produced and delivered to residents is safe to drink and the water quality meets the standards as set forth by NJDEP. While the water quality is sufficient, and operation of the system is maintained, a number of upgrades or repairs are necessary to modernize the system and ensure water quality, reliability, efficiency, and system longevity. As mentioned previously, it is recommended that this Asset Management Plan, planned capital improvements, and capital budgets and funding strategies be re-evaluated annually.

APPENDIX A

Water Quality Accountability Act

CHAPTER 133

AN ACT concerning the operation and management of public water systems, and supplementing Title 58 of the Revised Statutes.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

C.58:31-1 Short title.

1. This act shall be known and may be cited as the "Water Quality Accountability Act."

C.58:31-2 Definitions relative to operation, management of public water systems.

2. As used in this act:

"Board" means the Board of Public Utilities.

"Department" means the Department of Environmental Protection.

"Public water system" means the same as the term is defined in section 3 of P.L.1977, c.224 (C.58:12A-3).

"Water purveyor" means any person that owns a public water system with more than 500 service connections.

C.58:31-3 Inspections, testing by water purveyor.

3. a. Each water purveyor shall inspect each valve in its public water system in accordance with the provisions of subsection b. of this section in order to determine (1) accessibility of the valve for operational purposes, and (2) the valve's operating condition. A water purveyor shall repair or replace any valve found to be broken or otherwise not operational.

b. Each water purveyor shall inspect each valve that is 12 or more inches in diameter at least once every two years, and shall inspect all other valves at least once every four years , except that the requirements of this subsection shall not apply to any service connection valve or customer shut-off valve . At a minimum, each valve inspection conducted pursuant to this subsection shall include:

(1) clearing of the area around the valve to ensure full access to the valve for operating purposes;

(2) cleaning out of the valve box;

(3) dynamic testing of the valve, by opening and then closing the valve for either of the following number of turns:

(a) the number of turns recommended by the valve manufacturer to constitute a credible test; or

(b) the number of turns which constitutes 15 percent of the total number of turns necessary to completely open or completely close the valve ; and

(4) complying with any other criteria as may be required by the department pursuant to rules and regulations adopted pursuant to the "Administrative Procedure Act," P.L.1968, c.410 (C.52:14B-1 et seq.).

c. (1) Each water purveyor shall, once a year, test every fire hydrant in its system in order to determine the hydrant's working condition.

(2) Each water purveyor shall formulate and implement a plan for flushing every fire hydrant in the public water system, and every dead end of a main in the public water system. This plan for flushing may be combined with the periodic testing of fire hydrants required pursuant to paragraph (1) of this subsection.

d. Each water purveyor shall keep a record of all inspections, tests, and flushings conducted pursuant to this section for a period of at least six years.

e. Each water purveyor that owns, solely or jointly, a fire hydrant shall mark each hydrant with the initials of its name, abbreviation of its name, corporate symbol, or other distinguishing mark or code by which ownership may be readily and definitely ascertained. Each fire hydrant shall be marked with a number or symbol, or both, by which the location of the hydrant may be determined on the water purveyor's office records. The markings may be made with paint, brand, or with a soft metal plate, and shall be of such size and so spaced and maintained as to be easily read.

f. Each water purveyor shall identify, to the extent possible, the geographic location of each valve and fire hydrant in its public water system using a global positioning system based on satellite or other location technology.

C.58:31-4 Development of cybersecurity system; exemptions.

4. a. Within 120 days after the effective date of this act, each water purveyor shall develop a cybersecurity program, in accordance with requirements established by the board, that defines and implements organization accountabilities and responsibilities for cyber risk management activities, and establishes policies, plans, processes, and procedures for identifying and mitigating cyber risk to its public water system. As part of the program, a water purveyor shall conduct risk assessments and implement appropriate controls to mitigate identified risks to the public water system, maintain situational awareness of cyber threats and vulnerabilities to the public water system, and create and exercise incident response and recovery plans.

A copy of the program developed pursuant to this subsection shall be provided to the New Jersey Cybersecurity and Communications Integration Cell, established pursuant to Executive Order No. 178 (2015) in the New Jersey Office of Homeland Security and Preparedness.

b. Within 60 days after developing the program required pursuant to subsection a. of this section, each water purveyor shall join the New Jersey Cybersecurity and Communications Integration Cell, established pursuant to Executive Order No. 178 (2015), and create a cybersecurity incident reporting process.

c. A water purveyor that does not have an internet-connected control system shall be exempt from the requirements of this section.

C.58:31-5 Violations; mitigation.

5. In addition to any other requirements in law, or any rule or regulation adopted pursuant thereto, whenever a water purveyor is issued , pursuant to section 10 of P.L.1977, c.224 (C.58:12A-10) , three notices of violation for any reason or two notices of violation related to an exceedance of a maximum contaminant level within any 12-month period, the water purveyor, within 60 days after receipt of the third or second notice, as applicable, shall submit to the department a mitigation plan specifying whether the notice of violation will be addressed through operational changes or require a capital expenditure and providing a schedule for implementation of the mitigation plan. The mitigation plan shall include a report prepared by the licensed operator of the public water system and a professional engineer licensed pursuant to P.L.1938, c.342 (C.45:8-27 et seq.) that includes a technical analysis of the notices of violation and an explanation of how the mitigation plan submitted pursuant to this section is intended to prevent a recurrence of the issue that resulted in the notice of violation. Any capital expenditures required pursuant to this section shall be incorporated into the asset management plan required pursuant to section 7 of this act.

C.58:31-6 Additional certifications.

6. In addition to any other certifications required pursuant to law, rule, or regulation, the responsible corporate officer of the public water system, if privately held, executive director, if an authority, or mayor or chief executive officer of the municipality, if municipally owned, as applicable, shall be required to certify in writing each year to the Department of Environmental Protection and, if applicable, the Board of Public Utilities that the water purveyor complies with: all federal and State drinking water regulations, including water quality sampling, testing, and reporting requirements; the hydrant and valve requirements set forth in section 3 of this act; the notice of violation mitigation plan requirements set forth in section 5 of this act, if applicable; and the infrastructure improvement investment required pursuant to section 7 of this act.

C.58:31-7 Asset management plan; report.

7. a. Beginning no later than 18 months after the effective date of this act, every water purveyor shall implement an asset management plan designed to inspect, maintain, repair, and renew its infrastructure consistent with standards established by the American Water Works Association. The asset management plan shall include:

(1) a water main renewal program designed to achieve a 150-year replacement cycle, or other appropriate replacement cycle as determined by a detailed engineering analysis of the asset condition and estimated service lives of the water mains serving the public water system;

(2) a water supply and treatment program designed to inspect, maintain, repair, renew, and upgrade wells, intakes, pumps, and treatment facilities in accordance with all federal and State regulations, standards established by the American Water Works Association, and any mitigation plan required pursuant to section 5 of this act ; and

(3) any other programs, plans, or provisions as may be required by the department pursuant to rules and regulations adopted pursuant to the “Administrative Procedure Act,” P.L.1968, c.410 (C.52:14B-1 et seq.).

Each water purveyor shall dedicate funds on an annual basis to address and remediate the highest priority projects as determined by its asset management plan.

All asset management plans and system condition reports shall be certified to by the licensed operator or professional engineer of the public water system and the responsible corporate officer of the public water system, if privately held, executive director, if an authority, or mayor or chief executive officer of the municipality, if municipally owned, as applicable. The replacement cycle shall be determined by dividing the miles of water main located in the public water system by 150 or other appropriate demonstration set forth in the certified asset management plan prepared pursuant to this section.

b. At least once every three years, each water purveyor shall provide to the department and the board, if applicable, a report based on its asset management plan prepared pursuant to subsection a. of this section identifying the infrastructure improvements to be undertaken in the coming year and the cost of those improvements, as well as identifying the infrastructure improvements completed in the past year and the cost of those improvements. A municipal water department or municipal water authority shall also submit the report required pursuant to this subsection to the Division of Local Government Services in the Department of Community Affairs.

c. The department, the board, and the Department of Community Affairs shall create a centralized portal allowing for electronic submittal of the report required pursuant to subsection b. of this section. The lack of a centralized portal pursuant to this subsection shall

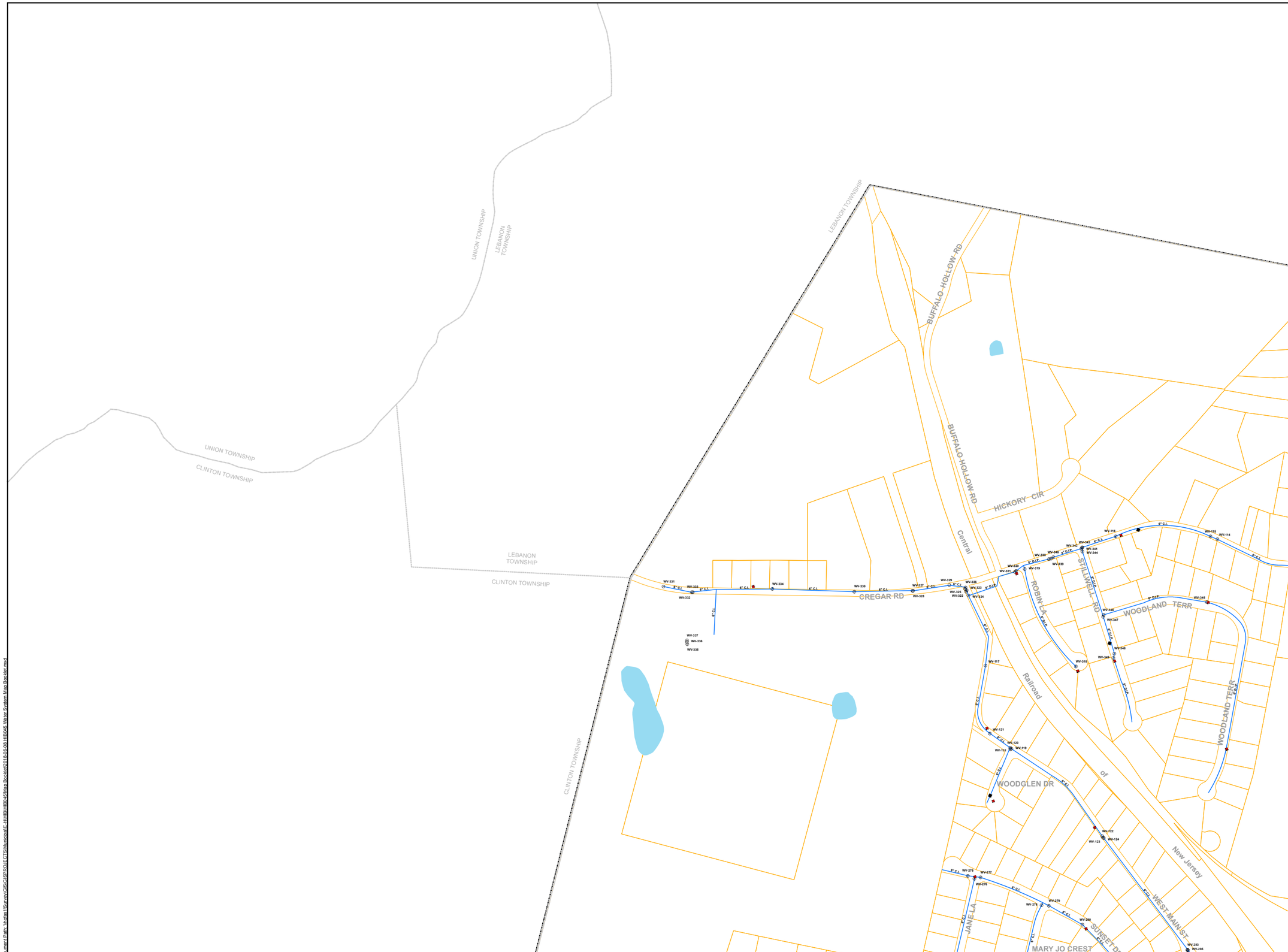
not negate the requirement for a water purveyor to submit a report pursuant to subsection b. of this section.

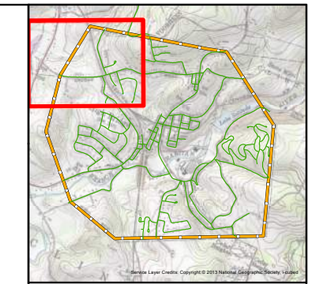
8. This act shall take effect on the 90th day after the date of enactment.

Approved July 21, 2017.

APPENDIX B

Water System Map Booklet





0 100 200 400 Feet

LEGEND

- Valve (WV-###)[5]
- Valve[7]
- Hydrant[6]
- Pump Station
- Tank
- Well
- Abandoned Water Main
- Water Main
- Municipal Boundary
- Parcel
- Borough of High Bridge
- Waterbodies

NOTES :

1. Water mains have been labeled with pipe diameter and material.
2. Pipe diameters are labeled in inches.
3. Parcels, municipal boundaries, rivers and streams were obtained from NJDEP and NJOIT.
4. Pipe material abbreviations include:

   C.I. = Cast Iron
   D.I.P. = Ductile Iron
   GAL. = Galvanized

5. Water valves were located using a trimble Geo 7.X centimeter edition GPS unit in May 2018.
6. Hydrant location data was provided to Maser Consulting by the Borough.Hydrant locations were not accurate enough to connect to the water distibution system on this map.
7. Approximate location of valves obtained from the "Water Utility System Map" prepared by Studer and McEldowney, P.A. in September 2004. These valves could not be located in the field.

WATER DISTRIBUTION SYSTEM MAP

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY, NJ

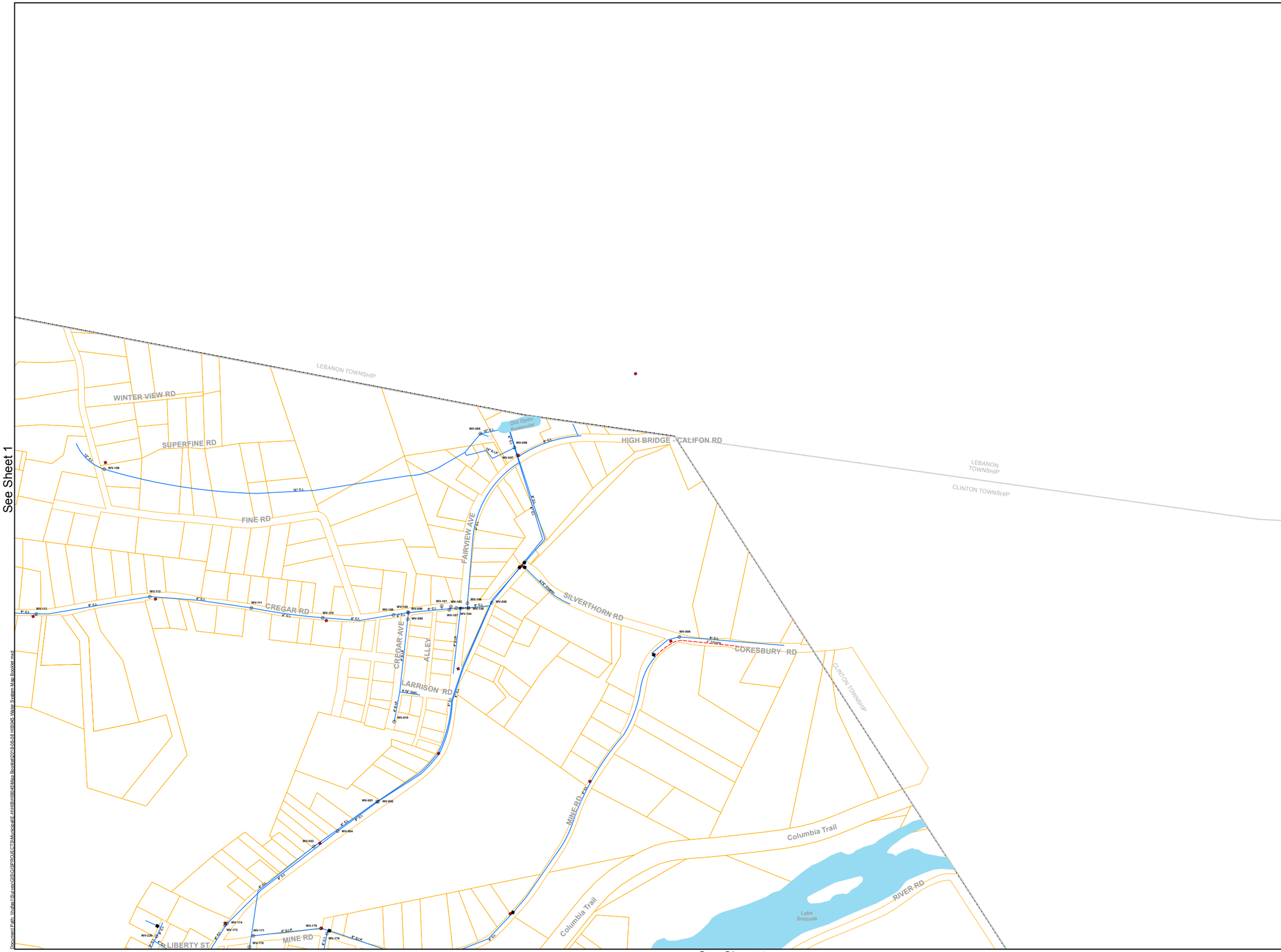
MASER CONSULTING P.A.
Red Bank Office
331 Newman Springs Rd, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

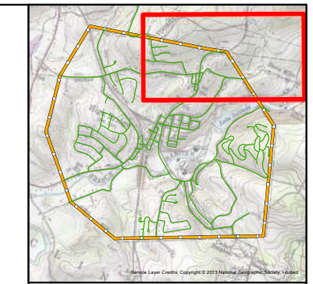
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	06/08/2018	AAP	MTK

PROJECT NUMBER:	FIGURE NUMBER:
HIB-045	1

See Sheet 2

See Sheet 3





0 100 200 400 Feet

LEGEND

- Valve (WV-###)[5]
- Valve[7]
- Hydrant[6]
- Pump Station
- Tank
- Well
- Abandoned Water Main
- Water Main
- Municipal Boundary
- Parcel
- Borough of High Bridge
- Waterbodies

NOTES :

1. Water mains have been labeled with pipe diameter and material.
2. Pipe diameters are labeled in inches.
3. Parcels, municipal boundaries, rivers and streams were obtained from NJDEP and NJOIT.
4. Pipe material abbreviations include:

   C.I. = Cast Iron
   D.I.P. = Ductile Iron
   GAL. = Galvanized

5. Water valves were located using a trimble Geo 7.X centimeter edition GPS unit in May 2018.
6. Hydrant location data was provided to Maser Consulting by the Borough.Hydrant locations were not accurate enough to connect to the water distibution system on this map.
7. Approximate location of valves obtained from the "Water Utility System Map" prepared by Studer and McEldowney, P.A. in September 2004. These valves could not be located in the field.

WATER DISTRIBUTION SYSTEM MAP

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY, NJ

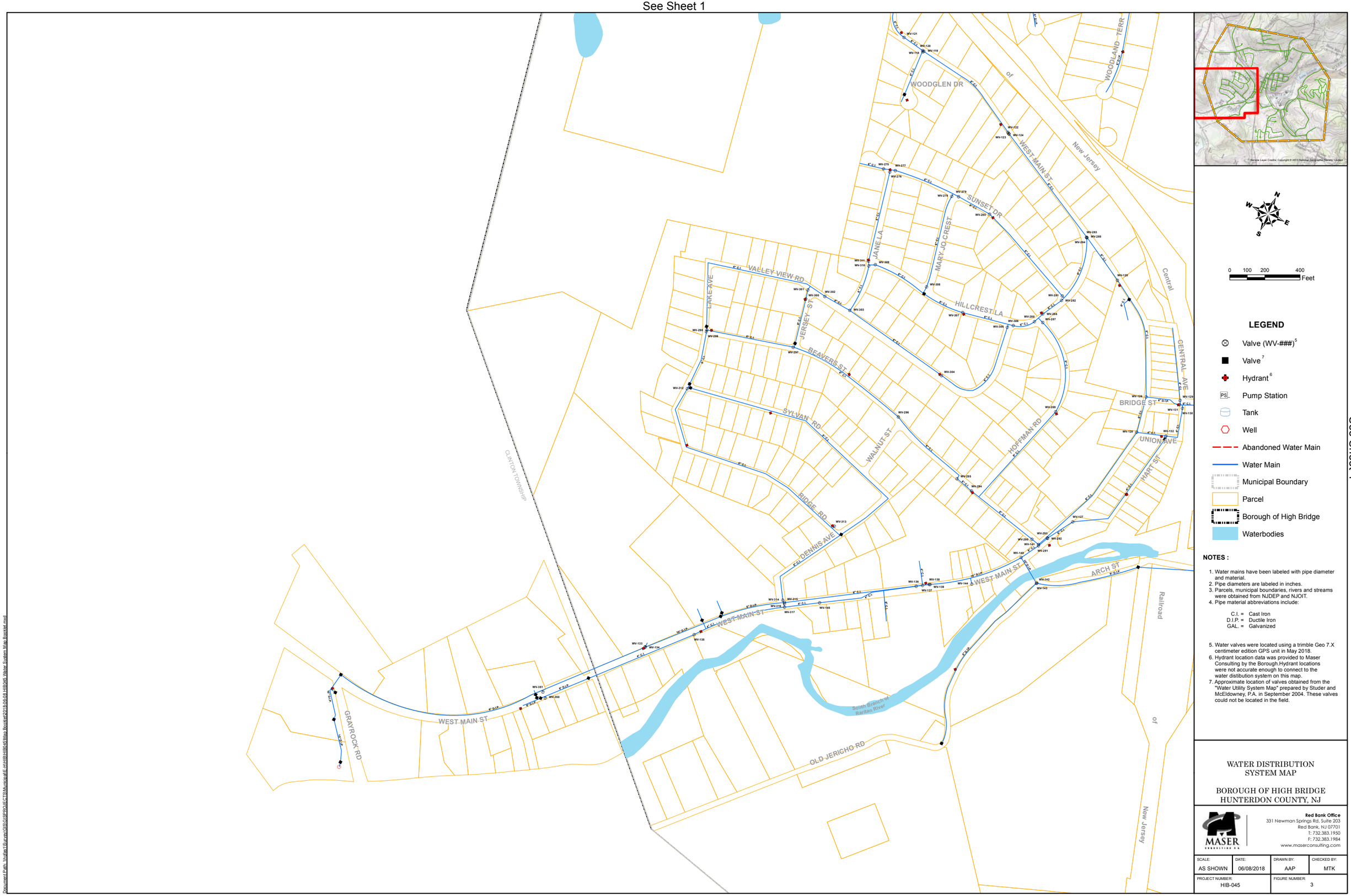
MASER CONSULTING P.A.
Red Bank Office
331 Newman Springs Rd, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	06/08/2018	AAP	MTK

PROJECT NUMBER:	FIGURE NUMBER:
HIB-045	2

Document Path: \\hdfas1\Survey\GIS\GISPROJECTS\Municipal\E-H\HIB\HIB045\Map Booklet\2018-06-08 HIB045 Water System Map Booklet.mxd

See Sheet 1



See Sheet 4

0 100 200 400 Feet

LEGEND

- Valve (WV-###)[5]
- Valve[7]
- Hydrant[6]
- Pump Station
- Tank
- Well
- Abandoned Water Main
- Water Main
- Municipal Boundary
- Parcel
- Borough of High Bridge
- Waterbodies

NOTES :

1. Water mains have been labeled with pipe diameter and material.
2. Pipe diameters are labeled in inches.
3. Parcels, municipal boundaries, rivers and streams were obtained from NJDEP and NJOIT.
4. Pipe material abbreviations include:

   C.I. = Cast Iron
   D.I.P. = Ductile Iron
   GAL. = Galvanized

5. Water valves were located using a trimble Geo 7.X centimeter edition GPS unit in May 2018.
6. Hydrant location data was provided to Maser Consulting by the Borough.Hydrant locations were not accurate enough to connect to the water distibution system on this map.
7. Approximate location of valves obtained from the "Water Utility System Map" prepared by Studer and McEldowney, P.A. in September 2004. These valves could not be located in the field.

WATER DISTRIBUTION SYSTEM MAP

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY, NJ

MASER CONSULTING P.A.
Red Bank Office
331 Newman Springs Rd, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	06/08/2018	AAP	MTK

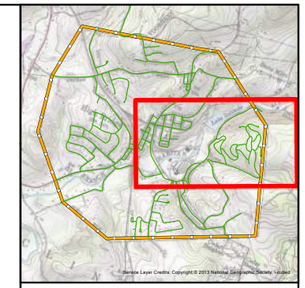
PROJECT NUMBER:	FIGURE NUMBER:
HIB-045	3

Document Path: \\hqfs1\Survey\GIS\GISPROJECTS\Municipal\E-H\HIB\HIB045\Maps Booklet\2018\06\08 HIB045 Water System Map Booklet.mxd

See Sheet 2

See Sheet 3

See Sheet 5



N
W
E
S

0 100 200 400
Feet

LEGEND

- Valve (WV-###)[5]
- Valve[7]
- Hydrant[6]
- Pump Station
- Tank
- Well
- Abandoned Water Main
- Water Main
- Municipal Boundary
- Parcel
- Borough of High Bridge
- Waterbodies

NOTES :

1. Water mains have been labeled with pipe diameter and material.
2. Pipe diameters are labeled in inches.
3. Parcels, municipal boundaries, rivers and streams were obtained from NJDEP and NJOIT.
4. Pipe material abbreviations include:

   C.I. = Cast Iron
   D.I.P. = Ductile Iron
   GAL. = Galvanized

5. Water valves were located using a trimble Geo 7.X centimeter edition GPS unit in May 2018.
6. Hydrant location data was provided to Maser Consulting by the Borough.Hydrant locations were not accurate enough to connect to the water distibution system on this map.
7. Approximate location of valves obtained from the "Water Utility System Map" prepared by Studer and McEldowney, P.A. in September 2004. These valves could not be located in the field.

WATER DISTRIBUTION SYSTEM MAP

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY, NJ

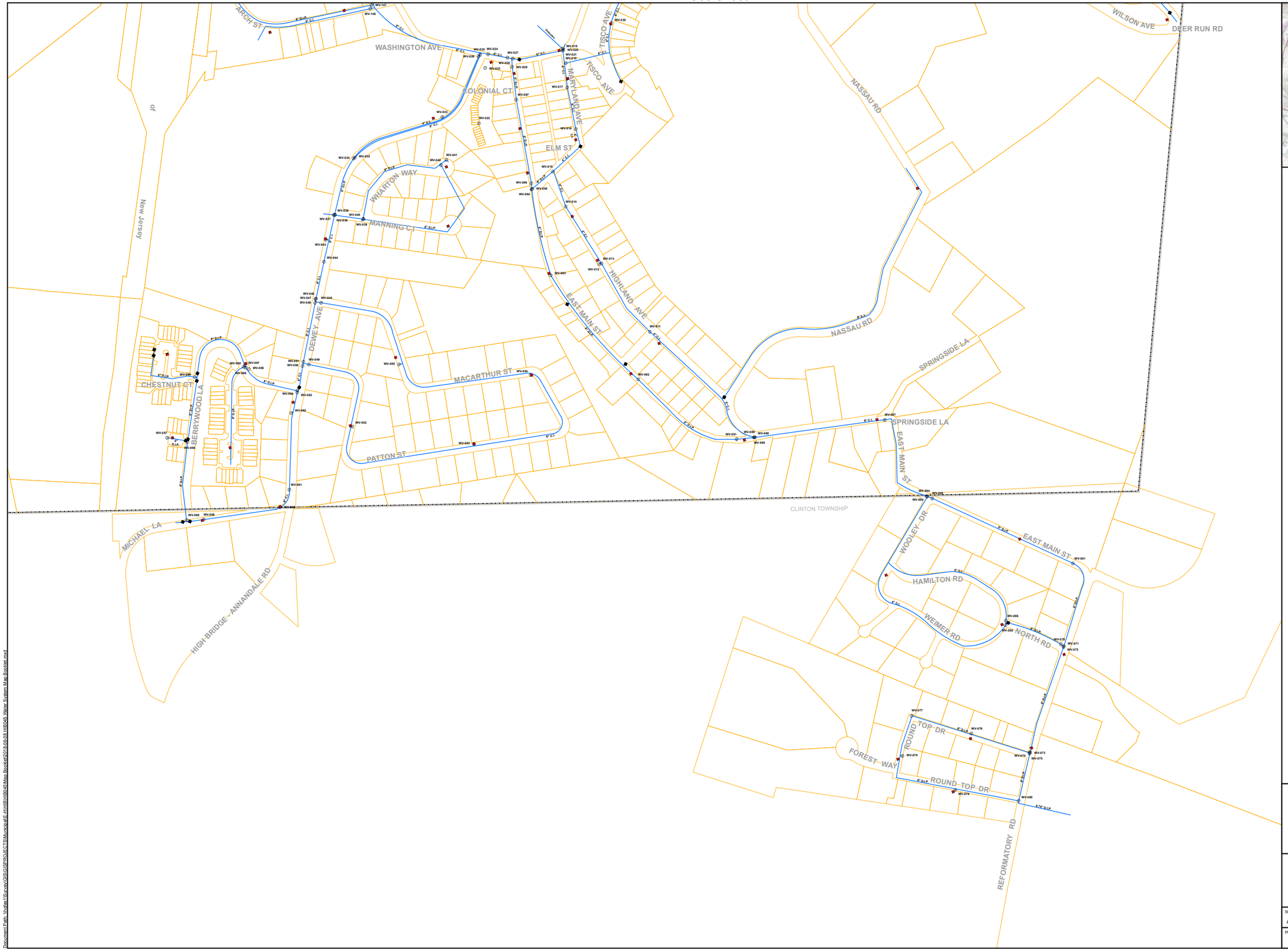
MASER CONSULTING P.A.
Red Bank Office
331 Newman Springs Rd, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

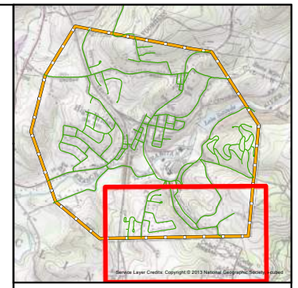
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	06/08/2018	AAP	MTK

PROJECT NUMBER:	FIGURE NUMBER:
HIB-045	4

Document Path: N:\Projects\Survey\GIS\GISPROJECTS\Municipal\E_H\HIBH\HIB045\Map Booklet\2018.06.08 HIB045 Water System Map Booklet.mxd

See Sheet 4





N
W
E
S

0 100 200 400 Feet

LEGEND

- Valve (WV-###)[5]
- Valve[7]
- Hydrant[6]
- Pump Station
- Tank
- Well
- Abandoned Water Main
- Water Main
- Municipal Boundary
- Parcel
- Borough of High Bridge
- Waterbodies

NOTES :

1. Water mains have been labeled with pipe diameter and material.
2. Pipe diameters are labeled in inches.
3. Parcels, municipal boundaries, rivers and streams were obtained from NJDEP and NJOIT.
4. Pipe material abbreviations include:

   C.I. = Cast Iron
   D.I.P. = Ductile Iron
   GAL. = Galvanized

5. Water valves were located using a trimble Geo 7.X centimeter edition GPS unit in May 2018.
6. Hydrant location data was provided to Maser Consulting by the Borough.Hydrant locations were not accurate enough to connect to the water distibution system on this map.
7. Approximate location of valves obtained from the "Water Utility System Map" prepared by Studer and McEldowney, P.A. in September 2004. These valves could not be located in the field.

WATER DISTRIBUTION SYSTEM MAP

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY, NJ

MASER CONSULTING P.A.
Red Bank Office
331 Newman Springs Rd, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	06/08/2018	AAP	MTK

PROJECT NUMBER:	FIGURE NUMBER:
HIB-045	5

Document Path: \\hvfile1\Survey\GIS\GISPROJECTS\Municipal\E-H\HIB\HIB045\Map Booklet\2018-06-08 HIB045 Water System Map Booklet.mxd

APPENDIX C

Above Grade Asset Inventory

Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Asset Management Plan
TREATMENT FACILITIES ASSET INVENTORY
For
Borough of High Bridge
Hunterdon County, New Jersey

Asset Inventory			Condition Assessment					Risk Assessment			
Asset Type	**Asset Facility**	**Asset ID**	**Approx. Year Installed**	**Estimated Useful Life**	**Remaining Life Span**	**Condition Rating**	**Comments**	**Redundancy %**	**Probability of Failure Rating**	**Consequence of Failure Rating**	**BRE / Criticality Rating**
SUPPLY INFRASTRUCTURE											
Supply Well	Bunnvale Well Site	S-BUNV-WELL-2	1936	100	17	Fair		25%	3	3	9
Well Pump	Bunnvale Well Site	S-BUNV-PMP-2	2015	10	6	Fair		25%	3	3	9
Well Piping/Appurtenances	Bunnvale Well Site	S-BUNV-PIPE-2	1950	80	11	Fair		25%	3	3	9
Supply Well	Bunnvale Well Site	S-BUNV-WELL-3	1938	100	19	Fair		25%	3	3	9
Well Pump	Bunnvale Well Site	S-BUNV-PMP-3	2014	10	5	Fair		25%	3	3	9
Well Piping/Appurtenances	Bunnvale Well Site	S-BUNV-PIPE-3	1950	80	11	Fair		25%	3	3	9
Supply Well	Bunnvale Well Site	S-BUNV-WELL-4	1945	100	26	Fair		25%	3	3	9
Well Pump	Bunnvale Well Site	S-BUNV-PMP-4	2011	10	2	Fair		25%	4	3	12
Well Piping/Appurtenances	Bunnvale Well Site	S-BUNV-PIPE-4	1950	80	11	Fair		25%	3	3	9
Supply Well	Bunnvale Well Site	S-BUNV-WELL-5	1950	100	31	Fair		25%	3	3	9
Well Pump	Bunnvale Well Site	S-BUNV-PMP-5	2012	10	3	Fair	Sag in above grade well piping.	25%	4	3	12
Well Piping/Appurtenances	Bunnvale Well Site	S-BUNV-PIPE-5	1950	80	11	Poor		25%	4	3	12
Supply Well	GrayRock Well Site	S-GRYR-WELL-8	1985	100	66	Good		0%	2	3	6
Well Pump	GrayRock Well Site	S-GRYR-PMP-8	2018	10	9	Good	Runs manually / continuously	0%	2	3	6
Well Piping/Appurtenances	GrayRock Well Site	S-GRYR-PIPE-8	1985	80	46	Poor	Failed Cla-Valve, significant corrosion.	0%	4	3	12
Emergency Generator	Bunnvale Well Site	S-BUNV-PMP-1	2010	30	21	Good		0%	2	4	8
Generator Load Bank	Bunnvale Well Site	S-BUNV-LDBK-1	2010	30	21	Out of Service		0%	5	2	10
Controls Building	Bunnvale Well Site	S-BUNV-BLDG-1	Unkown	N/A	N/A	Fair		N/A	2	3	6
Controls Building	GrayRock Well Site	S-GRYR-BLDG-1	Unkown	N/A	N/A	Fair		N/A	3	3	9
Elec. Service Equipment	Bunnvale Well Site	S-BUNV-ELEC-1	Unkown	N/A	N/A	Poor		N/A	3	5	15
Elec. Service Equipment	GrayRock Well Site	S-GRYR-ELEC-1	Unkown	N/A	N/A	Good		N/A	2	5	10
TREATMENT INFRASTRUCTURE											
Treatment Building	Bunnvale Well Site	T-BUNV-BLDG-1	Unkown	N/A	N/A	Poor		N/A	4	5	20
Air Stripper	Bunnvale Treatment Building	T-BUNV-STRP-1	Unkown	N/A	N/A	Fair	Potential to decommission.	0%	3	3	9
Air Stripper Blower	Bunnvale Treatment Building	T-BUNV-BLOW-1	Unkown	N/A	N/A	Fair	Potential to decommission. High energy usage.	0%	3	3	9
Hypochlorite Pump	Fairview Ave. Tank Building	T-FAIR-PMP-1	2018	7	6	Good		0%	2	4	8
Hypochlorite Pump	Grayrock Controls Building	T-GRYR-PMP-1	2018	10	9	Excellent		0%	1	4	4
STORAGE INFRASTRUCTURE											
Standpipe (1,000,000 gal)	Fairview Ave. Tank	ST-FAIR-TANK-1	1980	80	41	Fair	In need of inspection / cleaning.	N/A	3	4	12
Standpipe (150,000 gal)	Solitude Village Tank	ST-SOLT-TANK-1	1973	80	34	Fair	In need of inspection / cleaning.	N/A	3	4	12
Clearwell	Bunnvale Treatment Building	ST-BUNV-CLRW-1	Unkown	N/A	N/A	Fair		N/A	2	3	6
Clearwell Liner	Bunnvale Treatment Building	ST-BUNV-LINR-1	Unkown	N/A	N/A	Poor		N/A	3	3	9

APPENDIX D

Asset Photographs

Well Nos. 2 – 5 Site and Treatment Building

Well No. 8 Site

1

1,000,000 Gallon Fairview Avenue Standpipe

150,000 Gallon Solitude Village Standpipe

Raw Water Storage Tank and Clearwell

Carbonair Air Stripper

Emergency Diesel Generator and Enclosure

Well 8 Chemical Feed Pump (Sodium Hypochlorite)

APPENDIX E

Level of Service Goals Tracker

Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Asset Management Plan
LEVEL OF SERVICE GOALS TRACKER
For
Borough of High Bridge Water System
Hunterdon County, New Jersey

Level of Service Goal	Goal Source	Data Needed to Measure Goal	Period of Measurement	Current Level	Status of Completion	Comments
Provide customers with finished water that meets or exceeds all Maximum Contaminant Level Goals (MCLGs) 100% of the time.	USEPA - SDWA	Finished Water Sampling Results	Continuous Sampling / Annual Assessment	No Violations	Meeting Goal	
Maintain compliance with all water allocation permit requirements and reporting.	NJDEP	See WAP	See WAP	No Violations	Meeting Goal	
Maintain compliance with the requirement set forth in the WQAA and update the AMP annually. Develop a capital improvement plan that meets the level of service goals at a sustainable life cycle cost.	NJDEP	WQAA Certification	Annual	In Progress	In Progress, to be completed by April 19, 2019.	
Main breaks will be fixed within 8 hours of discovery 90% of the time. Service line breaks will be fixed within 16 hours of discovery 90% of the time.	Internal Goal	Main break response times	Continuous Monitoring / Annual Assessment	Unknown	Uknown	
Improve record keeping related to water distribution system integrity. Leaks and breaks to be tracked per mile of pipe.	Internal Goal	Annual Breaks and Leak Report	Continuous Monitoring / Annual Assessment	Breaks are informally tracked and logged	In Progress	
Perform an annual water loss audit and bring unaccounted for water below 30% within the next 3 years, with a long term goal of less than 15% within the next 10 years.	NJDEP - WAP	Annual Water Loss Audit	Annual Monitoring / Assessed at 3-years and 10-years	Not Meeting Goal	In Progress	Water Loss Audit Performed in 2016 showed unaccounted for water in upwards of 35%.
Creation of standard operating procedures (SOPs) and O&M Manuals for all relevant equipement and facilities.	Internal Goal	N/A	1-year	In Progress	In Progress	

Note: The above listed goals are not a complete list of items required for compliance and/or permitting. The above goals are to be utilized to track progress of the asset management program.

APPENDIX F

Water Allocation Permit

State of New Jersey

CHRIS CHRISTIE
GOVERNOR

KIM GUADAGNO
LT. GOVERNOR

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BOB MARTIN
COMMISSIONER

Mail Code 401-03
Division of Water Supply & Geoscience
New Jersey Geological and Water Survey Element
Bureau of Water Allocation & Well Permitting
401 E. State Street - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel #: (609) 984-6831 - Fax #: (609) 633-1231
http://www.nj.gov/dep/watersupply/

March 15, 2013

HIGH BRIDGE BORO WATER DEPT
Attn: Ralph A Runge
71 Main St
High Bridge, NJ 08829

Dear Mr. Runge:

Re: Renewal of Water Allocation Permit No. 5242
High Bridge Borough Water Department
Activity No. WAP120001

I have completed a Draft Staff Report, Draft Permit Requirements, and Draft Permit Inventory based upon my review of the information submitted with the application filed on behalf of HIGH BRIDGE BORO WATER DEPT. Attached for your review and comments are copies of the above referenced draft documents.

Your review of the factual material is important as this was the basis for my analysis, and subsequent recommendations for permit conditions. Please advise me if you find any of this information to be incomplete or inaccurate.

The Permit Requirements section should be reviewed carefully to make sure that you will be able to comply with the proposed permit conditions. Please note that it has been recommended that both High Bridge Borough Water Department permits (5242 and 5243) be combined under permit no. 5242. Resource limits have been recommended based on the sources location within the Highlands Planning (Well 8) and Highlands Preservation (Wells 2 – 5) Areas. Your review and comments at this time will allow us to resolve any problems before the permit is issued.

I would appreciate receiving your comments within 30 days from the date of this letter. If I do not hear from you within this time frame, I will assume that the Draft Staff Report, Draft Permit Requirements, and Draft Permit Inventory are acceptable to you, and the Bureau will continue with processing of the permit application. Should you have any questions please contact me at (609) 984-6831.

Sincerely,

Kenneth M. Komar
Bureau of Water Allocation & Well Permitting

Enclosure

HIGH BRIDGE BORO WATER DEPT
5242

Water Allocation Permit : WAP120001

Permit Inventory

Water Diversion Sources - Water may be diverted under this permit from the following sources:

Source Designation (Well Permit No. or Intake No.)	Description	Subject Item ID
2400000437	WELL 5	WSWL0000064495
2400018383	WELL 8	WSWL0000064660
4400000039	WELL 2	WSWL0000069885
4400000040	WELL 3	WSWL0000069886
4400000041	WELL 4	WSWL0000069887

Group Subject Items - The following items are grouped sources for the purpose of setting permit requirements outlined in this document:

Group Designation	Group Description	Group Subject Item ID	Group Members
HIGH BRIDGE BOROUGH WATER DEPT	5242 WA PERMIT - ALL DIVERSION SOURCES	WSWA0000075833	KITTATINNY LIMESTONE FORMATION SOURCE, WELL 8 (WARG1005091)
			HORNBLENDE GRANITE FORMATION SOURCES, WELLS 2 - 5 (WARG1018152)
KITTATINNY LIMESTONE FORMATION SOURCE	WELL 8	WARG0001005091	2400018383, WELL 8 (WSWL064660)
HORNBLENDE GRANITE FORMATION SOURCES	WELLS 2 - 5	WARG0001018152	2400000437, WELL 5 (WSWL064495)
			4400000039, WELL 2 (WSWL069885)
			4400000040, WELL 3 (WSWL069886)
			4400000041, WELL 4 (WSWL069887)
HIGHLANDS PRESERVATION AREA SOURCES	WELLS 2 - 5	WARG0001018154	2400000437, WELL 5 (WSWL064495)
			4400000039, WELL 2 (WSWL069885)
			4400000040, WELL 3 (WSWL069886)
			4400000041, WELL 4 (WSWL069887)
HIGHLANDS PLANNING AREA SOURCE	WELL 8	WARG0001018155	2400018383, WELL 8 (WSWL064660)

HIGH BRIDGE BORO WATER DEPT
5242

Water Allocation Permit : WAP120001

Permit Requirements

Limit Requirements

The following limits apply and are the maximum permitted allocation:

Final Permit Phase

Subject Item	Parameter	Limit
HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)	Maximum Diversion Rate	<= 1000 Gallons Per Minute. [N.J.A.C. 7:19- 2]
	Water Diverted	<= 19.13 Million Gallons Per Month. [N.J.A.C. 7:19- 2]
		<= 186 Million Gallons Per Year. [N.J.A.C. 7:19- 2]
HIGHLANDS PRESERVATION AREA SOURCES, WELLS 2 - 5 (WARG1018154)	Water Diverted	<= 8 Million Gallons Per Month. [N.J.A.C. 7:19- 2]
		<= 96 Million Gallons Per Year. [N.J.A.C. 7:19- 2]
HIGHLANDS PLANNING AREA SOURCE, WELL 8 (WARG1018155)	Water Diverted	<= 12 Million Gallons Per Month. [N.J.A.C. 7:19- 2]
		<= 108 Million Gallons Per Year. [N.J.A.C. 7:19- 2]

DRAFT

Other Limit Requirements

Final Permit Phase

Subject Item	Parameter	Limit
2400000437, WELL 5 (WSWL64495)	Rated Pump Capacity	<= 160 Gallons Per Minute. [N.J.A.C. 7:19- 2]
2400018383, WELL 8 (WSWL64660)	Rated Pump Capacity	<= 500 Gallons Per Minute. [N.J.A.C. 7:19- 2]
4400000039, WELL 2 (WSWL69885)	Rated Pump Capacity	<= 100 Gallons Per Minute. [N.J.A.C. 7:19- 2]
4400000040, WELL 3 (WSWL69886)	Rated Pump Capacity	<= 100 Gallons Per Minute. [N.J.A.C. 7:19- 2]
4400000041, WELL 4 (WSWL69887)	Rated Pump Capacity	<= 140 Gallons Per Minute. [N.J.A.C. 7:19- 2]

Monitoring Requirements

Final Permit Phase

Subject Item	Requirement	Frequency	Monitored Parameter	Monitoring Method
2400000437, WELL 5 (WSWL64495)	Static water levels for each well indicated shall be monitored. [N.J.A.C. 7:19- 2]	Each Month	Static Water Level	Airline, Tape, or Gage

Monitoring Requirements

Final Permit Phase

Subject Item	Requirement	Frequency	Monitored Parameter	Monitoring Method
2400018383, WELL 8 (WSWL64660)	Static water levels for each well indicated shall be monitored. [N.J.A.C. 7:19- 2]	Each Month	Static Water Level	Airline, Tape, or Gage
4400000039, WELL 2 (WSWL69885)				
4400000040, WELL 3 (WSWL69886)				
4400000041, WELL 4 (WSWL69887)				
2400000437, WELL 5 (WSWL64495)	The monthly diversion from each source indicated shall be monitored. [N.J.A.C. 7:19- 2]	Each Month	Water Diverted	Meter
2400018383, WELL 8 (WSWL64660)				
4400000039, WELL 2 (WSWL69885)				
4400000040, WELL 3 (WSWL69886)				
4400000041, WELL 4 (WSWL69887)				

DRAFT

Record Keeping Requirements

Final Permit Phase

Subject Item	Requirement	Frequency	Monitored Parameter	Record Keeping Method
HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)	A log book of month end meter readings for each diversion source shall be maintained on site. [N.J.A.C. 7:19- 2]	Each Month	Meter Reading	Log Book

Submittal/Action Requirements

Final Permit Phase

Applicable Subject Items	Submittal/Action Type	Requirement
2400000437, WELL 5 (WSWL64495)	Submit Public Quarterly Report	The required monitoring results shall be recorded on the form provided by the Department. The completed form shall be submitted within 30 days after the end of each quarter. [N.J.A.C. 7:19- 2]
2400018383, WELL 8 (WSWL64660)		

Submittal/Action Requirements

Final Permit Phase

Applicable Subject Items	Submittal/Action Type	Requirement
4400000039, WELL 2 (WSWL69885)	Submit Public Quarterly Report	The required monitoring results shall be recorded on the form provided by the Department. The completed form shall be submitted within 30 days after the end of each quarter. [N.J.A.C. 7:19- 2]
4400000040, WELL 3 (WSWL69886)		
4400000041, WELL 4 (WSWL69887)		
HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)	Submit Report as Described	The permittee shall submit an unaccounted-for water report addressing the action taken to identify and repair leaks within the system and the status of the meter replacement program. This report should include the number of leaks detected and repaired, the volume in gallons per minute of each leak (if known), the length of water main replaced, and the number of meters replaced. The report shall be submitted within three years of the effective date of this permit. [N.J.A.C. 7:19- 2]
HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)	Submit Water Conservation and Drought Management Plan	The permittee shall continue to implement, to the satisfaction of the Department, a water conservation and drought management program. The program shall encourage water conservation in all types of use within the area served by the permittee, including actions taken pursuant to this program and the impact thereof. An update to the water conservation and drought management plan shall be submitted. Submit according to the following schedule: prior to September 30, 2014 and every two years thereafter. [N.J.A.C. 7:19- 2]
HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)	Submit Renewal Application	A renewal application shall be submitted three months prior to the expiration date. [N.J.A.C. 7:19- 2]

DRAFT

Text Requirements

All Phases

HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)

1. Water may be diverted under this renewed permit for public community supply. However, water shall not be used to serve non-potable, consumptive purposes for new projects that are greater than 50 percent non-potable and greater than 50 percent consumptive, where, as determined by the Department, alternate water sources, including but not limited to reclaimed water for beneficial reuse, are feasible to serve the non-potable, consumptive needs of the project. [N.J.A.C. 7:19- 2]
2. Water may be diverted under this permit only from the approved diversion sources at the maximum rates specified. [N.J.A.C. 7:19- 1]
3. A major modification of this permit may be required in order to request the approval of any additional diversion sources or an increase in the pumping capacity. [N.J.A.C. 7:19- 2]
4. All diversion sources shall be metered with a totalizing flow meter. [N.J.A.C. 7:19- 2]
5. At a minimum, each diversion source flow meter shall be calibrated at least once every five years. [N.J.A.C. 7:19- 2]
6. Each flow meter shall be calibrated to within five percent accuracy. [N.J.A.C. 7:19- 2]

DRAFT

Text Requirements

All Phases

HIGH BRIDGE BOROUGH WATER DEPT, 5242 WA PERMIT - ALL DIVERSION SOURCES (WSWA75833)

7. All wells shall be equipped with a metal tag showing the well permit numbers (source designation) as listed in the allocation permit inventory or have the well permit numbers painted on the casings. [N.J.A.C. 7:19- 2]
8. The pumping equipment capacity shall not be increased without prior approval from the Bureau of Water Allocation and Well Permitting. [N.J.A.C. 7:19- 1]
9. Any well not intended for use shall be decommissioned in accordance with N.J.A.C. 7:9D-3.1 et seq. [N.J.A.C. 7: 9D- 3]
10. Static water level shall be measured and reported as depth to water, in feet, from ground surface. [N.J.A.C. 7:19- 2]
11. All new services shall be metered in accordance with all applicable laws, regulations or codes including, but not limited to, the Water Supply Management Act. [N.J.A.C. 7:19- 6]
12. All existing services shall be metered. [N.J.A.C. 7:19- 6]
13. Water charges for each service connection shall be based in part on metered usage. [N.J.A.C. 7:19- 6]
14. The Department may modify, suspend or terminate this permit, after due process, for violations of permit conditions, N.J.S.A. 58:1A-1, N.J.A.C. 7:19-1 et seq., any orders issued by the Department, or when in the public interest. [N.J.A.C. 7:19- 2]
15. The permittee shall investigate to the Department's satisfaction complaints by users of wells or surface water supplies within the zone of influence of its diversion to determine what impact the diversion has had on such wells or surface water supplies. A report on these investigations shall be forwarded to the Bureau of Water Allocation and Well Permitting. Any well or surface water supply which becomes damaged, dry, has reduced capacity, reduced water quality or is otherwise rendered unusable as a water source as a result of the permittee's diversions shall be repaired or replaced at the expense of the permittee. Work shall be in accordance with all State, County and Municipal construction standards for potable water. After reviewing all applicable investigational reports the Department of Environmental Protection will make the final determination regarding the validity of such complaints, the scope or sufficiency of such investigations, and will determine how to resolve any problems resulting from the diversion. [N.J.A.C. 7:19- 2]
16. This permit is issued for a limited period, and is not subject to automatic renewal. [N.J.A.C. 7:19- 2]
17. The permittee is subject to such fees as may be prescribed by the regulations. [N.J.A.C. 7:19- 3]
18. The permittee shall have the right to apply at any time for modification of this permit by submission of the appropriate application forms. [N.J.A.C. 7:19- 2]
19. The permittee may informally discuss the terms and conditions of this permit at any time with the Bureau of Water Allocation and Well Permitting. [N.J.A.C. 7:19- 2]
20. The permittee shall obtain approval from the Bureau of Water System Engineering before using the diversion for public water supply. [N.J.A.C. 7:19- 2]
21. In addition to the specific management requirements cited above, and when so directed by the Department, the permittee shall comply with applicable portions of the Water Supply Management Rules (N.J.A.C. 7:19-6 et seq. and N.J.A.C. 7:19-8 et seq.) to include the determination of dependable yield; unaccounted-for water; rehabilitation; system pressure and storage; interconnections; and operation of interconnections. [N.J.A.C. 7:19- 6]
22. If the permittee violates any condition of this permit, the permittee is subject to administrative penalties up to $25,000 per day per offense as specified. [N.J.S.A. 58: 1A-16]
23. The issuance of this permit shall not be deemed to affect in any way action by the Department of Environmental Protection of the State of New Jersey on any future application. [N.J.A.C. 7:19- 2]
24. No change in plans or specifications shall be made except with the prior written permission of the Department of Environmental Protection of the State of New Jersey. [N.J.A.C. 7:19- 2]
25. The granting of this permit shall not be construed to in any way affect the title or ownership of property, and shall not make the Department of Environmental Protection or the State a party in any suit or question of ownership of property. [N.J.A.C. 7:19- 2]
26. This permit does not waive the obtaining of Federal or other State or local government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits have been obtained. [N.J.A.C. 7:19- 2]
27. A copy of this permit shall be kept at the facility site, and shall be exhibited upon request of any person. [N.J.A.C. 7:19- 2]

DRAFT

03/14/2013

STAFF REPORT
PERMIT RENEWAL

In the matter of

High Bridge Borough Water Department

Renewal of Water Allocation Permit No. 5242 to divert water from one Kittatinny Limestone Well in Clinton Township, and Permit Nos. 5243 to divert water from four Hornblende Granite Wells in Lebanon Township, Hunterdon County

Background

On October 29, 2003 Water Allocation Permit Nos. 5242 and 5243 were issued to High Bridge Borough Water Department, 71 Main Street, High Bridge, New Jersey 08829 with an expiration date of November 30, 2012. Applications for both permits were filed on September 24, 2012 requesting renewal of the permits. Permit No. 5242 requested the privilege to divert a maximum of 12 million gallons of water per month (MGM), not to exceed 108 million gallons of water per year (MGY) at a maximum rate of 500 gallons per minute (gpm) from existing Well No. 8; 115 feet deep, in the Kittatinny Limestone formation. Permit No. 5243 requested the privilege to divert a maximum of 8 MGM, not to exceed 96 MGY at a maximum rate of 500 gpm from existing Wells 2, 3, 4 and 5, 230 to 330 feet deep respectively, in the Hornblende Granite formation.

Findings of Fact

1. The diversion is used for public community supply and serves the Borough of High Bridge and portions of Clinton and Lebanon Township, from the following sources at the maximum rates specified below:

   Groundwater

Well Permit No.	Well Name or Designation	Pump Capacity (gpm)	Formation
4400000039	2	100	Hornblende Granite
4400000040	3	100	Hornblende Granite
4400000041	4	140	Hornblende Granite
2400000437	5	160	Hornblende Granite
2400018383	8	500	Kittatinny Limestone

2. This application request is for a renewal of an allocation granted by the following:

Permit No.	Date Issued	Source of Water	Diversion Amount (MGM)	(MGY)
5242	10/29/2003	One Kittatinny Limestone well	12.0	108.0
5243	10/29/2003	Four Horneblende Granite wells	8.0	96.0
5242	07/06/1992	One Kittatinny Limestone well	15.0	123
5243	08/28/1992	Four Horneblende Granite wells	8.0	96
5242	03/06/1991	One Kittatinny Limestone well	15.0	123
5243	03/06/1991	Four Horneblende Granite wells and Willoughby Creek	8.0	96
5243	03/12/1985	Four Horneblende Granite wells and Willoughby Creek	8.0	96
5242	10/12/1984	Three Kittatinny Limestone well	15.0	123
1782	08/12/1980	Two Kittatinny Limestone well	20.15	-
1766	04/17/1978	One Kittatinny Limestone well	20.15	-
595	09/18/1944	Four Horneblende Granite wells and Willoughby Creek	20.15	-
464	12/06/1936	Three Horneblende Granite wells and Willoughby Creek	15.0	-

3. A review of quarterly diversion reports indicates the following water use:

Permit No. 5242

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Existing Allocation (MGM)	(MGY)
2012	53.241	6.426 (July)	4.437	12.0	120
2011	68.118	6.637 (Jan)	5.677	12.0	120
2010	81.573	8.193 (Jan)	6.798	12.0	120
2009	60.616	7.125 (Dec)	5.051	12.0	120
2008	66.194	6.290 (Mar)	5.516	12.0	120

Permit No. 5243

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Existing Allocation (MGM)	(MGY)
2012	71.613	8.081* (July)	5.968	8.0	96
2011	53.123	5.727 (Jan)	4.427	8.0	96
2010	63.284	7.684 (July)	5.273	8.0	96
2009	71.364	9.303* (Feb)	5.947	8.0	96
2008	68.835	7.783 (Jan)	5.736	8.0	96

* Exceeded monthly allocation limits in February 2009, July 2012, and December 2012

Combined Diversion from 5242 & 5243 (5242X)

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Combined Allocation (MGM)	(MGY)
2012	124.854	14.507 (JULY)	10.404	19.13	-
2011	121.241	12.364 (JAN)	10.103	20.15	-
2010	144.857	14.876 (JULY)	12.071	20.15	-
2009	131.980	14.395 (FEB)	10.998	20.15	-
2008	135.029	13.891 (JAN)	11.252	20.15	-

4. The population served is approximately 3700 (5242 & 5243 combined), which represents an average monthly consumption of 102 gpcd, and a peak monthly consumption of 123 gpcd based upon 2010 water use data, with a 95.5 percent residential use component.

5. The following information is available for the applicant's diversion sources:

Well No.:	2	3	4	5	8
Well Permit No.:	4400000039	4400000040	4400000041	2400000437	2400018383
Date Constructed:	10/01/36	10/15/38	06/10/45	11/24/50	03/28/85
Depth (feet):	287	330	230	239	115
Pump Capacity (gpm):	100	100	140	160	500
Site Elevation:	676	673	664	670	200
Static Water Level:					
Date (when constructed):	10/1936	08/19/38	09/29/44	11/21/50	03/28/85
Level (feet):	Unknown	0	0	25	8

Well No.:	2	3	4	5	8
Date (recent):	09/19/12	09/19/12	09/19/12	09/19/12	09/18/12
Level (feet):	23	29	28	32	6.5
Well Test Data: (from well records)					
Test Date:	No Data	08/19/38	09/29/44	11/21/50	03/28/85
Yield (gpm):		118	140	210	500
Drawdown (feet):		62	140	58	27
Static Level (feet):		0	0	25	8
Pumping Time (hours):		7	24	8	-
Specific Capacity: (gpm/ft drawdown)		1.9	1	3.78	19

6. The applicant's diversion sources are located within: Planning Area No. 10 - Raritan River as designated by the New Jersey Water Supply Master Plan, the Central Drought Region, Watershed Management Area No. 8 - North and South Branch Raritan, and is in the Highlands Planning (Well 8) and Preservation (Wells 2 – 5) Areas.

7. A site inspection was not conducted as part of this renewal activity.

The sources are located as follows:

Source Name	X (NJ State Plane 83 – US FEET)	Y (NJ State Plane 83 – US FEET)	Location
Well 2	384233.21	680725.68	Approximately 1250 feet W of intersection of High Bridge-Califron and Buffalo Hallow Roads
Well 3	384458.44	680628.37	Approximately 1000 feet W of intersection of High Bridge-Califron and Buffalo Hallow Roads
Well 4	384360.81	680486.56	Approximately 1100 feet W of intersection of High Bridge-Califron and Buffalo Hallow Roads
Well 5	384486.57	680495.98	Approximately 980 feet W of intersection of High Bridge-Califron and Buffalo Hallow Roads

Source Name	X (NJ State Plane 83 – US FEET)	Y (NJ State Plane 83 – US FEET)	Location
Well 8	378752.02	664222.28	Grayrock Road

8. All of the applicant's diversion sources that are located within an area of a square three miles on a side.

9. Flow meters for all diversion sources have been calibrated within the past five years. The most recent date of calibration is September 13, 2012.

10. The following wells have been abandoned, decommissioned, are inactive or unused:

Well No.	Well Permit No.	Depth (feet)	Status
1	Unknown	200	Sealed – 05/28/85
6	2400012180	300	Sealed – 01/26/89
7	2400017372	250	Sealed

11. The applicant has failed to comply with existing permit condition requiring the reduction of the system's unaccounted for water to less than 15% by 2008. An estimated unaccounted for water level of 35% was reported for 2011. The applicant also exceeded their monthly allocation under Permit 5243 in February 2009, July 2012 and December 2012.

12. Water, after use, is discharged to the Town of Clinton Treatment Plant for treatment and discharged to the South Branch of the Raritan River under Permit No. NJ0020389. The treatment works are not under a sewer connection ban or other restriction imposed by NJDEP.

13. The system has no emergency interconnections with adjacent systems or agreements for the purchase or sale of water. The applicant's service area is interconnected with water diverted under either permit (5242 or 5243) having the ability to provide water to all customers. Water that is diverted from well 8 provides water to the applicant's customers located within Clinton and Lebanon Townships that are covered under permit no. 5243. Water diverted under permit no. 5243 is diverted into the applicant's storage tank and distributed to the entire system during periods of high water demand.

14. The system is 100 percent metered.

15. The water system has storage capacity of 1.0 MG, as compared with a 2010 average water demand of 0.397 MGD.

16. The applicant submitted a Water Conservation Plan on September 21, 2012.

17. The estimated consumptive use of water is 100 percent, which is equivalent to 0.397 MGD, based upon a 2010 peak annual use.

Staff Analysis/Conclusions

1. The applicant's diversion sources covered under Water Allocation Permits 5242 and 5243 are located within an area of a square three miles on a side and the systems are interconnected. Therefore the two separate water allocation permits should be combined under one Water Allocation Permit Number pursuant to N.J.A.C. 7:19-1.7(f) 3.

2. On December 5, 2012 the Bureau received a plan of work from the applicant outlining the steps to be taken to reduce the system's unaccounted for water to a reasonable level by 2016. These steps include the purchase of a data logger leak detection system to locate systems leak in 2013. The Borough will budget a meter replacement program to replace all meters by 2016. Water mains are regularly replaced in streets as part of an ongoing NJDOT Local Aid program to reconstruct streets within the Borough. Finally, the Borough is in the process of assuming ownership of a mobile home park water system that was served by the Borough. The mobile home park had allowed their storage tank to fall into disrepair and experienced regular storage tank overflows.

   The applicant should be required to provide a report at the conclusion of their unaccounted-for water reduction work plan to identify the measures taken to reduce the unaccounted-for water use for the system. This report should include the number of meters replaced, the amount of mains replaced, and leaks identified, quantified and repaired.

3. The applicant's current water use is not reasonable given the high unaccounted-for water use. This, once reduced, should also result in a lower per capita water use for the system.

4. The applicant's current allocation is adequate to meet their future demands. Demand projections provided by the applicant indicate that their systems ten year demands will be 7.3 MGM and 87.7 MGY (5242) and 9.1 MGM and 87.7 MGY (5243). Analysis of this in conjunction with historical water use and supporting documentation provided with the application shows that the existing allocations of 12 MGM and 108 MGY (5242) and 8MGM and 96 MGY (5243) should be sufficient to meet their needs once unaccounted-for water is brought under control.

   The individual system allocation should be retained given the locations of the diversion sources are in the Highlands Preservation and Planning Areas, with the combined cross permit limit serving as the monthly allocation from all sources. An annual allocation from all sources should be established. Based upon the existing monthly cross permit limit of 19.13 MGM and a ratio of the maximum monthly diversion to annual use the limit should be established at 186 MGY.

5. Natural replenishment of ground water is probably occurring because there has been minimal change to the static water level in twenty seven years of diversion at the Well 8 site and observed fluctuations in the other wells do not follow a continual decreasing trend.

In order to confirm this and given the proposed increases in diversions in this region, static water level reports should be required as a condition of this permit to determine future trends.

6. No adverse impacts have been reported to the Department regarding the applicant's diversion sources.

7. Elevated chloride concentrations are not a consideration in the Kittatinny Limestone and Hornblende Granite formations at this location. Salt water intrusion is not expected to occur due to the distance to a salt water source and the wells elevation above mean sea level (approximately 200 to 700 feet). The requirement to sample well 8 for chloride concentrations should be removed from the permit.

8. No changes in diversion rates are proposed and no problems with groundwater contamination associated with the diversion have been reported to the Bureau.

Summary

The Department has completed its review of this application pursuant to N.J.A.C. 7:19-1 et. seq. The review of this application reveals that it does not have any adverse impacts and meets, based upon the information certified to in the application, the statutory requirements of N.J.S.A. 58:1A-1 et. seq.

Therefore, based upon a review of the information submitted with the application, and the existing water allocation files, the following conclusions have been reached regarding this application:

- The applicant should be required to submit a report within three years of the effective date of the permit that identifies the number of meters replaced, the amount of mains replaced, and leaks identified, quantified, and repaired as part of their unaccounted-for water work plan;

- The requirement to sample well 8 for chloride concentrations should be removed as a permit requirement;

- Pursuant to N.J.A.C. 7:19-1.6(f) 3, both Water Allocation Permits 5242 and 5243 should be combined under 5242, and 5243 should be cancelled;

- The allocation limits for both permits (5242 and 5243) should be retained and combined allocation limits of 19.13 MGM and 186 MGY should be assigned to Permit 5242 from all sources.

Therefore this application should be approved in accordance with the following recommendations as the applicant has satisfied the requirements of N.J.A.C. 7:19-2.4 et seq.

References

In addition to the historical information on file at the Bureau of Water Allocation & Well Permitting and the application submitted, the following information sources were also utilized to establish the recommendations contained within this Staff Report:

APPENDIX G

Water Main Replacement Prioritization

WATER MAIN REPLACEMENT PRIORITY MAP

HIGH BRIDGE ASSET MANAGEMENT PLAN

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY
NEW JERSEY

LEGEND

- High Bridge Borough Boundary
- Breaks (2016 to Present)
- PotentialMainExtensions

Water Main Priority

- High
- Medium
- Low

N

0 250 500 1,000 1,500 2,000 Feet

1 inch = 950 feet

This map was developed using NJDEP and County GIS digital data, but this secondary product has not been verified by NJDEP and is

MASER CONSULTING P.A.

JUNE 2018

R:\General\Projects\HIB\HIB-045\Reports\Asset Management Plan\GIS Appendices\Main Replacement 11x17.mxd

APPENDIX H

Fire Department Testing Results

High Bridge Fire Department

High Bridge, NJ

This report was generated on 1/21/2019 6:43:08 PM

Hydrants Flow Tested for Date Range

Start Date: 01/01/2018 | End Date: 12/31/2018

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
Zone 14										
001-167 Fairview Ave	167 Fairview AVE High Bridge, NJ 8829	Fairview and Water Tank	07/24/2018	7:53	8:05	43 PSI	25 PSI	860 GPM (Unnamed)	860 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1972						**TESTED BY:**	Hinson, Timothy R	
002-24 Silverthorne Rd	24-32 Silverthorne RD at Cokesbury RD High Bridge, NJ 8829		07/24/2018	8:10	8:39	1 PSI	0 PSI	0 GPM (Unnamed)	0 @ 0.5 PSI	14
Flow Test Results: Fail		Remarks: Stem will not open, notified Director of DPW Mike Hann as well as Chief Smith. Covered hydrant with garbage bag.						**TESTED BY:**	Hinson, Timothy R	
003- Fairview & Silverthorne	98 Fairview AVE at Silvertorne rd High Bridge, NJ 08829	In grass median of Fairview Ave & Silverthorne	07/24/2018	8:39	8:49	55 PSI	5 PSI	340 GPM (Unnamed)	340 @ 5 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1998						**TESTED BY:**	Crampton, Thomas	
004- 26 Larrison Rd	26 Larrison rd at Cregar AVE High Bridge, NJ 08829		07/24/2018	9:01	9:16	45 PSI	1 PSI	120 GPM (Unnamed)	119 @ 1 PSI	14
Flow Test Results: Pass		Remarks: James B Clow						**TESTED BY:**	Crampton, Thomas	
005- Super Fine & Fine	Super Fine at Fine RD High Bridge, NJ 8829		07/24/2018	9:18	9:35	12 PSI	3 PSI	290 GPM (Unnamed)	290 @ 3 PSI	14
Flow Test Results: Pass		Remarks: James B Clow Leak from stem						**TESTED BY:**	Hinson, Timothy R	
006- 33 Cregar Road	33 Cregar rd High Bridge, NJ 08829	IFO 33 Cregar	07/24/2018	10:20	10:39	57 PSI	15 PSI	650 GPM (Unnamed)	650 @ 15 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2014						**TESTED BY:**	Crampton, Thomas	
007-71 Cregar Road	71 Cregar rd High Bridge, NJ 08829		07/24/2018	10:33	10:45	62 PSI	18 PSI	710 GPM (Unnamed)	710 @ 18 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2014						**TESTED BY:**	Hinson, Timothy R	
008- 96 Cregar Rd	96 Cregar rd High Bridge, NJ 08829		07/24/2018	10:55	11:11	80 PSI	16 PSI	670 GPM (Unnamed)	670 @ 16 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Hinson, Timothy R	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
009- 133 Cregar Rd	133 Cregar RD at Stillwell RD High Bridge, NJ 8829		07/24/2018	11:13	11:25	105 PSI	18 PSI	710 GPM (Unnamed)	710 @ 18 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2016						**TESTED BY:**	Crampton, Thomas	
010- 166 Cregar Road	166 Cregar rd High Bridge, NJ 08829		07/27/2018	7:45	8:10	125 PSI	28 PSI	890 GPM (Unnamed)	890 @ 28 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2016						**TESTED BY:**	Hinson, Timothy R	
011- 14 Stillwell	14 Stillwell RD at Woodland TER High Bridge, NJ 8829		07/27/2018	8:16	8:28	115 PSI	38 PSI	1130 GPM (Unnamed)	1130 @ 38 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Crampton, Thomas	
012- 8 Woodland Terrace	8 Woodland TER at Stillwell RD High Bridge, NJ 8829		07/27/2018	8:32	8:57	105 PSI	26 PSI	860 GPM (Unnamed)	860 @ 26 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1977						**TESTED BY:**	Hinson, Timothy R	
013- 22 Woodland Terrace	22 Woodland TER at Stillwell RD High Bridge, NJ 8829		07/27/2018	9:15	9:43	125 PSI	36 PSI	1010 GPM (Unnamed)	1010 @ 36 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1977						**TESTED BY:**	Crampton, Thomas	
014- 67 County Road 513	67 County Road 513 RD High Bridge, NJ 08829		07/27/2018	9:45	10:15	65 PSI	4 PSI	340 GPM (Unnamed)	340 @ 4 PSI	14
Flow Test Results: Pass		Remarks: James B Clow						**TESTED BY:**	Crampton, Thomas	
015- 49 County Road 513	49 County Road 513 RD High Bridge, NJ 8829		07/27/2018	10:54	11:28	75 PSI	14 PSI	630 GPM (Unnamed)	630 @ 14 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1988						**TESTED BY:**	Hinson, Timothy R	
016- 21 County Road 513	21 County Road 513 RD High Bridge, NJ 8829		07/27/2018	13:00	13:32	105 PSI	8 PSI	480 GPM (Unnamed)	480 @ 8 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1890, trouble taking caps off 2 1/2.						**TESTED BY:**	Hinson, Timothy R	
017- 61 Mine Road	61 Mine RD at Seal ST High Bridge, NJ 8829		07/27/2018	13:50	14:30	100 PSI	2 PSI	240 GPM (Unnamed)	240 @ 2 PSI	14
Flow Test Results: Pass		Remarks: Unknown Manufacturer.						**TESTED BY:**	Crampton, Thomas	
018-97 Mine Rd	97 Mine RD at Cokesbury RD High Bridge, NJ 8829		08/01/2018	8:00	8:36	105 PSI	1 PSI	130 GPM (Unnamed)	120 @ 120 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
019-122 Mine Rd	122 Mine rd High Bridge, NJ 08829		08/01/2018	8:45	9:20	100 PSI	1 PSI	120 GPM (Unnamed)	120 @ 1 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Brong, Mark A	
020- 4 Seal Street	4 Seal ST at Mine RD High Bridge, NJ 8829		08/01/2018	9:56	10:30	100 PSI	26 PSI	860 GPM (Unnamed)	860 @ 26 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
021- 69 Church	69 Church st High Bridge, NJ 08829		08/01/2018	10:34	11:03	120 PSI	12 PSI	580 GPM (Unnamed)	580 @ 12 PSI	14
Flow Test Results: Pass		Remarks: leaks from stem						**TESTED BY:** Brong, Mark A		
022-56 Church	56 Church st at Seal st High Bridge, NJ 08829		08/01/2018	12:15	12:48	115 PSI	24 PSI	820 GPM (Unnamed)	820 @ 24 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Crampton, Thomas		
023-28 Church	28 Church ST at Thomas ST High Bridge, NJ 8829		08/01/2018	12:38	13:11	120 PSI	24 PSI	820 GPM (Unnamed)	820 @ 24 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Brong, Mark A		
024- 15 Thomas	15 Thomas ST at Chruch ST High Bridge, NJ 8829		08/01/2018	15:23	15:40	120 PSI	24 PSI	820 GPM (Unnamed)	820 @ 24 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Crampton, Thomas		
025-6 Taylor Street	6 Taylor ST at Mine RD High Bridge, NJ 8829		08/03/2018	8:12	9:05	110 PSI	40 PSI	920 GPM (Unnamed)	920 @ 40 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Smith, Sean		
026-28 Church St and Taylor St	28 Church ST at Taylor st High Bridge, NJ 08829	Corner of Church and Taylor	08/03/2018	9:10	10:00	125 PSI	26 PSI	860 GPM (Unnamed)	860 @ 26 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Smith, Sean		
027-42 Taylor St	42 Taylor ST at Academy ST High Bridge, NJ 8829		08/03/2018	10:08	10:58	132 PSI	28 PSI	730 GPM (Unnamed)	730 @ 28 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Smith, Sean		
028-57 Thomas St.	57 Thomas ST at Prospect ST High Bridge, NJ 8829		08/03/2018	11:02	11:48	129 PSI	8 PSI	480 GPM (Unnamed)	480 @ 8 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Ritz, Kevin		
029- Thomas St. at Academy St	Thomas ST at Academey ST High Bridge, NJ 8829		08/03/2018	12:45	13:10	122 PSI	32 PSI	820 GPM (Unnamed)	820 @ 32 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Ritz, Kevin		
030-14 Church St.	14 Church ST at Mill st High Bridge, NJ 08829		08/03/2018	13:15	14:25	125 PSI	38 PSI	860 GPM (Unnamed)	860 @ 38 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Ritz, Kevin		
031-4 Church St.	4 Church ST at Main ST High Bridge, NJ 08829		08/03/2018	14:30	15:10	125 PSI	35 PSI	880 GPM (Unnamed)	880 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Ritz, Kevin		
032-78 Main St.	78 Main ST at Columbia TRL High Bridge, NJ 08829		08/03/2018	15:15	15:55	135 PSI	35 PSI	800 GPM (Unnamed)	800 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Ritz, Kevin		

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
033- 66 Main Street	66 Main st High Bridge, NJ 08829		08/06/2018	8:15	9:00	140 PSI	18 PSI	710 GPM (Unnamed)	710 @ 18 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1981						**TESTED BY:**	Hinson, Timothy R	
034- 54 Main Street	54 Main st High Bridge, NJ 08829		08/06/2018	9:45	10:28	140 PSI	28 PSI	890 GPM (Unnamed)	890 @ 28 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1981						**TESTED BY:**	Crampton, Thomas	
035- 35 Main Street	35 Main st High Bridge, NJ 08829	Century Link Parking lot	08/06/2018	10:30	11:13	145 PSI	34 PSI	980 GPM (Unnamed)	980 @ 34 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1981						**TESTED BY:**	Hinson, Timothy R	
036- 8 Main Street	8 Main st High Bridge, NJ 08829		08/06/2018	11:15	11:58	140 PSI	30 PSI	920 GPM (Unnamed)	920 @ 30 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1981						**TESTED BY:**	Crampton, Thomas	
037- 11 Center Street	11 Center st High Bridge, NJ 08829		08/06/2018	13:00	13:43	140 PSI	2 PSI	240 GPM (Unnamed)	222 @ 20 PSI	14
Flow Test Results: Pass		Remarks: James B Clow						**TESTED BY:**	Crampton, Thomas	
038- 17 Mill Street	17 Mill ST at Chruch ST High Bridge, NJ 8829		08/06/2018	13:45	14:25	150 PSI	24 PSI	820 GPM (Unnamed)	820 @ 24 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1988						**TESTED BY:**	Hinson, Timothy R	
039- 34 Mill Street	34 Mill ST at McDonald ST High Bridge, NJ 8829		08/06/2018	14:30	15:00	160 PSI	22 PSI	790 GPM (Unnamed)	790 @ 22 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2017						**TESTED BY:**	Hinson, Timothy R	
040- 2 Washingt on Ave	2 Washington ave High Bridge, NJ 08829	Across from Shop E Road	08/07/2018	8:15	9:00	165 PSI	30 PSI	920 GPM (Unnamed)	920 @ 30 PSI	14
Flow Test Results: Pass		Remarks: Unknown Hydrant						**TESTED BY:**	Hinson, Timothy R	
041- 50 Center Street	50 Center ST at Main ST High Bridge, NJ 8829		08/07/2018	9:05	9:45	140 PSI	25 PSI	840 GPM (Unnamed)	840 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1985						**TESTED BY:**	Pearce , Richard Alex	
042- Mine & Thomas	13-23 Mine RD at Thomas ST High Bridge, NJ 8829	Bottom of Elementary School Trail	08/07/2018	9:55	10:25	95 PSI	28 PSI	890 GPM (Unnamed)	890 @ 28 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1999						**TESTED BY:**	Hinson, Timothy R	
043- 5 Robin Lane	5 Robin LN High Bridge, NJ 08829		08/07/2018	10:30	11:15	115 PSI	25 PSI	840 GPM (Unnamed)	840 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1986						**TESTED BY:**	Pearce , Richard Alex	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
044-Cregar Rd & Robin Lane	Robin LN at Cregar RD High Bridge, NJ 8829	At corner of Cregar Rd and Robin Ln	08/07/2018	11:20	12:00	115 PSI	26 PSI	860 GPM (Unnamed)	860 @ 26 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1986						**TESTED BY:**	Hinson, Timothy R	
045- 203 Cregar Rd	203 Cregar rd High Bridge, NJ 08829	By golf course pro shop	08/07/2018	13:30	14:05	120 PSI	17 PSI	690 GPM (Unnamed)	690 @ 17 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1874						**TESTED BY:**	Pearce , Richard Alex	
046- 99 Grayrock Rd	99 Grayrock RD at 513 RD High Bridge, NJ 8829	IFO Grayrock Professional Building	08/07/2018	14:15	14:50	190 PSI	42 PSI	1090 GPM (Unnamed)	1090 @ 42 PSI	46
Flow Test Results: Pass		Remarks: Mueller 1984						**TESTED BY:**	Hinson, Timothy R	
047-155 RT 513	155 513 HWY High Bridge, NJ 08829	155 RT 513 by telephone pole	08/08/2018	8:00	8:45	195 PSI	36 PSI	1010 GPM (Unnamed)	1010 @ 36 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
048-126 W Main St	126 West Main ST High Bridge, NJ 08829	In front of High Bridge Stone	08/08/2018	8:49	9:32	170 PSI	36 PSI	1010 GPM (Unnamed)	1010 @ 36 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
049- 4 Sycamore CT	4 Sycamore CT High Bridge, NJ 08829	End of the Drive	08/08/2018	9:40	10:08	95 PSI	15 PSI	650 GPM (Unnamed)	650 @ 15 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
050-Chestnut Ct	10 Chestnut CT High Bridge, NJ 08829	Center Island by Unit 10	08/08/2018	10:10	10:47	75 PSI	22 PSI	780 GPM (Unnamed)	780 @ 22 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
051-1 Berrywood Ln	1 Berrywood LN High Bridge, NJ 08829	Across from Indian Spring	08/08/2018	10:52	11:38	50 PSI	15 PSI	650 GPM (Unnamed)	650 @ 15 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
052-10 Micheal Ln	10 Michael LN High Bridge, NJ 08829	10 Micheal Ln	08/08/2018	11:41	12:10	40 PSI	15 PSI	650 GPM (Unnamed)	650 @ 15 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
053-2 Micheal Ln	2 Michael LN High Bridge, NJ 08829		08/08/2018	12:43	13:26	45 PSI	15 PSI	650 GPM (Unnamed)	650 @ 15 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
054-Indian Springs Lane		in the middle of the cul de sac	08/08/2018	13:31	14:17	20 PSI	10 PSI	530 GPM (Unnamed)	530 @ 10 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
055- 19 Wharton Way	19 Wharton Way WAY at Manning CT High Bridge, NJ 8829		08/13/2018	7:30	8:10	95 PSI	25 PSI	670 GPM (Unnamed)	670 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1995 Straightened out hydrant marker						**TESTED BY:** Hinson, Timothy R		
056- 4 Manning Court	4 Manning Court CT at Wharton WAY High Bridge, NJ 8829		08/10/2018	8:15	8:55	80 PSI	7 PSI	430 GPM (Unnamed)	430 @ 7 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1995						**TESTED BY:** Hinson, Timothy R		
057- 16 Manning Court	16 Manning CT High Bridge, NJ 08829		08/10/2018	9:00	9:45	95 PSI	20 PSI	630 GPM (Unnamed)	630 @ 20 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1995						**TESTED BY:** Smith, Sean		
058- Colonial & Washington Ave	Colonial CT at Washington ave High Bridge, NJ 08829		08/10/2018	10:00	10:45	138 PSI	32 PSI	950 GPM (Unnamed)	950 @ 32 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1986						**TESTED BY:** Hinson, Timothy R		
059- Greenwich & King Hill	Greenwich DR at King Hill RD High Bridge, NJ 8829		08/10/2018	10:55	11:30	60 PSI	45 PSI	950 GPM (Unnamed)	950 @ 45 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1995						**TESTED BY:** Smith, Sean		
060- 5 Woodglen Dr	5 Woodglen DR at W Main ST High Bridge, NJ 8829		08/10/2018	11:35	12:05	124 PSI	30 PSI	840 GPM (Unnamed)	840 @ 30 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1973						**TESTED BY:** Hinson, Timothy R		
061- 9 W Main St	9 W Main st High Bridge, NJ 08829		08/10/2018	13:00	13:35	125 PSI	40 PSI	860 GPM (Unnamed)	860 @ 40 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1987						**TESTED BY:** Smith, Sean		
062- 18A West Main St	18A W Main st High Bridge, NJ 08829		08/10/2018	13:45	14:15	135 PSI	40 PSI	820 GPM (Unnamed)	820 @ 40 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1999						**TESTED BY:** Hinson, Timothy R		
063- 26 W Main	26 W Main st at Hillcrest LN High Bridge, NJ 08829	IFO DPW	08/10/2018	14:00	14:45	160 PSI	25 PSI	710 GPM (Unnamed)	710 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Smith, Sean		
064- Bridge & Central	Central AVE at Bridge ST High Bridge, NJ 8829		08/13/2018	8:25	9:00	143 PSI	32 PSI	860 GPM (Unnamed)	860 @ 32 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1985						**TESTED BY:** Smith, Jeffrey		
065- 4 Union Ave	4 Union AVE at Hart ST High Bridge, NJ 8829		08/13/2018	9:15	9:55	145 PSI	15 PSI	410 GPM (Unnamed)	409 @ 15 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1988						**TESTED BY:** Hinson, Timothy R		

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
066- 13 Hart	14-19 Hart ST at W Main ST High Bridge, NJ 8829	Across from 13 Hart St	08/13/2018	10:00	10:55	160 PSI	10 PSI	530 GPM (Unnamed)	530 @ 10 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1974						**TESTED BY:** Smith, Jeffrey		
067- 59 W Main St	59 W Main ST at Beavers ST High Bridge, NJ 8829		08/13/2018	11:10	12:00	175 PSI	65 PSI	1180 GPM (Unnamed)	1180 @ 65 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1981						**TESTED BY:** Hinson, Timothy R		
068- 100 W Main	100 W Main ST at Arch ST High Bridge, NJ 8829	Exact Tool & Level	08/14/2018	7:30	8:00	175 PSI	54 PSI	1230 GPM (Unnamed)	1230 @ 54 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1986						**TESTED BY:** Hinson, Timothy R		
069- 125 W Main	125 W Main st at Dennis ave High Bridge, NJ 08829	Gronsky's Milk House	08/13/2018	13:00	13:45	185 PSI	5 PSI	410 GPM (Unnamed)	410 @ 5 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2012						**TESTED BY:** Smith, Jeffrey		
070- Ridge & Dennis	Ridge RD at Dennis AVE High Bridge, NJ 8829		08/13/2018	13:55	14:25	185 PSI	50 PSI	1030 GPM (Unnamed)	1030 @ 50 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2005						**TESTED BY:** Hinson, Timothy R		
071- 30 Ridge Road	30 Ridge rd at Sylvan rd High Bridge, NJ 08829		08/13/2018	14:00	14:45	170 PSI	25 PSI	790 GPM (Unnamed)	790 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Unk MFG.						**TESTED BY:** Smith, Jeffrey		
072- 25 Sylvan Rd	25 Sylvan RD at Lake AVE High Bridge, NJ 8829		08/14/2018	8:05	8:45	160 PSI	30 PSI	890 GPM (Unnamed)	890 @ 30 PSI	14
Flow Test Results: Pass		Remarks: Unknown hydrant MFG						**TESTED BY:** Pearce , Richard Alex		
074- 74 Beavers St	74 Beavers ST at Lake AVE High Bridge, NJ 8829		08/14/2018	9:00	9:45	160 PSI	35 PSI	950 GPM (Unnamed)	950 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Unknown hydrant MFG						**TESTED BY:** Testby not Assigned		
075- 2 Jersey St	2 Jersey ST at Valley View RD High Bridge, NJ 8829		08/14/2018	9:50	10:30	140 PSI	35 PSI	790 GPM (Unnamed)	790 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1986						**TESTED BY:** Pearce , Richard Alex		
076- 44 Valley View	44 Valley View RD at Hillcrest LN High Bridge, NJ 8829		08/14/2018	10:35	11:00	130 PSI	35 PSI	820 GPM (Unnamed)	820 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Hinson, Timothy R		
077- 16 Hillcrest	16 Hillcrest LN at Mary Jo CRST High Bridge, NJ 8829		08/14/2018	11:05	11:25	120 PSI	30 PSI	840 GPM (Unnamed)	840 @ 30 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1971						**TESTED BY:** Hinson, Timothy R		
078- 11 Jane Lane	11 Jane LN at Hillcrest LN High Bridge, NJ 8829		08/14/2018	11:30	12:00	50 PSI	25 PSI	650 GPM (Unnamed)	650 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1971						**TESTED BY:** Pearce , Richard Alex		
080- 12 Sunset	12 Sunset dr at Mary Jo CRST High Bridge, NJ 08829	Between 12-14 Sunset Lane	08/15/2018	8:18		130 PSI	23 PSI	810 GPM (Unnamed)	810 @ PSI	14

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Brong, Mark A	
081- 7 Hillcrest	7 Hillcrest LN at Hoffman dr High Bridge, NJ 08829	7 Hillcrest Lane	08/15/2018	8:52		130 PSI	26 PSI	860 GPM (Unnamed)	860 @ PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Strange, Devin	
082- 12 Hoffman	12 Hoffman dr at Beavers st High Bridge, NJ 08829	12 Hoffman Drive	08/15/2018	9:05		150 PSI	28 PSI	890 GPM (Unnamed)	890 @ 0 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Brong, Mark A	
083- 23 Beavers	23 Beavers st at Hoffman dr High Bridge, NJ 08829		08/15/2018	9:20		165 PSI	20 PSI	750 GPM (Unnamed)	750 @ PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Strange, Devin	
084- Deer Run & Wilson	Deer Run rd at Wilson ave High Bridge, NJ 08829	Corner of Deer Run Road & Wilson Avenue	08/15/2018	9:35		70 PSI	32 PSI	950 GPM (Unnamed)	950 @ 0 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Brong, Mark A	
085- 14 Pleasant	14 Pleasant rd at Squire LN High Bridge, NJ 08829	Corner of Pleasant Road & Squire Lane	08/15/2018	9:50		60 PSI	36 PSI	1010 GPM (Unnamed)	1010 @ 0 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Strange, Devin	
086- 12 High Ct	12 High CT at Pleasant rd High Bridge, NJ 08829		08/15/2018	10:05		35 PSI	13 PSI	605 GPM (Unnamed)	605 @ PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Brong, Mark A	
087- 56 Mark Drive	56 Mark dr at Pleasant rd High Bridge, NJ 08829		08/15/2018	12:45		55 PSI	20 PSI	750 GPM (Unnamed)	750 @ 0 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Strange, Devin	
094- 602 Cokesbury Rd	602 Mine RD at Cokesbury RD High Bridge, NJ 8829	Across from 602 Cokesbury Rd	08/17/2018	13:00	13:45	110 PSI	5 PSI	230 GPM (Unnamed)	230 @ 5 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Pearce , Richard Alex	
095- 6 Cregar Road	6 Cregar rd at Cregar ave High Bridge, NJ 08829		08/20/2018	7:30	8:00	50 PSI	25 PSI	630 GPM (Unnamed)	630 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2014						**TESTED BY:**	Hinson, Timothy R	
096- 17 Cregar Road	17 Cregar rd High Bridge, NJ 08829		08/20/2018	8:05	8:55	60 PSI	25 PSI	580 GPM (Unnamed)	580 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2014						**TESTED BY:**	Brong, Mark A	
097- 48 Cregar Road	48 Cregar rd High Bridge, NJ 08829	Across 48 Cregar Road	08/20/2018	9:00	9:45	55 PSI	25 PSI	580 GPM (Unnamed)	580 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2014						**TESTED BY:**	Hinson, Timothy R	
098- 117 Cregar Rd	117 Cregar rd High Bridge, NJ 08829		08/20/2018	9:55	10:30	90 PSI	35 PSI	710 GPM (Unnamed)	710 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2016						**TESTED BY:**	Brong, Mark A	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
099- 71 Old Jericho Rd	71 Old Jericho RD at Arch ST High Bridge, NJ 8829		08/17/2018	14:00	14:40	125 PSI	60 PSI	1100 GPM (Unnamed)	1100 @ 60 PSI	14
Flow Test Results: Pass		Remarks: Mueller 2007						**TESTED BY:**	Hinson, Timothy R	
100- 27 Arch St	27 Arch ST at Washinton AVE High Bridge, NJ 8829		08/17/2018	14:45	15:30	160 PSI	5 PSI	240 GPM (Unnamed)	240 @ 5 PSI	14
Flow Test Results: No Data Provided		Remarks: Mueller 1979						**TESTED BY:**	Pearce , Richard Alex	
101- 10 Arch Street	10 Arch ST at Washington AVE High Bridge, NJ 8829		08/20/2018	10:35	11:05	165 PSI	42 PSI	1090 GPM (Unnamed)	1090 @ 42 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Hinson, Timothy R	
102- 16 Dewey	16 Dewey AVE at Washington AVE High Bridge, NJ 8829		08/20/2018	11:10	12:00	110 PSI	5 PSI	340 GPM (Unnamed)	340 @ 5 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Brong, Mark A	
103- 49 Dewey Ave	42-54 Dewey AVE at Manning CT High Bridge, NJ 8829	Across 49 Dewey	08/20/2018	13:00	13:45	75 PSI	25 PSI	580 GPM (Unnamed)	580 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1979						**TESTED BY:**	Hinson, Timothy R	
104- 60 Dewey Ave	60 Dewey AVE at Berrrywood LN High Bridge, NJ 8829		08/20/2018	13:50	14:25	75 PSI	10 PSI	410 GPM (Unnamed)	410 @ 10 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1980						**TESTED BY:**	Brong, Mark A	
105- 8 Patton St	8 Patton ST at MCArthur ST High Bridge, NJ 8829		08/20/2018	14:30	15:15	75 PSI	2 PSI	300 GPM (Unnamed)	300 @ 2 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1987						**TESTED BY:**	Hinson, Timothy R	
106- 18 Patton St	18 Patton ST at MCArthur ST High Bridge, NJ 8829		08/21/2018	7:30	8:13	65 PSI	5 PSI	340 GPM (Unnamed)	340 @ 5 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1984						**TESTED BY:**	Hinson, Timothy R	
107- 31 McArthur	31 McArthur st High Bridge, NJ 08829		08/21/2018	8:15	9:00	80 PSI	10 PSI	380 GPM (Unnamed)	380 @ 10 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1989						**TESTED BY:**	Pearce , Richard Alex	
108- 7 McArthur	7 McArthur st at Dewey ave High Bridge, NJ 08829		08/21/2018	9:05	9:50	65 PSI	5 PSI	400 GPM (Unnamed)	400 @ 5 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1987						**TESTED BY:**	Hinson, Timothy R	
110- 10 E Main	10 E Main st High Bridge, NJ 08829		08/21/2018	9:55	10:35	135 PSI	50 PSI	1030 GPM (Unnamed)	1030 @ 50 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1977						**TESTED BY:**	Pearce , Richard Alex	
111- 30 E Main	30 E Main ST at Washington AVE High Bridge, NJ 8829		08/21/2018	10:40	11:25	130 PSI	40 PSI	950 GPM (Unnamed)	950 @ 40 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1977						**TESTED BY:**	Hinson, Timothy R	
112- 48 E Main	112 E Main st High Bridge, NJ 08829		08/21/2018	11:30	12:15	120 PSI	45 PSI	950 GPM (Unnamed)	950 @ 45 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1974						**TESTED BY:**	Pearce , Richard Alex	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
113- 74 E Main	74 E Main st High Bridge, NJ 08829		08/21/2018	13:35	14:25	110 PSI	35 PSI	860 GPM (Unnamed)	860 @ 35 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1985						**TESTED BY:** Hinson, Timothy R		
114- 102 E Main	102 E Main st High Bridge, NJ 08829		08/21/2018	14:30	15:15	95 PSI	25 PSI	670 GPM (Unnamed)	670 @ 25 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1985						**TESTED BY:** Hinson, Timothy R		
115-132 E Main	132 Main st High Bridge, NJ 08829	132 E Main	08/22/2018	7:37	8:20	75 PSI	8 PSI	480 GPM (Unnamed)	480 @ 8 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Crampton, Thomas		
118-46 Highland Ave	46 Highland ave High Bridge, NJ 08829	46 Highland Ave	08/22/2018	11:32	12:15	120 PSI	8 PSI	480 GPM (Unnamed)	480 @ 8 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Crampton, Thomas		
119- 26 Highland	26 Highland ave High Bridge, NJ 08829		08/22/2018	12:45	13:26	130 PSI	2 PSI	240 GPM (Unnamed)	240 @ 2 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Crampton, Thomas		
120- 8 Highland	8 Highland ave High Bridge, NJ 08829		08/22/2018	13:30	14:12	140 PSI	7 PSI	450 GPM (Unnamed)	450 @ 7 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:** Crampton, Thomas		
122- 8 Maryland Ave	8 Maryland ave High Bridge, NJ 08829		08/24/2018	7:30	8:10	125 PSI	13 PSI	605 GPM (Unnamed)	605 @ 13 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1994						**TESTED BY:** Hinson, Timothy R		
123- Washington and Maryland	7 Washington ave at Maryland ave High Bridge, NJ 08829	Across from HBFD	08/24/2018	8:15	9:00	125 PSI	18 PSI	710 GPM (Unnamed)	710 @ 18 PSI	14
Flow Test Results: Pass		Remarks: Mueller 1971						**TESTED BY:** Crampton, Thomas		
124- 20 Tisco	20 Tisco AVE at Washington AVE High Bridge, NJ 8829		08/24/2018	9:05	9:50	140 PSI	7 PSI	440 GPM (Unnamed)	440 @ 7 PSI	14
Flow Test Results: Pass		Remarks: James B Clow						**TESTED BY:** Hinson, Timothy R		
125- 30 Tisco	30 Tisco AVE at Washington AVE High Bridge, NJ 8829		08/24/2018	9:55	10:35	95 PSI	6 PSI	410 GPM (Unnamed)	410 @ 6 PSI	14
Flow Test Results: Pass		Remarks: James B Clow						**TESTED BY:** Crampton, Thomas		
126- Nassau Rd	Nassau RD at Washington ave High Bridge, NJ 8829		08/24/2018	10:40	11:25	80 PSI	2 PSI	240 GPM (Unnamed)	240 @ 2 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Hinson, Timothy R		
127- 2 Wilson Ave	2 Wilson ave High Bridge, NJ 08829	Across 2 Wilson Ave	08/24/2018	13:00	13:50	130 PSI	6 PSI	410 GPM (Unnamed)	410 @ 6 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:** Crampton, Thomas		
128- Watergate	21 Watergate DR at Wilson AVE High Bridge, NJ 8829	Across from 21 Watergate	08/24/2018	13:55	14:35	125 PSI	15 PSI	480 GPM (Unnamed)	479 @ 15 PSI	14

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Hinson, Timothy R	
129- 1 Northwood Ave	1 Northwood AVE at Watergate DR High Bridge, NJ 08829	Across from 1 Northwood	08/24/2018	14:40	15:25	120 PSI	10 PSI	480 GPM (Unnamed)	479 @ 10 PSI	14
Flow Test Results: No Data Provided		Remarks: Mueller 1973						**TESTED BY:**	Crampton, Thomas	
130- Overlook & Northwood	Northwood AVE at Overlook DR High Bridge, NJ 8829		08/27/2018	7:35	8:15	170 PSI	60 PSI	1300 GPM (Unnamed)	1300 @ 60 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Hinson, Timothy R	
131- 17 Overlook	17 Overlook DR at Village SQ High Bridge, NJ 8829		08/27/2018	8:20	9:05	100 PSI	40 PSI	1135 GPM (Unnamed)	1135 @ 40 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Crampton, Thomas	
132- Northwood & Mark	Northwood dr at Mark dr High Bridge, NJ 08829		08/27/2018	9:10	9:55	80 PSI	38 PSI	1110 GPM (Unnamed)	1110 @ 38 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Hinson, Timothy R	
133-30 Mark Dr	30 Mark DR at Kill Hill RD High Bridge, NJ 8829		08/27/2018	10:00	10:45	80 PSI	50 PSI	1180 GPM (Unnamed)	1180 @ 50 PSI	14
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Crampton, Thomas	
134-62 Baron Ct	62 Baron CT at Mark DR High Bridge, NJ 8829	In between #60-#62 Baron	08/28/2018	7:45	8:32	85 PSI	36 PSI	1010 GPM (Unnamed)	1010 @ 36 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
135-1 Deer Run	Deer Run DR at King Hill RD High Bridge, NJ 8829	Across from 1 Deer Run	08/28/2018	8:41	9:15	55 PSI	34 PSI	980 GPM (Unnamed)	980 @ 34 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
136-13 Village Sq	13 Village SQ at King Hill RD High Bridge, NJ 8829	13 Village Sq	08/28/2018	9:18	10:00	75 PSI	33 PSI	965 GPM (Unnamed)	965 @ 33 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
137-5 Timbercroft	5 Timbercroft RD at Watergate DR High Bridge, NJ 8829	5 Timbercroft	08/28/2018	10:02	10:43	85 PSI	10 PSI	670 GPM (Unnamed)	670 @ 10 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
139-River Rd & Watergate	13-95 River RD at Watergate DR High Bridge, NJ 8829	Intersection of Watergate and River Rd	08/28/2018	11:08	11:47	95 PSI	22 PSI	790 GPM (Unnamed)	790 @ 22 PSI	14
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
Zone 46										
088- 183 East Main	183 E Main st at Douglas TER Annandale, NJ 08801		08/15/2018	13:05		30 PSI	6 PSI	400 GPM (Unnamed)	400 @ 0 PSI	46
Flow Test Results: Pass		Remarks: Hydrant went from approximately 580 gpm to 400 gpm with in 15 seconds of being tested.						**TESTED BY:**	Brong, Mark A	

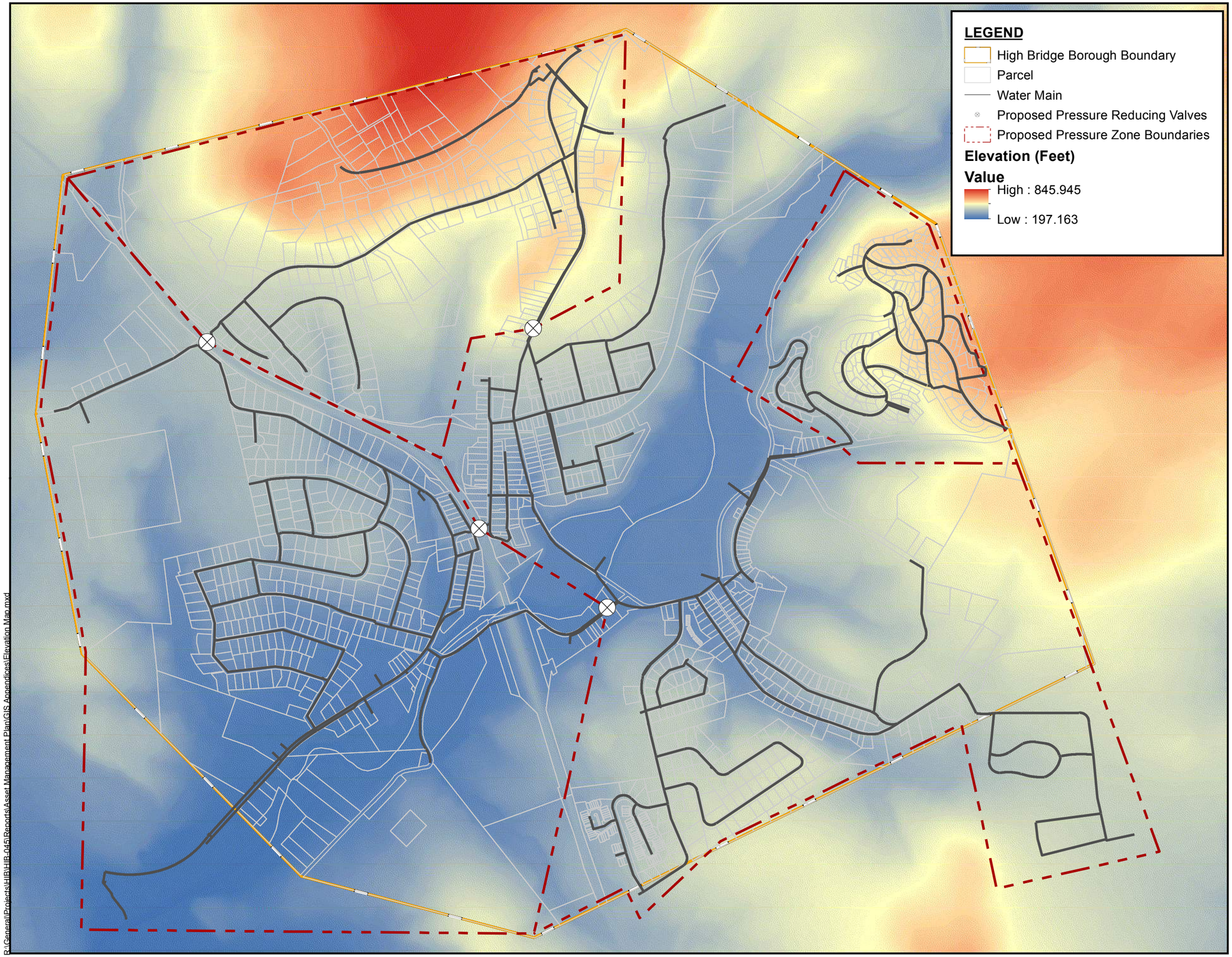
HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

HYD. ID	ADDRESS	LOCATION	TEST DATE	START TIME	END TIME	STATIC	RESIDUAL	DOWNSTREAM (HYD. ID)	FLOW @ DES. PRESS	DISTRICT
089- East Main and North Rd	E Main ST at North DR Annandale, NJ 8801		08/17/2018	7:30	8:00	60 PSI	5 PSI	530 GPM (Unnamed)	530 @ 5 PSI	46
Flow Test Results: Pass		Remarks: Mueller 1979						**TESTED BY:**	Hinson, Timothy R	
090- E Main and Roundtop	E Main st at Roundtop DR High Bridge, NJ 08829		08/17/2018	8:15	8:55	25 PSI	5 PSI	410 GPM (Unnamed)	410 @ 5 PSI	46
Flow Test Results: Pass		Remarks: Mueller						**TESTED BY:**	Pearce , Richard Alex	
091- 5 Roundtop Dr	5 Round Top DR at E Main ST Annandale, NJ 8801		08/17/2018	9:00	9:45	55 PSI	10 PSI	410 GPM (Unnamed)	410 @ 10 PSI	46
Flow Test Results: Pass		Remarks: Mueller 1988						**TESTED BY:**	Hinson, Timothy R	
092- 21 Roundtop Dr	21-27 Round Top DR at E Main ST Annandale, NJ 8801		08/17/2018	10:00	10:45	50 PSI	5 PSI	250 GPM (Unnamed)	250 @ 5 PSI	46
Flow Test Results: Pass		Remarks: Mueller 1988						**TESTED BY:**	Pearce , Richard Alex	
093- 27 Roundtop Dr	27 Roundtop DR Annandale, NJ 88018801		08/17/2018	11:00	11:45	30 PSI	10 PSI	430 GPM (Unnamed)	429 @ 10 PSI	46
Flow Test Results: Pass		Remarks: Mueller 1988						**TESTED BY:**	Hinson, Timothy R	
116- 4 Wooley Dr	4 Wooley DR High Bridge, NJ 08829	4 Wooley Dr	08/22/2018	8:34	9:08	115 PSI	6 PSI	410 GPM (Unnamed)	410 @ 6 PSI	46
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	
117- 1 Weimer Rd	1 Weimer Rd High Bridge, NJ 08829	Corner of Weimer Rd & North Rd	08/22/2018	9:15	10:00	65 PSI	8 PSI	410 GPM (Unnamed)	410 @ 8 PSI	46
Flow Test Results: Pass		Remarks:						**TESTED BY:**	Crampton, Thomas	

HYD. ID column sorts alphanumerically rather than strictly numerically because the Hydrant ID field can also contain letters and certain characters at the discretion of the Department entering the data.

APPENDIX I

Elevation & Pressure Zone Map



WATER SYSTEM ELEVATION & PRESSURE ZONE MAP

HIGH BRIDGE ASSET MANAGEMENT PLAN

BOROUGH OF HIGH BRIDGE
HUNTERDON COUNTY
NEW JERSEY

N

0 250 500 1,000 1,500 2,000
Feet

1 inch = 950 feet

This map was developed using NJDEP and County GIS digital data, but this secondary product has not been verified by NJDEP and is

MASER CONSULTING P.A.

JUNE 2018

R:\General\Projects\HBW\HB.045\Reports\Asset Management Plan\GIS Appendices\Elevation Map.mxd

APPENDIX J

Capital Improvement Project Cost Estimate

Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Asset Management Plan
High Priority Projects - Estimates of Probable Cost
For
Borough of High Bridge
Hunterdon County, New Jersey

Project : Bunnvale Upgrades

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
1	Repair / Replacement of treatment building roof	20	1 year	1	LS	$100,000	$100,000
2	Replace Electrical Service Equipment	15	1 - 2 years	1	LS	$100,000	$100,000
3	Replacement of Well Piping	9, 9, 9, 12	3 - 5 years	1	LS	$75,000	$75,000
4	Replacement of Pump 4 & 5	12, 12	2 - 3 years	2	EA	$10,000	$20,000
5	Replace Well Flow Meters	9, 9 ,9, 12	3 - 5 years	4	EA	$2,000	$8,000
6	Install Pressure Transducers in Wells	N/A	N/A	4	EA	$5,000	$20,000
7	Install Pressure Transducer in Clearwell	N/A	N/A	1	LS	$5,000	$5,000
8	Repair exposed conduit duct bank	N/A	1 - 2 years	1	LS	$5,000	$5,000
9	Install Auto-dialers	N/A	N/A	1	LS	$10,000	$10,000
						Subtotal	$343,000
						Contingency (20%)	$68,600
						Engineering & Legal (25%)	$85,750
						Total	**$497,350**

Project : Meter Replacement

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
1	Meter Replacement	N/A	1 - 2 years	1,450	EA	$500	$725,000
						Subtotal	$725,000
						Contingency (5%)	$36,250
						Administrative Expenses (3%)	$21,750
						Engineering/Planning/Design (12%)	$87,000
						Total	**$870,000**

Project : Grayrock Upgrades

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
1	Repair / Replacement of above grade piping/valving	12	1 - 2 years	1	LS	$50,000	$50,000
2	Pump Replacement	9	5 - 7 years	1	LS	$10,000	$15,000
3	Install Auto-dialers	N/A	N/A	1	LS	$10,000	$10,000
4	Building Upgrades	N/A	N/A	1	EA	$20,000	$20,000
						Subtotal	$95,000
						Contingency (20%)	$19,000
						Engineering & Legal (20%)	$19,000
						Total	**$133,000**

Project : Water Main Upgrades

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
3	Leak & Break Study	N/A	N/A	1	LS	$20,000	$20,000
4	High Priority Main Replacement	N/A	1 - 5 years	39,400	EA	$150	$5,910,000
						Subtotal	$5,930,000
						Contingency (20%)	$1,186,000
						Engineering & Legal (20%)	$1,186,000
						Total	**$8,302,000**

Project : Supply Line Upgrades

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
1	Evaluation of 12" Supply Line	N/A	1 - 5 years	1	LS	$30,000	$30,000
2	Replacement of 12" Supply Line	N/A	1 - 5 years	9,000	LF	$175	$1,575,000
						Subtotal	$1,605,000
						Contingency (20%)	$321,000
						Engineering & Legal (20%)	$321,000
						Total	**$2,247,000**

Project : Standpipe Rehabilitation

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
1	Inspection & Cleaning of Standpipes	12	1 - 2 years	2	EA	$10,000	$20,000
2	Capital Improvements for Standpipes	12	1 -3 years	1	LS	TBD	TBD
						Subtotal	$20,000
						Contingency (20%)	$4,000
						Total	**$24,000**

Project : Pressure Reducing Valves

Item	Description	BRE	Timetable	Quantity	Unit	Unit Cost	Cost
1	Creation of Hydraulic Model	N/A	1 -5 years	1	LS	$20,000	$20,000
2	Installation of Pressure Reducing Valve	N/A	1 -5 years	4	EA	$30,000	$120,000
						Subtotal	$140,000
						Contingency (20%)	$28,000
						Engineering & Legal (20%)	$28,000
						Total	**$196,000**

Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Asset Management Plan
Medium and Low Priority Projects - Estimates of Probable Cost
For
Borough of High Bridge
Hunterdon County, New Jersey

Medium Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Replacement of Well Pump 2 & 3 - Bunnvale	9	5 - 7 years	2	EA	$10,000	$20,000
						Subtotal	$20,000
						Contingency (20%)	$4,000
						Engineering & Legal (20%)	$4,000
						Total	**$28,000**

Medium Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Replacement of Clearwell Liner - Bunnvale	9	5 - 7 years	1	LS	$75,000	$75,000
						Subtotal	$75,000
						Contingency (20%)	$15,000
						Engineering & Legal (20%)	$15,000
						Total	**$105,000**

Medium Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Replacement of Generator Load Bank	10	5 - 10 years	1	LS	$8,000	$8,000
						Subtotal	$8,000
						Contingency (20%)	$1,600
						Total	**$9,600**

Medium Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Medium Priority Main Replacement	N/A	5 - 10+ years	46,150	LF	$150	$6,922,500
						Subtotal	$6,922,500
						Contingency (20%)	$1,384,500
						Engineering & Legal (20%)	$1,384,500
						Total	**$9,691,500**

Medium Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Installation of a Tank Mixing System	N/A	5 - 10 years	1	LS	$30,000	$30,000
						Subtotal	$30,000
						Contingency (20%)	$6,000
						Engineering & Legal (20%)	$6,000
						Total	**$42,000**

Medium Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Purchase of Redundant Chemical Feed Pumps	6, 9	1 - 10 years	2	LS	$7,500	$15,000
						Subtotal	$15,000
						Contingency (20%)	$3,000
						Total	**$18,000**

Low Priority Project							
Item	**Description**	**BRE**	**Timetable**	**Quantity**	**Unit**	**Unit Cost**	**Cost**
1	Low Priority Main Replacement	N/A	10+ years	35,250	LF	$150	$5,287,500
						Subtotal	$5,287,500
						Contingency (20%)	$1,057,500
						Engineering & Legal (20%)	$1,057,500
						Total	**$7,402,500**