



Mr. Ziad Andrew Shehady  
Business Administrator  
Borough of Red Bank  
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**Proposal for Professional Engineering Services  
Water Utility Inventory Project  
Borough of Red Bank, Monmouth County, NJ**

February 29, 2020

Dear Mr. Shehady,

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**Background**

The Borough of Red Bank owns, operates, and maintains a potable water supply, storage, and distribution system. The Borough has funded the water utility inventory project by Ordinance 2018-34 in order to comply with the New Jersey Water Quality Accountability Act (WQAA) which was enacted in July 2017. On October 19, 2017, the WQAA became effective, requiring any water purveyor with more than 500 service connections to demonstrate and report upon sound fundamentals in the planning, operation, maintenance, and reinvestment of its water systems to assure a safe and reliable water supply to its customers.

In order to comply with the WQAA requirements, the Borough proposes to proceed with the following program of activities at this time:

1. GIS Database Development based on GPS location of the valves within the Borough's water system using existing system mapping.
2. Development of an Asset Management Plan consistent with the requirements of the WQAA.
3. Inventory of Major Water System Components. This will be done in connection with the Borough's Department of Public Utilities and the results will be incorporated into the Asset Management Plan.
4. Valve Exercising Program to be completed in connection with the Department of Public Utilities.

Mott MacDonald has significant experience in development water system asset management plans in addition to GIS systems for water utilities throughout New Jersey and the United States. The Mott MacDonald team will be led by Kyle Smith, PE, CME, serving as Project Manager. The work will be under the supervision of Brian Dougherty, PE, who will serve as the Project Director and oversee the quality control review. The GIS effort will be led by Duane Chapman, with survey work to be conducted under the supervision of William DiBartolo, PLS.



## Scope of Services

We proposed the following scope of services related to the Borough's Water Utility Inventory Project.

### **Task 1 Survey Grade Water Utility GIS Database Development**

The Borough owns and operates an estimated 35 miles of water main and appurtenant assets. Existing utility mapping is currently maintained on small scaled hardcopy mapping dating back to 1983 that does not reflect current conditions. The Borough has an immediate need to field locate water valves to comply with the Water Quality Accountability Act. In addition to meeting regulatory compliance, the Borough wishes to develop a water utility GIS to assist with daily field operations and asset management activities. Some of the benefits of developing a utility GIS database includes:

- Simplified access to utility records in the field and office;
- Improved accuracy of utility information;
- Assisting planning and development activities;
- Elimination of redundant and discrepant utility information;
- Development of a powerful analysis, querying, and reporting tool;
- Reduced costs for map production and maintenance; and
- Integration with other information systems.

Mott MacDonald has professional land surveyors that operate the latest electronic surveying equipment. We own Leica® RTK GNSS GPS survey equipment including Viva GS15 RTK centimeter accurate systems. GNSS GPS units are capable of receiving signals from both the Navstar and GLONASS GPS constellations. The ability to track both GPS constellations allows for near 100% utilization and minimizes downtime associated with poor GPS satellite configuration when only using one constellation.

The Leica RTK units are outfitted with cellphone cards that receive real time corrections from the Leica SmartNet network. SmartNet is comprised of over 650 GNSS base stations that have comprehensive and redundant coverage within the project area. The base station in Neptune (NJNT) will be utilized as the primary control station with Piscataway (NJTP) and Ocean County (NJOC) serving as the back-up stations.

Mott MacDonald is committed to performing the project fieldwork in the safest manner possible and in accordance with all pertinent local, state, and federal safety requirements. For each field data collection project, our team develops a Health and Safety Plan outlining the proper use of field safety equipment.

Mott MacDonald's surveyors will walk the estimated 35 miles of water main alignments and locate system valves (inline and hydrant) using **survey** grade GNSS Realtime Kinematic (RTK) GPS equipment. The goal of the survey is to capture surface assets within **+/- 0.15 foot** of their true horizontal and vertical location. The high accuracy results will provide the Borough with a high-quality product which represents the exact valve location.

Along with an accurate location, Mott MacDonald will collect various relevant asset attributes including: descriptive location (roadway, grass, etc), and photographs of each asset. Mott MacDonald will work with the Borough to define attributes to be

captured before beginning the field work. Any major defects or safety hazards will be immediately reported to the Borough.

Mott MacDonald assumes that all assets will be readily accessible and easily identifiable. It is also assumed that Borough employees will be available to assist with locating assets in easements, provide access to restricted areas, and provide traffic control.

The Borough's Water Utility GIS database will be developed using the following workflow:

1. Customize the industry standard ESRI Local Government Information Model (LGIM) geodatabase to accommodate for features, domains, attributes and topology that are needed to support the Borough's utility networks. The geodatabase will be developed using ESRI's geometric network functionality which allows feature connectivity rules to be established. This will ensure that features are connected to each other following the specified connectivity rules (example hydrants can only be connected to hydrant laterals). Connectivity will improve data maintenance and will also be necessary for future applications such as hydraulic modeling.
2. Utilizing the RTK GPS-surveyed asset locations Mott MacDonald will capture water main alignments as shown on the water system map. Attribute information contained on the source drawings (ex. diameter, material, IDs, etc.) will be captured into the appropriate attribute within the GIS database.
3. Produce a set of maps for the Borough to redline markup and comment. Markups will be incorporated into the final GIS database.
4. Apply Mott MacDonald's robust QA/QC procedures to ensure feature geometries are valid, domain attributes are followed and feature connectivity has been maintained.

In addition to the water utility GIS layer, Mott MacDonald will compile available GIS data layers from Monmouth County and other public sources. This data is free of charge and is useful for emergency response planning, map production, and other purposes.

The following deliverables will be furnished under this task:

- Customized ESRI LGIM data model
- Populated Water GIS database
- Federal Geographic Data Committee (FGDC) Compliant Metadata (required for compliance with NJDEP permitting applications)

We have assumed that Borough personnel will be able to provide any necessary traffic control during the performance of the field survey work at no cost to Mott MacDonald. If Borough resources cannot provide traffic control, we can subcontract with a traffic control service at a rate of \$750 per day.

#### Optional Task 1: Hardcopy Mapping

If requested by the Borough, Mott MacDonald will prepare and deliver the following hardcopy mapping utilizing the developed GIS databases:

- Two (2) copies of an Overall Water Utility System Map (1"=400' scale on 24"x36" paper or more appropriate scale and paper as determined once the database is created);

- Two (2) Water Utility Map Books (1"=100' scale on 11"x17" paper). The Map Books will be bound, laminated and include a title sheet, map and street index);
- PDF files of maps created.

Sample GIS mapping that has been developed by Mott MacDonald for other utilities can be provided if requested.

### **Task 2 Water System Asset Management Plan**

In accordance with Section C.58:31-7 of the WQAA, 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 (AWWA). Section C.58:31-7 specifically requires the following to be included in the Asset Management Plan:

- 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 services lives of the water mains serving the public water system;
- 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 AWWA, and any mitigation plan required pursuant to Section 5 of this Act; and
- Any other programs, plans, or provision as may be required by the Department pursuant to rules and regulations adopted pursuant to the "Administrative Procedure Act," P.L.1968, c410 (C.52:14B-1 et seq.).

In addition, WQAA requires:

- Each water purveyor must dedicate funds on an annual basis to address and remediate the highest priority projects as determined by its Asset Management Plan.
- The Asset Management Plan and system condition reports must be certified to by the Licensed Operator of the public water system and Chief Executive Officer of the Municipality.
- A report based on the Asset Management Plan must be submitted to the Department of Environmental Protection every three years.

The Asset Management Plan will need to fully document the overall condition and operation of the water system and identify the priority and budgetary costs of future capital investments. The Asset Management Plan will evaluate the physical, demographic, renewal (replacement or rehabilitation), regulatory, water quality, operational efficiency, safety, and security planning drivers to identify capital investment needs into the future (15 years).

The proposed scope of work for this task includes preparing an Asset Management Plan (AMP) report that meets the specific requirements of the WQAA and includes the following items:

1. Water Demand Analysis

This section of the AMP will provide a summary of water demands for the previous 5 years. As part of this effort, the non-revenue water will be reviewed.

The current demands will be compared to the Water Allocation Permit and system production capacity. The water system must have the source capacity to meet maximum day demands. In addition, the NJDEP requires that the system have firm capacity to supply, treat, and pump water with the largest source, treatment, or pumping component out of service.

## 2. Source of Supply Evaluation

This section of the AMP will evaluate the current condition and reliability of the water treatment facilities and supply wells. This analysis will also compare the total and firm capacity of the water supply to the future estimated maximum day demands.

This section will include an inspection and assessment of the condition of the existing well facilities and water treatment plant. This effort will result in a summarized list of recommended capital improvements and associated estimated costs for a 15-year planning period. This section will also include an evaluation of existing and potential future regulations that may require additional investment relative to maintaining water quality that meets all Primary and Secondary Drinking Water Standards of the Safe Drinking Water Act (SDWA).

The existing condition of the wells and treatment facilities will be based upon visual observations during a site visit under Task 3 of this proposal and review of available maintenance records. Under this task, existing records will be reviewed for each well including historical operational and pumping test data, maintenance records, allocation permit compliance, and flow meter calibration.

The result of this effort will be the identification of the estimated future surplus/deficit in groundwater supply for the next 15 years, and recommendations for capital improvements to perform any needed upgrades at the wells.

## 3. Distribution System and Storage Evaluation

This section of the AMP will include an evaluation of the capacity and condition of the existing storage and distribution system and recommendations for capital improvements.

This effort will utilize available data on the age of the existing water mains to provide an estimate of required replacement schedule using an AWWA algorithm. This estimate will be compared with the current water main replacement program to determine the appropriate level of investment necessary to maintain system reliability. Water main break data will also be compared to industry averages.

The scope of the work for this proposal does not include completion of a hydraulic model to evaluate system operation as it was not requested as part of the proposal.

A visual inspection of the storage facility sites will be also conducted for general condition of the tanks and associated electrical and SCADA equipment, and site conditions, including site security. The scope of work for this proposal does not include detailed internal and external inspections of the storage tanks but if past reports are available, they will be reviewed and

taken into account in the assessment. A schedule for detailed inspections of the storage tanks will be included in the overall recommendations and planning for maintenance, operation and reinvestment/renewal of the water system.

Based on the summary and evaluation of the distribution and storage systems, recommendations and cost estimates will be prepared for distribution and storage facility capital improvements.

#### 4. Evaluation of Operations and Maintenance Procedures

This section of the AMP will include a summary of the Borough's existing operations and maintenance procedures. This Section will also include the development of a valve inspection and testing program through an outside Contractor. This section will summarize the Borough's existing hydrant inspection, flushing and testing program, including recommendations for improvements or enhancements.

This section will also include a review of the existing water department workforce relative to current operations and maintenance procedures as well as the new requirements for compliance with the WQAA and the findings of the AMP.

#### 5. Recommended Operational and Capital Improvement Program

This section of the AMP will include a prioritized summary of the capital and operational improvements established in the previous sections, including budgetary cost estimates and implementation schedule. The prioritization model will be based on an industry-standard asset management approach that uses a combination of a Likelihood of Failure score and a Consequence of Failure score. The Likelihood of Failure scoring will be based on industry standard failure modes developed by the Water Environment Research Foundation as part of the Sustainable Infrastructure Management Program Learning Environment (SIMPLE). The Consequence of Failure scoring is evaluated in the context of an accounting framework referred to as the Triple Bottom Line (TBL), which considers economic, social, and environmental consequences associated with potential asset failures

The Scope of Work for this Task also includes:

- A design kick-off meeting/workshop with the Borough to discuss the above scope of work and gather required information.
- Two progress meetings with the Borough.
- A presentation of the Asset Management Plan to the Borough.

The following deliverables will be furnished under this task:

- Draft Water System AMP Report
- Final Water System AMP Report

#### **Task 3 Inventory of Major Water System Components**

As requested by the Borough, Mott MacDonald will provide an inspection and assessment of the major water system components in conjunction with the Borough's Department of Public Utilities under this Task. This includes condition assessment of the existing well facilities, water treatment plans and storage facilities. The

summarized list of recommended capital improvements and associated costs will be included in the Asset Management Plan.

#### **Task 4 Valve Exercising Program**

The WQAA requires the inspection and testing of existing valves in accordance with the following schedule:

- Valves 12-inch and larger – every two years
- All other valves – every four years

The WQAA also requires the repair or replacement of any valve found to be broken or otherwise not operational.

The Borough's water distribution system is anticipated to include approximately 650 valves, anticipated to range in size from 4-inch to 16-inch diameter. The Borough currently does not have a valve inspection and testing program in place, and reportedly does not have sufficient manpower to implement a valve inspection and testing program with Borough personnel. Therefore, the Borough proposes to procure a Contractor to conduct the inspection and testing of existing valves for compliance with the WQAA requirements. As such, based on prior experiences, outside Contractors will not work to find all valves in the system. Therefore, we suggest the field survey to create the water utility GIS be completed under Task 1 prior to the valve exercising program.

#### **Task 4a Valve Exercising Program Contract Documents**

The Scope of Services under this task includes coordination with the Department of Public Utilities, preparation of contract documents and public bidding of the project to solicit valve inspection and testing services by an outside Contractor. The bid documents will include:

- Front end bid documents in accordance with the latest edition of the New Jersey Local Public Contracts Law
- Scope of work
- Technical specifications
- Water Distribution Map (with valve locations)
- Summary of valves based on historical data
- Field documentation forms and requirements

#### **Task 4b Valve Exercising Program Bid Services**

This task consists of support services to the Borough during the public bidding period following completion of the specifications. Bid support services will include the following:

1. Printing, collating and binding fifteen (15) sets of contracts documents for distribution to prospective bidders as well as for use during the construction portion of the project;
2. Preparation of responses to questions and/or clarification requests made during the bidding period, including the preparation of required addenda;
3. Attendance at the bid opening; and
4. Conducting a review of the bids received and preparation of bid reports including a tabulation of bids received with recommendations for the Borough for the award of the contract.

During the course of the valve exercising program construction phase, Mott MacDonald can offer assistance to the Department of Public Utilities with general coordination regarding the valve locations per the water system GIS. Should the Borough wish to have Mott MacDonald provide construction administration and oversight in lieu of the Department of Public Utilities, a separate proposal can be provided for that work.

### **Schedule**

Mott MacDonald anticipates completing the scope of services described herein within a nine-month time frame (weather permitting) of authorization. It is recommended that field work be conducted during the late winter and early spring when tree-cover conditions are optimal for GPS surveying. Close coordination with the Borough will be required in order to meet the project schedule.

### **Project Fee Schedule**

Mott MacDonald proposes to undertake the work described herein on a lump sum basis as summarized in the table below. The scope of services will be performed under our general terms and conditions.

<b>Task</b>	<b>Description</b>	<b>Fee</b>
1	Survey Grade Water Utility GIS Database Development	\$31,000
2	Water System Asset Management Plan	\$25,000
3	Inventory of Major Water System Components	\$9,000
4	Valve Exercising Program	
4a	Valve Exercising Program Contract Documents	\$8,500
4b	Valve Exercising Program Bid Services	\$3,750
<b>TOTAL</b>		<b>\$77,250</b>

Additional work that can be provided if requested by the Borough as described above are as follows:

<b>Task</b>	<b>Description</b>	<b>Reimbursement</b>	<b>Fee</b>
Optional Task 1	Hardcopy Mapping	Lump Sum	\$7,000
Optional Task 2	Valve Exercising Program Construction Services	Reimbursable	TBD
Optional Task 3	Traffic Control, If and Where Directed (Assuming 10 days)	Reimbursable at \$750/day	\$7,500



We appreciate the opportunity to submit a proposal for this important infrastructure improvement project that will benefit your community. If you have any questions, or wish to discuss any aspects of the proposal, please do not hesitate to contact us.

Very truly yours,

Mott MacDonald

A handwritten signature in blue ink that reads "Kyle A. Smith".

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