

**FORT MONMOUTH REUSE AND REDEVELOPMENT PLAN  
TECHNICAL MEMORANDUM: INFRASTRUCTURE SYSTEMS**

**Figures/Maps in this section have been deleted due to security  
and force protection issues**

**Fort Monmouth Reuse and Redevelopment Plan**  
**Technical Memorandum: Infrastructure Systems**

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**Introduction**

This Technical Memorandum describes the location, distribution and availability of various utility services within the study area, both on the Fort Monmouth facility proper and the provision of services by utility companies in the immediate vicinity of the Fort. To the extent possible, an assessment of the condition and/or capacity of the utility infrastructure within the Fort facility are also provided.

**Gas**

The Main Post and Charles Wood Area of Fort Monmouth are both serviced by New Jersey Natural Gas (NJNG). NJNG operates and maintains the gas service system both within and around the Fort Monmouth facility, as this is the only utility service that has been privatized. The gas service was privatized in 1992.

Fort Monmouth converted from fuel oil to natural gas in the late-1970s into the mid-1980s, and the facilities were upgraded accordingly. Currently, all of the existing gas mains are high pressure, operating in the range of 40 pounds per square inch (psi) to 60 psi. The entire network of gas mains consists of a variety of pipe sizes, including 1” (for service to buildings), 2”, 4”, 6”, 10” and 12”. See Figures 9 and 10 in the Attachments.

Overall, the capacity and condition of the existing gas system is adequate to handle future development and/or could be expanded if necessary to address the needs of future development proposals. Some of the old pipes (prior to privatization) have been abandoned in place. Also, propane is supplied to the facility by an independent contractor through a distribution center located in the 400 Area (see Figure 15 in the Attachments).

**Electricity**

Fort Monmouth purchases its electric power from Jersey Central Power and Light (JCP&L). The Army currently controls and maintains all the electrical facilities within the Fort area.

Electricity is distributed through two delivery points; one 34.5 kiloVolt (KV) metering station and the other 34.5 KV metering station  
See Figures 7 and 8 in the Attachments.

Five transmission lines, designated as F-110, Q-96, D-56, P-42 and Z-78, pass through the Fort area, branching out to 31.5 circuit miles of primary distribution lines servicing all of the buildings and 1,000 street lights located throughout the Fort, as well as fire alarm boxes and

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pole-mounted floodlights. Service is metered at the Main Post substation, which is fed by the F-110 (Normal Feed) & P-42 transmission lines. Service is also metered at the Pearl Harbor Substation in the Charles Wood Area, which is fed by the Q-96 transmission line. The estimated annual consumption of the entire Fort complex is about 20 megawatts (MW).

Approximately 90 Uninterruptible Power Supply (UPS) systems and 51 emergency generators are located in various buildings throughout the installation. Additionally, nine vehicular mobile emergency generators and one skid-mounted emergency generator, ranging in size from 45 to 200 kilowatts, are stored at Main Post Building 750 for use throughout the installation as needed.

According to the “Final Integrated Natural Resources Management Plan” of December 1999 and the “Final Environmental Condition of Property Report” of January 2007, several PCB (Polychlorinated Biphenyls) contaminated transformers are located throughout the installation. Twenty-one of these transformers are still in use, while the others are undergoing retrofits. In order to accommodate new development in the future, significant infrastructure improvements would likely be required outside of the existing Fort Monmouth property boundaries.

### **Fiber Optic**

Fort Monmouth installed and maintains an extensive underground fiber optic system throughout the Main Post and Charles Wood Area. The system consists of 37,000 linear feet (LF) of underground fiber optic cable passing through six 4” conduit duct banks embedded in concrete. There are fifty-nine (59) manholes located along the network. A redundant telecom pathway exists in the Charles Wood Area.

Overall, the network has adequate capacity to service future growth; however, more detailed information regarding the location, type, material, and capacity of the fiber optic system would be required in order to take full advantage of this asset. See Figures 11 and 12 in the Attachments.

### **Potable Water**

Fort Monmouth purchases potable water from New Jersey American Water Company (NJAWC) and redistributes it throughout the Main Post and Charles Wood Area.

The potable water is distributed through 178,760 LF (33.9 miles) of underground lines ranging from 2” to 12” in diameter. Approximately 55% of the water system is located in the Main Post area and 45% in the Charles Wood Area. The system includes two elevated storage tanks (250,000 gallon capacity each) and one above ground storage tank (500,000 gallon capacity), which are currently not in service. See Figures 1 and 2 in the Attachments.

There are approximately 253 valves of various sizes and 251 fire hydrants dispersed throughout the Main Post and Charles Wood Area, of which 43 fire hydrants are identified as inoperable at this time. Five chlorination facilities exist, but are not currently in use. Five existing irrigation wells service the Sunegles Golf Course.

The approximate annual consumption of the base is 232,764,000 gallons, which is less than 20% of the capacity of the metering stations. However, actual capacity of the system may be limited by its age and condition. The water mains have been constructed of various materials over the years, beginning with asbestos cement in the 1940s, cast iron, ductile iron, and most recently PVC. In a study completed in 1998, the fair market value of Fort Monmouth's potable water distribution system was estimated to be \$2.152 million (1997\$).

The Main Post and Charles Wood Area have had water quality problems throughout the years with the water distribution system, primarily due to the system's age. The majority of the problems have been related to corrosion and bacteria. Also, due to a lot of dead ends in the pipe network, silt has accumulated in the pipes, particularly in the case of asbestos cement pipes. There have also been some instances of lead in the drinking water. Specifically, lead in the water was documented in Buildings 2700 and 118 (see Figures 15 and 16 in the Attachments). One sample collected in Building 118 on May 5, 1994 showed a lead concentration above the action level; however, a second sample collected on May 13, 1994 was below the action level. Testing of water fountains and sinks in Building 2700 conducted around the year 2000 revealed high lead levels in certain areas of the building, which has since been remediated.

In 1998, Guernsey & Co. performed an analysis to assess the feasibility of privatization of the utility systems servicing Fort Monmouth. The report assumed a total replacement of the existing potable water system over 50 years, the estimated remaining useful life of the existing system, at a cost of approximately \$10.0 million (\$200,000 per year in 1997 dollars), to replace the existing system. The study found that privatization of the potable water system could result in a net financial savings of between 0.1 to 25.7 percent, would allow for future upgrades and additions to the system, and would provide a cost-effective means to provide continued safe and reliable potable water to Fort Monmouth. The study recommended that, upon the Government's approval to proceed, the Army should start the procurement process by developing a Request for Proposal.

The Guernsey report indicated that privatization of Fort Monmouth's potable water system would result in lower utility service costs than continued Government ownership and operation; however, consideration to other non-economic issues, including environmental factors and reliability/security/safety concerns would be necessary. Further, the maintenance and replacement of existing systems were becoming more complex and costly, making it difficult for the Government to operate the systems in compliance with the myriad of federal, state, and local laws and regulations. More recent environmental laws and regulations may impose even more stringent requirements on the utility systems, thus making it increasingly difficult for the Government to operate the utility systems in a cost-effective and prudent manner. Although public, private, and regional utility systems are also required to meet the same environmental laws and regulations, it was opined that they are better positioned to respond to such requirements. Budgetary constraints and manpower limitations could also limit the Army's ability to continue to provide reliable services. The potable water system was never privatized.

Presently, the potable water system is presumed to be in fairly reliable condition. Continued use and potential increase in service demands would be appropriate; however, potential redevelopment of the site could benefit from the installation a new water distribution system

rather than replacement and/or repair of the existing system. Further, future development of the Fort property itself may necessitate significant modifications to the system.

## **Wastewater**

Wastewater from the Main Post and Charles Wood Area is connected to a Two Rivers Water Reclamation Authority (TRWRA), formerly the Northeast Monmouth County Regional Sewerage Authority, wastewater lift station and pumped to the Authority's wastewater treatment plant. Currently, TRWRA is under a self-imposed ban on new connections for an anticipated two years as of July 2007 (Asbury Park Press, July 11, 2007).

Fort Monmouth annually transmits between 300 and 350 million gallons of wastewater, approximately 59% of which is from the Main Post. The system consists of 121,360 LF (23 miles) of pipe, including gravity lines and force mains, the diameters of which range from 4" to 20". The system also includes 547 manholes and 19 lift stations. The force main system constitutes a 14,106 LF network. The estimated fair market value of Fort Monmouth's sanitary sewer system was estimated to be \$2.46 million (1997\$). See Figures 3 and 4 in the Attachments.

A significant portion of the wastewater system is over 50 years old. The majority of the pipes are terra cotta-type clay pipe, which is substandard per current standards. Other materials include cast iron, asbestos cement, and concrete. Manholes are built with brick and mortar in most cases, although a few are made of concrete. Most of the force main sewer system consists of cast iron pipe, with a few steel pipes. In addition, the pipes are not typically located in roadways.

There are numerous sinks and floor drains tied into the sanitary sewage system at laboratories and testing facilities. Because these connections were made prior to modern waste handling procedures, it is expected that discharge of hazardous substances into the waste stream occurs. Of particular concern is the potential for recalcitrant chemicals, such as mercury. The Fort Monmouth sewage system was deemed to be of concern in the January 2007 "Final Environmental Condition of Property Report".

A 1981 study on infiltration/inflow and exfiltration analysis for gravity sewers at Fort Monmouth (Gannett Fleming) revealed that the quantity of inflow/infiltration in the system was estimated to be 20% to 30% of the total waste water flow; some areas could have even greater infiltration rates due to structural defects in the pipes, sags, misaligned pipe sections, root intrusions, and silted pipe conditions, etc.; and the system was in need of various rehabilitation measures. No records were provided that would indicate that any improvements have been implemented to correct these deficiencies.

The 1981 study included an analysis of the existing pump stations, indicating that the physical condition of the pump stations was from fair to good. Some of the deficiencies noted were leaking check valves, lack of adequate maintenance activities, and poor safety conditions. Several dry wells also exhibited ponding due to improperly sloped floors and inoperable sump pumps. These factors, along with present and future flows and pumping capacities, indicated

inadequate pump station usage. The total upgrade cost recommended was more than \$2.5 million.

A force main exfiltration test showed that whenever failures occurred, it was a direct result of leaky valves. Although some upgrades to the system have been made since 1981, not all leaky valves have been repaired or replaced. Accumulation of deposits on pipe walls and sediments are the other causes.

The Guernsey report referenced above also reviewed privatization of the wastewater systems. The report assumed a total replacement of the existing wastewater system over 50 years, the estimated remaining useful life of the existing system, at a cost of approximately \$6.37 million (\$127,000 per year in 1997 dollars), to replace the existing system. The study found that privatization of the wastewater system could result in a net financial savings of between 2.1 to 2.2 percent, would allow for future upgrades and additions to the system, and would provide a cost-effective means to provide continued safe and reliable wastewater service to Fort Monmouth. The study recommended that, upon the Government's approval to proceed, the Army should start the procurement process by developing a Request for Proposal.

The Guernsey report indicated that privatization of Fort Monmouth's wastewater system would result in overall lower costs of utility service than continued Government ownership and operation; however, decision-makers would also need to consider non-economic issues, including environmental factors and reliability/security/safety concerns. Further, the maintenance and replacement of existing systems were becoming more complex and costly, making it difficult for the Government to operate the systems in compliance with the myriad of federal, state and local laws and regulations. New environmental laws and regulations may impose more stringent requirements on the utility systems, thus making it increasingly difficult for the Government to operate the utility systems are also required to meet the same environmental laws and regulations, it was opined that they are better positioned to respond to such requirements. Budgetary constraints and manpower limitations would also impact the Army's ability to continue to provide reliable services.

Due to its currently poor condition, a potential developer, or TRWRA, may prefer to install a new wastewater system rather than replacing, repairing and/or expanding the existing system, as required to accommodate future development of the Fort.

### **Stormwater**

The stormwater system is separate from the existing wastewater system. From the Main Post and Charles Wood Area, water flows through the network and discharges to various outfall locations, including Wampum Brook, Husky Brook, Husky Brook Lake, Lafetra Creek, Mill Brook, Parkers Creek, and Oceanport Creek. See Figures 5 and 6 in the Attachments.

The stormwater system was constructed approximately 65 years ago. Because of the age of the system, many pipes and catch basins are in the need of repair. Some of the outfalls on the Main Post are below the elevation of the mean high tide, particularly along Oceanport Creek and Parkers Creek; hence water backs up during high tides. The extreme southeast portion of the Main Post is subject to flooding during high tides and heavy rains. The Charles Wood Area in

the Borough of Eatontown is identified as an area of possible flood hazard. Stormwater in the 600 Area of the Main Post adequately carries stormwater and is not subject to flooding. It is important to note that, after a renovation of the Myer Center completed in the mid-1980s, the new boilers do not discharge to the stormwater system.

Implementation of a Stormwater Pollution Prevention Plan (SPPP) was outlined by URS Consultants in August 1994. The report states that NJDEP regulations require a SPPP be developed for each installation covered by a New Jersey National Pollutant Discharge Elimination System (NJPDES) permit for stormwater discharges. Fort Monmouth has prepared a SPPP covering both of the former NJPDES permits and the new Public Complex General permits for both the Main Post and Charles Wood Area. Eighteen (18) Best Management Practice (BMP) areas are delineated throughout the Main Post and Charles Wood Area, and are associated with various stormwater outfall locations. Fort Monmouth has a Stormwater Pollution Prevention Team who maintains overall responsibility for implementation and management of the SPPP and stormwater program. The team reports to the Environmental Quality Control Committee and has been delegated responsibility from the installation commander to achieve compliance with all aspects of the SPPP. Quarterly compliance inspections are conducted for all BMP areas and outfall locations.

### **Storage Tanks**

A total of 73 storage tanks were present in the Main Post and Charles Wood Area at one time, including 26 residential underground storage tanks (USTs) for heating oil, 16 commercial and 31 above-ground storage tanks. Currently, only 13 USTs remain; however, none of the storage tanks are used to store heating oil. They currently store either gasoline or diesel fuel for generators and vehicles.

The 13 remaining USTs are constructed of a single wall of fiberglass and the tank piping is constructed of double-walled fiberglass. The tanks are manifolded together in pairs with three product lines running from the tank field to the fuel dispensing islands. The product lines are sloped from the fuel dispensing islands back to a sump that is situated atop of one of the paired tanks systems. Liquid leak sensors have been installed inside the sumps and serve as continuous leak detection monitors for the piping. Automatic tank gauges have been installed within each tank and they continuously monitor the product levels within the tanks. Fort Monmouth has a comprehensive and thorough tank management program.

According to the January 2007 "Final Environmental Condition of Property Report", one 995-gallon, one 750-gallon, and two 275-gallon above-ground storage tanks are located in the Charles Wood Area and a single 275-gallon above-ground storage tank is located on the Main Post. The 995-gallon tank is the only one currently used to facilitate the proper collection and temporary storage of used oils. The 750-gallon tank and the three 275-gallon tanks are kept at the 90-day hazardous waste storage area for safe keeping. The tanks are of double wall steel construction and come equipped with a view port for inspecting the interstitial space between the primary and secondary tank wall for potential leaks. The tanks are designed to industry standards and are capable of effectively containing the enclosed oil. Furthermore, the tanks are compatible with the oil they contain. The outer containment walls are sufficiently impervious to contain the used oil in the event of a leak from the primary tank. The tanks feature a low profile

design for easy access and use. The tanks are visually inspected twice weekly for signs of leaks, proper labeling, and general site conditions. It should be noted that the inspection of the 90-day sites and those tanks are performed under a separate program. The 90-day sites are inspected daily and the tanks are inspected twice weekly.

## **Other Infrastructure**

### Boiler Plants

Three gas-fired boilers are located in Main Post Building 1220 and two gas-fired boilers are located in Charles Wood Area Building 2700. They primarily supply heat and hot water to those facilities.

### Geothermal Wellfields

Several geothermal well-fields are located throughout Fort Monmouth, on both the Main Post and Charles Wood Area. The wells are about 400 feet deep. Approximately three quarters of the field is currently in use. No detailed information or plans were provided regarding the wellfields or the specific buildings/facilities connected. This information would be required before a determination could be made on the feasibility or probability of a developer continuing the use of the geothermal fields. See Figures 13 and 14 in the Attachments.

### Communication Lines

Verizon Inc. provides communication services to the Fort Monmouth area. The operation and maintenance of these lines is controlled by the Army. Comcast provides cable television services to the installation. Information from these carriers has not been received.



## **REFERENCES**

Environmental Condition of Property Report, U.S. Army BRAC 2005, Fort Monmouth, Monmouth County, New Jersey, January 2007.

Final Integrated Natural Resources Management Plan, Fort Monmouth, New Jersey, USACE & Tetra Tech, Inc., December 1999.

Infiltration/Inflow Exfiltration Analysis Report, Fort Monmouth Area, New Jersey, Gannett Fleming, Inc., November 1981.

Memo, New Jersey Natural Gas, June 26, 2007.

Memo, JCP&L Engineering Division, Fort Monmouth Electric Service, June 16, 2007.

Potable Water and Waste Water Utility System, Privatization Study, Fort Monmouth, New Jersey, C.H.Guernsey & Co., April 1998.

Reconnaissance Report and Master Plan, Fort Monmouth Reuse.

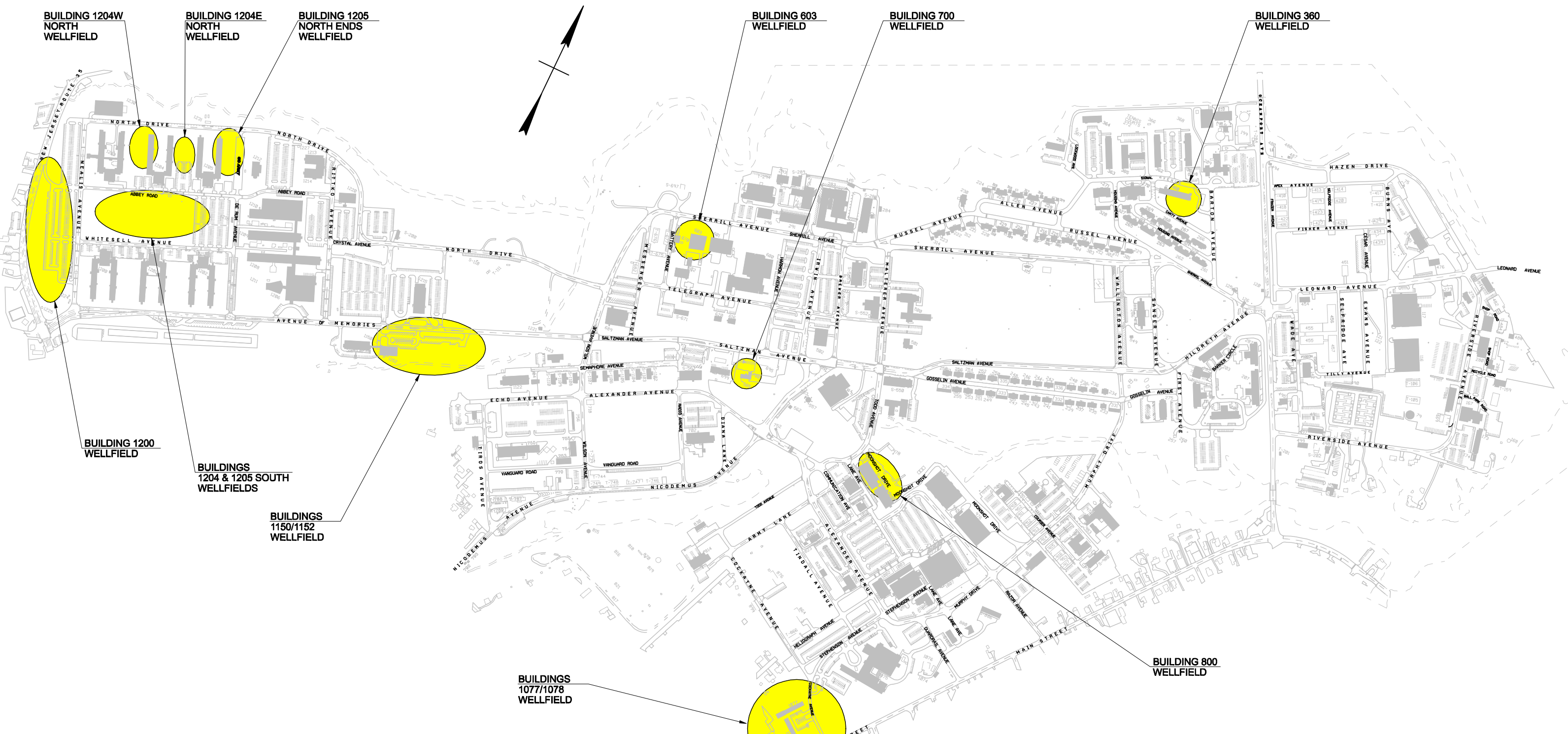
Storm Water Pollution Prevention Plan, Fort Monmouth, New Jersey, URS Consultants, August 1994.

Stormwater Management Plan, Borough of Tinton Falls, Monmouth County, New Jersey, Leon S. Avakian, Inc., April 2005.

**Figures/Maps in this section have been deleted due to security and force protection issues.  
Deleted pages are flagged with two asterisks (\*\*).**

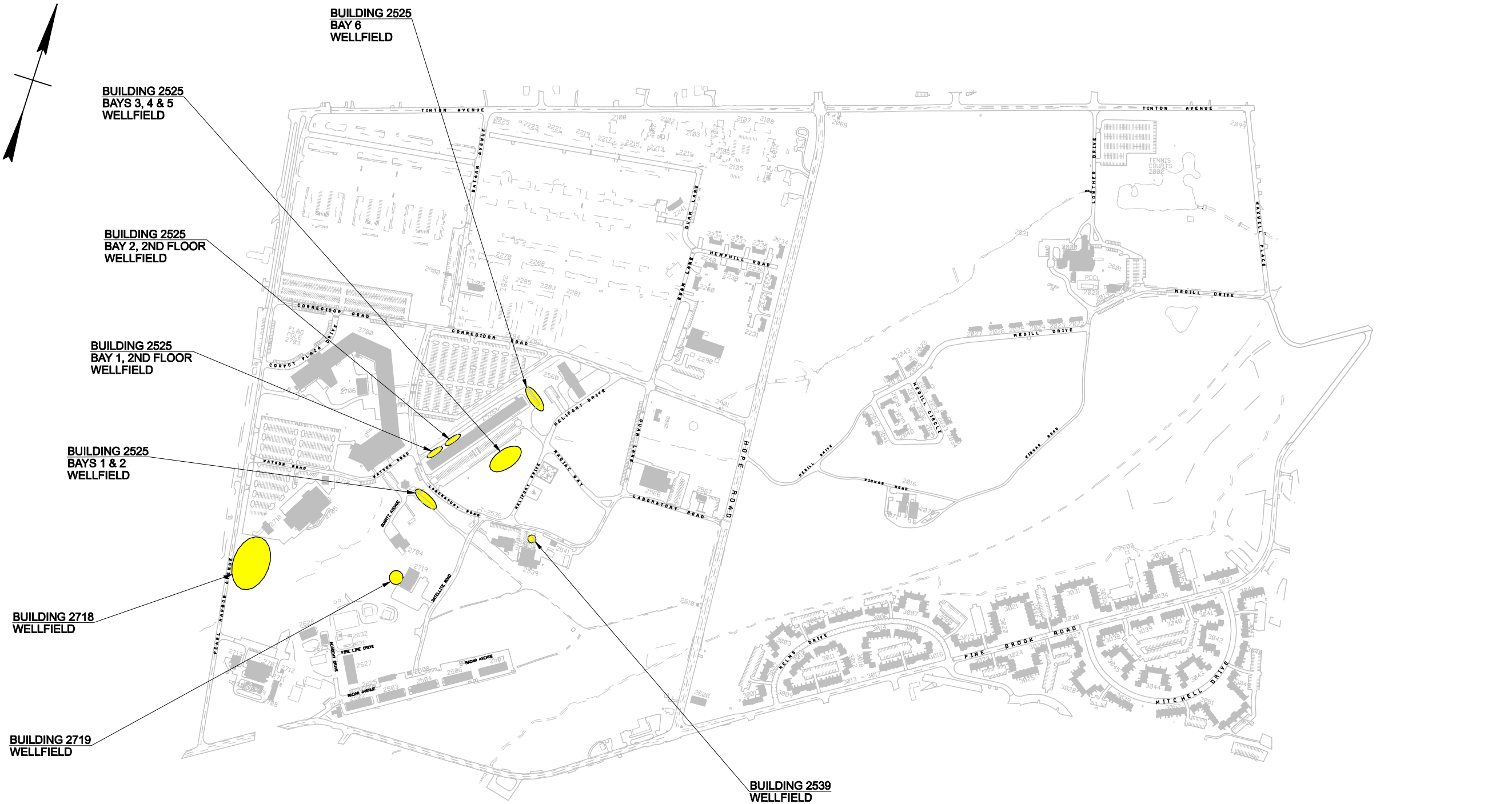
**ATTACHMENTS – FIGURES 1 THROUGH 16**

1. Water Supply Systems Main Post \*\*
2. Water Supply Systems Charles Wood Area \*\*
3. Sanitary Sewer Systems Main Post \*\*
4. Sanitary Sewer Systems Charles Wood Area \*\*
5. Storm Water Systems Main Post \*\*
6. Storm Water Systems Charles Wood Area \*\*
7. Electric Systems Main Post \*\*
8. Electric Systems Charles Wood Area \*\*
9. Gas Systems Main Post \*\*
10. Gas Systems Charles Wood Area \*\*
11. Telecommunication Systems Main Post \*\*
12. Telecommunication Systems Charles Wood Area \*\*
13. Geothermal Wellfield Locations Main Post
14. Geothermal Wellfield Locations Charles Wood Area
15. Building Area Designations Main Post
16. Building Area Designations Charles Wood Area



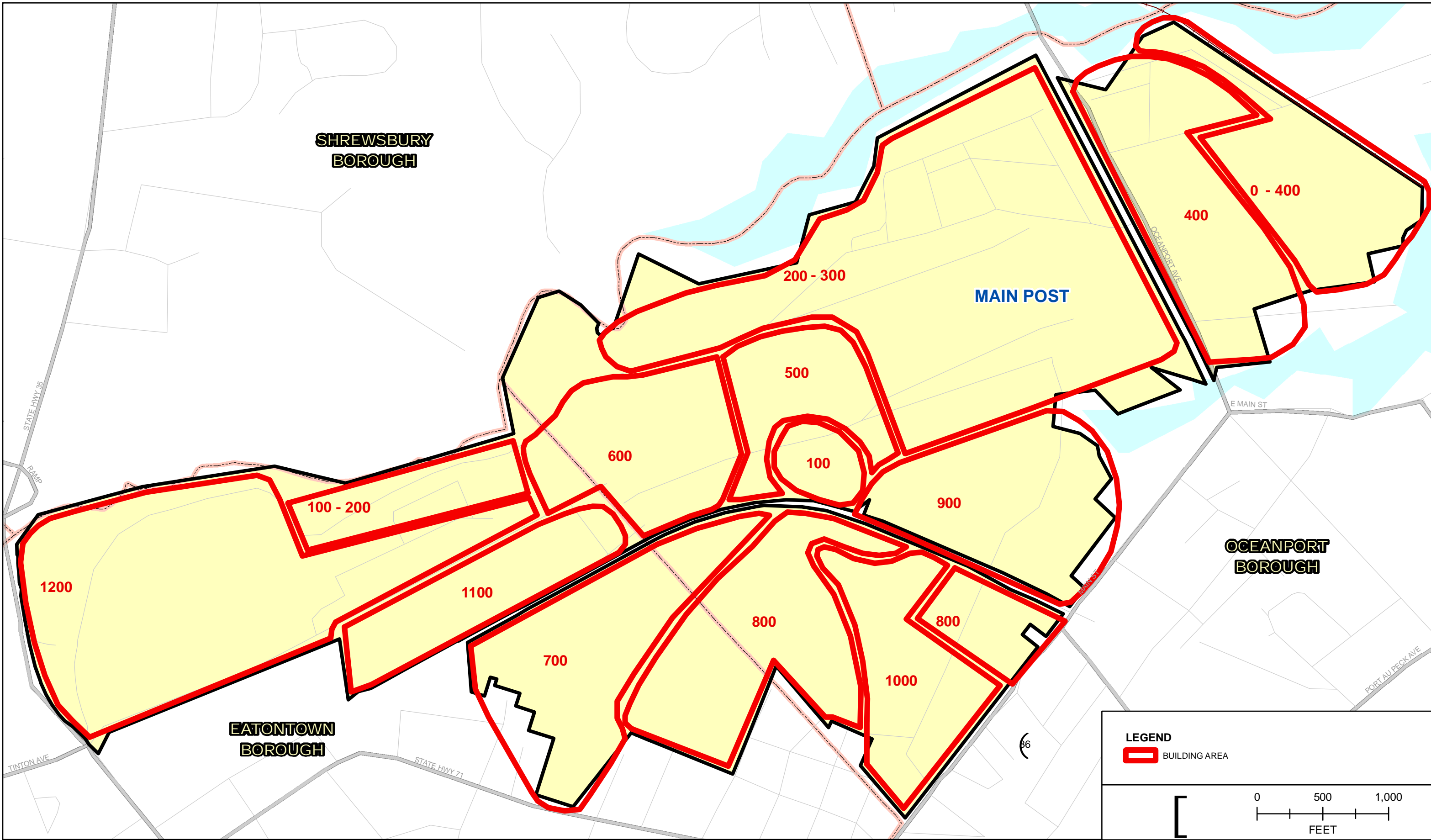
**NOTES:**  
 THE INFORMATION RELATED TO THE BASE MAP AND THE UTILITY DISTRIBUTION SYSTEM HAS BEEN OBTAINED FROM THE "DIRECTORATE OF PUBLIC WORKS", FORT MONMOUTH, NEW JERSEY (DATED JANUARY 21, 1999)

**LEGEND:**  
 WELLFIELD LOCATION



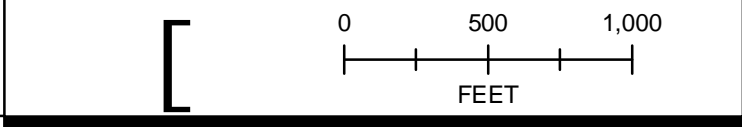
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**LEGEND:**  
 WELLFIELD LOCATION



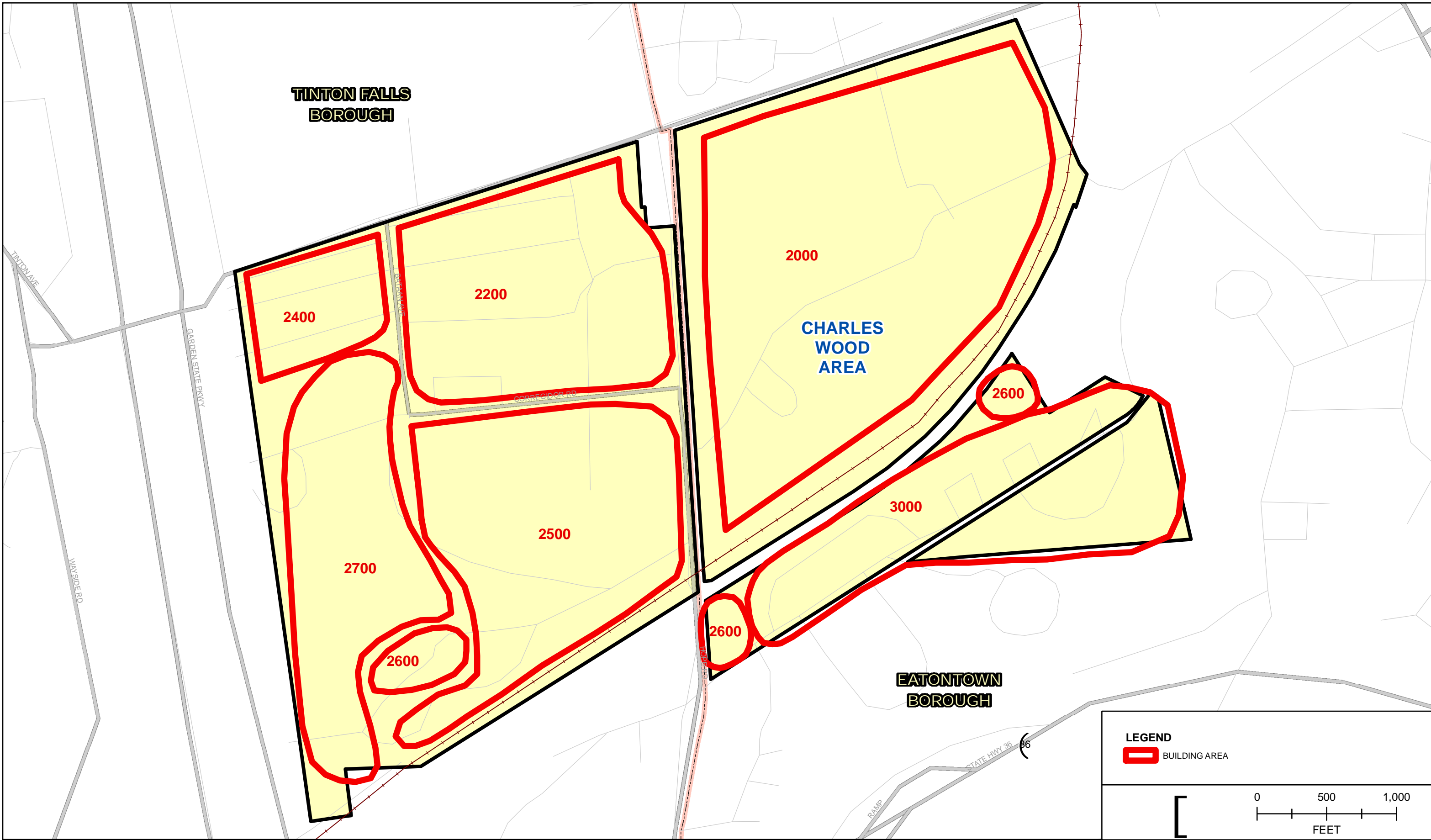
**LEGEND**

 BUILDING AREA



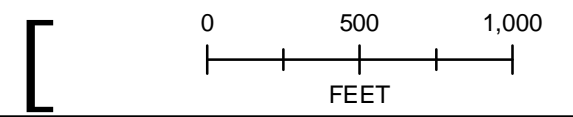
**FIGURE 15: BUILDING AREA DESIGNATIONS  
MAIN POST**

**TINTON FALLS  
BOROUGH**



**EATONTOWN  
BOROUGH**

**LEGEND**  
[Red outline] BUILDING AREA



**FIGURE 16: BUILDING AREA DESIGNATIONS  
CHARLES WOOD AREA**