

Memorandum

To: Maurice Goulet
From: Environmental Partners Group, Inc.
Cc: Medfield Board of Water and Sewerage
Date: November 17, 2017
Subject: New Source Exploratory Drilling

The summary below describes field activities performed for the completion of Tasks 7 through 9 of the New Source Test Wells project.

Task 7 – New Source Test Wells

Exploratory drilling was performed at the following potential new water supply source sites: Noon Hill (Site #8), Plain Street Farm (Site #10) and McCarthy Park/Hospital Farm (Site #3). These sites are identified on *Figure 1 – New Source Locus Map*.

Drilling was performed by Maher Services using a Geoprobe 7822 DT rig. Borings were completed with the dual tube sample system of either 4.5-inch or 3.5-inch casings, or 2.25-inch probing rods advanced to refusal or till at each location. Soil samples were collected from borings completed with 4.5-inch dual tube or 3.5-inch dual tube, however it was not possible to collect samples from borings completed with the 2.25-inch probing rods. The 2.25-inch rods were used to perform exploratory probing at locations where shallow refusal was encountered, or poor material had been observed.

Noon Hill (Site #8)

On November 1, 2017, Maher Services and Environmental Partners field staff mobilized to the first potential new source water supply site at Noon Hill (See *Figure 1 – New Source Locus Map*). After completing two borings to confirm unsuitable aquifer material on site, Noon Hill was deemed unfit to be a new source water supply location.

- Two locations were selected, within the 400-ft Zone I area, to complete soil borings
- TW-4 was completed by driving 2.25-inch casing to refusal at 34-feet below ground surface (bgs)
 - Poor aquifer material consisting of fine sands and silt was observed from the soil samples collected
 - This location was determined to be an unsuitable location for a test well
 - No wells were installed at this location
- TW-5 was completed by driving a 2.25-inch casing to refusal at 34-feet bgs
 - This boring was drilled approximately 50-feet Northeast of TW-4
 - Poor aquifer material consisting of fine sands and silt was observed from the soil samples collected
 - Evidence of the water table (iron concentration) was observed at approximately 14-feet bgs
 - This location was determined to be an unsuitable location for a test well
 - No wells were installed at this location

Plain Street (Site #10)

On November 2, 2017, Maher Services and Environmental Partners field staff mobilized to the next potential new source water supply site at the Plain Street Farms (See *Figure 1 – New Source Locus Map*). After the first attempt of using the 4.5-inch dual tube sampling system failed with shallow refusal, Environmental Partners decided to use the 2.25-inch probing rods to more efficiently investigate the surrounding area in all directions in efforts to find deeper bedrock and potentially suitable aquifer material. All borings were located within the 400-foot Zone I area, and within the zone of coarse stratified glacial deposits estimated in MassGIS. Eight additional borings were completed using the probing rods, though no soil samples were collected. After shallow refusal and dense subsurface material was encountered at all explored locations, Plain Street was deemed unfit as a potential new source water supply location. No wells were installed on site.

- B-1 was completed using 4.5-inch dual tube sampling, in order to recover a 3-inch sample core
 - Refusal was encountered at 4-feet bgs
- The following eight (8) borings were completed using 2.25-inch probing rods
 - B-2: Refusal at 5-feet bgs
 - B-3: Refusal at 6-feet bgs
 - B-4: Refusal at 6-feet bgs
 - B-5: Refusal at 5.5-feet bgs
 - B-6: Refusal at 9.5-feet bgs, very tight drilling the entire length of the boring
 - B-7: Refusal at 13-feet bgs, very tight drilling the entire length of the boring
 - B-8: Refusal at 15-feet bgs
 - B-9: Refusal at 4-feet bgs

McCarthy Park/Hospital Farm (Site #3)

On November 3, 2017, Maher Services and Environmental Partners staff mobilized to Site #3 at 44 Hospital Road. A 4.5-inch dual tube sampling system was used at the first boring location, and soil samples were collected to shallow refusal. Environmental Partners then decided to use the probing rods again to efficiently gauge depth to bedrock and refusal in all directions before selecting a better location for sampling. Shallow refusal was confirmed in all directions surrounding the original boring location, and therefore Site #3 was abandoned as a potential new source water supply site. No wells were installed on site.

- TW-6 was completed with 4.5-inch dual tube sampling
 - Refusal encountered at 13-feet bgs
 - Poor aquifer material, including extremely dense till, was observed from 5-13-feet bgs
- The following four (4) borings were completed with 2.25-inch probing rods
 - B-10
 - Located approximately 50-feet south downhill of TW-6
 - Refusal encountered at 5-feet bgs
 - B-11

- Located approximately 50-feet west of TW-6
- Refusal encountered at 15-feet bgs
- B-12
 - Located approximately 50-feet north of TW-6
 - Refusal encountered at 11-feet bgs
- B-13
 - Located approximately 50-feet northeast of TW-6
 - Refusal encountered at 14-feet bgs

Task 8 – Hospital Well

Former State Hospital Tubular Wellfield (Site #15)

On November 6, 2017, representatives from Environmental Partners met at the DPW to discuss plans to perform exploratory drilling on Site #15, at a new proposed location to the southeast of the existing tubular wellfield. This location would require the utilization of additional land from surrounding properties, should suitable aquifer material be discovered. This proposed location was 680-feet north of the trailhead of off Wight Street, and then approximately 15-feet west off the edge of trail. On November 10, 2017, Maher Services and Environmental Partners mobilized to Site #15. Because this location was unlikely to have suitable subsurface material from the top of a hill, Environmental Partners started exploration using the 2.25-inch probing rods. After two borings were completed to shallow refusal, with no evidence of a water table, this site was abandoned.

- B-14: Refusal encountered at 10-feet bgs
- B-15: Refusal encountered at 29-feet bgs
 - Located approximately 15-feet west of B-14
 - Very tight drilling past 22.5-feet bgs
 - If we were to sample, we could only drive the sampling system to 22.5-feet due to the dense material

Task 9 – Well #4 Test Well

Environmental Partners field staff and Maher Services performed work surrounding Well #4 between October 30 and November 10, 2017. A total of six (6) borings were completed on site, in efforts to find a suitable location for a potential replacement well. All borings were located at least 150-feet away from wetlands and within 250-feet of the existing Well #4, to comply with DEP requirements. Three (3) borings located to the west of Well #4 were completed initially, with no suitable materials observed. Environmental Partners then proposed a new approach, to drill two (2) additional exploratory borings: one between Well #3 and Well #4, and another to the north of Well #4. Though the boring between Wells #3 and #4 showed poor material, the boring to the north of Well #4 was found to have suitable aquifer material at the same screen interval of Well #4. A 3-inch test well and 2-inch observation well were installed at this location, TW-8/OW-8. Following well development, a 2-hour pumping test was conducted on TW-8. See *Figure 2 – Well #4 Site Locus* for all boring locations.

- TW-1
 - 4.5-inch dual tube sampling system
 - Collected 3-inch sample cores
 - Refusal encountered at 60-feet bgs
 - Tight drilling encountered below 20-feet bgs
 - Unsuitable aquifer material observed, short stratified layers of medium sand in fine dense silt
 - Water table observed at approximately 10-feet bgs
- TW-2
 - 3.5-inch dual tube sampling system
 - Collected 2-inch sample cores
 - Refusal encountered at 49-feet bgs
 - Unsuitable aquifer material observed, short stratified layers of medium sand in fine dense silt
 - Water table observed at approximately 9-feet bgs
- TW-3
 - 3.5-inch dual tube sampling system
 - Collected 2-inch sample cores
 - Refusal encountered at 55-feet bgs
 - Unsuitable aquifer material observed, short stratified layers of medium sand in fine dense silt
 - Water table observed at approximately 9-feet bgs

After completing exploratory drilling activities for potential new source water supply sites, drillers and field staff mobilized back to the Well #4 site to attempt drilling at two other locations.

- TW-7
 - 4.5-inch dual tube sampling system
 - Collected 3-inch sample cores
 - Refusal encountered at 37-feet bgs
 - Unsuitable aquifer material observed, short stratified layers of medium sand in fine dense silt and silty sand
- OW-8/TW-8
 - 4.5-inch dual tube sampling system
 - Collected 3-inch sample cores
 - Refusal encountered at 61-feet bgs
 - Suitable aquifer material observed from 30-45 feet bgs, coarse sands, gravel and cobbles
 - Water table observed at approximately 4-feet bgs
 - Best aquifer material was observed at the same interval as that of Well #4, between 32-42 feet bgs
 - Set a 2-inch observation well and a 3-inch test well at this location
- Well Construction
 - OW-8
 - Total depth – 42-feet bgs

- Screen Interval – 32-42 feet bgs
 - 60 slot stainless steel 10-foot x 2-inch screen
 - 35-feet of 2-inch schedule 40 PVC riser
 - Bentonite from 5-8 feet bgs
 - Natural Pack
 - 3-feet of stick up
 - 4-inch, locking protective steel casing
 - Note: Stainless steel screen was used to see how the well pumped with 60-slot and to set ideal target screen zone
- TW-8
 - Total depth – 42-feet bgs
 - Screen Interval – 32-42 feet bgs
 - 100 slot stainless steel 10-foot x 2-inch screen
 - (1) 2-inch to 3-inch screen to PVC adapter
 - 35-feet of 3-inch schedule 40 PVC riser
 - Bentonite 5-8 feet bgs
 - 3-feet of stick up
 - 4-inch, locking protective steel casing
 - Static WL – 8.2' (top of PVC), 5.2' (bgs)

TW-8 2-Hour Pumping Test

A 2-hour pumping test was conducted on TW-8 on November 10, 2017. The suction pump was turned on at 9:00 AM and turned off at 11:00 AM, at which point recovery measurements were taken to 95% of the static water level. Recovery up to 95% was achieved after approximately 10 minutes of the pump being turned off. Throughout the pumping test, the pumping rate ranged from 97 to 94 gallons per minute (GPM).

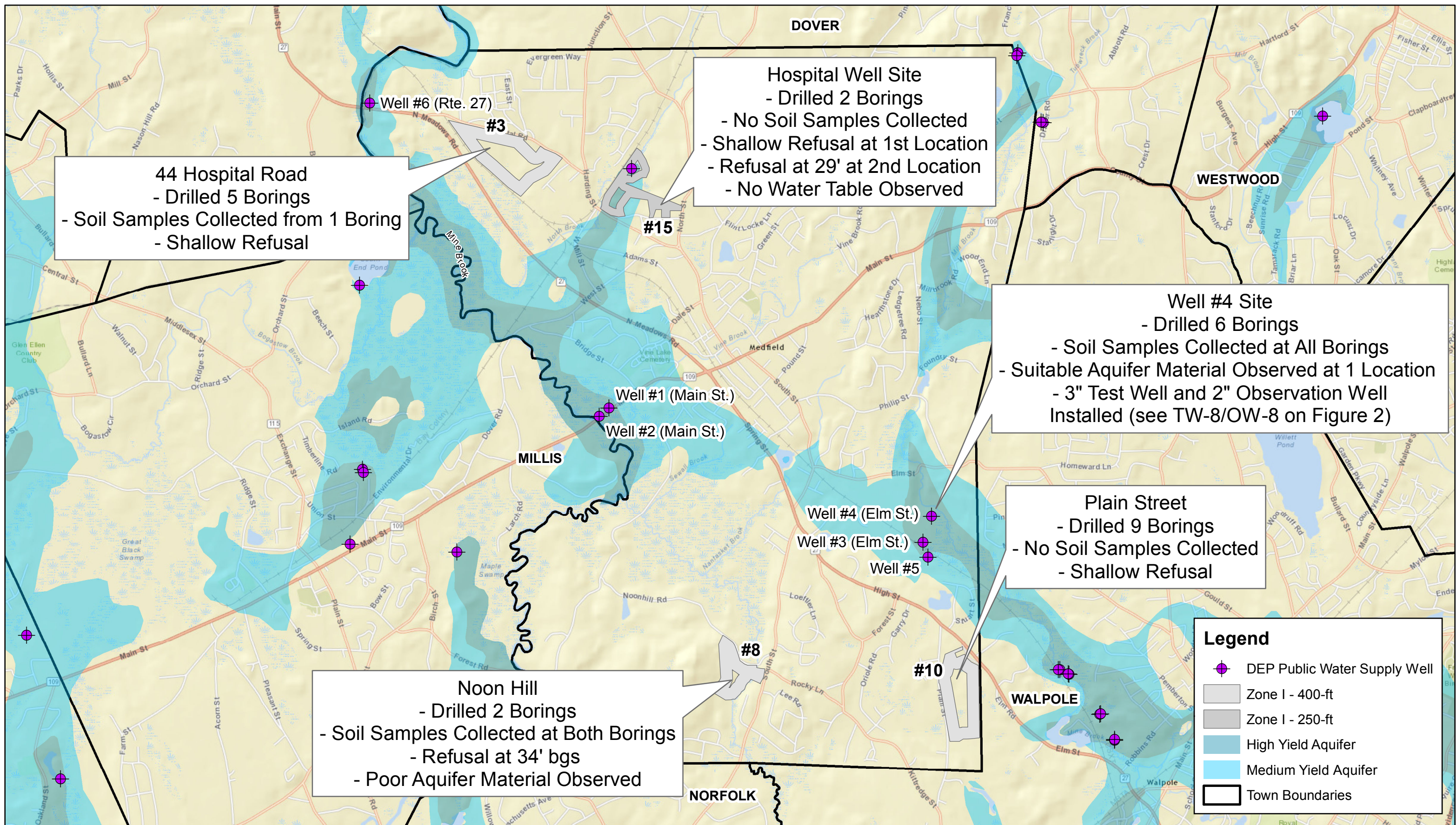
- Static Water Level – 8.23' (below top of PVC)
- Water Level at End of Test – 10.25' (below top of PVC)
- Total Drawdown – 2.02'
- Pumping Rate at End of Test – 97 GPM
- Specific Capacity – 48.02 GPM/Ft (approx. 1.5 MGD, 22 feet of available water)

Water quality will be analyzed beginning Tuesday, November 14, 2017. Samples will be lab tested for secondary contaminants including iron and manganese, coliform bacteria, nitrate, nitrite, and volatile organics. Online iron and manganese analyzers were temporarily installed and began monitoring water from TW-8 on Thursday November 16, 2017.

Attachments

Figure 1 – New Source Locus Map

Figure 2 – Well #4 Site Locus



0 3,000 6,000 12,000 Feet
 1 in = 3,000 feet

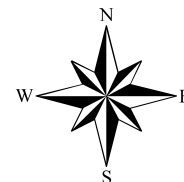


Figure 1: New Source Locus Map
Exploratory Drilling Locations and Aquifer Zones
November 2017
Medfield, MA

