

## Appendix B

1. Notes from 11-10-21 Conversation with MA State Geologist Stephen Mabee, Smith College Hydrogeologist Bob Newton, South Hadley Planning Director Anne Capra
2. Notes from 10-6-21 conversation with Fire District #2s Mark Aiken and South Hadley Planning Director Anne Capra
3. Notes from 11-15-21 conversation with MassDEP WERO's Catherine Skiba - on South Hadley

**Notes from 11-10-21 Conversation with  
MA State Geologist Stephen Mabee, Smith College Hydrogeologist Bob Newton,  
Planning Director Anne Capra**

To provide context for conversation, Anne and Patty began by providing overview of Dry Well Brook drinking water supply, including mapping (surficial geo, zoning, and land protection) and key highlights from USGS analysis and North Pole Estates proposal. Steve and Bob were familiar with the 2004 USGS study and the scientists and town officials involved.

Following are key elements of the conversation that ensued, including major takeaways, next steps, and points of discussion.

**Major take-aways:**

- Water could be moving in from far away to supply Dry Brook Well so extent of Drinking Water Supply Protection Overlay District in South Hadley zoning should not be reduced.
- Not much has changed in terms of modeling since 2004 USGS study other than it can be done so much more easily. The graphical interface has been enhanced and ease of analysis so much easier. Dave Boutt is the person to provide greater specifics on this as he does a lot of modeling.
- Isotopic analysis of water would be very helpful to better understanding sources of supply. This so-called “fingerprinting of water” can identify such things as an evaporative signal, indicating water is from the Connecticut River, or even whether the source was rainfall in a storm coming from the West or from the South/Caribbean. Such signals can remain for even after 5 years.

**Next steps:**

- Steve will talk with Dave Boutt to come up with a plan of sampling on the isotopic analysis.
- Anne will determine how to move sampling program forward. Bob offered to run samples through his lab at Smith for free. Al Werner might be interested in organizing students to collect samples, but not clear whether he has lab to run analysis.
- Bob will continue looking for good research on impacts of excavation in recharge areas
- Patty will go back to USGS study to pull any additional information on 3D understanding of this area and possible role of water moving through faults.
- Patty will also check with MassDEP on who specifically did the modeling for Zone II delineations.

**Major points of discussion:**

Geology of the area

- It is important to look at USGS study for cross sections
- 3D picture here is extremely important to understanding recharge. Without knowing how geology stacks up, it is hard to be specific
- Could be that recharge occurs where clay layer pinches out or where there are holes in clay layer, which would indicate direct connection with meteoric rainfall
- Noted that in another study area, there was no way to explain water budget other than that 2 MGD coming up from bedrock sources below

- The gap in the Range here and known deep faults in bedrock running across this area means that should not underestimate the possible role of deep-seated regional flow paths through fractured rock

#### Excavation in recharge area and risks

- Not a lot of existing research on impact of gravel mining on aquifers, but perhaps some research in Wisconsin and Minnesota
- Rule of thumb is that the more unsaturated zone you have, the better the ability to filter out harmful substances from groundwater sources
- As Bob has another project where this topic is of interest, he will continue research and share with us any information that he is able to find
- North Pole estates had planned for removal of about 400,000 cubic yards of gravel which would take grade down by about 58 feet
- There was some discussion about restoration of grade, but noted that under Title 5 rules this could not be done. Septic systems must be constructed in native soils, and septic perc tests must be in native soils.
- With removal of some 50 feet, there would be 100 feet of depth to groundwater, which unfortunately left MassDEP rather unsupportive of Town concerns on earth removal.

#### Isotopic analysis

- Could get better sense of water source through “fingerprinting,” which entails isotopic analysis of samples
- Need only 10 ml bottles and there is not a lot of special handling required of samples
- Cost of analysis is low: \$10 at UMass; Bob is offering to do for free at Smith; Al Werner may also have capacity to analyze at MHC.
- Best to sample from public supply wells, as well as domestic wells, and streams at different times of the year/seasons

#### Earth MRIs

- Would be great to do Earth MRI of the region to produce good 3D model.
- USGS is doing this with helicopter and electromagnetics.
- Right now, resources are focused on places with “critical mineral resources,” which we don’t have much of in our region.
- Aim is to reduce reliance on foreign sources of minerals that are key to economy and national security.

**Notes from 10-6-21 conversation with  
Fire District #2s Mark Aiken and Planning Director Anne Capra**

From website, <https://www.shdistrict2.org/>: South Hadley Fire District No. 2 is an independent regional quasi-municipal government operating within the towns of South Hadley and Granby  
Fire District 2 has three distinct departments:

District Government - facilitates and oversees district meetings, elections, and financial matters.

Water Department - ensures the district's water supply by monitoring water quality and maintaining the distribution infrastructure.

Fire Department - provides Fire Protection and Emergency Medical Services to all individuals within the District as well as surrounding areas via mutual aid.

1. How many households and businesses (out of all in Town) receive supply from Dry Brook well(s)?
  - Approximately 1,600 service connections with 150 homes located in Granby (Registration indicates 1,589 service connections)
  - 6,200 customers of which 2,200 are Mount Holyoke College (so summer is 4,000)
  - If you have a private well for drinking water supply, you cannot have FD#2 service connection.
  - Exception is for private irrigation wells where the water line does not enter the foundation of house
  
2. A 2019 report notes that the Dry Brook wells operate under a Water Management Act Registration. Can you tell us about the well Registration under which you operate? Are new and older well under same Registration?
  - Yes, all operated under a Registration. Extended until April 6, 2023.
  
3. What is current withdrawal limit? How does that compare with actual use? What reporting duties do you have to MassDEP?
  - Authorized to pump .68 MGD, approximately 250 MGY
  - Only pumping 150 MGY
  - Annual statistical report, sampling schedule
  - Have a SOC, VOC, PFAS waiver (ND on PFAS so do not need to test again until 2024)
  
4. Do you know how Water Supply Protection District boundary was delineated?
  - Not sure, but likely legacy delineation from when operating other sources Lithia Springs, Batchelor Brook.
  
5. Does Fire District #2 monitor water levels in well? If yes, can you please share information?
  - Have transducers in wells to determine static pumping levels
  - So know that getting about 950 gallons/minute in older well; and 1,000 gallons/minute in newer well
  - Have very high recharge rate: can pump 1,000 gallons a minute and see a 20-foot drop in water level, but 15 minutes later the level has recovered

6. Have you noticed any changes in wells with extremes we have had of inundation and drought?
  - No, but definitely more pumping occurring during drought given demand for water for irrigation, swimming pools, etc.
  - Last year pumped 69 gallons per day per person, which includes Mt. Holyoke College.
7. What do you use as reference for drought conditions?
  - There is no reference or trigger currently.
8. What are your concerns and plans for the future on the drinking water supply wells?
  - North Pole Estates was a big concern given the plan to remove so much earth in the primary recharge area
  - Need a generator and pump, but no diesel fuel allowed in Zone 1. Propane represents much higher cost, hundreds of thousands.
  - Have multiple interconnections with Fire District #1
  - Have water use restriction bylaw for District, but have never instituted in 30 years.
  - Concern about 2023 Water Management Act Registration renewal and likely restrictions. Sale of water generates revenue for operating costs and capital investment in system.
9. What information needs would you say are essential to better understanding resource protection?
  - Worried about what people are doing in the Zone 2 with septic systems, fertilizers, salt products. We send information out in bills, but not sure how effective. All buildings in the Zone 2 are on septic systems; sewer does not cross beyond Batchelor Brook.
  - Planned timber harvest along Amherst Road and demolition of an abandoned pumping station within 300' of Elmer Brook (permit received through Conn-Com) is that protective of drinking water?

**Other notes:**

- There are 37 Fire Districts in MA that also have drinking water operations
- Received 4-6-20 letter from Catherine Hamilton at MassDEP, indicating that until local protection controls meet 310 CMR 22.21 (2), the Water Department will continue to be subject to Best Effort Requirements for new source approvals, water management permits, and monitoring waivers. Does not specify which part of code not met.

**Notes from 11-15-21 conversation with  
MassDEP WERO's Catherine Skiba - on South Hadley**

On Dry Brook Well Zone II delineation...

South Hadley had unique help in defining the Zone II through the USGS study. Most Zone IIs in the region were defined through an analytical model (consideration of geology and extent of aquifer and some conceptual). With the USGS study, there was a numerical model (using ModFlow). The approach used the same criteria, but entailed a 3D numerical model, providing more exact results.

On whether it makes sense to do additional study to better understand the recharge area...

Catherine said that new geologic information could change the results, but the model is the model (without new inputs the results will be the same).