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From: Kristopher Keenan <KKeenan@facetnw.com>
Sent: Aug 8, 2024 4:26 PM
To: billburnett@earthlink.net <billburnett@earthlink.net>
Cc: Brendan Zwiefel <BZwiefel@facetnw.com>
Subject: Polnell Landing Treatment Project

Hi Bill,

Thanks for taking my call this afternoon regarding the Polnell Landing treatment project. We discussed two main items:

1. The existing well pump and booster pumps do not have sufficient capacity to backwash the new treatment system, so system upgrades beyond what we initially anticipated are required to ensure the proposed treatment system functions properly.
2. Location of proposed treatment system within the pumphouse and impacts on existing treatment operations during construction.

Let's take the backwash issue first. We prefer to use the well pump to backwash filters in most scenarios where possible because it is the simplest configuration. During a site visit, we measured the flow rate of the well at about 16 gpm. This is not sufficient for backwash. When the well pump does not have adequate capacity for backwash, the next option is to use booster pumps for backwash. Doing this increasing system complexity, so it is preferred to backwash with the well pump where possible. We looked at the capacity of the booster pumps and they cannot provide enough pressure to backwash the proposed filters properly. When both the well pump and booster pumps cannot provide backwash, your options are: 1) rehab the well/replace the well pump with a pump that has adequate capacity, 2) replace booster pumps with pumps that have adequate capacity, or 3) install a dedicated backwash booster pump. All three of these options will require additional engineering fees to address issues outside the scope of our current contract. See discussion on each option below.

1. **Rehabilitate well and replace well pump**

The system's WFI form (see attached) states a well capacity of 35 gpm (compared to the 16 gpm we measured in the field), suggesting that the well has lost capacity over time. This could be due to things like a clogged well screen, aging/failing well pump, and/or changes in the water level of the well. Rehabilitating the well (by chlorination and/or redevelopment), replacing the well pump, and replacing/repairing other well components (i.e. casing and riser pipe) has the potential to address these issues and

increase the well's capacity. The following anecdotal information from King Water suggests that the well may need rehabilitation:

- Water level in well casing has risen and the system has recently had an increase in coliform bacteria hits. It is possible that these two issues are related. There could be a leak in the well casing or riser pipe that is leaking water into the casing and causing bacteria hits.
- Iron bacteria is present in the well. This could clog the well screen and decrease pumping rate.

Bill also mentioned that the well pump hasn't been replaced in about 15 years. We typically see a 15 to 20 year life expectancy for well pumps, so it is also possible that the well pump itself has degraded as it has gotten older and it needs replacement

If we went with this option, we would want to rehab the well and replace the well pump at the same time because the well its self appears to have issues and the well pump is nearing the end of its life expectancy. Successfully rehabbing the well and installing a pump that provides sufficient capacity for backwash would be ideal because it would allow us to backwash the system with the well pump, which is the simplest configuration. It would also address the apparent issue of decreased well capacity. We wouldn't want to be in a scenario where we installed the treatment system, didn't address the well issue, the well situation got worse, and the well couldn't produce enough water to meet system demand. Addressing the well issue in conjunction with the treatment system would be in the long term interest of the system. The down side of this option is that it could add a few months to the project time line because we will need to rehab the well and replace the well pump before finalizing out treatment design.

2. **Replace booster pumps**

   The system's existing booster pumps appear to be quite old and may be nearing the end of their lifespan. Other than apparent age, I don't have any knowledge of current problems with the booster pumps. We could potentially replace the booster pumps with new pumps that have adequate capacity for backwash and backwash the filters with those new pumps. The advantages of this option are: 1) we would replace booster pumps that appear old, and 2) this would not increase the project time line as much as the well/well pump option, but some additional time would be required to do the engineering/sizing of the booster pumps. The disadvantages are: 1) using the booster pumps for backwash increases system complexity, and 2) the issue of decreased well capacity is not addressed. Total

costs for this option (construction and additional engineering fees combined) are likely similar to that of the first option.

3. **Install dedicated backwash booster pump**

We can also leave the existing booster pumps in place and install a new dedicated backwash booster pump. This pump would only be used for back washing the filters. Advantages of this option are: 1) It will cause the least delay for the project timeline, and 2) it is likely the less expensive option in terms of both construction and additional engineering fees. Disadvantages are: 1) a dedicated booster pump for backwash will still increase system complexity compared to using the well pump, 2) the issue of decreased well capacity is not addressed, and 3) the existing booster pumps will likely need replacement sooner rather than later and it would make sense to size those pumps so they can backwash the filters, making the dedicated booster pump no longer necessary.

My recommendation is to rehab the well and replace the well pump.

Switching to the location of the proposed treatment system:
The existing filters are right along the pumphouse wall. We could put the proposed filters in the same spot or we could put them in the space between the existing filters and the existing booster pumps. Each option has its pros and cons.

Putting the proposed filters where the existing filters are would require us to take treatment offline for a period of time. If we demoed the existing filters at the start of construction to make room for the proposed filters, the system would be without treatment for the entire construction time (likely 1 to 2 months). Alternatively, King Water may be able to temporarily move the existing filters to the middle of the pumphouse (treatment would likely be offline for a few days for this) and then we could put the proposed filters where the existing ones were. Putting the proposed filters against the pumphouse wall makes the most long term sense. Putting them in the middle of the pumphouse floor would be a little funky and could potentially impact where future replacement booster pumps could go. But, putting the proposed filters in the middle of the pumphouse will allow us to keep existing treatment online for the entire construction time, expect for a few hours at the end of construction where treatment would be offline to switch over to the new treatment system.

King Water has mentioned that the existing treatment system is not working. Considering this, I recommend putting the proposed filters against the wall where the existing ones are. The downside is that without treatment, you would have iron and manganese entering your reservoir and distribution system. But neither of these are primary drinking water contaminants and your are only over the MCL for manganese.

Let me know if you have any questions.

Thanks,

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