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Title

Ground Water Well Design and PFAS Treatment

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Peer reviewed



Consulting
Engineers

Groundwater Well Design and PFAS Treatment

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Industry Advisor: Zeki Kayiran, P.E. AKM Consulting Engineer



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University of California, Irvine

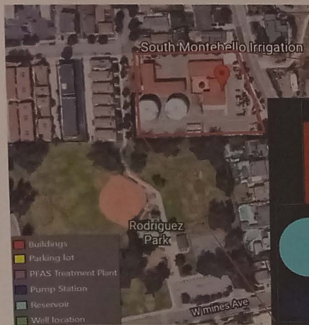
Project Description

Group E2 is working with AKM Consulting Engineers to design a groundwater well to meet an increase in water demand for South Montebello Irrigation District. In addition, a Perfluoroalkyl (PFAS) treatment will be added on-site to target and remove PFOA and PFOS, which were found to be in the water supply during feasibility testing of the well site determination.

Site Location & Constraints

Constraints

- Well Location
- Site Size
- Noise Pollution



PFAS

Per- and polyfluoroalkyl substances (PFAS) are a class of nearly 5,000 carcinogenic compounds used in manufacturing. Their non-biodegradability and resistance to heat and oils has given them the nickname of a "forever contaminate."

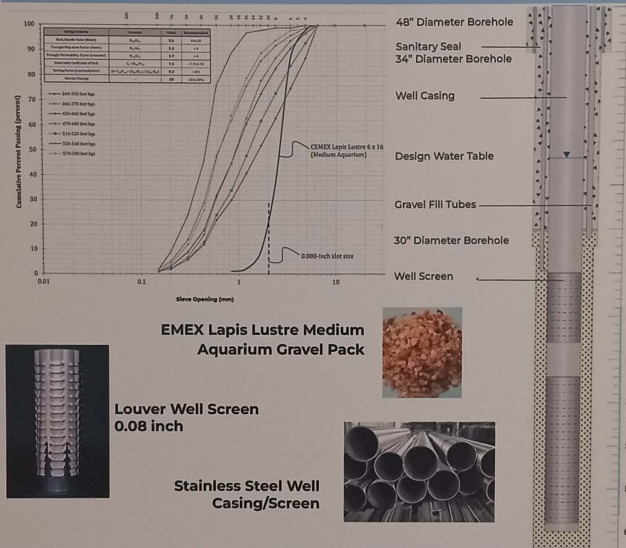
CA Notification Levels as of March 5, 2021:

- 10 PPT for PFOA
- 40 PPT for PFOS

These contaminants are found in:



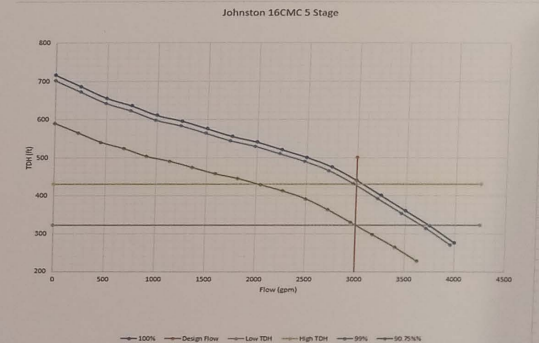
Well Specifics



Pump Curve

- Pump Selection Parameters**
- Johnston 16MC 5 Stage
 - 12 inch diameter bowl
 - Closed impeller, typically used in deep well pumping

Pumping Rate (GPM)	Discharge Pressure (psi)	System Pressure (psi)	Total Dynamic Head (ft)
3000	70	60 - 65	Low - 323 High - 430



Well Screen & Pump Type Alternatives

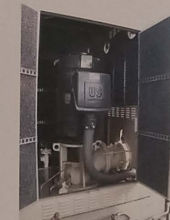
Louver

- One tube with punched slots
- Customize size & number of slots
- Durable
- Easy to clean



Wire Wrapped

- Continuous wire wrap
- Less Durable
- Hard to clean



Above Ground Well Pump

- Steady water flow
- Easily accessible
- Inexpensive O&M

Submersible Pump

- Energy efficient
- Minimal maintenance
- Self priming
- Quiet



PFAS Treatment

	Granular Activated Carbon (GAC)	Reverse Osmosis	Ion Exchange Resin
Advantages	- Method has been used for 15 years - Most studied method - Works well on longer chained PFAS	- Can remove up 93% of all contaminants - Can remove both short and long chain PFAS	- Can target specific PFAS - Low empty bed contact time - Removes multiple contaminants at a time - Smaller footprint - Lower long-term operating costs - Lower upfront capital expenses
Disadvantages	- High empty bed contact time - Less effective on removing smaller chains of PFAS - Need backwash - High operating cost - Requires large area	- Expensive to maintain - No safe way to dispose of concentrated waste (containing PFAS) - Noise from pumping - 80% water waste	- Cannot be used if oxidants are found in the water