How To Develop The Best Construction Dewatering Solutions

Basic construction activities today are more complex than ever when it comes to environmental concerns. Dewatering is a common necessity for contractors and developers today. In addition to ensuring a safe construction site, contractors must be aware of groundwater disposal constraints and regulations.

AdEdge Water Technologies specializes in the design, development, fabrication, and supply of water treatment solutions. They've developed innovative technologies to remove a wide range of contaminants in water projects around the world. Water Online spoke with Fariha Hassan, a Project Manager at AdEdge Water Technologies, to find out how to optimize construction dewatering and treatment methods.

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Why must dewatering be conducted for construction sites?

Dewatering is a common practice in construction and is a term used to describe the process where groundwater is extracted to temporarily or permanently lower the groundwater table. Dewatering is required at construction sites to provide a dry and stable environment upon which foundations can be built. It is most often utilized in building projects that are below perched or shallow water tables, such as basements, parking garages, and other sub-surface structures.

Are dewatering activities temporary or ongoing?

Dewatering activities can be both temporary and ongoing. Temporary dewatering often involves pumping of water which is accumulated in construction trenches or pits. In temporary scenarios, the dewatering process is no longer needed once construction is over. Permanent dewatering involves extraction and disposal of groundwater to provide support for underground structures. Depending on the water quality and discharge requirements of the extracted water, treatment may be required.

What are the most common ways to dewater these sites?

The dewatering process typically involves intercepting the shallow aquifer surrounding the structure and pumping water continuously from a series of groundwater extraction wells to lower the overall water table and allow the construction area to remain dry. The process for treatment of dewatering will depend on the water quality conditions, which are unique to the job site. Furthermore, the type of dewatering process, whether temporary or ongoing, will also play a role. For example, permanent filtration technologies are not cost-effective, so mobile treatment

systems are recommended for temporary dewatering.

Where do contractors typically discharge the water collected from dewatering activities?

Water collected from dewatering activities is disposed of according to federal, state, and county regulations, National Pollutant Discharge Elimination System (NPDES) and construction permits, the quality of water, and discharge restrictions associated with the receiving water body. In cases where a nearby local sanitary sewer is available and allowable for discharge, those local authorities (i.e., the publicly owned treatment works [POTW], or municipality) will allow or disallow via a permit. NPDES or the state version of such, referred to as the State Pollutant Discharge Elimination System (SPDES), permits are typically required if the water is discharged to a natural water body. They are not typically needed if the water is discharged to a sanitary sewer, reused on the construction site, discharged to adjacent land, used at an adjacent facility, or treated off-site. Therefore, these disposal options are preferred when dewatering.

Are there regulatory requirements or permitting required to dewater construction sites?

Yes, federal regulations for controlling discharges of pollutants from municipal separate storm sewer systems (MS4s), construction sites, and industrial activities were incorporated into the NPDES permit process by the 1987 amendments to the Clean Water Act (CWA). They were also required by the subsequent 1990 promulgation of federal storm water regulations by the U.S. Environmental Protection Agency (EPA). The EPA regulations require construction and storm water discharges to comply with an NPDES permit. Other state and/or county permit requirements may also apply.

Does the water quality need to be tested before discharge?

Yes, different water quality standards will need to be adhered to, depending on how and where the water is discharged.

What are some typical water quality parameters that must be met to discharge from a dewatering site?

Depending on how and where you are discharging, there are typically water quality standards that will need to be met prior to the release of the water. Dewatering typically faces three types of water quality issues: high levels of sediments, high pH (often from grouting or concrete work happening nearby), and naturally occurring contaminants. High levels of sediment and elevated pH are commonly problematic in temporary dewatering operations, where water is being removed during active construction only.

What treatment technologies are available to remove contaminants at dewatering facilities?

It is common to have a customized approach in situations with high levels of contamination. Capability to customize treatment methods to best serve the site's needs is important to consider when designing a dewatering treatment facility in order to lower long-term costs. Both quantity and quality of the water, along with a clear understanding of discharge objectives, are essential. One example of a common groundwater contaminant combination that needs treatment prior to discharge is elevated levels of suspended solids, iron, and manganese. These contaminants can be reduced to the EPA's Secondary MCL limits (0.30 mg/L, 0.05 mg/L, and < 5 NTU, respectively) through a three-stage treatment train using an automated backwashing pre-filter followed by an oxidation/filtration system and a polishing stage of granular activated carbon (GAC) filtration.

What happens to residuals or backwash water resulting from treatment of the extracted water?

With any treatment, residuals are often generated during the dewatering process, which must be managed properly. When dealing with extremely elevated iron and manganese concentrations in the extracted water, backwashing of the oxidation/filtration system can occur daily. Special design techniques can be employed to capture, filter, and recycle backwash water to provide a zero-liquid discharge option for the plant. A low-waste system can essentially eliminate the wastewater discharge at a site and lower corresponding monitoring costs. The iron/manganese residuals generated from backwashing operations can be dewatered to form nonhazardous solids. These can be transported and disposed of periodically in a local sanitary landfill.

How do contractors determine the specific type of dewatering methodology, pumping rates, discharge locations, and treatment methods to use for a dewatering activity?

Properly designed ex-situ treatment has become a familiar companion to construction dewatering. As the list of EPA-regulated contaminants grows, more situations are occurring where these contaminants or co-contaminants (either naturally occurring or anthropogenic in origin) are found in construction-generated water. These contaminants must be addressed either temporarily or, more commonly, on a permanent basis. Regulatory constraints, geotechnical aspects of extraction (quantity), the water quality, and corresponding treatment needs are all important early considerations for developers and contractors. Formation and selection of an experienced, qualified team early on is critical for designing and implementing any such projects with long-term implications. Developing a customized solution for managing wastewater discharges can greatly impact long-term costs for permanent dewatering ventures. ■