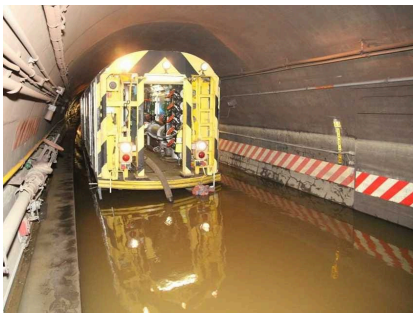
Pump Systems



Some assets need to be designed with a back-up pump system and others that are not adequately protected with other measures to prevent water damage should consider pumping systems to quickly remove water when flooding occurs. Pump types that may be used in emergency situations include portable de-watering, mobile pumps and submersible pumps. Factors that affect pump system performance and flow rate include the amount and size of debris (e.g., silt, sand, mud, organic matter, etc.) in the water, the distance (and height) that water is pumped, the type and length of pipe or hose used for suction and discharge lines. This measure focuses on temporary pump systems.

Relation to Adaptation and Resiliency

Helps achieve protection of structures/facilities, underground assets, etc. in the event of floods, inundation, or natural disasters.

Benefits

Benefits include rapid deployment; adaptability to terrain or site conditions; ability to relocate to different parts of the site (portable or mobile pumps); ability to quickly replace or interchange equipment (if backups available)..

Limiting Factors (Constraints)

Limiting factors include: accessibility of flooded area to setup a mobile pump; size and portability of pump and power source; selecting the correct size pump and discharge line based on amount and rate of water to be pumped; selection of the correct type of pump based on site and flooding conditions (dewatering pump, trash pump, submersible pump); identification of appropriate and safe discharge location that does not impact neighboring properties or cause erosion at the discharge line outlet.

Design & Preliminary Costs

If site location is subject to recurring flooding and no other site design or permanent flood protection measures are appropriate then a permanent pump system should be considered. Design and sizing requirements are based on amount of flood inflow or accumulated water; nature of water to be pumped (clean, muddy, presence of floating trash); consideration of multiple pumps (and backup pumps). Other design considerations include automatic and manual operation of pump controls and inclusion of trash screen. Typical pump types/configurations include:

- Portable Dewatering Pumps: best suited for clean water and minor flooding with low to medium pumping rates (up to several hundred gallons per minute). These pumps are typically less than 250 pounds and can be readily transported and setup by two personnel.
- Mobile Pumps: mobile trash pumps are larger and heavier than portable dewatering pumps and typically need to be transported by trailers or skids. These pumps have typical capacities of 500 to several thousand gallons per minute, can have self-contained power, and can handle 'dirty' water with debris up to several inches in diameter.
- Submersible Pumps: Electrically or hydraulically powered submersible pumps are lowered into the flooded area ideally at the sump location to draw water down to near the surface. These pumps require an external power source.

Costs vary depending on type and size of pump. Anticipate less than $1,000-$2,000 for small pumps (portable dewatering pumps with capacities up to several hundred gallons per minute) to $10,000-$50,000 for mobile pumps (larger skid or trailer mounted mobile systems with capacities of 500 to several thousand gallons per minute).

Permits & Approvals

If pumps use a generator there will be associated emissions and they may require the following approvals:

- MDE Form 1.01: Air Quality General Permits to Construct
- And/or for a diesel-fired emergency generator set rated at 500 brake horsepower or greater certified by the US EPA, complete the MDE Diesel-Fired Emergency Generator Application under Air Quality General Permits to Construct Application Forms.

Implementation

Implementation time varies depending on site conditions and ease of access to flooded areas and placement location for pump, and pump size and length/size/configuration of discharge lines. For areas with easy access and smaller pump sizes, implementation could take less than an hour. For larger systems, implementation and setup could take several hours. Placement and location of portable generators outside of flood prone areas should also be considered. Pump(s) may need relocation as flood waters recede if pump cannot initially be placed at sump.

Maintenance Requirements

Pumps and generators should be fully deployed and tested on an annual basis. An inspection, operations, and maintenance manual should be prepared for each different pump and generator type and be readily available with hard copies stored with pump equipment.

Useful Life

Useful life will vary depending on maintenance and use. Most pump systems have a useful life of 20 years, barring any damages that occur during use.

References/Specifications

Department of Homeland Security, Portable and Mobile Pumps Used for Flood Management Tech Note