

The primary objective of this project was the installation of steel, sealed-sheet piling to funnel impacted groundwater from a former manufactured gas plant facility to activated carbon treatment cells to treat the groundwater before discharging into a creek and, reconstructing the city's storm sewer outfall and drainage swale and replacing a foot bridge over the storm sewer outfall. In addition, a secondary objective involved the removal of impacted soils along a creek bank within the confined boundaries of an apartment complex. The construction site occupied approximately two acres and contained a variety of waste residuals including coke, ash, gas plant residuals and demolition debris.



Given the high visibility and close proximity the construction site was to a senior residential apartment, careful steps were taken to communicate the scope of the project to all parties involved, including local media and surrounding neighbors, and what the benefits would be upon completion. Once the site was contained for erosion control, a 600-foot temporary road had to be constructed to allow truck traffic access to the site for the removal of the impacted soils. Next, approximately 550 feet of temporary sheeting along with a silt curtain were installed in the creek for containment. Extra measures were taken due to the fact that the creek was a designated trout stream by the State of Michigan. In addition, fire-suppression foam was used to control odors and an air-monitoring program was implemented to safeguard human health and the environment.

Before the excavation of materials could begin, the area needed to be dewatered. Due to the nature of the soils and residuals within the site, dewatering wells could not effectively prepare the area. Water was pumped from within small cofferdams and excavation cells approximately 700 feet into four, 20,000-gallon frac tanks. Over 800,000 gallons of water were removed during the project and hauled to a treatment and disposal facility. During the excavation of impacted soils, a pocket of coal tar was discovered outside the temporary sheet pile containment area within the creek. This tar was a weathered, hard tar with a thickness that ranged between 2 inches to 2 feet. Normally this material would have to be dredged out, which would have delayed the project weeks as a dredging permit would have to be obtained. Terra, however, was able to remove this material using their own patented Sed-Vac® process—a unique vacuuming process that can be used effectively as an alternative to standard dredging options.



Basically, Terra's Sed-Vac process consists of vacuuming sediments from water using an industrial vacuum loader. The operation allows sediments, in this case the coal tar, to be removed from the affected area with very low turbidity. And even though the coal tar was extremely hard, which would have made dredging more difficult, Terra employed hydro-blasting technologies, with up to 10,000 PSI to loosen the hardened tar for easy removal. Additional benefits of the Sed-Vac process include quick set-up, the ability to work around underwater debris and it provides automatic separation of heavy solids. Tar was removed from approximately 100 lineal feet of the creek. The material removed was "landfill-ready" with no further treatment required before it was hauled to a local landfill.



Another major component of the project was the reconstruction of the storm water outfall. With the bypass of the storm sewer setup, including three diversion pumps, the contaminated soils were removed.



## FORMER MGP—MARSHALL, MI

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The sealed-sheet pile wall, placed at the perimeter of the new outfall and measuring 150 feet long, had to be constructed immediately after soil removal.

A new storm sewer was then reconstructed to pass through the new headwall. The new sewer construction included the installation of a custom fit, 60-inch 45-degree bend. The installation of the remaining 450 feet of sealed-sheet pile wall was then completed. The sheets measured 15 feet to 30 feet in length and were driven 2 feet to 3 feet into the underlying bedrock. The joints of each sheet were grouted for a complete seal.

A groundwater collection system was then constructed inside the sealed-sheet pile wall. The collection system consisted of a “French-drain” with an internal 6-inch perforated pipe. The drain system was connected to three underground carbon cells measuring 8 feet in diameter and 6 feet deep. Each cell contained 6,000 pounds of activated carbon. The groundwater entered the top of each cell and was redirected to a diffusion system in the bottom of each cell. The hydraulic head would push the water up through the carbon placed over the diffusions system and outlet at the top of each cell, through the sealed-sheet pile wall and out to the creek. Currently 28,000 gallons of water are treated daily. Next, site restoration began. The temporary road was removed and replaced with a permanent concrete roadway to the carbon cells and various sidewalks. The pedestrian bridge was replaced with a new, pre-engineered steel bridge that would carry the weight of service vehicles deployed to maintain the carbon cells.

In the end, the total amount of sheeting used was 11,175 square feet—the total amount of contaminated material removed was 6,068 tons and the total amount of back fill was 5,200 tons. But more importantly, even with so much activity during construction in a confined area, Terra’s Safety Plan achieved its objective of no accidents. Finally, all parties involved were very pleased with the results, especially the residents of the senior apartment house, who presented the site manager from the Michigan-based utility a hand-written thank you note for a job well done.

“This project again demonstrated Terra’s ability to respond with ingenuity and sensitivity. Terra’s ingenuity was demonstrated with their Sed-Vac process to effectively remove unexpected coal tar from the stream bed. Terra’s sensitivity was demonstrated by using appropriate and effective construction methods within the confined work area to minimize odors, dust and vibrations. Upon project completion, a “thank you” card from one of the residents said it all on the success of the project.”

**-Site Manager**

*Michigan-based Utility*

