

## EAST SIDE REMEDIAL COMPONENTS DESIGN/BUILD PROJECT

<b>CLIENT</b>	Pfizer, Inc.
<b>LOCATION</b>	North Haven, Connecticut
<b>VALUE</b>	\$ 23.5 M
<b>DATE</b>	May 2011-April 2015
<b>SAFETY</b>	Zero OSHA Recordables



### Remediation, Design/Build

NorthStar was retained by Pfizer as the prime contractor to design and construct the East Side Remedial Components (ESRC) project. The project involved implementation of the United States Environmental Protection Agency (USEPA) approved site-wide corrective measurements and also included regulatory involvement by the Connecticut Department of Energy & Environmental Protection (CTDEEP) and the United States Army Corps of Engineers (USACE) for work in tidal wetlands located adjacent to and in the Quinnipiac River.

The design phase of the project began in May 2011 and involved an evaluation of the conceptual remedial approach presented to the USEPA in the Corrective Measures Study to determine any additional pre-design investigation (PDI) activities required and to make modifications to any remedial components



deemed appropriate. The data generated from the PDI phase and discussions with the client and their engineering representatives yielded a final design that was being submitted to the regulatory agencies in the winter of 2013. Interim approvals for modified aspects of the remedial approach were also presented to the USEPA in the form of pre-design proposals (PDPs) that were reviewed and approved by the USEPA. In addition, meetings were held with the various involved federal, state and local agencies to facilitate an expedited review of initial construction activities to enable mobilization in the spring of 2013.

Remedial construction was performed during two construction years (2013 and 2014), with some weather-sensitive wetlands plantings extending into the spring of 2015. The remedial construction activities included the following:

- Mobilization and site preparation included providing temporary facilities, performing an initial site topographic survey, installing erosion and sedimentation controls, performing clearing of vegetation, and demolition of existing surface concrete features.
- Construction of a 5,425 linear foot low-permeability hydraulic barrier wall with an average depth of 22 feet and a maximum depth of 32 feet. The wall was constructed via soil mixing and using a reagent mix design prepared by NorthStar via bench-scale testing. The wall extended 3 feet into the clay layer underlying the site.
- Installation of new groundwater extraction wells and conveyance piping with all associated instrumentation and controls to collect and convey water from inside the barrier wall to the existing on-site groundwater treatment facility (GWTF). This work also entailed the installation of two groundwater extraction trenches with collection sumps and conveyance piping. NorthStar also abandoned and decommissioned existing extraction wells and monitoring wells located throughout the site.
- The Former Aeration Lagoon (FAL) and South Pile contained wastewater residuals that required consolidation to support the required capping systems. Therefore, a system of horizontal and vertical wick drains was installed and was accompanied by collection trenches and sumps to collect and convey pore water removed from these areas through the groundwater conveyance piping for treatment in the existing GWTF. Once the wick drains were installed, on-site soil that was excavated from various required areas of the site was placed on the FAL and South Pile to pre-load these areas and force the pore water to the surface. Settlement monitoring was performed to verify that the required degree of consolidation occurred before the required capping systems were installed.
- The North Pile was regraded to lessen the side slopes and to lower the top elevation as required. The material cut from the North Pile was used as a portion of the pre-load fill on the FAL. The North Pile was then capped with a 40-mil geomembrane, geocomposite gas collection and drainage layers, 18 inches of cover soil, and 6 inches of topsoil. Permanent stormwater drainage features were constructed to convey water from the completed cap area.
- Once consolidation of the FAL and South Pile were completed, they were capped. The capping systems were similar to that discussed above for the North Pile with the exception that the South Pile did not require a gas collection geocomposite. Similar to the North Pile, stormwater drainage features were constructed as necessary on the FAL and South Pile.
- Low-lying areas of the site were excavated to provide for temporary stormwater management during construction and were completed as stormwater best management practice



areas (BMPs) and to construct 6 acres of inland wetlands required under the USEPA Order for the site. The material cut from these areas was used for pre-loading the FAL and South Pile such that the site had a net cut and fill balance (i.e., no off-site soil disposal was required). These areas were completed using a geocomposite clay liner to isolate the base of these areas from the water table and to provide adequate water storage to support the proposed inland wetlands. The liner was covered with 24 inches of wetland soil in preparation for required plantings. Peripheral areas of the site not completed as BMPs or inland wetlands were completed by installing a geotextile separation layer, 18 inches of cover soil and 6 inches of topsoil.

- Two tidal flat areas in and near the Quinnipiac River and a small area in the South Creek required sediment remediation. This work involved the installation of coffer dams to enable the work areas to be segregated from the river/creek such that the sediment removal could be performed under dry conditions. Sediment was removed to a depth of 2 feet and will be placed on the FAL or South Pile before capping. These areas were backfilled with 2 feet of imported clean fill and the coffer dams were removed.
- The entire site was restored with an integrated ecological enhancement system that includes a combination of upland meadows, inland wetlands, and tidal wetlands. Upland meadows and inland wetlands consist of seeding with wetland seed mix and the installation of a diverse grouping of wetland plugs and shrubs to produce the desired ecological system. The tidal wetlands involve an area of creation and a few areas of mitigation that are required due to temporary and permanent impacts to tidal wetlands. This work was performed under a separate wetlands mitigation plan approved by both USACE and CTDEEP's Office of Long Island Sound Protection (OLISP).

In addition to the ecological enhancements, access roads were constructed throughout the site, including roads on the North Pile and South Pile. Also, a series of walking trails and educational signs were constructed to provide for educational purposes under a planned restricted site access after the project is completed. The roads will also provide for access to wells and other items for continuing monitoring of the ESRC performance.

Once the work was completed, NorthStar demobilized and labor and equipment and prepared a Construction Completion Report for submittal to the required agencies. As part of the scope of work, we will perform monitoring and maintenance of the wetlands plantings for a 5-year period following construction.

### *Project Statistics:*

The original and actual start and completion dates changed for several reasons. First, the design phase was fast-tracked to enable construction to commence a year earlier than originally anticipated. This resulted in the construction work starting in the spring of 2013 instead of 2014. The construction phase was targeted for completion over two years with a winter shutdown and with the expectation of finalizing wetlands planting work in the spring of the third year. The final cost is expected to be at or below the originally awarded value. Several changes to the work incurred additional costs and were offset by a reduction in scope for certain aspects of the project. Though no specific awards or prizes were received, the project has received accolades from various local, state and federal agencies and has been recognized by Pfizer for exemplary safety performance, including over 100,000 hours worked with no OSHA lost time incidents.