

## Construction Quality Assurance during Environmental Dredging and Capping Projects

**Mike Ellis** (mellis@barr.com), and Tom Boom (tboom@barr.com) (Barr Engineering, Ann Arbor, MI)  
Andrew Santini (Consumers Energy, Jackson, MI)

**Background/Objectives.** Barr provided construction quality assurance (CQA) during an environmental dredging and capping project conducted at a former manufactured gas plant (MGP) site in Flint, Michigan during the 2017 construction season. The project was completed on a 1,700 foot reach of river flowing through an urban area. A high hazard dam defined the downstream end of the work zone. The main objectives of the remediation were to remove MGP-related impacts in the riverbed and riverbanks, install an impermeable cap along the riverbed to prevent groundwater from venting into the river, restore the riverbed and riverbanks to meet flood stage requirements, and minimize secondary impacts to the public.

**Approach/Activities.** The project included removal of approximately 5 feet of sediment then placement of a multilayered cap. The cap layers, beginning with the lowest layer, consisted of a sand foundation, Blended Barrier™ (a mixture of AquaBlok® and gravel), cover sand, gravel, and rip rap. Site-specific modifications to the cap were designed around existing structures and other areas. Implementation of the dredging and capping required construction quality monitoring to document that the design objectives of the project were met. Specific construction quality monitoring activities included:

- Survey verification, including defining the requirements for collecting survey points at planned locations for each cap layer to verify the thickness of each layer, survey tolerances, and tabulations developed for rapid approval in the field
- Verification of Blended Barrier™ mixing, including documenting integrity of the material and correct mixture ratios prior to placing the material
- Management of the leading edge of the Blended Barrier™ layer, including field evaluation of cap material drift during placement and specific surveying and cover requirements for the Blended Barrier™ layer
- Structural monitoring of existing infrastructure in the work area, including using an automated total station programmed to regularly collect survey data from prisms installed on infrastructure throughout the work area
- Geotechnical monitoring, including assessment of dredged material and surveying of the subsurface along the riverbanks
- Implementation of post construction monitoring devices, including vibrating wire piezometers installed to assess groundwater pressures

**Results/Lessons Learned.** Field factors can affect construction quality if appropriate CQA is not conducted. For each construction quality monitoring activity, the monitoring data and the evaluation of data influenced construction and informed future decisions. Monitoring results were used to verify that specifications were being met and construction controls were performing effectively. Data were used to adjust specifications in the field as needed. The collected data also improved communication with project stakeholders.