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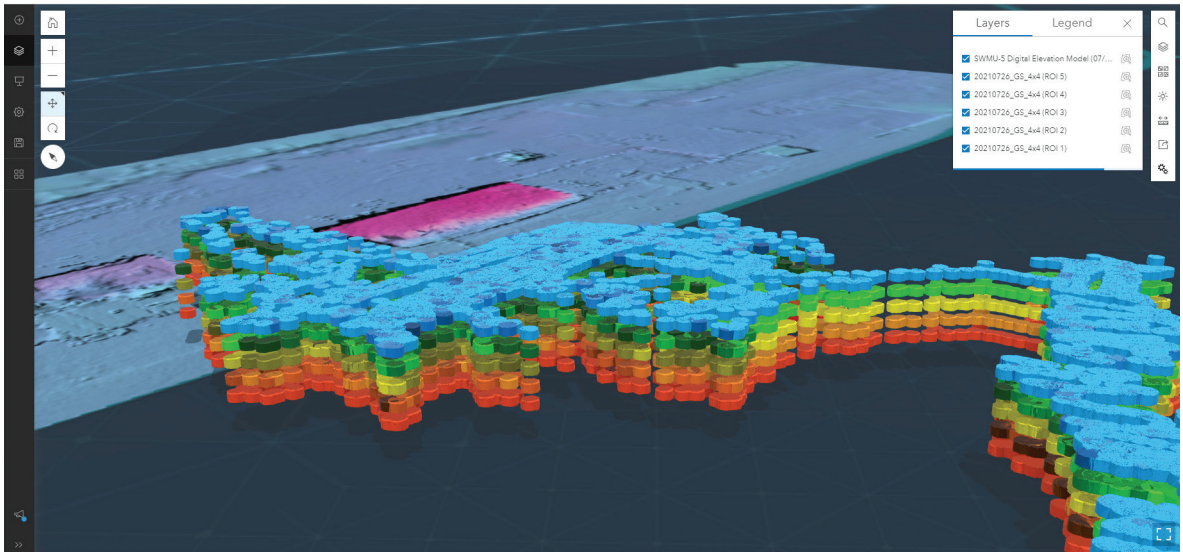
GIS SOLUTIONS

From Base Mapping to 3D Deliverables, Ramboll Uses Esri Tools to Leave the World a Better Place

BY MARC GOLDMAN



Using Esri's Experience Builder, Ramboll was able to quickly prepare web-served, intelligent 3D images that were ideal for weekly virtual meetings.

The DuPont Chambers Works in Deepwater, N.J., is a scary and dangerous 700-acre toxic waste site rife with chemical and radiological contamination resulting from more than 100 years of use as a manufacturing facility. The aura of gloom from the site can hardly be overstated—it would make a fine setting for a horror movie based on a mutant plague or zombie outbreak.

In 2018, global engineering, architecture and sustainability consultancy Ramboll entered into a long-term engagement with the U.S. Army Corps of Engineers (USACE) Philadelphia District aimed, ultimately, at cleaning up the Works. It was a large and daunting challenge, but also the type of noble, good-for-the-world project that anyone involved in sustainability dreams of taking on and accomplishing.

"It really seems that we're on the right side here and that we're doing right by the American people," says Ramboll 3D Visualization & Data Technical Leader Tim Cushman, GISP, the GIS lead at Deepwater. "We're helping clean up a 100-year legacy of contamination, and not everyone cares to do that—not everyone cares to clean up the environment and leave it better than it was."

The nature of the required mitigation work was largely geospatial; Ramboll (and their "internal startup" Galago) was charged with creating an effective base map of the site, improving on conventional radiological data collection techniques and 2D data representations, developing better ways to collect and process remedial action radiological data, developing precise and robust 3D visualizations of radiological contamination, and enabling (with visualizations) real-time decision-making with real-time data.

From base mapping to UAV (drone) data collection to creating 3D visualizations that supported weekly meetings with all stakeholders to high-quality, intelligent, 3D web deliverables, Cushman relied on a sophisticated GIS approach powered up and enabled by Esri solutions including ArcGIS, the AEC Project Delivery Subscription and ArcGIS Experience Builder.

'We Started from Scratch'

In terms of base mapping and location of contamination, Cushman didn't have much to work with at first. "There was a

rudimentary monitoring network, but we started from scratch." So he and his distributed team of about five, in several states, set to work establishing the ArcGIS base maps they needed, georeferencing 80 years of aerial imagery, and, most importantly, delimiting the location of contamination, which was tricky.

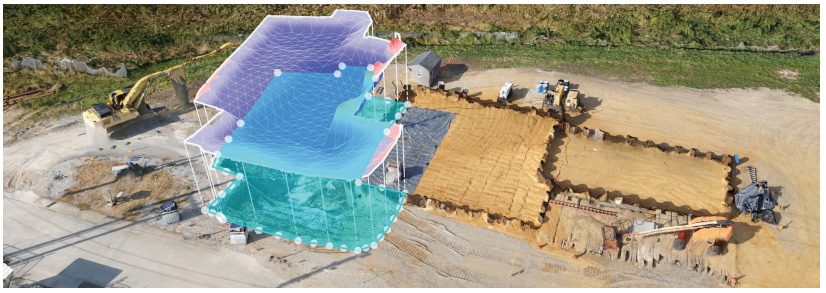
"When the site was decommissioned, many of the structures with radiation contamination were demolished, and the demolishers did whatever they wanted with the rubble," Cushman explains. "If they needed structural fill in a wetland area, they dumped a building there. If somebody *offsite* wanted to fill, they'd give them a demolished building to get rid of it."

Cushman identified several key years of aerial photography and, using the ArcGIS swipe tool in Web App Builder, created a web-delivered historical reference application that made it easy for users to identify areas of probable contamination and set about the difficult, dangerous work of verifying contamination (often by workers in full and cumbersome PPE gear) and physical mitigation of soil (i.e., digging it up and treating it and moving it around as needed). (Actual earth moving and fieldwork was done by New York's Sevenson Environmental Services Inc.)

As work progressed, Ramboll greatly densified control and site data, primarily by the use of an eight-rotor UAV with gimbal and sensor array mounts equipped with high-resolution LiDAR sensors and digital cameras. Flights of about 20 minutes were performed every two weeks, gathering gigabytes of x, y and z coordinates and photographic data that were used to continually update the 3D and intelligent ArcGIS visualization.

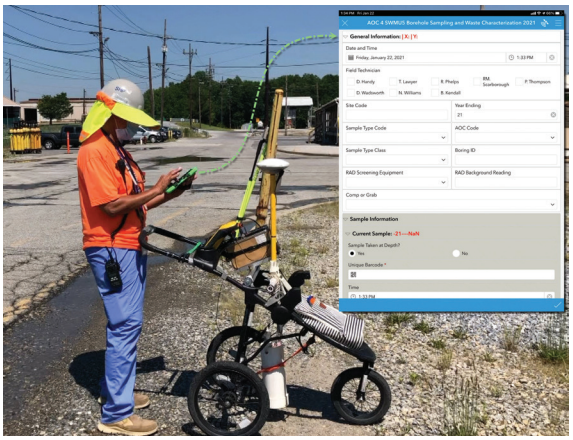
Esri tools automated the process and made it a "plug-and-play process," according to Cushman. "We enter the photos and LiDAR data, we enter the ground control points, and the rest happens behind the scenes."

Drone images and data captured in biweekly flights were routinely imported into ArcGIS in a near-automatic process.


ArcGIS tools automatically created 3D surfaces and 3D representations used constantly at the Deepwater site to verify location and quantities of earth moved, among other applications.

Real-Time Decision Making and Deliverables

The ArcGIS Experience Builder visualization is the basis of weekly "touchpoint" meetings for owners and contractors logging in remotely, and a lot of work gets done very quickly at these meetings. Mitigation work performed in the past weeks is verified (Ramboll can use ArcGIS to confirm quantities of soil moved), and decisions are made about what to do next. This real-time making of mitigation work decisions—*in one brief meeting*—cuts short a project management process that used to take weeks. On a project that costs the Corps $80,000 to $100,000 per day, that represents enormous savings … and an opportunity for a lot more mitigation work in a year.


Field work assignments and data collection were automatically integrated into smartphone collectors.

Ramboll's success on this ongoing project was so outstanding that the firm received a USDOE Meritorious Service Award, and the USACE was so impressed with the work accomplished during the difficult COVID-19 year of 2021 that they issued an official congratulatory letter, saying in part, "Your … *state-of-the-art approach to data management is what has allowed this project to successfully move forward this past year*," and "What we imagined in a design-driven database, you made possible and have exceeded our expectations. *You have saved the project and the program millions of dollars*. This is especially evident with the rapid integration of onsite test results with GIS capabilities and allowing for streamlined identification of new areas of contamination." (*emphasis added*)

Heady praise indeed for two companies, Ramboll and Esri.

To learn more about Esri's solutions being used to clean up the world and leave it a better place, watch Esri's "*GIS Trends for Environmental Consulting*" on-demand webinar at ***bit.ly/3Qp9Uta***.

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