From Field to Decision: Leveraging ArcGIS for Smarter PFAS Remediation

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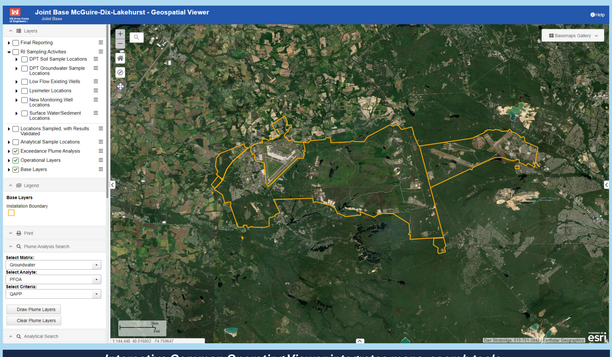
Leveraging ArcGIS

ArcGIS Server | ArcGIS Pro | ArcGIS Online | ArcGIS Survey123 | ArcGIS Field Maps | ArcGIS Maps SDK for JavaScript

Background

Joint Base McGuire-Dix-Lakehurst (JBMDL), a 42,000-acre joint installation comprising of McGuire Air Force Base, Fort Dix U.S. Army Base, and Naval Air Engineering Station Lakehurst, NJ, has been utilized by the military to fight fires caused by petroleum for decades. This activity resulted in the release of PFAS-containing foam into the environment. To address this issue and comply with CERCLA, USACE Baltimore contracted Weston to conduct a Remedial Investigation (RI) at 21 sites within JBMDL. The RI aimed to understand the spread of PFAS contamination in various areas, identify the extent of soil contamination, find potential exposure risks, gather data for future assessments, update site models, and suggest further sampling needs.

Due to the project's complexity—including multiple media, widespread contamination, unexploded ordnance (UXO) hazards, and strict security protocols—an innovative data management framework was critical. Weston leveraged Geographic Information System (GIS) technology to build this system, enabling real-time data visualization and analysis. This allowed the client to quickly identify contamination hotspots and make informed decisions with minimal disruption to JBMDL's military operations.

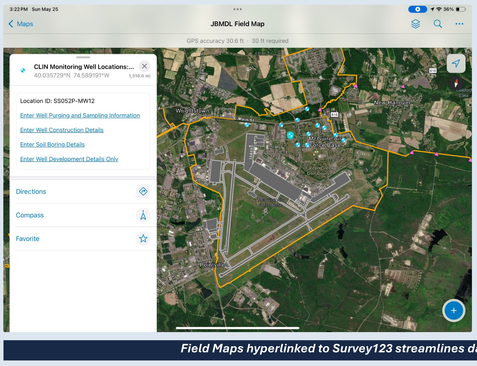


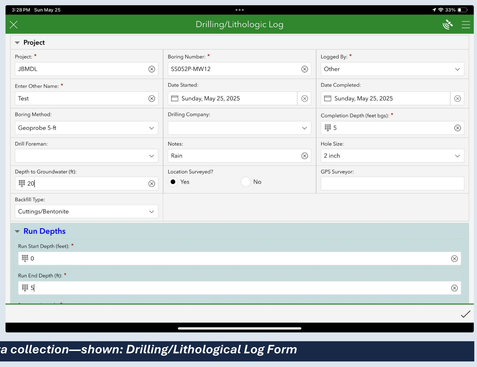
Interactive Common Operating Viewer integrates maps, search tools, and document access for a unified project view

Data

One of the primary goals of this RI was to collect data on PFAS levels in soil, groundwater, surface water, and sediment across 21 sites. Weston mobilized field teams to install over 350 Direct Push Technology (DPT) soil borings and drilled 269 DPT groundwater screening borings.

Real-time data collection was facilitated using handheld GPS units and a Geoprobe Screen Point 22 Groundwater Sampler, ensuring precise location tracking and efficient sampling. The collected data included 884 soil samples and 631 groundwater samples.





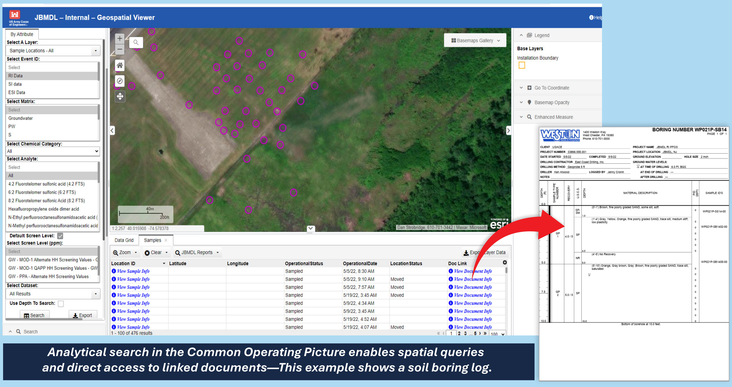
Field Maps hyperlinked to Survey123 streamlines data collection—shown: Drilling/Lithological Log Form

Solution

The GIS team was tasked with managing and centralizing operational and analytical data for across all sites. To achieve this, Weston implemented a scalable GIS Enterprise workflow to centralize and include location-based functionality into both operational and analytical data, as well as documentation.

Key features of this solution include:

- **Real-time mobile data collection:** Field Maps and Survey123 allow field teams to capture sampling data, operational details, and photos, while also providing real time situational awareness of activities.
- **QA/QC application built on ArcGIS Online:** Empowered chemists and project management teams to verify sample data collection daily, improving quality control, accelerated validation workflows, and allowing digital chains of custody (COCs) to be created directly in the field.
- **An interactive web viewer**: Enabled accessibility to all datasets—including operational GIS layers, analytical lab data, and site documents— allowing project stakeholders to visualize, query, and assess data in real time. This enhanced quality control, stakeholder communication, and regulatory reporting.
- **A custom analytical search widget:** Developed using the ArcGIS JavaScript SDK, to allow for dynamic querying, review, and display of laboratory results.
- **One-Click Soil boring logs access:** Integrated document management provides one-click access to logs and supporting data.



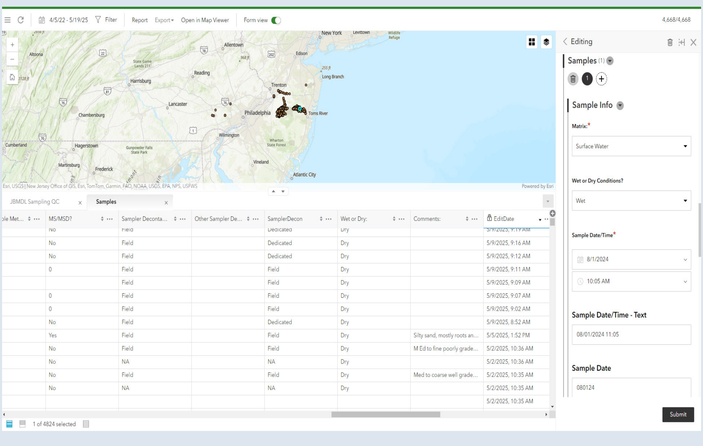
Analytical search in the Common Operating Picture enables spatial queries and direct access to linked documents—This example shows a soil boring log.

Project Success

This GIS enabled workflow reduced the client's fieldwork costs by approximately 7% and enhanced overall project efficiency by implementing a geospatial framework using tools within the ArcGIS Enterprise Platform, such as ArcGIS Field Maps and Survey123, for real-time data collection.

This system improved data accuracy, reliability, and accessibility; minimized errors; ensured systematic data collection, storage, and retrieval; and ultimately accelerated the project schedule by boosting operational efficiency.

This integrated approach improved coordination, accelerated the project timeline, and enhanced stakeholder communication through real-time visualizations—resulting in a more effective PFAS remediation process that helped protect public health and the environment.



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