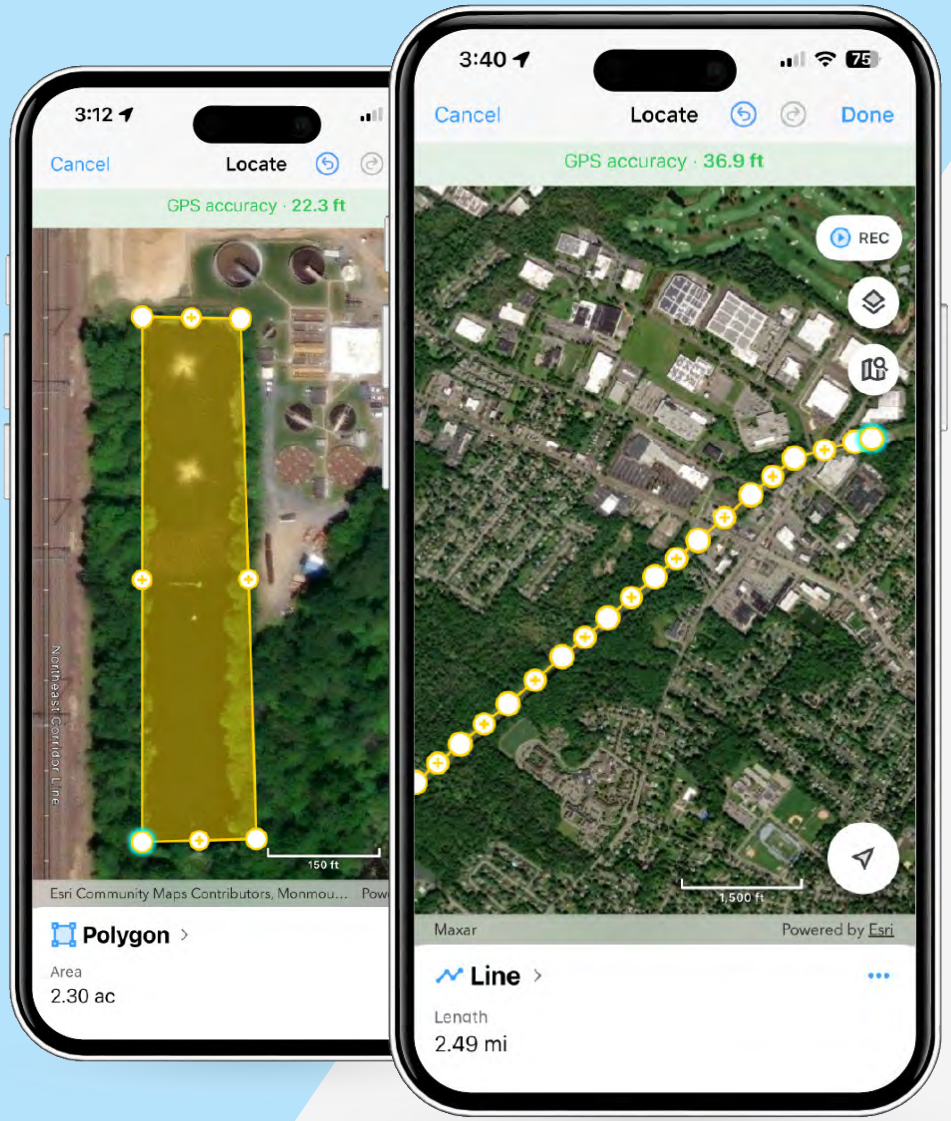
Fulcrum

White paper

Beyond boundaries: Advancing GIS for modern utility field operations



Introduction

For utilities, the field is where service meets reality. Pipes crack. Lines sag. Poles shift. Each of these moments demands not only a response, but one rooted in precision, speed, and full situational awareness. The ability to make sound operational decisions — where to send a crew, what equipment to bring, how to prioritize maintenance — relies on spatial context that is both accurate and current.

Traditional GIS systems were never designed to move at the speed of today's utility fieldwork. They've served their purpose in the back office, but they rarely deliver what front-line teams need in the moment: accessible maps, real-time updates, and workflows that match the pace of operations. Now, a new generation of mobile geospatial tools is changing how utility teams plan, respond, and document their work in the field.

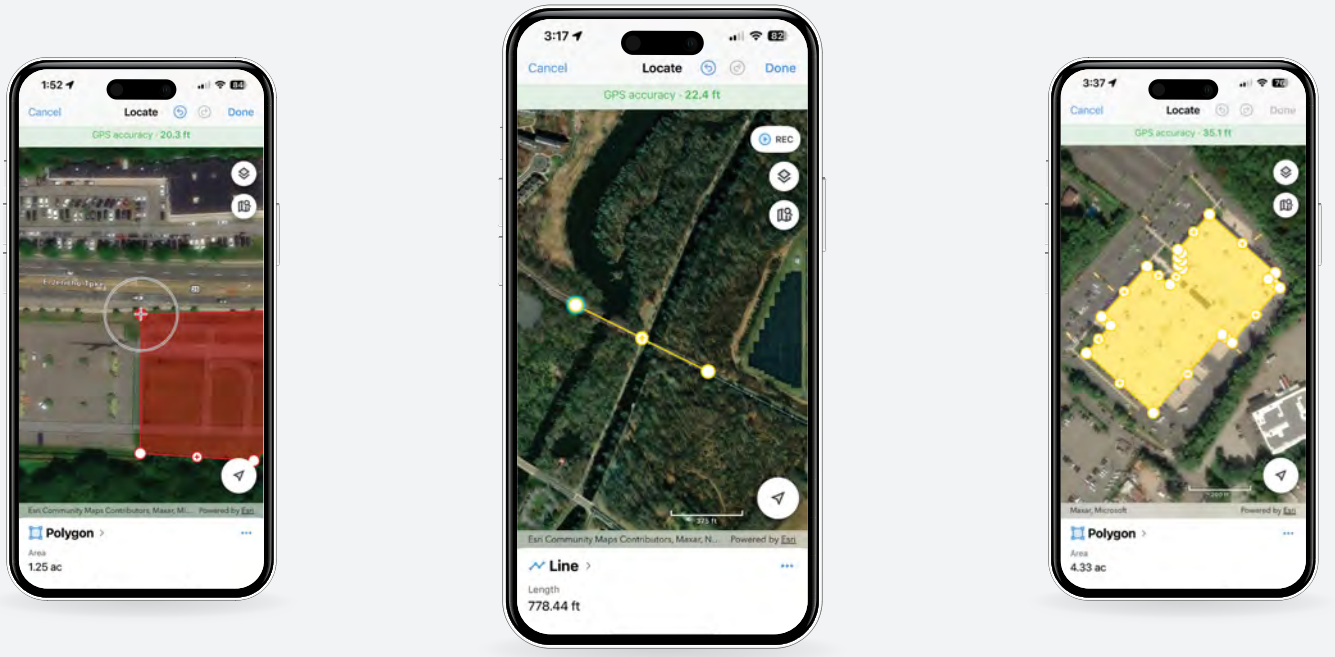
This white paper explores how utilities are expanding the role of GIS beyond asset registries and compliance reports. By adopting advanced geospatial capabilities, like lines and polygons for richer spatial context, live data tracking, "snapping" for accuracy, and automation based on spatial inputs, field operations leaders are improving response times, increasing data integrity, and simplifying reporting. Most importantly, when these capabilities are integrated into a field process management platform, they help crews spend more time doing the job and less time managing the paperwork around it.

Why the GIS status quo creates friction for utility field teams

Even with the rise of mobile GIS apps, frontline deployment often remains limited. These tools may offer rich capabilities — but they're built for GIS professionals. The average field user isn't trained to manage layers or navigate schema-based interfaces, so they fall back on printed maps or static screenshots that may already be out of date before the truck leaves the yard.

Meanwhile, when field data is collected by non-GIS-trained personnel — the typical frontline inspectors, technicians, or contractors — it often travels through fragmented, manual workflows. Sometimes data is hand-written. Other times it's typed into spreadsheets or uploaded from a mobile device, then manually imported back into the GIS days later. This process introduces lag, duplication, and the constant risk of missing or inaccurate data.

For electric, water, and gas utilities, these inefficiencies directly affect service delivery.



Outages take longer to resolve. Small issues go unreported until they become emergencies. Reporting for regulators or municipalities takes more time than it should. And the field team, tasked with doing the actual work, often feels like the systems aren't working for them at all.

Utilities don't need a GIS replacement. They need a different kind of platform altogether, one designed for field teams. Traditional GIS platforms serve office-based specialists well, but their mobile extensions often assume a level of expertise that most inspectors, technicians, and contractors don't have. Field operations tools fill that gap by delivering spatial context in a way that's practical, accessible, and built for real-world work. The sections that follow show how utilities are putting them to work to improve clarity, coordination, and control.

Seeing the full picture with lines and polygons

Point data is useful, but it doesn't always tell the whole story. Field teams need to document not just where something is, but how it connects to other assets, what area it affects, and where the limits of responsibility begin and end. And they're rarely working alongside a GIS expert. That's where lines and polygons make the difference: giving non-specialists a way to communicate spatial detail with confidence.

Lines help visualize the linear nature of most utility infrastructure: transmission lines, underground pipes, fiber conduits, inspection routes. Drawing a line isn't only adding geometry to a map. It can also calculate length, connect assets, and communicate routing decisions with clarity that written notes simply can't match.

Polygons allow crews to define boundaries, whether for substations, easements, service zones, or hazard areas. These shapes become containers for analysis, helping determine area, support condition assessments, and ensure nothing important gets left out of scope.

Examples from the field:

- A vegetation management contractor working for an electric utility uses lines to trace transmission corridors and draw 30-foot buffer polygons on either side. Crews trim within the designated zone and document any exceptions in real time. The result: consistent service, no over-trimming, and clear spatial records of the work performed.

- A water utility inspecting stormwater drainage systems assigns each crew to a defined basin polygon. Within that area, crews use lines to track inspection routes and document cleaned or blocked culverts. This structure keeps teams focused and ensures full coverage without overlap or missed areas.
- During a gas pipeline inspection, a technician marks corrosion found on a section of pipe. Instead of dropping a single point, he draws a line along the affected segment and wraps a polygon around the dig site. The geometry enables instant calculation of service area, supports cost estimation, and ensures repair crews know exactly where to go.

These geometries are simple to create in the field, and they convey more information than points ever could. They also serve as anchors for downstream workflows such as cost estimation, reinspection scheduling, or compliance reporting.

Tracking progress and proving coverage in real time

Supervisors can't be everywhere at once, and most field crews aren't creating shapefiles as they go. They need tools that show progress clearly, without requiring GIS expertise. Real-time tracking gives supervisors the visibility to monitor crew movements, confirm task completion, and identify gaps before they become issues.

Utilities are using GPS tracking not only to manage resources, but also to validate performance. Recorded tracks show whether inspections followed prescribed routes. In storm recovery efforts, they help document which neighborhoods were serviced and when. In preventive maintenance programs, they offer accountability for routine patrols.

Real-world applications:

- An electric utility sends multiple crews to inspect feeders after a major weather event. Each crew's GPS trail shows the sections covered and

highlights any areas that still need review. Office staff coordinate in real time, reassigning teams to prevent duplication and close coverage gaps.

- A natural gas operator uses tracking data to validate leak survey completion. Trails are overlaid with pipeline centerlines to ensure all sections have been walked. If a portion is missed, supervisors can redirect teams immediately instead of discovering the issue days later during data review.
- During routine water main inspections, real-time location tracking allows the office to monitor progress against the day's work plan. If a crew finishes early or encounters a blockage, dispatch can adjust assignments quickly, reducing idle time and improving service efficiency.

Tracking also supports compliance and reporting. GPS trails provide timestamped, georeferenced evidence of where work occurred. This documentation makes audits easier and provides a defensible record for regulators or public clients.

Ensuring accuracy through guided mapping

When the field environment is fast-moving, maintaining spatial accuracy can be a challenge. GPS drift, user error, and misalignment with GIS records can all cause problems downstream, especially when inspections or repairs occur near property lines, easements, or safety zones.

Snapping tools help solve this by automatically aligning new spatial features with existing ones — no GIS expertise required. Whether drawing a line along a pipe or marking a maintenance zone next to a facility boundary, snapping keeps geometry clean and consistent.

Common use cases:

- In pipeline inspections, snapping ensures that all corrosion or leak findings align precisely with the pipeline's documented route. This accuracy reduces the risk of digging in the wrong location and ensures repair records match regulatory expectations.

- A crew inspecting substation equipment snaps all their observations to the facility polygon. This prevents data from drifting outside official boundaries and simplifies the task of generating asset reports based on location.
- When updating water infrastructure records, snapping helps field users connect new valve points to existing main lines. This avoids accidental overlaps or floating features that can break GIS analysis later on.

By capturing data that fits perfectly into existing maps, utilities save time on back-end cleanup and ensure that field-collected data adds value without creating new issues.

Using spatial logic to automate next steps

Advanced platforms for field teams respond not only to user input but also to spatial context. Geometry-based triggers allow the system to take action when certain conditions are met: for example, when a drawn polygon intersects a regulated buffer, or when an inspection point falls within a flagged zone.

No scripting or spatial analysis is required: the logic is built in. That way, field teams can focus on the work, not the workflow.

Spatial events like these can trigger follow-up tasks, auto-calculate estimates, or even notify specific personnel. The goal is to streamline field processes by reducing manual steps and improving consistency.

Field-driven scenarios:

- A field user marks an encroachment during a vegetation inspection. If the shape overlaps with a clearance zone, the system takes over to calculate the area, estimate crew time, and create the maintenance task.
- If an inspector identifies a leak within 50 feet of a school zone or waterway, the platform flags the record and alerts the safety officer immediately.
- After clearing debris from a flood-prone area, the crew closes out the original service polygon, and the system automatically schedules a reinspection for 30 days later.

These kinds of automations help utility teams reduce delays between data collection and action. They also enforce consistency across crews and projects — especially helpful when managing multiple contractors or jurisdictions.

Connecting the field to GIS with live data exchange

Even the best field data loses value if it remains siloed. Fulcrum's integration with ArcGIS and support for live feature service layers allows utility teams to import authoritative maps, collect updates in the field, and sync them directly back to GIS systems — all without losing structure or fidelity.

This two-way exchange ensures that everyone works from the same up-to-date dataset. Field users see the latest infrastructure layers. They can collect updates in the field and send them back without having to think about data structure or schema compatibility. Office staff receive current observations as they're collected. Project managers can monitor status without waiting for manual uploads or spreadsheet merges.

Examples of seamless integration:

- A utility contractor loads electric feeder maps and asset locations directly from ArcGIS into the mobile platform. As field teams inspect poles and note equipment damage, those records sync instantly with the GIS, ready for validation and reporting.
- Water departments conducting stormwater inspections import catchment areas and outfall locations into their mobile tools. As issues are logged, updates return to the office in near real time, allowing staff to review and prioritize responses without delay.
- In a joint pole management program, both telecom and electric teams update their respective datasets without overwriting each other's records. Shared feature layers maintain clarity while preserving data ownership and responsibility.

Live sync shortens the distance between field activity and business decisions to keep the entire operation aligned in real time.

Final thoughts

In utility operations, knowing where something is isn't enough. Crews need tools that turn spatial awareness into clear, frictionless action. Supervisors need real-time visibility without slowing anyone down. And data needs to flow smoothly from the field to the systems that support planning, reporting, and compliance.

Advanced geospatial capabilities enable that transformation. By extending mobile field workflows to include geospatial data capture and usage for non-specialist crews, utilities can gain clarity, accuracy, and momentum, all while working within their existing systems.

Fulcrum helps utilities bridge the gap between spatial insight and operational execution. With tools that support advanced geometries, real-time collaboration, and automated logic, teams can move faster, respond smarter, and keep service levels high in a landscape where every detail counts.

Learn more at fulcrumapp.com