KANSOFT

CASE STUDY · 2026

— AI & GEOSPATIAL INTELLIGENCE

AI-Powered *Cable Route* Optimization for Renewable Energy Infrastructure

One platform. Every obstacle. The shortest viable path between turbine and grid — *computed, not drafted*.

INDUSTRY	PRACTICE	ENGAGEMENT	REGION
Energy & Utilities	AI Capabilities · Geospatial Intelligence	Custom Platform Build	Confidential · Renewables

— THE CLIENT & THE CONTEXT

An infrastructure developer scaling renewable energy — faster than its planning tools could keep up.

The client is a leading infrastructure developer in the energy sector, focused on delivering scalable transmission solutions for large-scale renewable energy projects.

As renewable installations expanded, the work of planning cable infrastructure between turbines and substations grew more complex with every new site. Routes had to be drawn through terrain that included water bodies, villages, forests, and existing rail and road networks — while engineering teams balanced cable capacity, feeder limits, and cost variations across multiple cable types.

Spreadsheets and static GIS files weren't built for that kind of multi-variable optimization. The team needed a system that could think through the trade-offs at the pace the business needed to move.

ENGAGEMENT SNAPSHOT

What the client needed

Industry	**Energy & Utilities**
Use case	**Cable route planning**
Asset scope	**Turbines · Substations**
Output format	**KMZ geospatial**
Delivery model	**Custom platform build**
Kansoft practices	**AI Capabilities · Data, AI & Analytics**

KEY CHALLENGES

Five constraints the existing process couldn't reconcile.

01

Manual engineering complexity

Traditional route planning required significant manual intervention. Every new project meant rebuilding the same calculations, extending project timelines and pulling senior engineers into work that wasn't strategic.

02

Cost & capacity constraints

Cable types, feeder capacities, and cost variations all needed to be optimized together — not as separate decisions. Getting one wrong propagated through the rest of the plan.

03

Lack of unified planning interface

Engineering inputs were fragmented across spreadsheets, static map files, and disconnected tools. There was no single surface where a planner could see the full picture and act on it.

04

Limited collaboration visibility

Stakeholders — internal reviewers, partners, approvers — needed interactive outputs they could explore. Static PDFs and CSV exports slowed the approvals cycle and made consensus harder to reach.

05 · OBSTACLE-RICH TERRAIN

Every route crossed a different set of physical and regulatory boundaries.

Cable paths needed to account for eight distinct categories of obstacle, each with its own engineering and approval implications. The combinatorial complexity was the real problem — not any single obstacle in isolation.

- Water bodies
- Villages
- Residential zones
- Forest areas
- Industrial zones
- Hills
- Railways
- Roads & highways

— OUR APPROACH

Four capabilities, designed to live inside a single planning workflow.

Kansoft designed an AI-driven geospatial intelligence platform — combining optimization algorithms, terrain analytics, and engineering configurations under one interface, so planners could work end-to-end without exporting to other tools.

01

AI AGENTS · AGENTIC DEV

AI Optimization Engine

Automated route calculations that take terrain and obstacle constraints as inputs and return the optimal cable path — without an engineer having to redraw it by hand for every revision.

02

GEOSPATIAL ANALYTICS

Geospatial Intelligence Layer

Map-based visualization and editing built directly into the workflow. Planners can see the terrain, the obstacles, and the proposed route in one view — and edit them in place rather than across tools.

03

OPTIMIZATION MODELING

Scenario Modeling Framework

Capacity, cable-type, and cost simulations that let the team compare alternatives side by side — moving the cost conversation upstream into engineering, where it has more leverage.

04

AI-ASSISTED DELIVERY

Workflow Automation

Export and notification automation that closes the loop between planning and approval. KMZ outputs land where downstream tools expect them; reviewers get the interactive map link without a follow-up email.

SOLUTION DELIVERED · PART 1 OF 2

What we built — the platform, in six modules.

The first three modules establish secure project access, structured data ingestion, and the interactive map that drives every decision downstream.

01 Project Management & Secure Access

- Authentication module with controlled access
- Centralized dashboard to manage multiple renewable projects from one place
- Project-level segregation so teams only see what they own

02 Structured Data Input Framework

- Downloadable project templates that standardize what gets uploaded
- CSV-based ingestion for turbines, substations, and geolocation data
- Validation at upload — bad rows get flagged before they pollute a model run

03 Interactive Obstacle Mapping

- Visual representation of terrain obstacles — water bodies, forests, villages, residential and industrial zones, hills, railways, and roads — rendered on a single map surface
- Editable obstacle layers directly within the interface, so a planner can adjust the boundary of a no-go zone without leaving the screen
- Obstacle data feeds straight into the optimization engine — no re-export step

SOLUTION DELIVERED · PART 2 OF 2

From obstacle map to optimized route to export.

Modules four through six take the planner from a clean obstacle map to a costed, optimized route — and deliver it to the people who need it next.

04 AI-Powered Route Optimization

- Automated processing of obstacle data into optimization inputs
- Intelligent calculation of optimal cable routes given terrain, capacity, and cost constraints
- Re-runs in seconds when an input changes — no more half-day redraws

05 Engineering Configuration Controls

- Turbines-per-cable selection to model different aggregation strategies
- Substation and feeder capacity editing inline with the map
- Cable types and cost adjustments that flow through to the optimization run

06 Export & Notification Automation

- KMZ-format outputs compatible with the geospatial tools the team already uses for review and downstream design
- Automated email notifications that bundle the interactive map link and the final route attachments — so approvers don't wait on a follow-up message
- Audit trail of who saw which version of the route, captured for compliance and stakeholder review

— TECHNOLOGY STACK

Built on a stack chosen for geospatial scale and engineering precision.

Every choice in the stack maps to a constraint the platform had to satisfy — interactive maps, AI optimization, geospatial output formats, and reliable notifications across distributed teams.

LAYER 01 · FRONTEND

Interactive GIS-enabled web application

Map-first interface with editable obstacle layers, scenario controls, and real-time route visualization.

Browser-based

LAYER 02 · BACKEND

AI-powered optimization engine

Custom optimization service that ingests terrain and engineering constraints and returns optimized cable routes.

AI · Agentic

LAYER 03 · DATABASE

MongoDB Cloud Cluster

Document-oriented storage suited to nested project, asset, and geospatial data — and managed for scale.

Cloud-native

LAYER 04 · PROCESSING

Obstacle Analysis & Route Optimization modules

Separate processing modules so obstacle ingestion and route computation can scale and be tuned independently of the rest of the platform.

Modular compute

LAYER 05 · NOTIFICATIONS

SMTP-based email automation

Reliable, auditable email delivery for route notifications and stakeholder approvals — no third-party messaging dependency.

SMTP

LAYER 06 · OUTPUTS

KMZ geospatial files

Industry-standard geospatial export format — opens directly in the GIS tools downstream engineering and design teams already use.

KMZ

— MEASURED OUTCOMES

Before and after — five things that changed.

METRIC	BEFORE	AFTER
Route Planning	Manual & spreadsheet-driven	**AI-powered automation**
Obstacle Handling	Static analysis	**Dynamic geospatial modeling**
Cost Visibility	Limited	**Configurable simulations**
Decision Speed	Slow	**Accelerated**
Collaboration	Fragmented	**Unified digital platform**

— BUSINESS IMPACT

- ✓ Reduced manual route-planning effort across every new project
- ✓ Improved infrastructure deployment efficiency end to end
- ✓ Enabled cost-aware engineering decisions earlier in the cycle
- ✓ Higher planning accuracy in obstacle-rich environments
- ✓ Accelerated approvals through interactive visualization that stakeholders could explore on their own — not static deliverables they had to interpret

— WHAT CHANGED FOR THE BUSINESS

Beyond the platform — four ways the work compounded.

Engineering Efficiency

AI reduced the dependency on manual route calculations — freeing senior engineers from repetitive geometry work and putting their time on the decisions that actually need judgment.

Infrastructure Accuracy

Obstacle-aware optimization improved feasibility upfront and reduced the rework that happens when constraints surface late in approvals.

Cost Optimization

Scenario modeling moved cost into the engineering conversation rather than after it — enabling better cost-performance decisions before commitments harden.

Scalable Planning Model

The platform created a repeatable framework that scales to future renewable projects without rebuilding the planning approach for each one.

— WHY KANSOFT

The capability mix this engagement required.

01 Deep expertise in AI-powered optimization systems — production AI, not pilot work.

02 Strong capability in geospatial and engineering intelligence platforms.

03 Experience in energy & infrastructure digitalization across global markets.

04 Ability to combine AI, analytics, and operational workflows into one platform — not three.

KANSOFT

CONTINUE THE CONVERSATION

— READY TO BUILD SOMETHING LIKE THIS?

If your *infrastructure planning* is still being done in spreadsheets, the next call is the one worth having.

We help energy, utilities, and infrastructure organizations build the AI and geospatial systems that turn complex engineering decisions into repeatable workflows. If that's where you're headed, let's talk.

SPEAK TO OUR TEAM

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