NV5

ONSHORE TRANSMISSION LINE SITING

Electric Transmission Line Siting

NV5 Geospatial (powered by Quantum Spatial) will utilize the standard Overhead Transmission Line Siting Methodology. NV5 Geospatial has an unmatched expertise in helping electric utilities locate preferred routes for new transmission lines. The award-winning methodology has been used to site more than $1 billion in new infrastructure in eight states and three countries.

Our expertise spans data acquisition, alternative route development, impact analysis, route selection analysis, Cartography, engineering surveys, environmental compliance, public outreach, digital renderings, and beyond. NV5 Geospatial is the go-to partner for organizations that want to map, model, and better manage their world. Our end-to-end geospatial services deliver the geographic insights that advance business and government goals. NV5 Geospatial is at the forefront of using geospatial intelligence to help utilities deliver safe and reliable electric service. We have more than two decades of experience providing industry-leading geospatial services to dozens of utilities across North America.

Rigorous Approach

Siting new power lines requires resolving a complex set of engineering, environmental, and societal issues. Our methodology is an objective, comprehensive and consistent approach for routing a proposed transmission line. Our methodology provides a structured approach to apply quantitative stakeholder input and organize a vast amount of data. The rigorous step-by-step process facilitates the selection of an optimal route, taking into account the natural environment, built environment, and design and construction concerns.

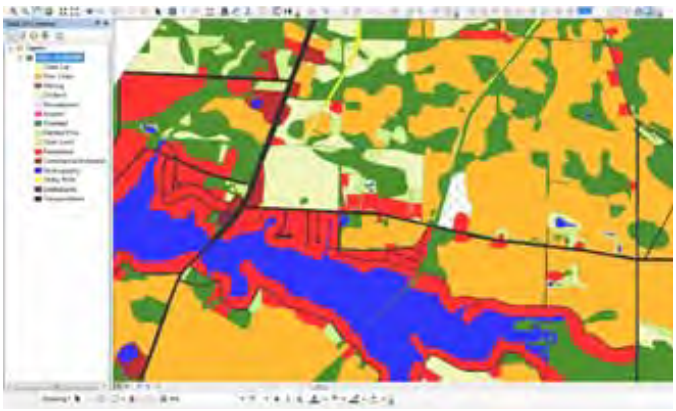
Industry-leading Siting Methodology

- Favored by regulators
- Utilized analysis in more than 200 real-world transmission line projects
- Used in eight states and internationally
- Featured in national industry publications including Transmission & Distribution World, GeoWorld, and Electric Transmission Week, and Point of Beginning
- Won the National Rural Electric Cooperative Association's (NRECA) 2006 Cooperative Innovators Award for GTC

Faster, Defensible Decisions

Electric utilities benefit enormously from a standardized approach to siting selection. Our methodology:

- Produces siting decisions that are quantifiable, consistent, transparent, and defensible
- Reduces risks by addressing regulatory scrutiny and stakeholder issues early in the process
- Shortens the planning and permitting cycle
- Improves productivity and analytical capabilities



NV5 Geospatial (powered by Quantum Spatial) created a siting methodology in partnership with the Electric Power Research Institute (EPRI).

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Step 1

Identify Macro Corridors

- Identify beginning and end points of proposed transmission line
- Create a digital map of the study area (grid of 100-square-foot cells)
- Assign values to each cell on the map, representing a land use feature, from 1 (most suitable) to 9 (least suitable)
- Calculate optimal paths for three types of suitability surfaces: 1– along existing transmission lines, 2 – along existing road rights of way, or 3 – crossing less developed areas

Step 2

Identify Alternate Corridors

- Collect more detailed data within the macro corridors
- Create suitability maps (grid of 15-square-foot cells)
- Define four types of alternate corridors: 1– built environment (human activities and interests), 2 – natural environment (environmental concerns), 3 – engineering requirements (design and construction), and 4 – simple average
- With the input of external stakeholders, set evaluation criteria and rank factors (such as housing density and wetlands and land cover)

Step 3

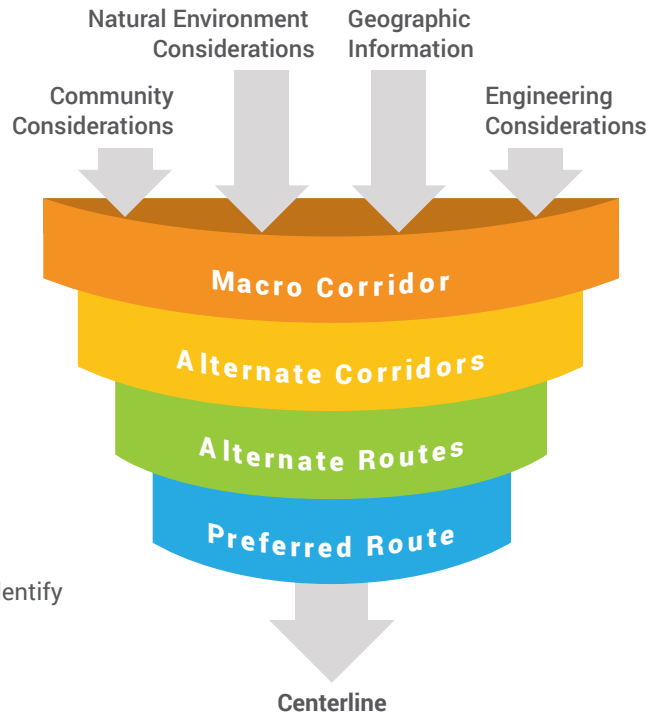
Identify Alternate Routes

- Identify property lines and classify types of buildings within the alternate corridors
- Have utility professionals use their expert judgment to identify alternate routes

Step 4

Select a Preferred Route

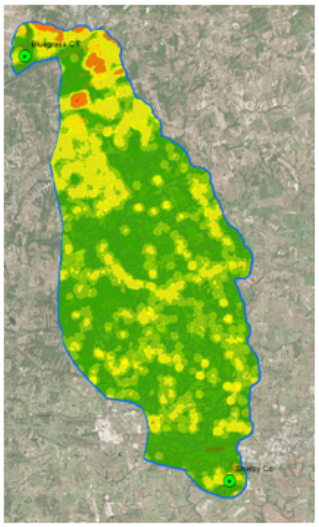
- Review a standard list of metrics (cost, number of houses nearby, etc.) for the alternate routes (metric values are automatically calculated)
- Assign relative weights to community concerns, visual concerns, special permit issues, scheduling risks, and accessibility for construction and maintenance
- Rank top alternate routes, then use expert analysis to identify the preferred route



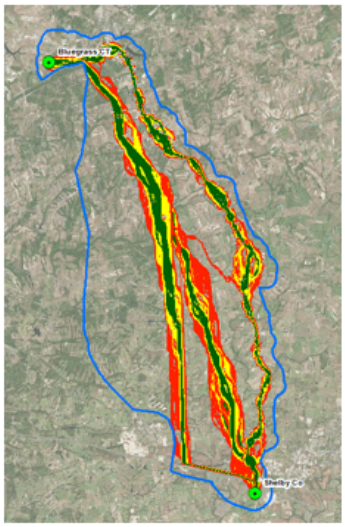
Deliverables

Statistical Analysis Report on Siting Suitability

A final report is delivered with detailed information on supporting methodology as well as the analysis produced in selecting the recommended route. This report and project resources have been used in legal proceedings where parties challenged the decisions made by the utility. This report can provide evidence that no bias existed and the decisions were made based on statistics and supported with the best information available. This analysis is a suitability model that combines readily available GIS datasets, heads-up digitization, raster calculation, least cost path analysis, field work, statistical analysis, client feedback, industry experience, and constant communication with municipal governments and clients. Most importantly, due to the comprehensive nature of the methodology as well as the numerous data sources involved, the analysis proves a thorough understanding of the AOI to select the best transmission line route.



Acquisition of Data for AOI
Substations provided by customer and data collection including LiDAR acquisition as well as publicly available layers (ex: parcels) are aggregated.



Corridor Options Established
Customer criteria including natural environment, built environment, existing infrastructure, and cost to build are weighted to determine best options for construction.

Precise Routes are Modeled
Route segments are established in detail using data acquired in initial phase. Additional review of weighting criteria ranks route options.

Final Route Delivered
The recommended route is provided in a detailed report that can be used to support legal and regulatory hurdles, enabling the customer to proceed as efficiently as possible through their permitting process.