The Vermont Partners Geospatial Database and Water Quality Mapping Application

STONE ENVIRONMENTAL
100% EMPLOYEE-OWNED

Special Achievement in GIS
2017 Award Winner

Services / Expertise
Geospatial and Data Solutions
Web-Based Mapping Application
Database Management
Web Hosting

Technology
ArcGIS Server, ArcSDE, ArcGIS JavaScript API, PostGres, PostGIS, Amazon AWS EC2 and S3, HTML5, CSS3, Node.JS, GruntJS, Yeoman, AngularJS, Compass, Microsoft Windows Server 2012 R2, Python, AGILE methodologies

Markets
State Government
Diverse GIS

Project Location
Vermont

Date Completed
2014–Present

Project Owner
Vermont Agency of Agriculture, Food & Markets

Project Manager
Barbara Patterson
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Project Team
Nick Floersch
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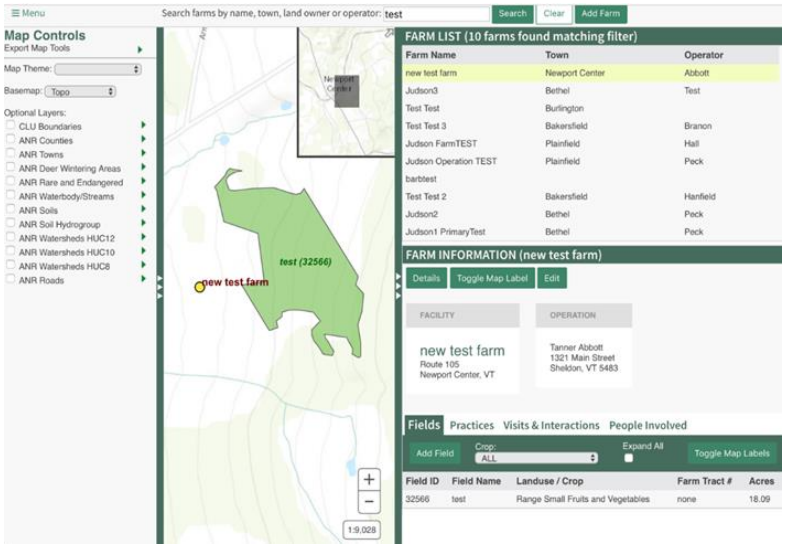

The Vermont Partner Database application can be used to view and edit spatial and non-spatial information within the relational database.

STONE developed the Vermont Partners Database, a secure, shared, web-based mapping, database, and reporting platform for communicating, coordinating, and tracking farm conservation efforts. The application was designed in partnership with the Vermont Agriculture Water Quality Partnership and the Vermont Agency of Agriculture, Food & Markets (VAAFM) to improve long-range planning across and within agencies to maximize resources and improve agronomic impacts on water quality. The Partners Database provides up-to-date farm field data that helps field staff plan, coordinate, and track best management practice implementation statewide.

This information exchange platform will greatly aid efforts to improve the efficiency and effectiveness of Vermont's agricultural water quality management practices implementation over time. The application helps reduce redundancy and improves communication among farm conservation planners. Authorized users can drill down to a farm field of interest, determine what activities have already been planned or implemented, and which organization provided the assistance.

Using ArcGIS Server and PostGres, Stone developed a robust relational database to manage both spatial and non-spatial information associated with agricultural best management practice implementation. The database allows users to view and edit farm information, including farm fields, practices, visits and interactions, and farm contacts. Because the application contains sensitive farm data and direct communication with farmers, access is available only with a secure username and password. Vermont conservation districts have access, and farm data is restricted based on a user's county. The relational database also allows for flexible reporting capabilities to list details of practices or a summary based on county or watershed.

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State and Local Government Specialty

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In 2019, Stone worked with VAAFM's Water Quality Division to develop and integrate a new farm water quality multi-user online mapping application and spatial data management system within the Vermont Partner Database. The solution has required establishing separate user roles for VAAFM's water quality inspection team so that those users cannot access any of the Vermont Partner practice data. Similarly, the Vermont Partner's practice data users do not have access to inspection data or activities conducted by the water quality team. The solution has helped simplify the VAAFM's current workflow for mapping on-farm inspection information by providing multiple users the ability to access the application; quickly create farm inspections, add structures, fields, buffers, and other farm assets associated with the inspection; and create detailed maps of all farm data. The application also includes a custom labeling tool, allowing users to create detailed labels for inspection reports. Integrating the water quality inspection data with the Agency's farm practice data has provided the VAAFM with a more holistic picture of all activities on a farm.

The Stone team continues to work with VAAFM to identify new methods for integrating the application into the agency's workflow, such as a system to share data between Farm-PREP and the Vermont Partners system. These improvements and modifications streamline communication and coordinate an information exchange repository and reporting system to track and share all relevant farm, field, and practice data across teams.

Partner organizations include VAAFM, the Vermont Department of Environmental Conservation, the Natural Resources Conservation Service, Farm Service Agency, the United States Fish and Wildlife Service, the Vermont Association of Conservation Districts, the University of Vermont Extension Service, and the Lake Champlain Basin Program.

The application is built using COTS tools, including ArcGIS Server 10.3x's Javascript API, PostgreSQL, Angular JS, and CSS. In 2017, VAAFM was awarded the prestigious Special Achievement in GIS Award at the Esri 2017 International User Conference in San Diego, California.

Using a methodology grounded in NRCS standards and enhanced by Stone's geospatial expertise, the CSA layer integrates four key soil properties—slope gradient, hydrologic soil group, Kw factor (soil erodibility), and flood frequency—with proximity to surface water features. Proximity was assessed using two hydrological layers: surface water and enhanced hydrology, the latter derived from LiDAR-based mapping of intermittent flow paths and ditches. Each field received a composite score based on weighted soil and water risk factors, with soil contributing 60% and water 40% to the final CSA score.

Stone's GIS team developed a scoring rubric and applied it across the Missisquoi Bay Basin, producing a final map layer that classifies fields into low, medium, high, and very high-risk categories. This analysis enables VAAFM inspectors to efficiently target site visits and prioritize conservation efforts in areas most vulnerable to nutrient loss and sediment transport.

This project exemplifies Stone's ability to combine field data, hydrological modeling, and spatial analysis to support strategic conservation planning. The CSA methodology aligns closely with SLT's goals for identifying high-value conservation parcels based on scientifically grounded criteria such as slope, soils, and water proximity.

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Data Layers for Use in Application Include:		
✓ LiDAR elevation rasters and hillshade derivatives	✓ E911 roads layer / major roads layer.	✓ VSWI wetland layer
✓ Digital Elevation Models (DEMs) (10m, 30m) and hillshade derivatives.	✓ SSURGO soils data layer for Vermont.	✓ All available precipitation data.
✓ Most recent USGS topographic maps.	✓ Watershed boundaries (HUC8, HUC 10, HUC 12)	✓ Deer wintering areas
✓ County Boundaries	✓ True color, infrared, and B&W orthophotography – current and historical	✓ Well-head protection areas
✓ Town Boundaries	✓ Surface water layer(s).	✓ USDA Conservation Land Unit boundaries