LiDAR Data Supports the Vermont Clean Water Initiative:

LiDAR (**Li**ght **D**etection **A**nd **R**anging) is a remote sensing technology that produces elevation models of sufficient resolution[1] to support high precision river, stream, and unnamed tributary mapping in support of Clean Water initiatives.   This increase in resolution affords analysis at the site level that is simply not possible with current elevation data. LiDAR data supports Act 64 and the VT Clean Water Initiative as follows:

Required Agricultural Practices (RAPs):

LiDAR supports the mapping of ditches, diversions, gullies, swales and surface water features in direct support of nutrient management planning goals:

- Stacking manure outside of floodways and set back from various features, i.e., Property lines (200'), private water supplies (200') and perennial (200') and intermittent (100') surface waters.
- Not applying manure within certain distances of: private wells (100'), public water supplies (200'), perennial (25') and intermittent (10') surface waters.
- Establishing buffer widths on certain features, i.e., ditches, diversions, swales (10') and perennial (25') and intermittent (10') surface waters.
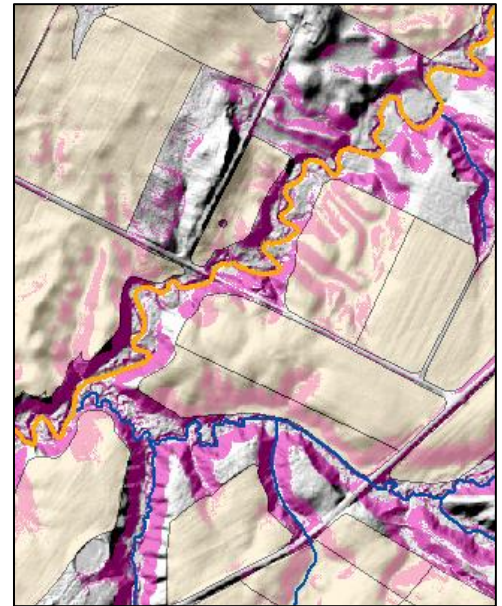
Using LiDAR to locate Ravine & Gullies - Conduits of nutrients and sediment in Lake Champlain (Credit: Caroline Alves – USDA/NRCS)

Municipal Roads General Permit: As part of the municipal roads storm water permit, municipalities will have to identify, inventory and prioritize erosion areas on local roads hydrologically connected to perennial streams.

- LiDAR elevation models can be used to map ditches, gullies, swales and unnamed tributaries. These features can then be used to:
  1. Identify Town highways with drainage systems connected to perennial streams;
  2. Inventory roads identified with ditch slopes GT 5% to be stone lined;
  3. Prioritize connected roads in a reliable and consistent way around the state to help ensure that:
     1. Only the local roads that affect water quality are regulated; and

Land Cover Classes from LiDAR

Legend
0 - NoData
1 - Tree Canopy
2 - Grass/shrub
3 - Bare Earth
4 - Water
5 - Buildings
6 - Roads
7 - Other Paved Surfaces

Impervious surfaces can be derived from LiDAR

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[1] An increase from 36 to 8400 data points per acre compared to current elevation data (Elevation_DEM0p7m vs. Elevation_DEM10m), i.e., 0.7m horizontal resolution/ 9.25cm vertical accuracy vs. 10m horiz./1.87m vert., respectively.

2. Water
are targeted only on the roads that matter.

Additional Uses:

See the VT State LiDAR Plan: Attachment A for a full listing of use cases: http://tinyurl.com/VTLiDARPlan.

- FEMA – National Flood Insurance Rate Map updates.
- Accurate river corridor layer to better reflect erosion hazards and mitigate riparian erosion.
- Runoff mapping in Town water and sewer districts.
- Directly supports creation of building footprints/parking lots/other impervious surface data to support town level decision making, e.g., density and stormwater/impervious surface planning.
- Town & regional level mapping of impervious surfaces (Act 64 general permits requirement on parcels with greater than 3 acres impervious surface.)
- NRCS agricultural management.
  1. Identification and mapping of ditched crop fields and ditch networks;
  2. Surface water flows off field surfaces into waterways;
  3. More accurate average slope values for agricultural lands;
  4. Identification of gullies to be addressed with conservation practices;
  5. Identification of areas with high erosion and runoff potential for P loading to Lake Champlain;
  6. Landscape visualization support in planning farm conservation.
- Vermont Geological Survey - Landslide hazard mapping.
- Transportation: Project design and survey support, road center line improvements and archeological assessment.
- Solar project siting and permitting.
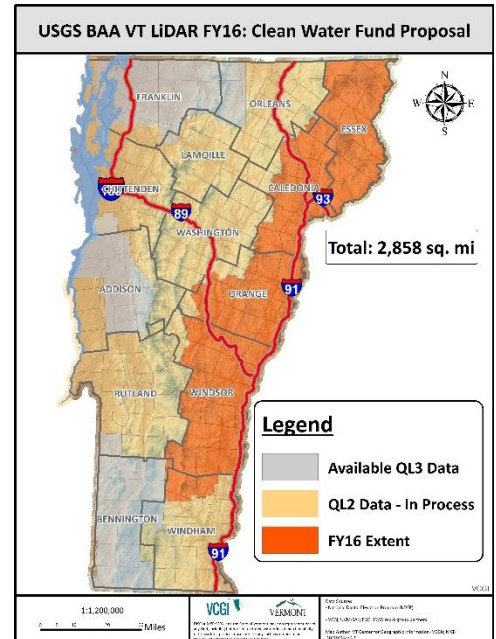
Proposed FY16 CWF supported data acquisition extent (in red)
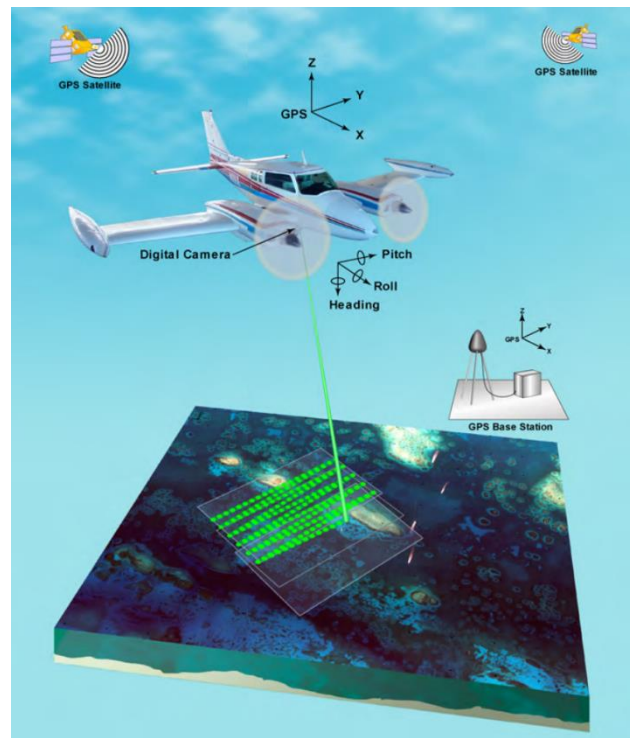
LiDAR at a Glance

LiDAR is a remote sensing method using light in the form of a pulsed laser to measure ranges (variable distances) to the Earth yielding precise elevation data.
The combined utility of LiDAR elevation products supports such a wide array of applications that it can truly be considered a form of critical digital infrastructure.

For More Information

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VT LiDAR Initiative web page **vcgi.vermont.gov/lidar**