VTRANS UAS

UNMANNED AIRCRAFT SYSTEMS

SAFETY – EFFICIENCY – INNOVATION

VTrans UAS
Program Mission

The mission of the State of Vermont, Agency of Transportation's unmanned aircraft system (UAS) program is to fly safe and efficient unmanned aircraft missions in full compliance of all FAA rules and regulations.

Mission specific flights will include collecting data for; emergency response, infrastructure inspection, construction site monitoring, remote aerial imagery for VTrans as well providing UAS support for other Vermont State Agencies. VTrans UAS program will have internal steady state operation capacity as well as be augmented by aerial equipment currently provided by outside contractors.

VTrans UAS
Our Team

VTrans UAS is comprised of 11 members of the VTrans Rail and Aviation Bureau. Our team includes many members with prior aviation knowledge and experience. Differing backgrounds and skillsets allow the opportunity for unique contributions from each member of VTrans UAS. The team of 11 members is made up of:

- (6) FAA certificated Remote Pilots (drone pilots)
- (11, all members) VTrans trained Visual Observers and operations crewmembers
- (5) Manned Aircraft Pilots
- (7) Airport Operations Specialists
- (1) Rail and Aviation Bureau Administrator
- (1) UAS Program Coordinator
- (1) Civil Engineer
- (1) GIS Mapping and Data Processing Specialist

VTrans UAS
Remote Pilot Certifications

All VTrans Remote Pilots must pass the FAA Remote Pilot Certification written knowledge test. The test requires pilots to be well versed in the following categories:

- Applicable regulations relating to UAS rating privileges, limitations, and flight operations
- Airspace classification
- Aviation weather sources and effects of weather on UAS
- UAS Aircraft Loading
- Emergency Procedures
- Crew resource management
- Radio communications procedures
- Determining performance of UAS
- Physiological effects of drugs and alcohol
- Aeronautical decision making (ADM)
- Airport operations
- Maintenance and pre-flight inspection procedures

VTrans UAS
Part 107 Compliance

All VTrans UAS operations will be conducted in compliance with:

FAA - Federal Aviation Regulations Part 107

Part 107 Summary:

- UAS must weigh less than 55 pounds
- UAS must be kept within visual line-of-sight* (beyond line of site with FAA waiver)
- Fly at or below 400 feet*
- Fly during daylight or civil twilight* (night flight with FAA waiver)
- Fly at or under 100 mph*
- Yield right of way to manned aircraft*
- Do not fly directly over people*
- Do not fly from a moving vehicle, unless in a sparsely populated area*

VTrans UAS Fleet

Currently, VTrans owns one drone and limited accessories. This system is a consumer level drone that is being used for both training and current missions. VTrans UAS is in the process of procuring four more complete drone set-ups.

- DJI Phantom 4
  - ✓ HD Video, 12 MP Camera

Current Drone

- Drone1 - Mapping, Inspection, Emergency Response
  - ✓ Dual Sensor Capability, GNSS GPS (1cm accuracy)
  - ✓ Survey, Ortho-imagery, Inspection
- Drone 2 – Inspection, Emergency Response
  - ✓ 12 MP Camera, Infrared Sensor
  - ✓ Spotlight, Speaker
- Drone 3 – Inspection, Marketing, Emergency Response
  - ✓ 20MP Camera
- Drone 4 – Inspection
  - ✓ Upward Facing 21 MP Camera

Actively Being Procured

VTrans UAS
Daily Operations

- Structure Inspection
  - ✓ Bridge, Culvert, Tower, Building, Rooftop
- Project and Construction Management
  - ✓ As-Builts, Progress Monitoring, Survey/Plan Overlay, Site Assessment, Stock Pile Volume Calculation, Time-Lapse Imagery
- Transportation Promotion
  - ✓ Government Event Media Coverage, Social Media, Public Outreach
- Geographic Mapping
  - ✓ Ortho-imagery, GIS Integration, Digital Surface/Terrain Models, Airport Obstruction Analysis
- Environmental Survey
  - ✓ Habitat Identification and Monitoring, Logging Oersight,Vegetation Health Analysis, Erosion Monitoring

Bridge Inspection

Snooper Truck

Drone Inspection

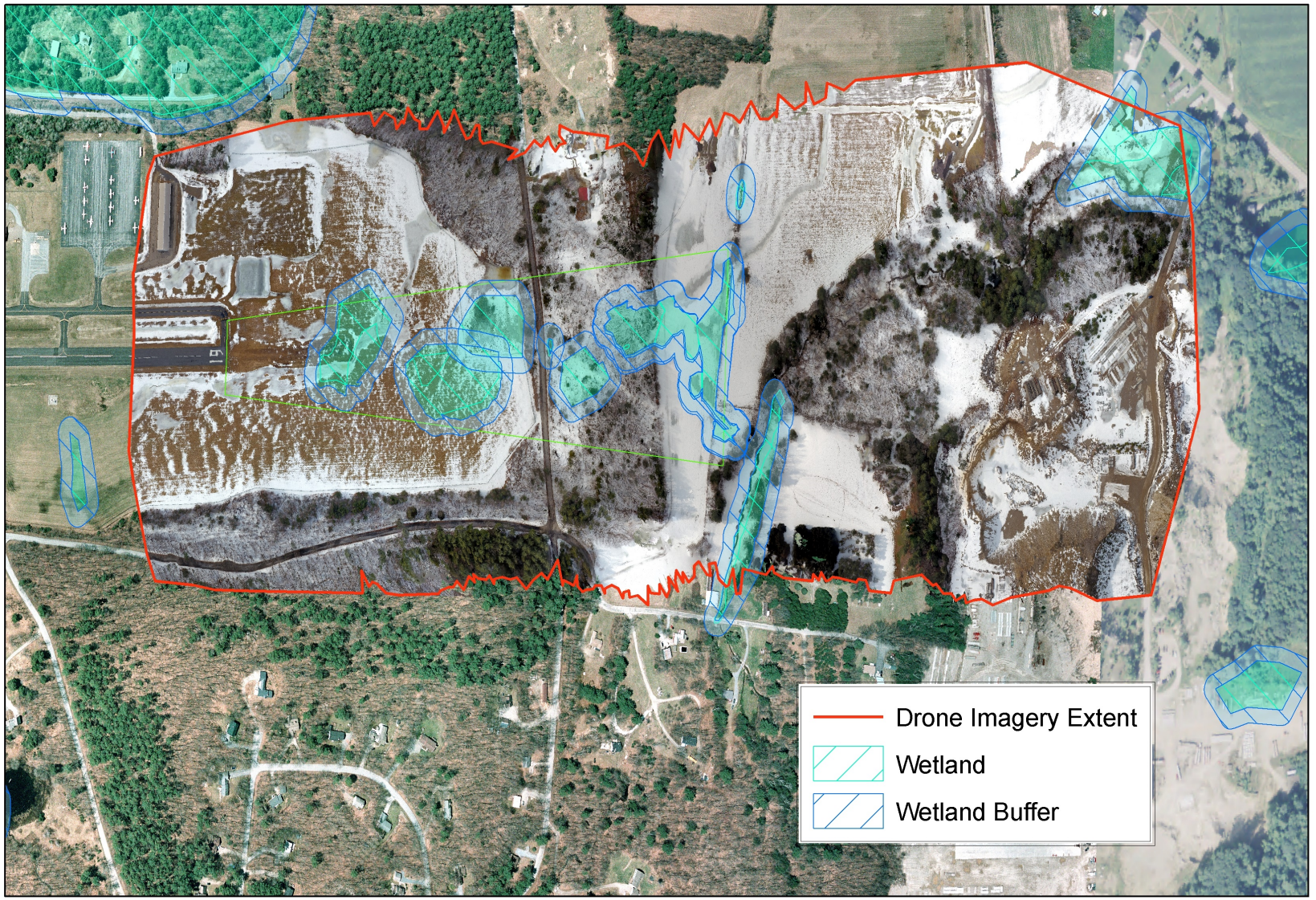
- Support (not replace) inspections conducted with snooper trucks
- Use identify and isolate areas that need further inspection
- Minimize traffic impacts
- Keep inspection personnel on the ground, minimizing risk

Construction Project Oversight

Bennington Airport Re-surface Project - August, 2018

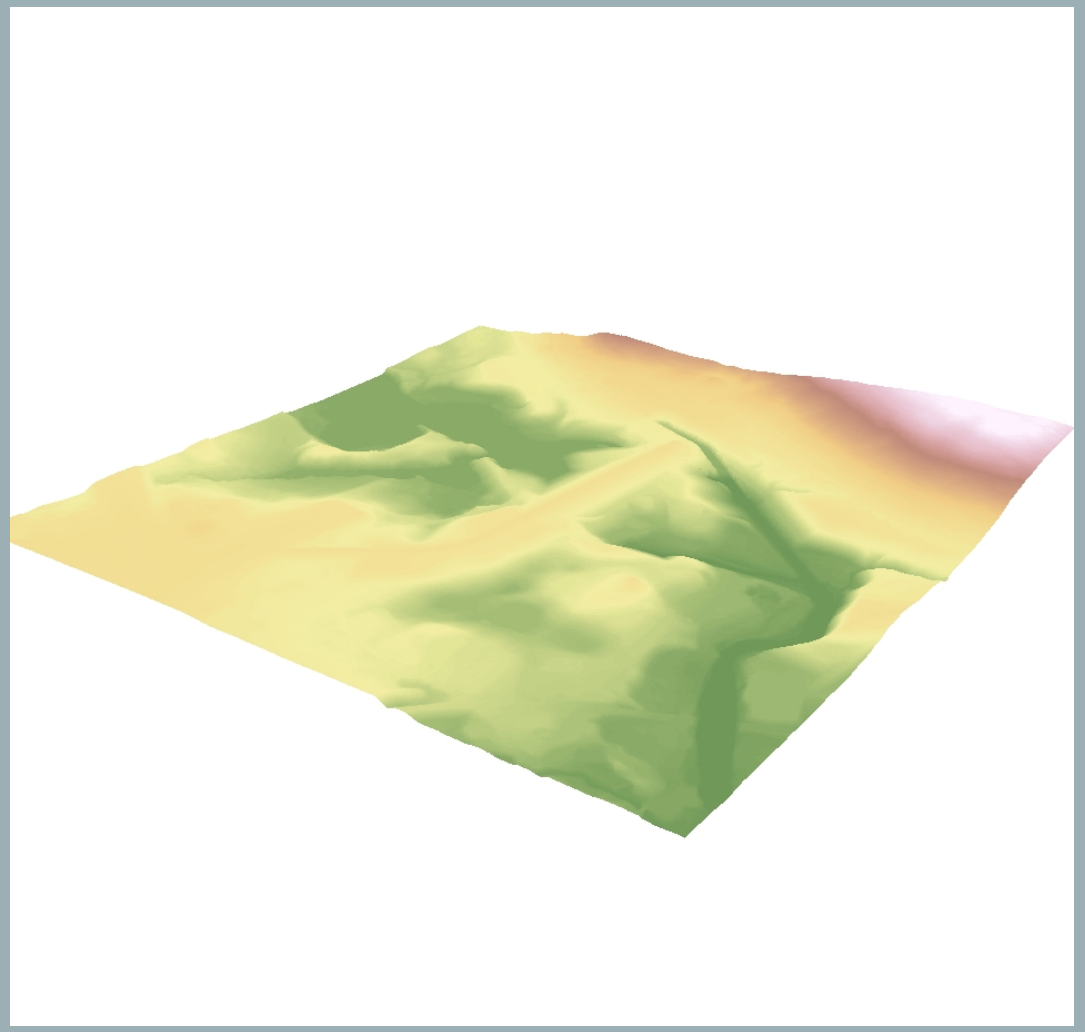
Orthomosaic Imagery - Obstruction Analysis with GIS Overlay

Middlebury, VT - North Approach RWY 19, 2/6/19



Digital Terrain/Surface Models

Hartness State Airport, Springfield, VT



Tree Removal Oversight

Morrisville, VT – September, 2018

VTrans UAS
Emergency Response Operations

- Search and Rescue

✓ Grid Search, Infrared Sensing, Night Operations (with FAA waiver), HD Video Livestream, Follow Object

- Flooding Event

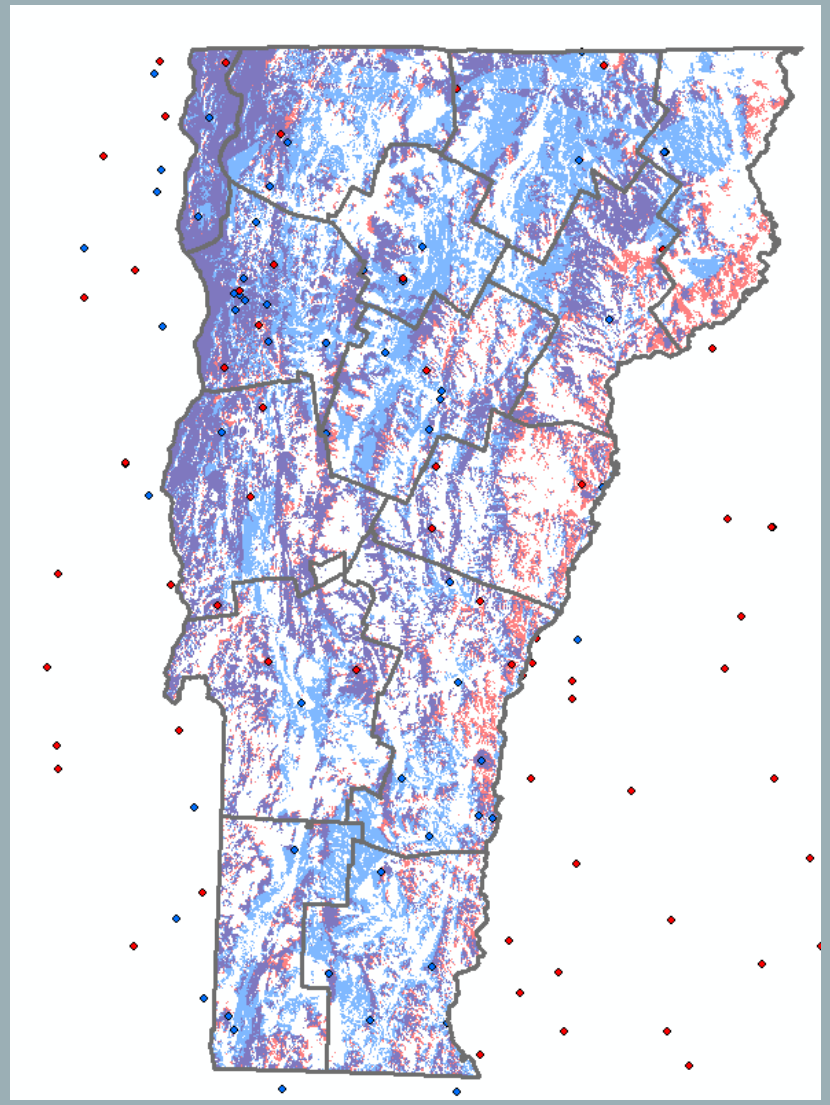
✓ Infrastructure Damage Assessment, HD Video Livestream,

- Wind Event

✓ Damage Assessment, Downed Powerline/Tree Identification

Live-Stream Video

Cellular Coverage in Vermont



- Livestream HD Video in near-realtime. (Based on cellular or WiFi coverage)
- Approximately 30 second lag from drone to device.
- Stream to SEOC, VEM, TMC, or any device via text/email link.

VTrans UAS

Damage Assessment (Example Image From Helicopter) – Post Irene - August 2011

Rapid and cost effective deployment of UAS to several locations

VTrans UAS
Inter-Agency Operations

- Inter-Agency benefit, leveraging VTrans UAS capabilities

✓ Flight Request form available on VTrans Aviation website

✓ Simple budget transfer using project EA #

✓ Data sharing for multi-project use (one flight may serve more than one project)

✓ Augment Search and Rescue response capability statewide

VTrans UAS Flight Request Form

1. Enter Information

Requestor (required)

Evan Robinson

Requestor Agency (required)

AOT - Highway

Select...
AOT - Aviation
AOT - DMV
AOT - Highway
AOT - Maintenance
AOT - Other
AOT - Policy Planning and Research
AOT - Public Transit
AOT - Publications and Maps
AOT - Rail
Agency of Agriculture, Food and Markets
Agency of Commerce and Community Development
Agency of Digital Services
Agency of Education
Agency of Natural Resources
Department of Public Safety
Department of Public Service
Other

March 28, 2019

City/Town (required)

Lyndonville

Mission Category (required)

Damage Assessment (non-emergency)

Mission Category Other

Flight Description (required)

Assess damage cause by the ice jam on the Passumpsic River

EA Number (required)

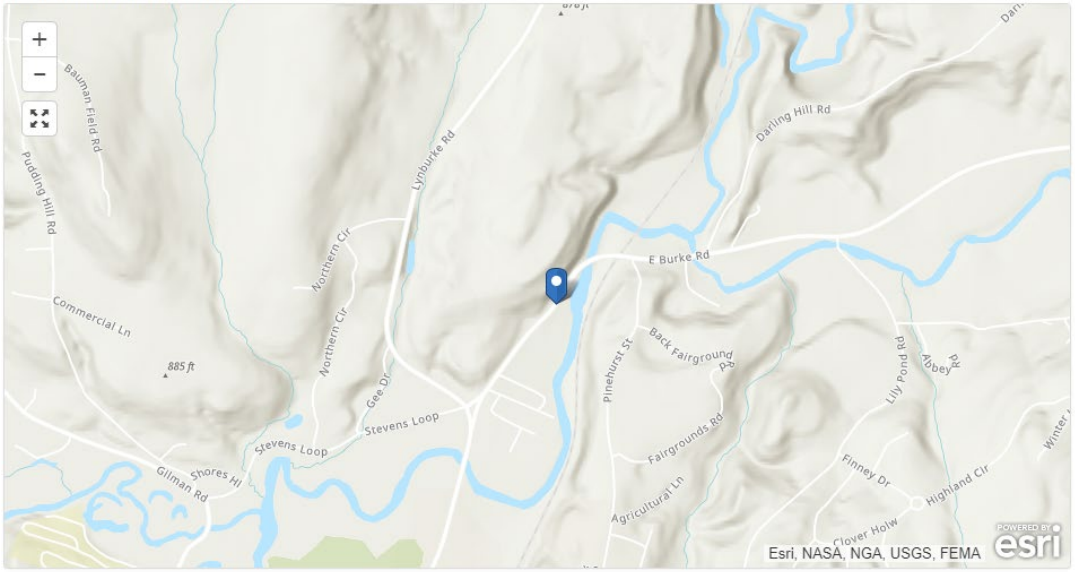
2. Select Location

UAS Restricted areas are colored **Red**. UAS height-specific restrictions are **Shaded**.
Specify the location for this entry by clicking/tapping the map or by using one of the following options.

Search | Lat/Lon

Find address or place

Latitude: 44.55608, Longitude: -71.99349



3. Complete Form

Add this information to the map.

Submit Application

VTrans UAS
2019-2020 Timeline

- Acquisition of equipment
- Continual crew training
- Procedural development
- Conduct basic/training missions

March 2019

June 2019

- Specialized equipment training
- Procedural development
- Accommodate all mission types
- Procure FAA waivers

(emergency response capability)

August 2019

- Team to attend training workshops
- Fly regular missions
- "Mid-season" program assessment
- Procedural development

December 2019

- Reflect and re-evaluate procedures. training, program needs
- Pursue acquisitions that will increase capability and efficiency

May 2020

- Begin agency integration of UAS
- Expand UAS team to applicable areas throughout VTrans
- Continual advancement in safety, efficiency, and technology.

December 2020

Steady-state operations:

- Inspection
- Mapping
- Project Management
- Emergency Response