



Unmanned Aerial System (UAS) Use in Adjudication Verification

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NDWR's Model



Outline

1. Governor Sandoval's Plan
2. Recognition
3. Performance Metrics
4. Actual Test Data
5. Resources Needed
6. Comments & Questions



“Generations to Come”



2016 - 2020

**First Edition
April 11, 2016**

Nevada's Strategic Planning Framework



VIBRANT AND SUSTAINABLE ECONOMY



No other state in the nation felt the effects of the Great Recession as severely as Nevada did. As a result, a decades-long conversation about diversifying an economy heavily dependent on disposable income reached a phase of urgency that compelled deliberate and targeted action to transform Nevada's economic landscape. While Nevada's traditional and foundational industries and sectors remain inextricably linked to the state's success, efforts must continue to recruit and retain dynamic, emerging businesses that are on the forefront of innovation and that offer job opportunities for a new generation of workers. While the new Nevada economy will be built on the emerging industries and technologies of the future, we must also guard our competitive advantage and reputation for excellence in foundational industries such as gaming, tourism, agriculture, and mining. The momentum that has been generated over the last five years must continue, not only to ensure a full recovery from the economic downturn of 2008, but also to ensure that when the next downturn strikes, Nevada's economic vitality will be fortified.

1. BUSINESS DEVELOPMENT AND SERVICES

1.1 Lead the nation in high-quality job creation.

- 1.1.1 By 2020, the job growth rate in Nevada will exceed the national average.
- 1.1.2 Meet or exceed national real wage growth rates on an annual basis.
- 1.1.3 Nevada will increase the number of jobs in the following emerging sectors:
 - Advanced Manufacturing
 - Food Manufacturing
 - Information Technology
 - Health Care
 - Logistics
 - Renewable Energy Technology and Development
 - Unmanned (Autonomous) Systems and Advanced Mobility
 - Water Technology
- 1.1.4 Cultivate a diverse and inclusive workforce and ensure equal employment opportunities.

1.2 Ensure a business-friendly regulatory environment.

- 1.2.1 Instill a regulatory and administrative framework that minimizes bureaucratic barriers to business success.
- 1.2.2 Expedite professional licensure in all fields.

1.3 Maintain our historic leadership role in tourism and gaming.

- 1.3.1 Foster innovation in the gaming and entertainment industries.
- 1.3.2 Achieve a 25% increase in out-of-state visitor counts over the next decade.
- 1.3.3 Demonstrate quantifiable gains in the 18-34 age demographic.



Acknowledgements

- **Federal**
 - FAA
 - USDA-APHIS
- **Private**
 - Rural Ranchers
 - Nevada Institute for Autonomous Systems
- **Local Government**
 - Carson City
- **States**
 - Arizona, Idaho, New Mexico, Utah, Wyoming
- **Nevada**
 - Governor's Office of Economic Development
 - Department of Conservation & Natural Resources
 - Division of Emergency Management
 - Department of Transportation
 - Highway Patrol
 - Risk Management
 - University



CPM Metrics

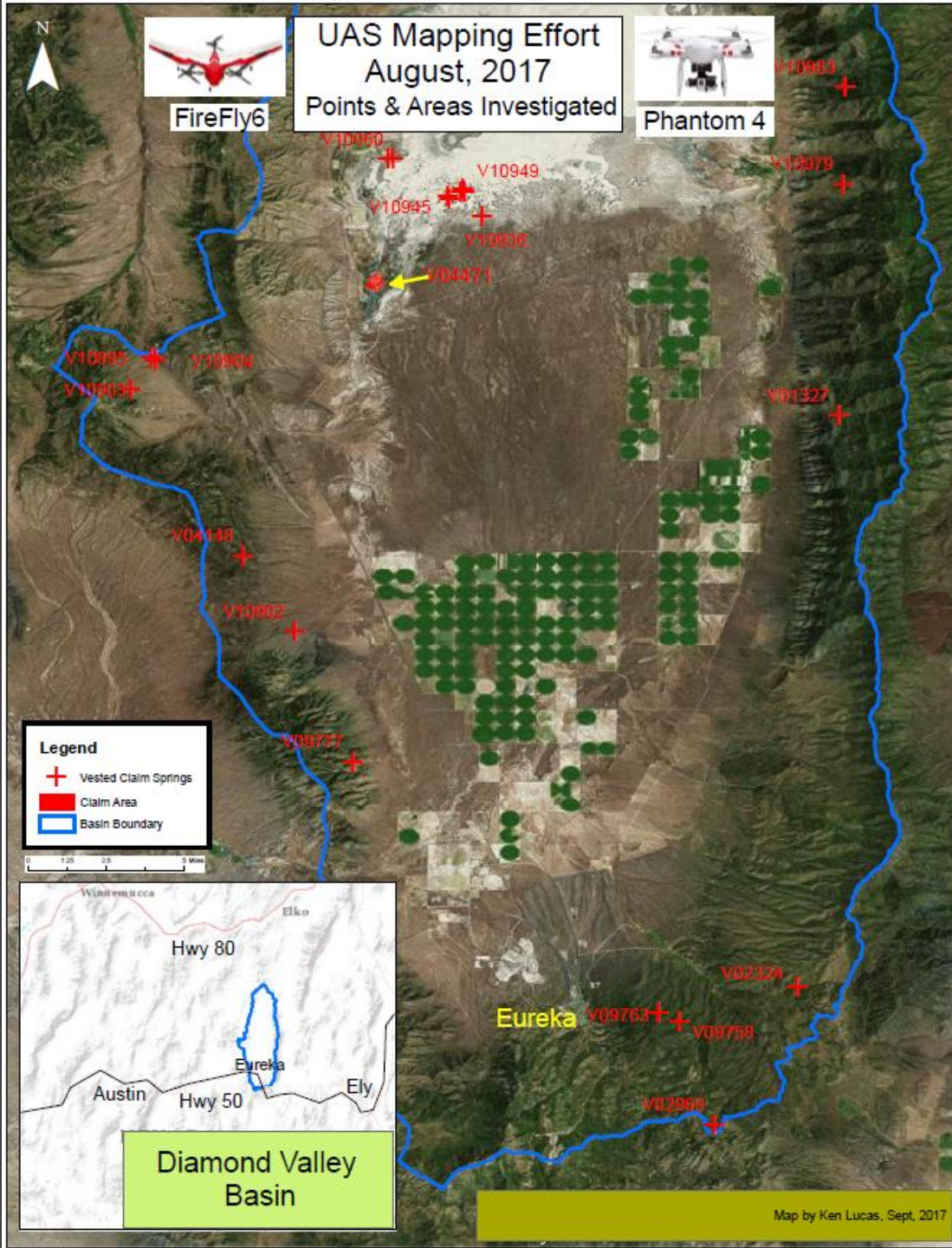
Actual Savings

- **Per Diem**
 - 61.5% reduction
- **Operating Costs**
 - 70% reduction per day (ATV \$56.78/hr vs. UAV \$16.42/hr)
- **Compensatory**
 - 20 hours reduced per person per trip
- **Time**
 - UAS 36 min/site vs. tradition 66 min/site

Projected Annual Savings

- **Per Diem**
 - \$12,176
- **Operating Costs**
 - \$101,624.04
- **Compensatory**
 - \$29,280.00
- **Time**
 - 47% reduction per site





McBride Spring

V10904
+

V10904
+

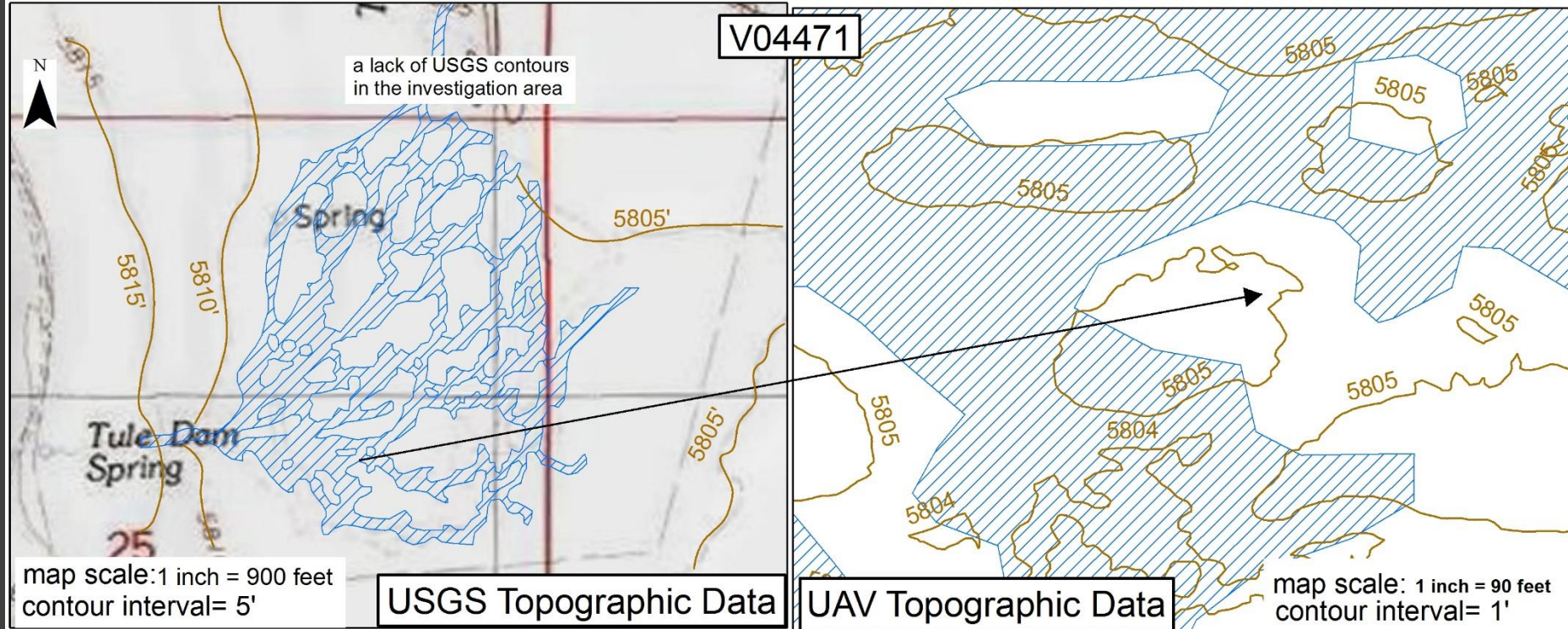
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07/25/2017

GIS Imagery

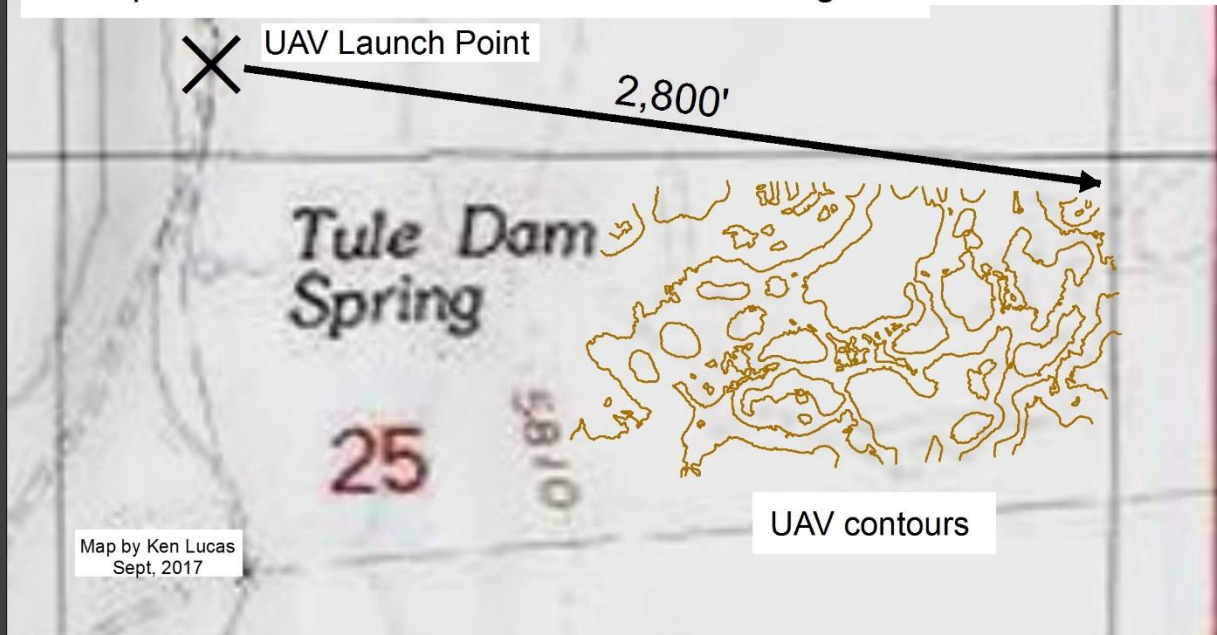


UAV Imagery

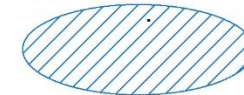


Required 100 minutes for a traditional investigation

Required 60 minutes for a UAV investigation



Historic harvest areas, drawn by a water rights surveyor, using aerial imagery, to cover low-lying areas,



The traditional method requires field verification, that mapped low areas, reasonably, match actual low areas in-the-field. UAV-captured contours allow tech to make this verification, with just an office review.



Scope

- **Operations**
 - Quadcopter Training
 - Data Processing
 - Missions
 - Project Management
- **Coordination**
 - Division of Emergency Management
 - FAA Integration Pilot Project
 - Department of Corrections
 - USDA
- **Equipment Needed**
 - Higher Powered Computer
- **Human Resources Needed**
 - Licensed Pilots
 - Vertical Take-Off & Landing Trainer
 - GIS Analysts
 - Certificate of Waiver or Authorization Expert



Questions?





Supplemental Supporting Data for Q&A Session

[FireFly Launch Flight Video](#)

Category	Item	Price
UAV	FireFLY6 PRO System	\$ 5,999.00
Insurance	Risk Management: Aircraft and Physical Damage Coverage \$7,500	\$ 350.00
	Risk Management: Liability \$5,000,000 per occurrence	\$ 934.00
Training	2x Holy Stone F183W Quad Copters	\$ 219.98
	FAA Exam Prep Course	\$ 224.00
	FAA Exam	\$ 150.00
	Travel Expense from Training in Utah	\$ 1,628.43
	Training with USDA in Utah	\$ 1,161.50
Accessories	OTG Host Adapter	\$ 3.50
	8" Long Nose Plier	\$ 5.79
	small screwdriver and Phillips	\$ 12.00
	LaCie USB-C hard drive 2 TB USB 3.1 Gen 1	\$ 148.49
	SanDisk Standard - flash memory card 32 GB SDHC for Sony Camera	\$ 14.84
	BTI Notebook LI Ion 7800mAH	\$ 70.00
	Tripp Lite 10 ft. USB 2.0 Hi-Speed Universal Reversible Cable	\$ 9.89
	Pipe stand supplies	\$ 6.39
	10' Joystick Interface Cable	\$ 10.00
	3x small tarps for GCP targets	\$ 20.00
	Battery Tester	\$ 7.00
	10'x12' Landing Tarp	\$ 10.25
	Bluetooth Dongle for Laptop (sunk)	\$ 15.00
	Pine board table top for keyboard stand	\$ 6.00
	Keyboard Stand for Firefly	\$ 18.49
	3 x Small Fireproof LiPo Bags for Battery Storage	\$ 22.99
	4 x Spare 16-GB SD cards for Sony camera	\$ 32.27
	Large Fireproof LiPo Bag for Battery Storage	\$ 35.96
	Polyurethane Trunk to Hold Accessories	\$ 40.08
	2x Metal Ammo Cans for Battery Storage	\$ 41.46
	Anemometer: Pyle PMA90	\$ 49.99
	AC Power Inverter to Charge Laptop	\$ 102.34
	23 Amp Desktop Switching Power Supply	\$ 126.00
	2-Port Battery Charger for Firefly Batteries	\$ 179.00
	4x Firefly Batteries	\$ 298.00
	Sony A6000 Digital Camera for Firefly	\$ 800.00
	Digital Camera Mount	\$ 549.00
Warranty	Packaging materials	\$ 10.17
	DWR shipping mount to BirdsEye View	\$ 10.00
	FedEx 2 Day Shipping UAV + Laptop to BirdsEye	\$ 166.78
Software	Drone2Map Subscription	\$ 1,466.00
Registration	2x packages Self Adhesive Labels for Firefly Registration	\$ 15.68
	DPS Registration as per NRS 493.112	\$ -
	FAA Aircraft Registration	\$ 5.00
	Total Startup Price =	\$ 14,975.27
	Amount Approved Under Division Package F =	\$ 12,711.00
	Approved - Total Startup Price =	\$ (2,264.27)
	Contingency Multiplier (Lesson Learned) =	1.18

Table 3M: 8 Comparison Traditional vs. UAS Field Investigation Methods

Vested Claims, Coincident Proof	Appendix Map Page (number)	Feature Type (point or acorage)	Traditional Method - Spot Check				UAS Method - Mapping				
			Investigation Time Per Team (minutes)	Test Staff (amount of people)	Required Staff (amount of people)	Paid Time (minutes)	Investigation Time Per Team (minutes)	UAV Type FireFly or Phantom)	Test Staff (amount of people)	Required Staff (amount of people)	Paid Time (minutes)
V01327	5	Point	45	1	2	90	30	Firefly	2	2	60
V02324	4	Point	20	1	1	20	20	Phantom	2	1	20
V10895	3	Point	30	1	1	30	30	Phantom	2	1	30
V10903	8	Point	60	1	1	60	35	Phantom	2	1	35
V10904, R06944	1	Point	30	1	1	30	50	Phantom	2	1	50
V10936, R04269	N/A	Point	45	2	2	90	15	Firefly	2	2	30
V10945	2	Point	45	2	2	90	15	Firefly	2	2	30
V10949	N/A	Point	60	2	2	120	15	Firefly	2	2	30
				Total Time =		530			Total Time =		285
				Time Per Site =		66			Time Per Site =		36

Dixon Spring

V10895



V10895



GIS Imagery

UAV Imagery



Monroe Spring

V01327

V01327

GIS Imagery

UAV Imagery



Newark Spring

V02324
+

V02324
+

GIS Imagery



UAV Imagery

Call Spring

V10903
+

V10903
+
Ken in blue shirt

GIS Imagery



UAV Imagery

Pinyon Spring

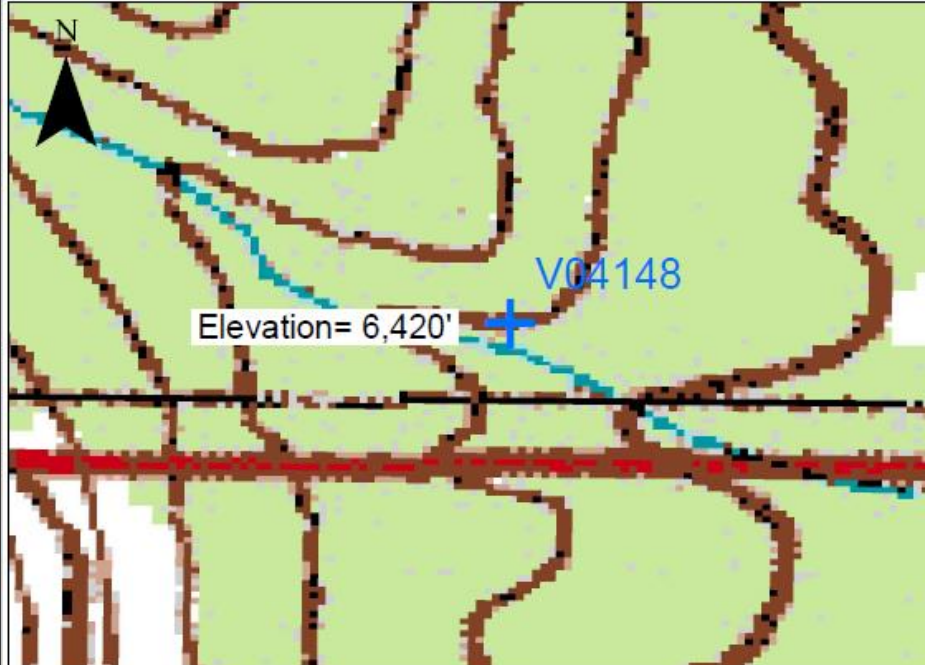
V04148

V04148

GIS Imagery

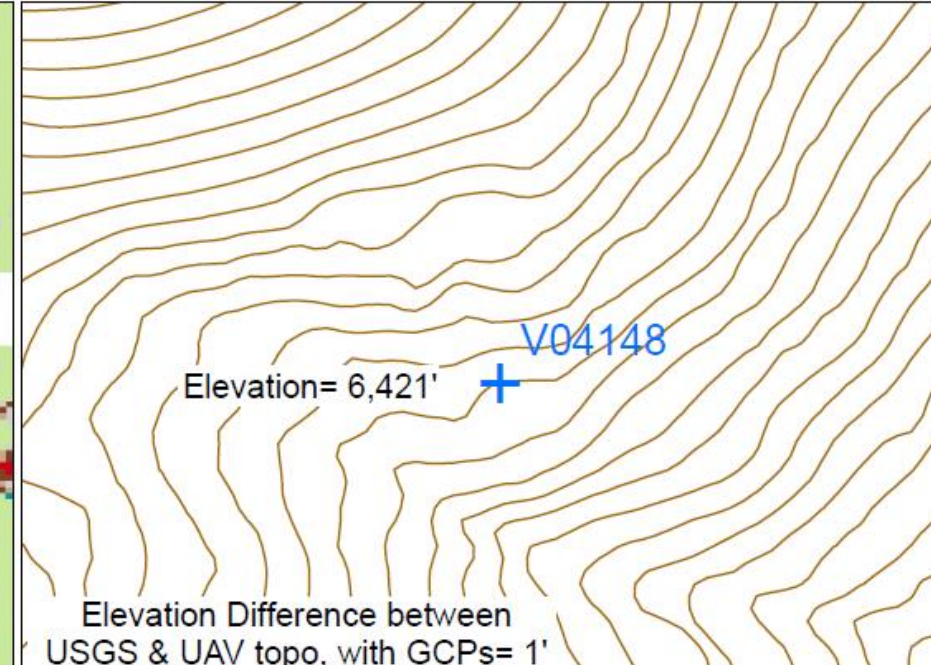
UAV Imagery





contour interval= 40'

USGS Topographical Data



UAV Topographical Data

contour interval= 1'

Insufficient time available
for a traditional investigation

Inset Scale: 1 inch = 44 feet

Required 40 minutes to investigate w/ the UAV

