

South Dayton Valley Area Drainage Master Plan



Public Meeting Webinar
July 29, 2020 | 5:30pm

What is an Area Drainage Master Plan (ADMP)?

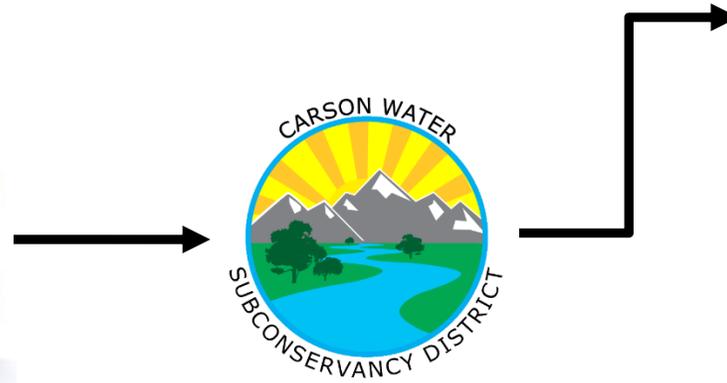
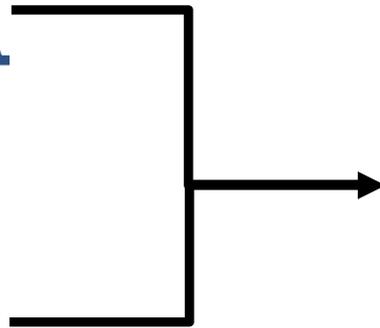
- Planning-level study of flood risk within a watershed
- Goals:
 - Develop a comprehensive understanding of the off-site existing condition flood risk
 - Develop alternative mitigation solutions

Project Funding

- FEMA Cooperative Technical Partner (CTP) grant
- Lyon County



FEMA

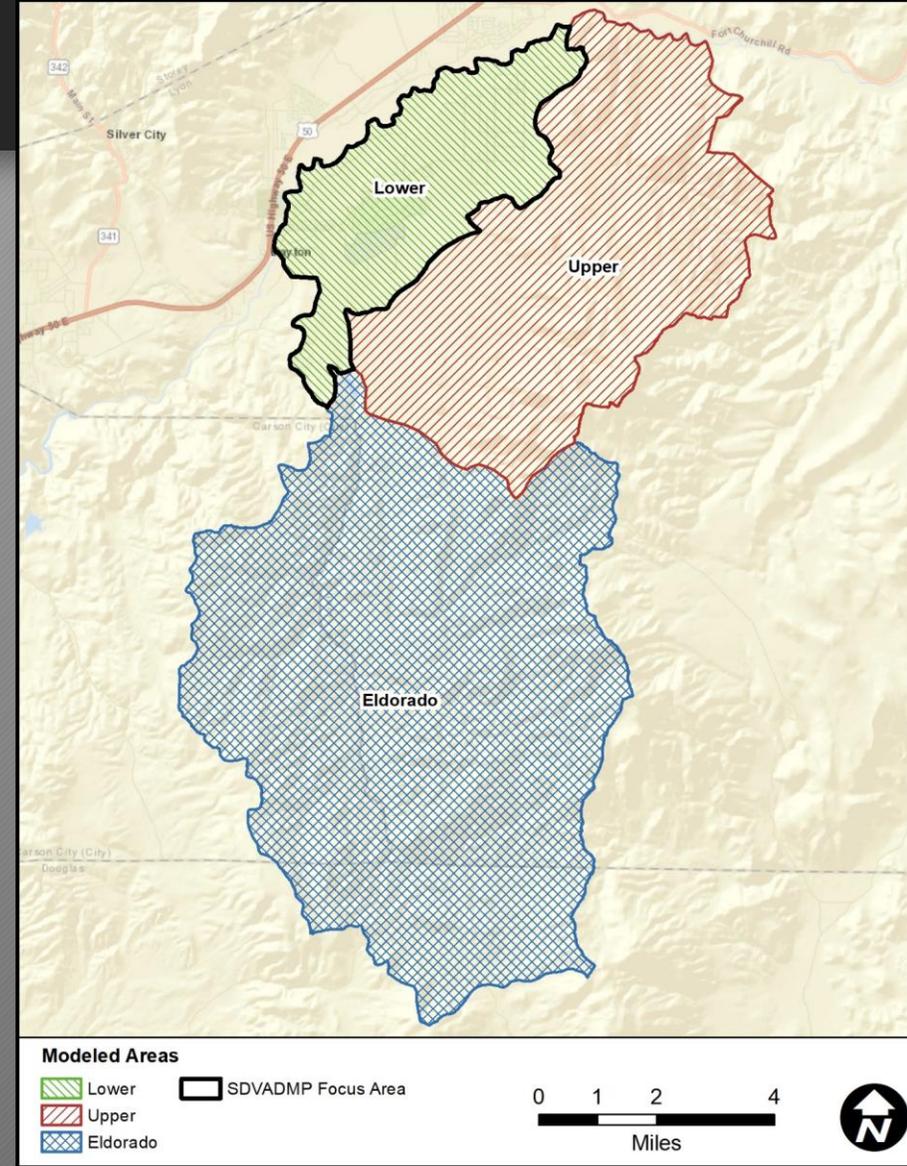


ADMP



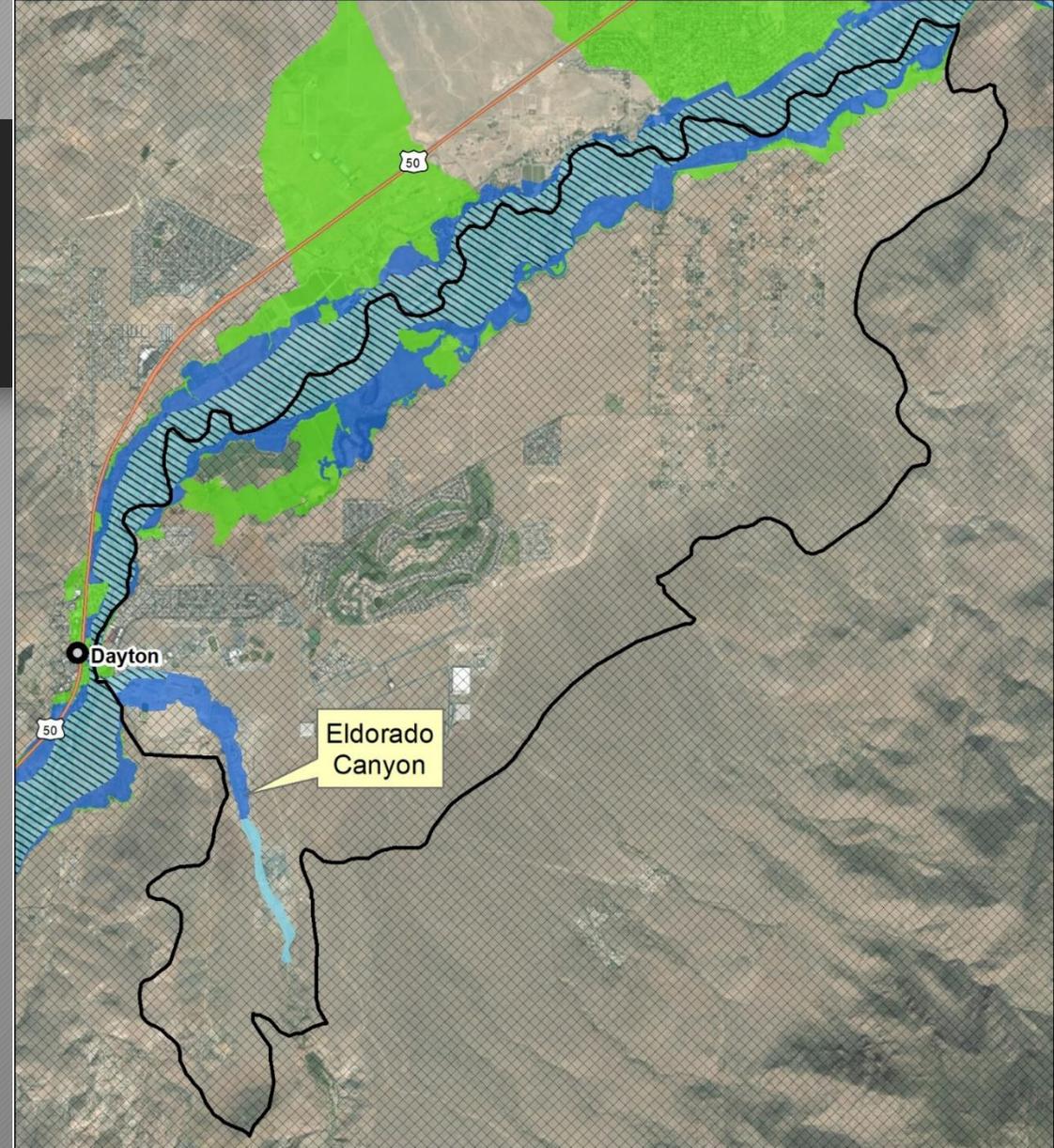
ADMP Major Project Elements

- Data Collection
- Topographic Mapping (USGS LiDAR)
- Watershed Assessment (landforms)
- Flood Risk Assessment
 - Hydrologic Modeling
 - Hydraulic (2D) Modeling
- Flood Risk Classification (people, buildings, roads)
- Sediment Engineering
- Economic Loss Estimates
- Regional Alternative

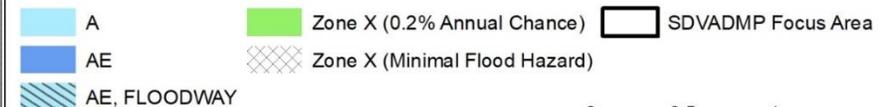


Data Collection

- Subdivision Drainage Reports
- Previous Studies
 - Flood Insurance Studies
 - FEMA Floodplain Mapping
 - USACE Alluvial Fan Mapping
- County GIS Layers
 - Land Use
 - Building Footprints
 - Assessor Parcels



Effective FEMA Flood Zones within the Study Area



0 0.5 1 2 Miles



Data Collection

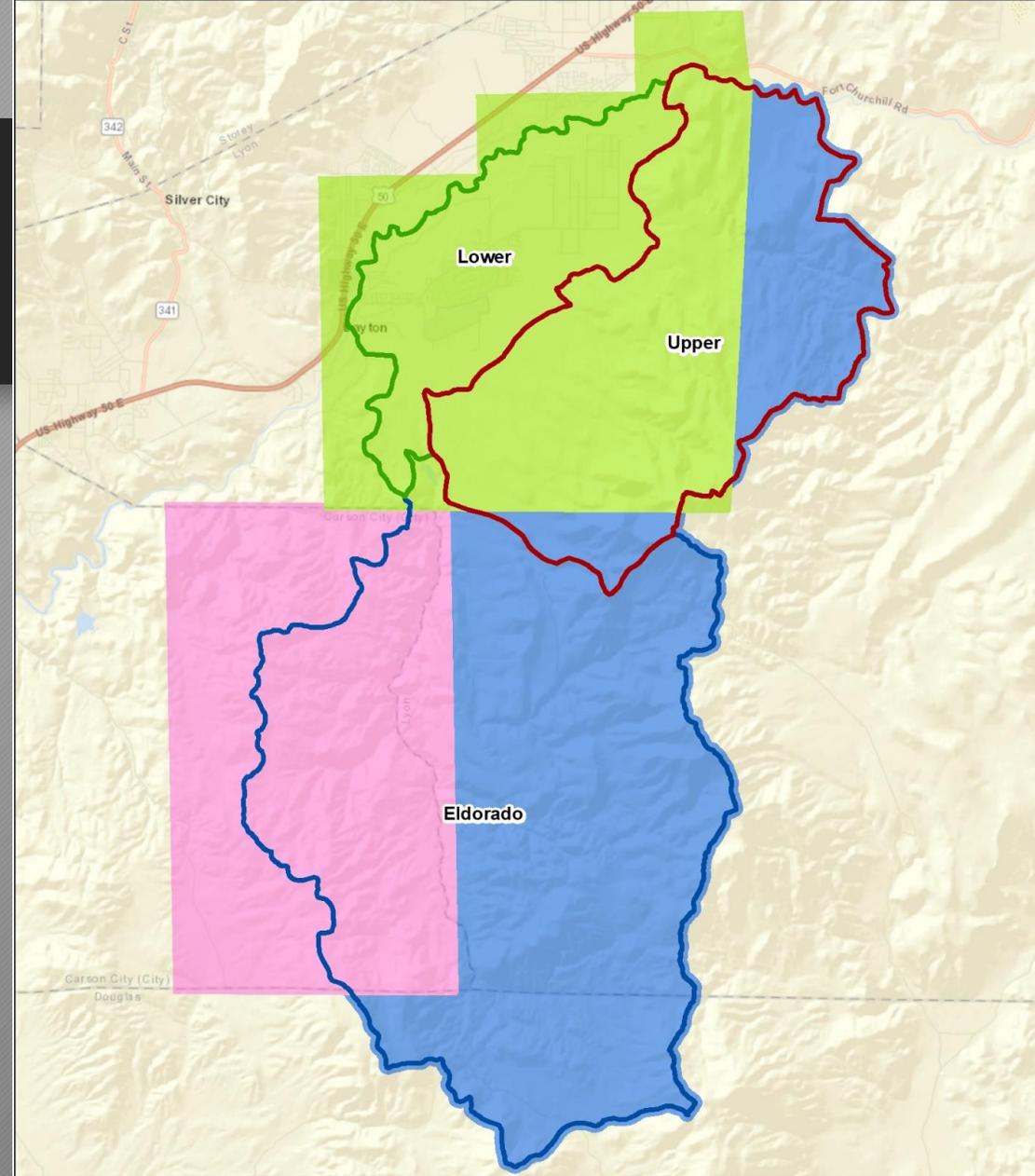
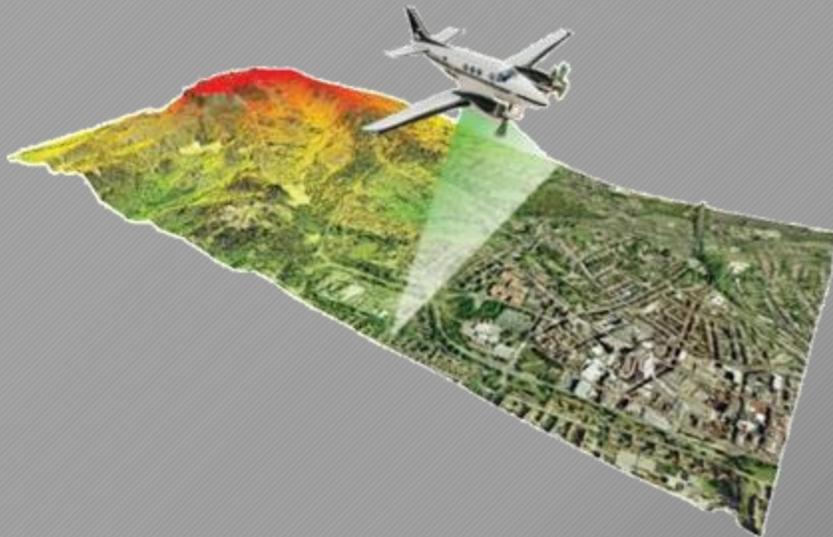
- Resident Flood Experience
 - ADMP Open House (March 12, 2019)
 - Flooding experience locations
 - Photographs/Videos
 - ADMP Flood Experience Website

Used to help calibrate and verify modeling

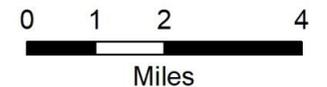


Topographic Mapping

- High-resolution USGS LiDAR mapping
 - October 27, 2017

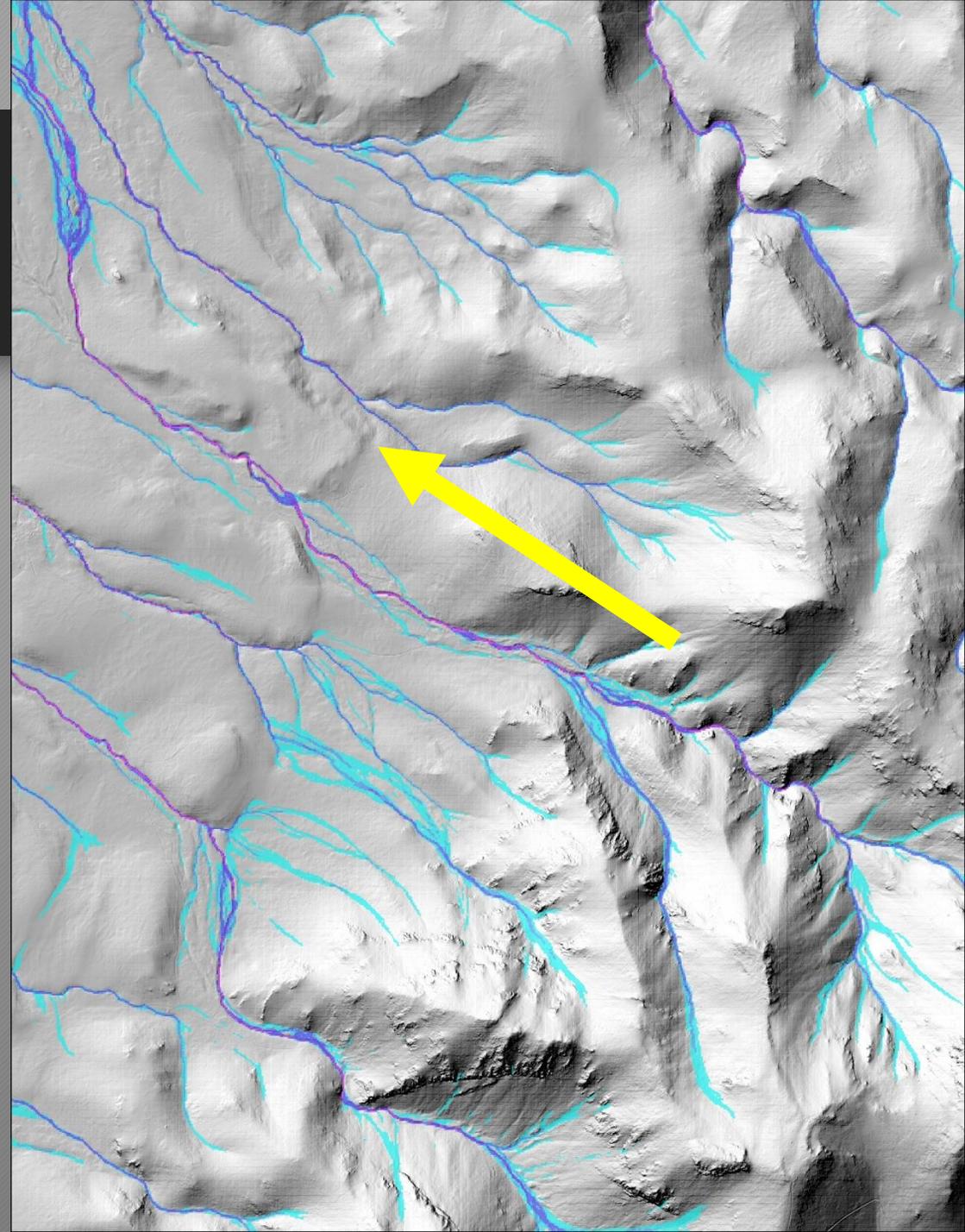


Model Domains	Mapping Limits
Lower	NEXTMap
Upper	USGS QL1
Eldorado	USGS QL2



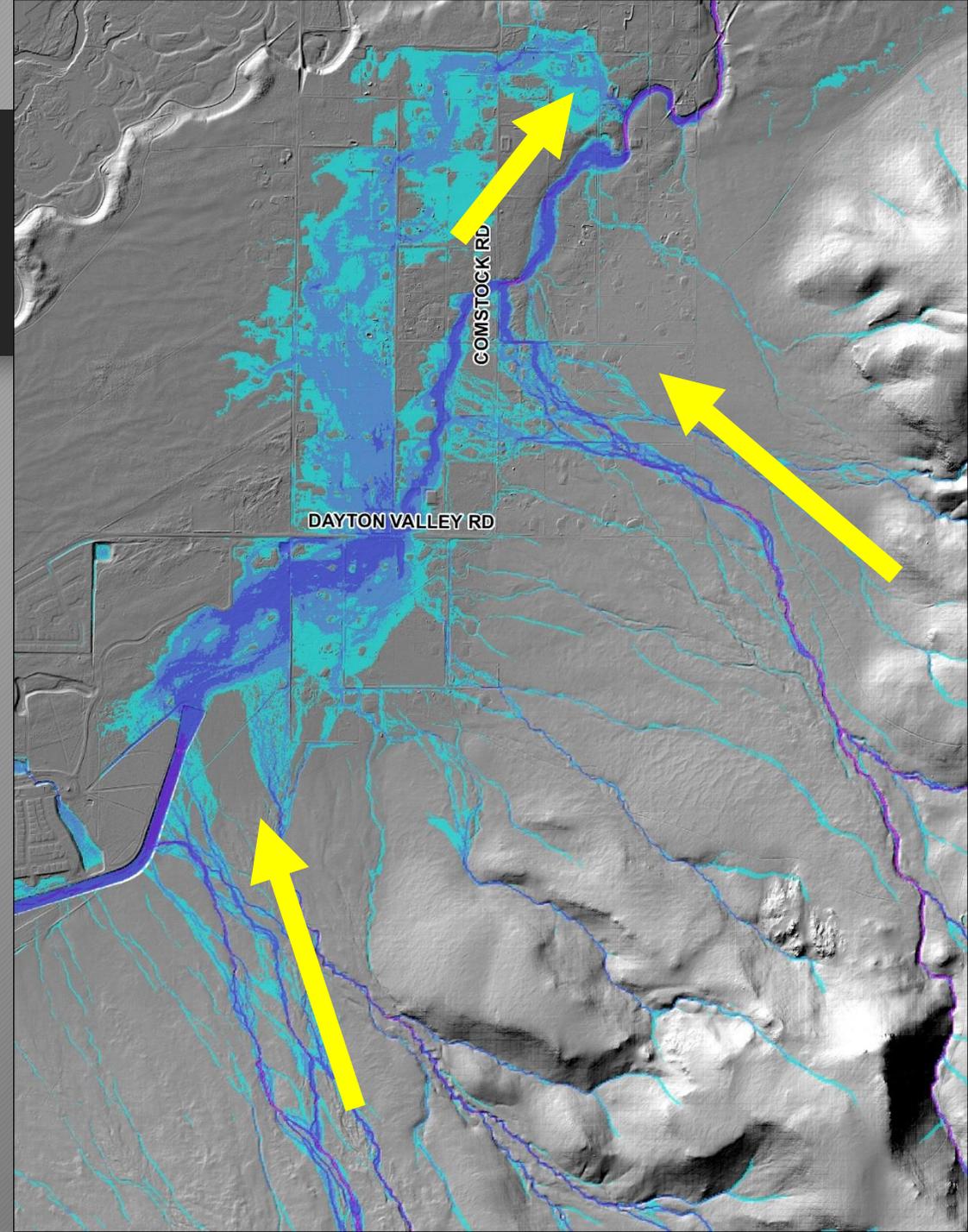
Watershed Assessment

- Many watercourses impacting study area
- Upper Watershed Geologic Setting
 - Tributary flow patterns (mountain streams)
- Lower Watershed Geologic Setting
 - Sloping piedmont surface
 - High sediment transport
 - Flow is distributary, shallow



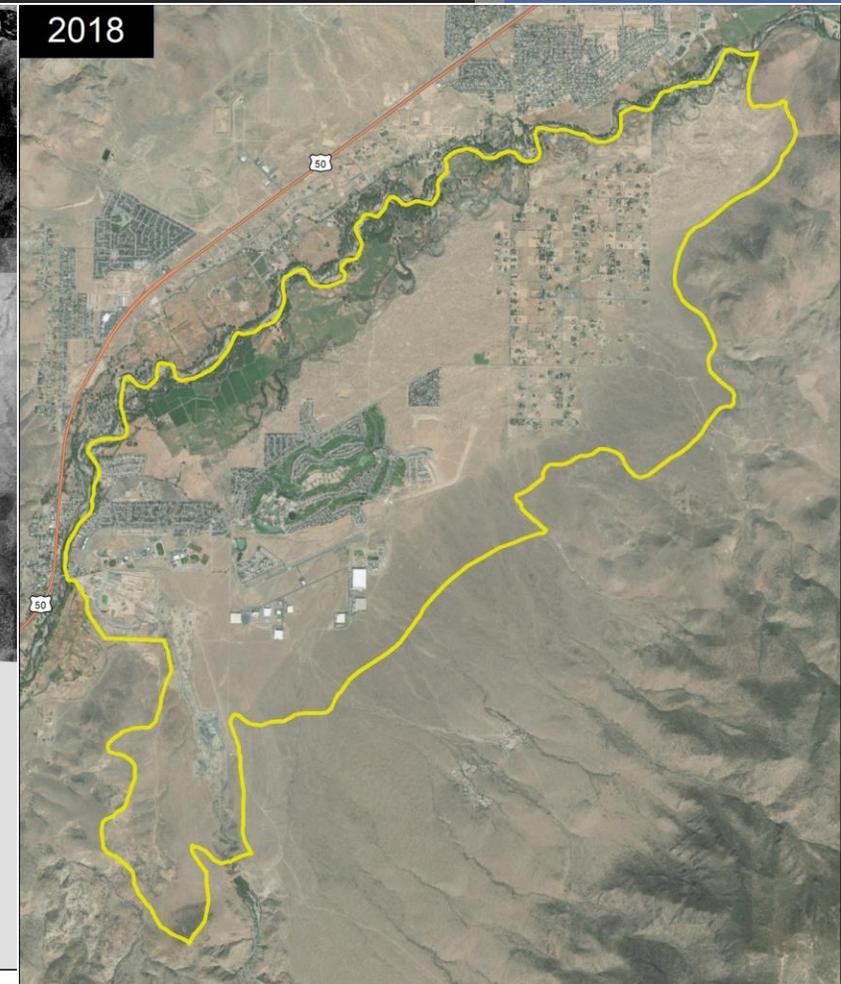
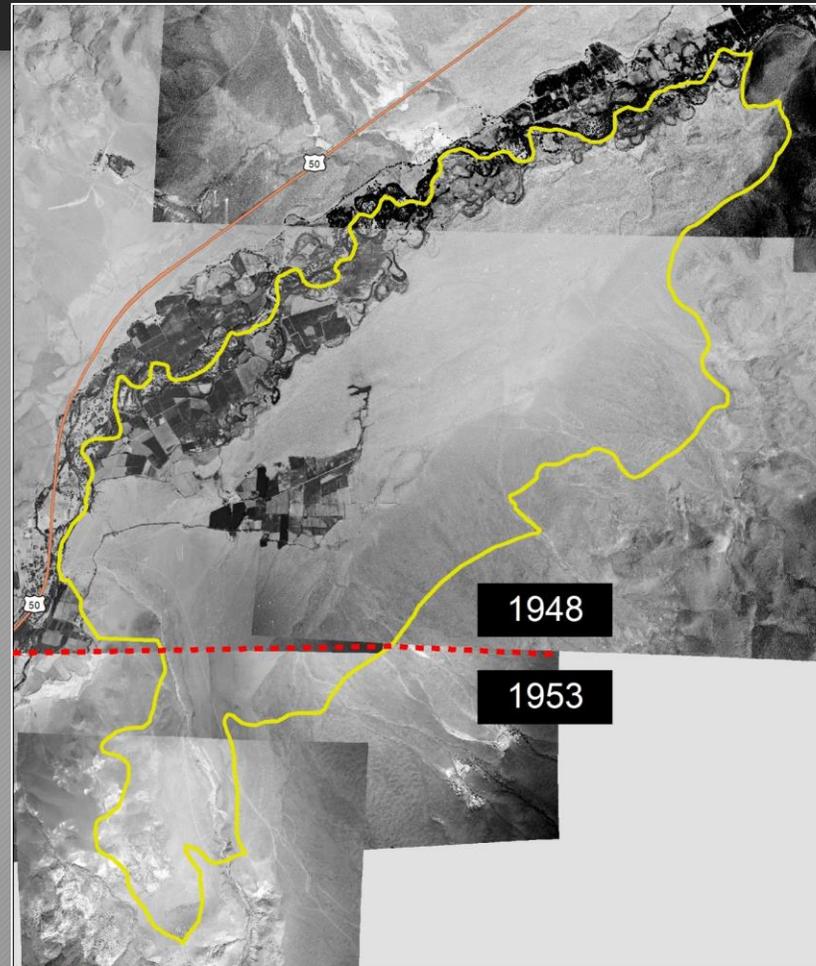
Watershed Assessment

- Many watercourses impacting study area
- Upper Watershed Geologic Setting
 - Tributary flow patterns (mountain streams)
- Lower Watershed Geologic Setting
 - Sloping piedmont surface
 - High sediment transport
 - Flow is distributary, shallow

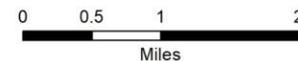


Watershed Assessment

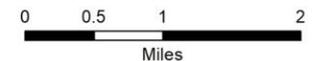
- Historical Flow Path Assessment



SDVADMP Focus Area
1948/1953 aerial
photography divider

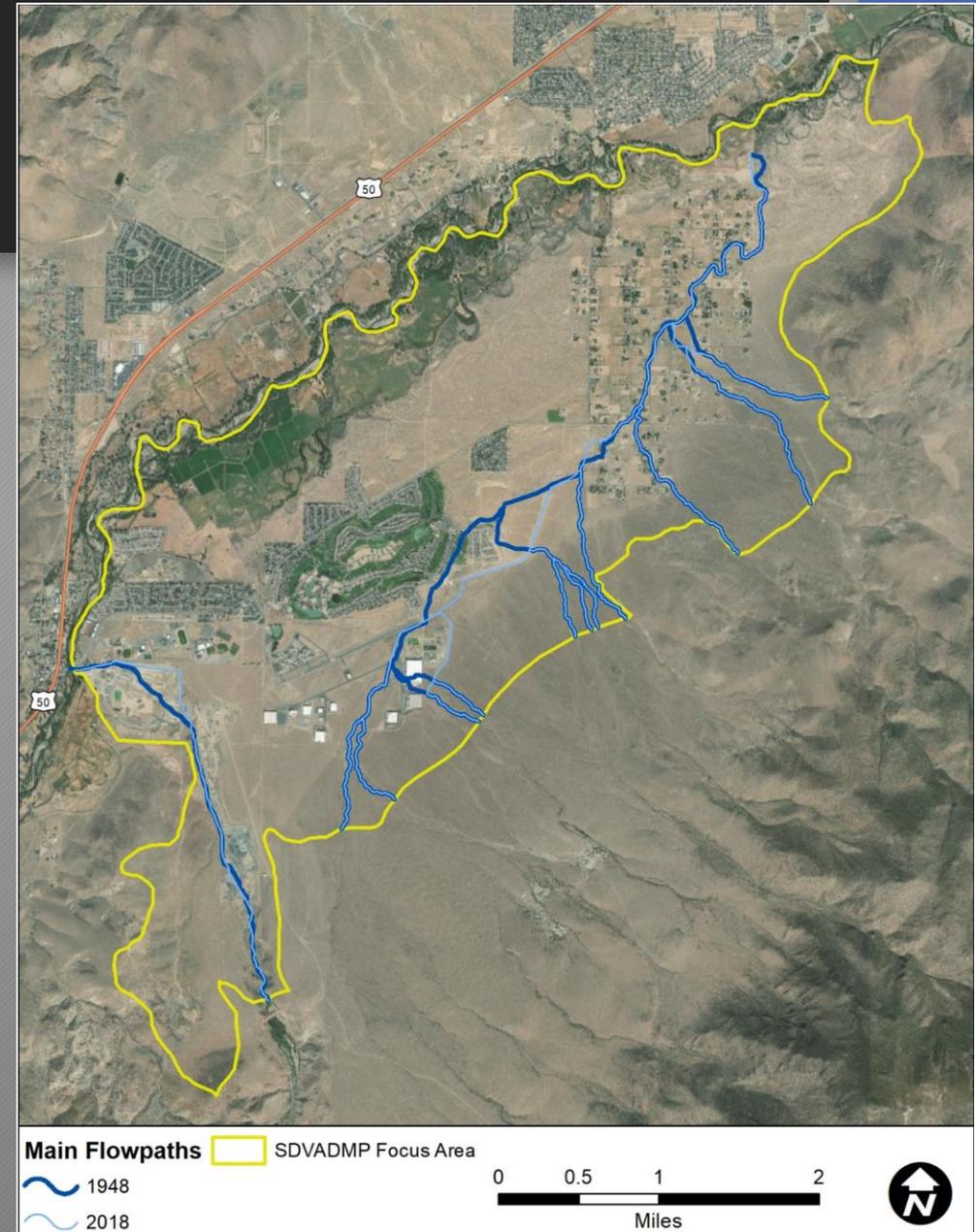


SDVADMP Focus Area



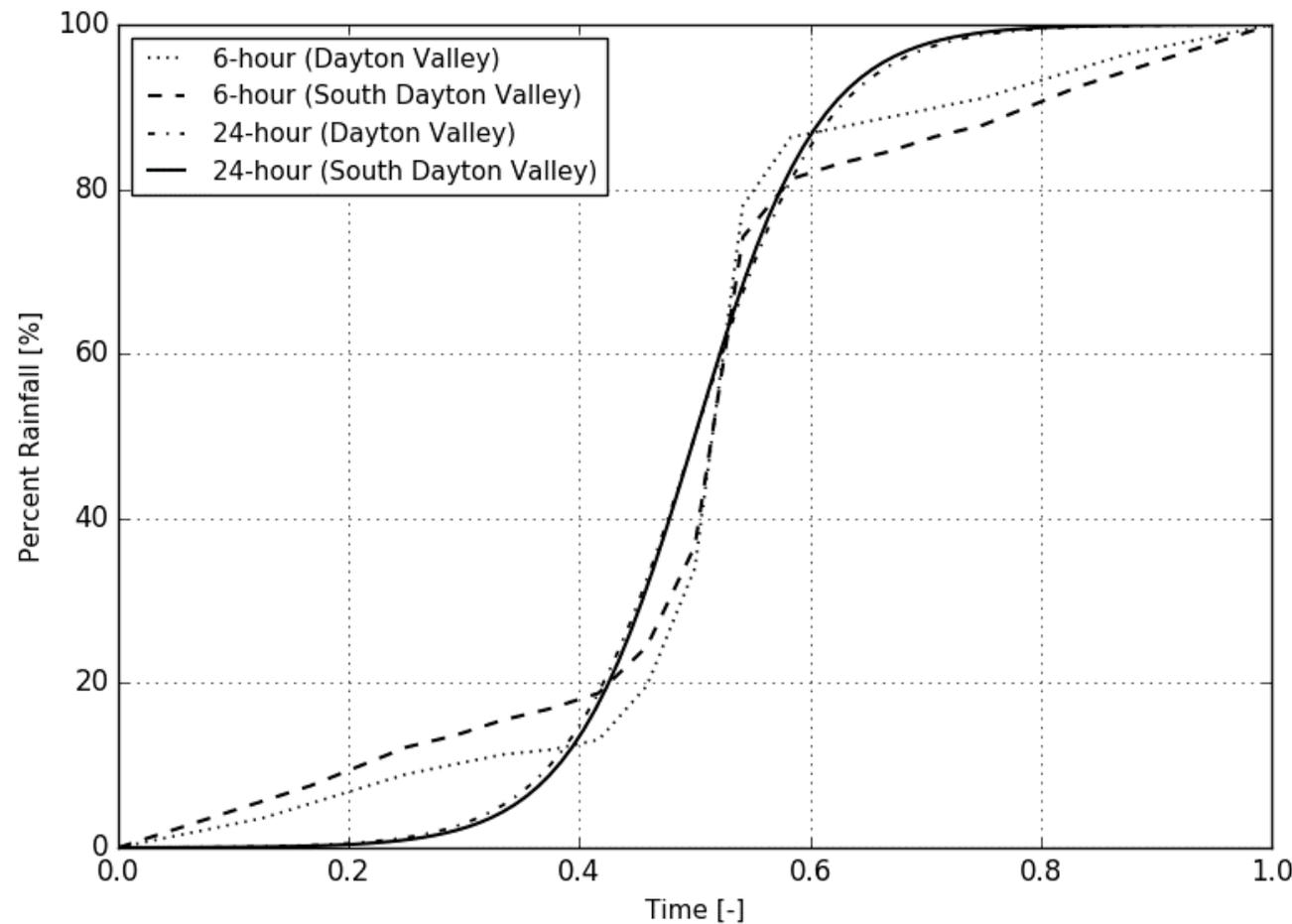
Watershed Assessment

- Historical Flow Path Assessment



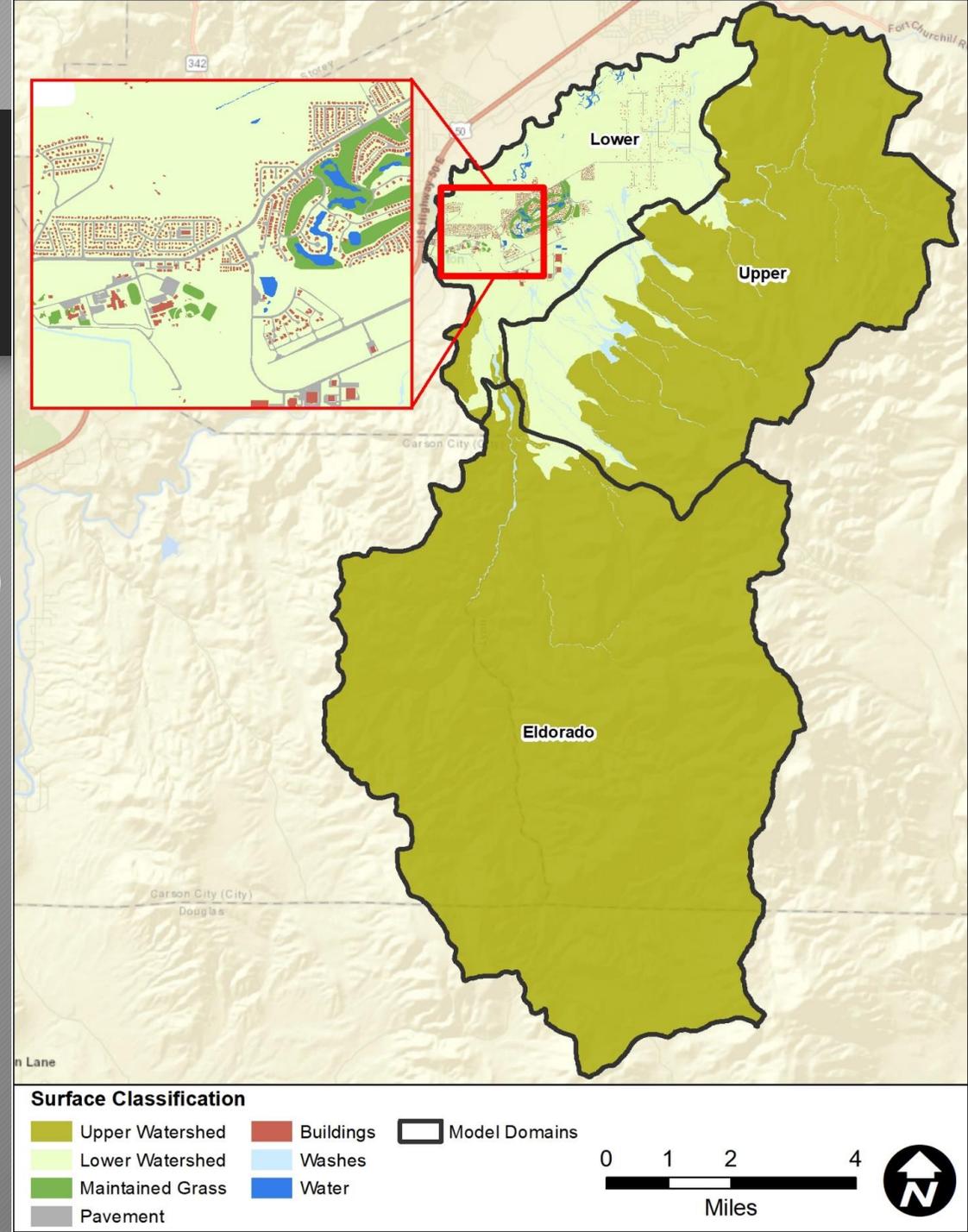
Flood Risk Assessment

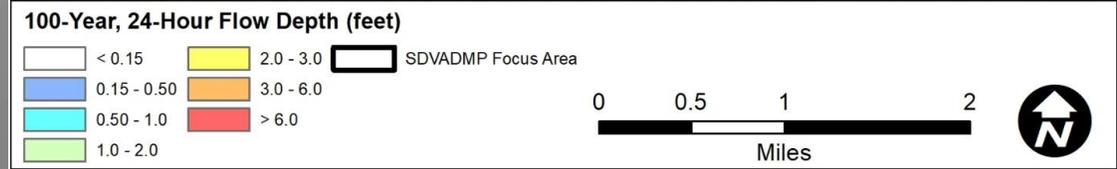
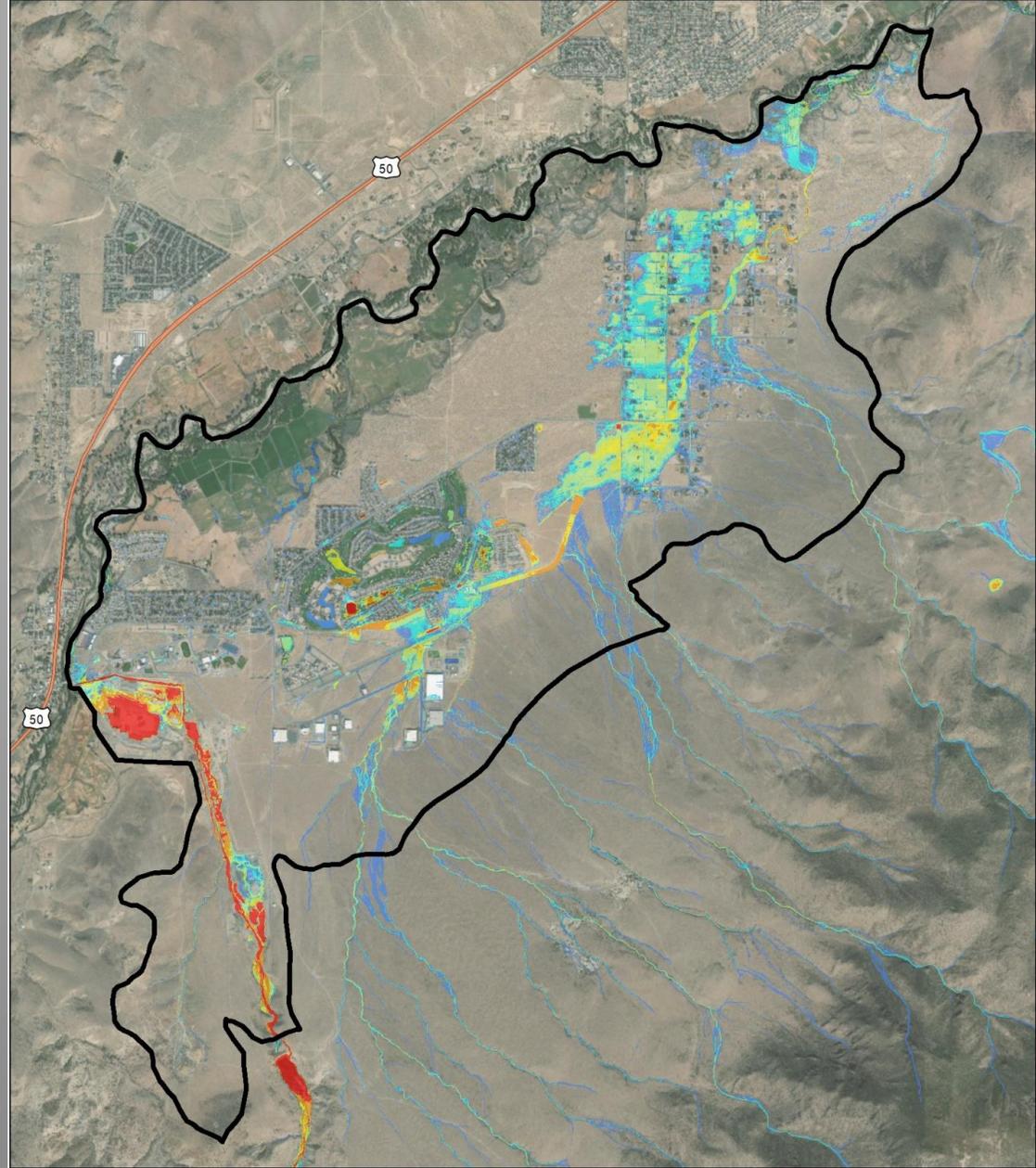
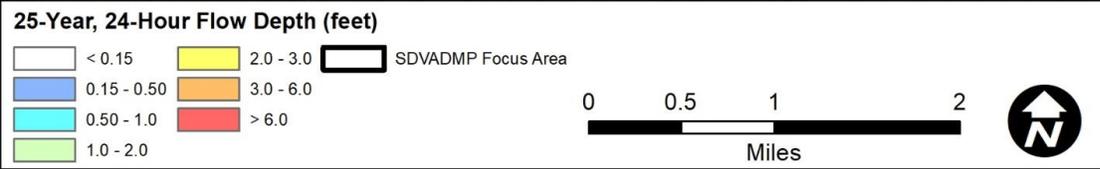
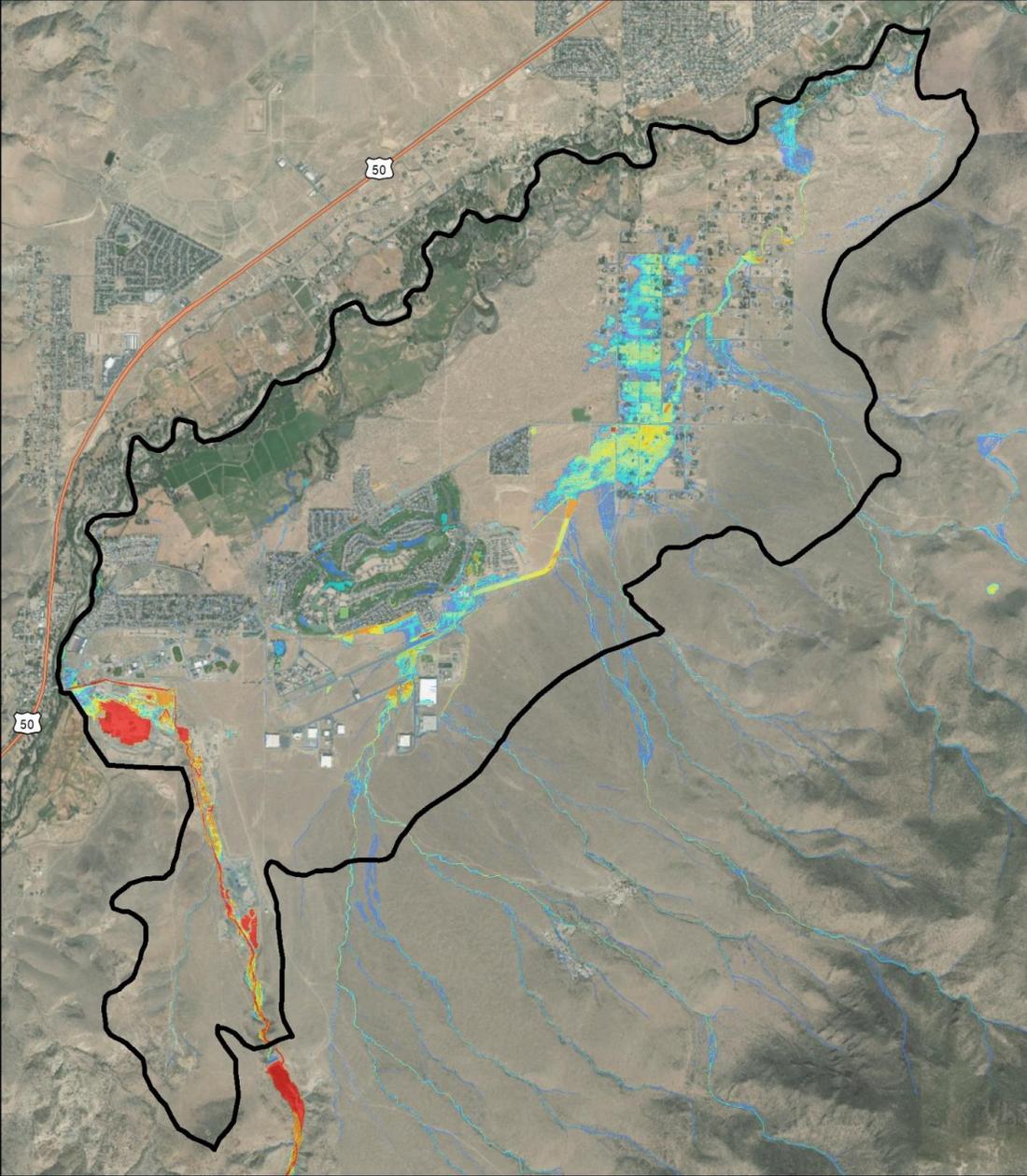
- Hydrologic Modeling
 - New NDOT Method for Storm Shape
 - 25-year, 24-hour storm
 - County Design Standards
 - 100-year, 6-hour storm
 - 100-year, 24-hour storm



Flood Risk Assessment

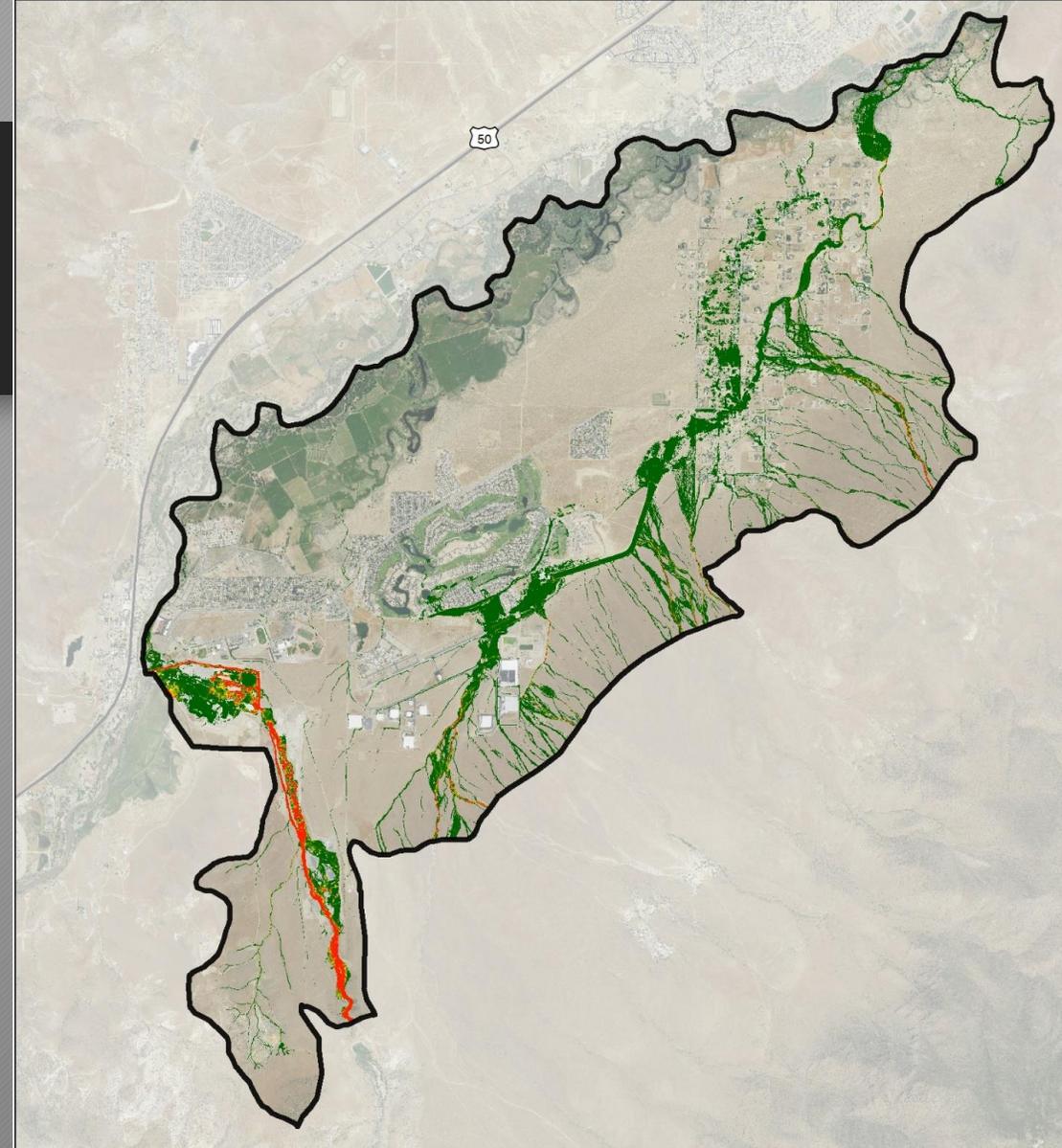
- Hydraulic Modeling (FLO-2D)
 - Three Separate Models
 - Upper Watershed (2.1M Grid Cells - 20ft)
 - Lower Watershed (3.7M Grid Cells - 10ft)
 - Eldorado Canyon (4.0M Grid Cells - 20ft)
 - Topography (LiDAR)
 - Land Use
 - Hydraulic structures (culverts, storm drains, etc.)
 - Floodplain cross-sections (200+)
 - Verification
 - Resident information
 - USGS Regression





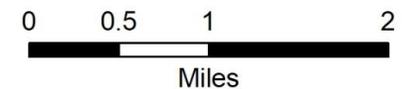
Flood Risk Assessment

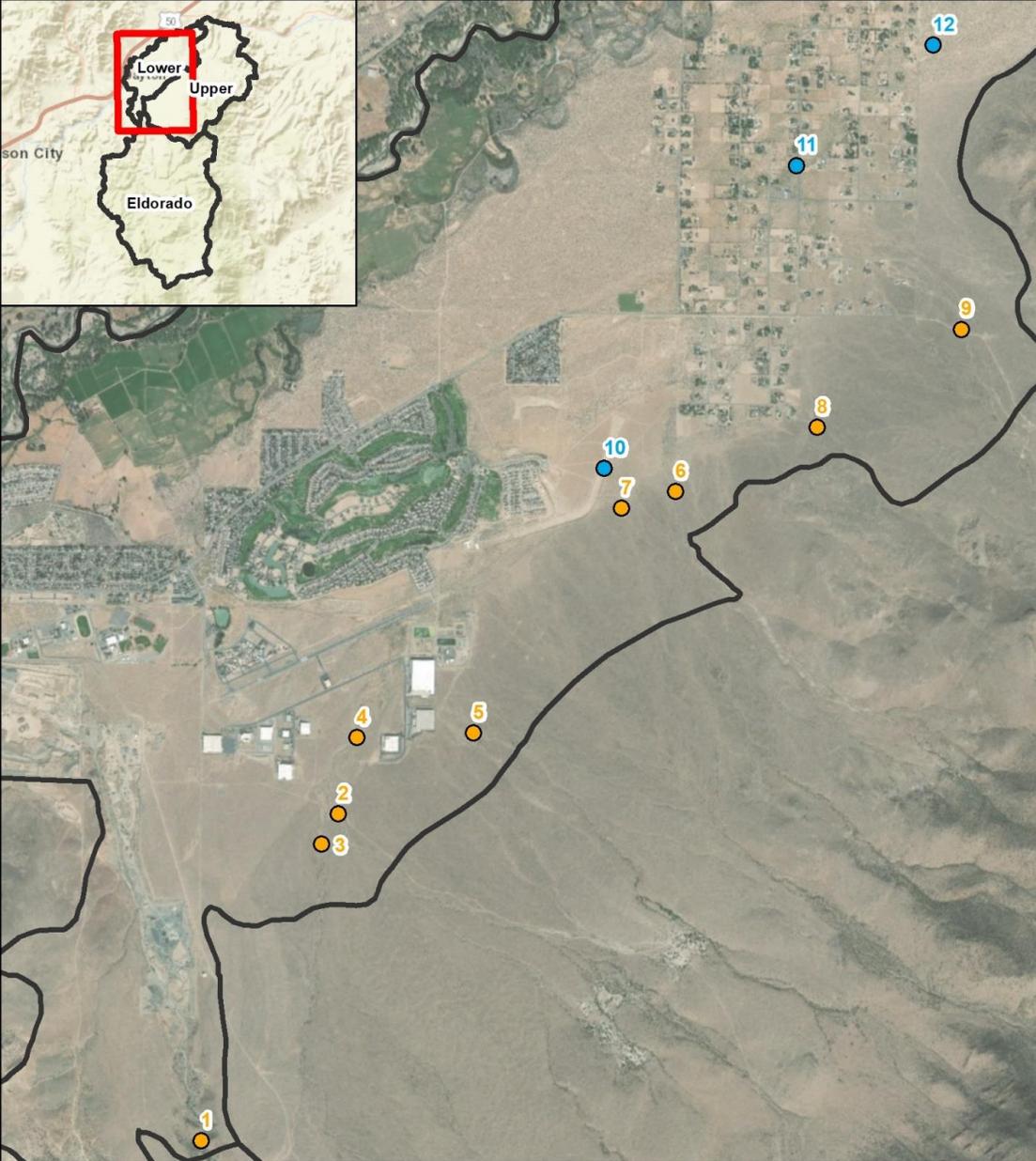
- Sediment Engineering
 - Collected 12 samples
 - Identify watercourses with high sediment transport
 - Quantify sediment yield



Relative Sediment Transport Capacity (100-year 24-hour)

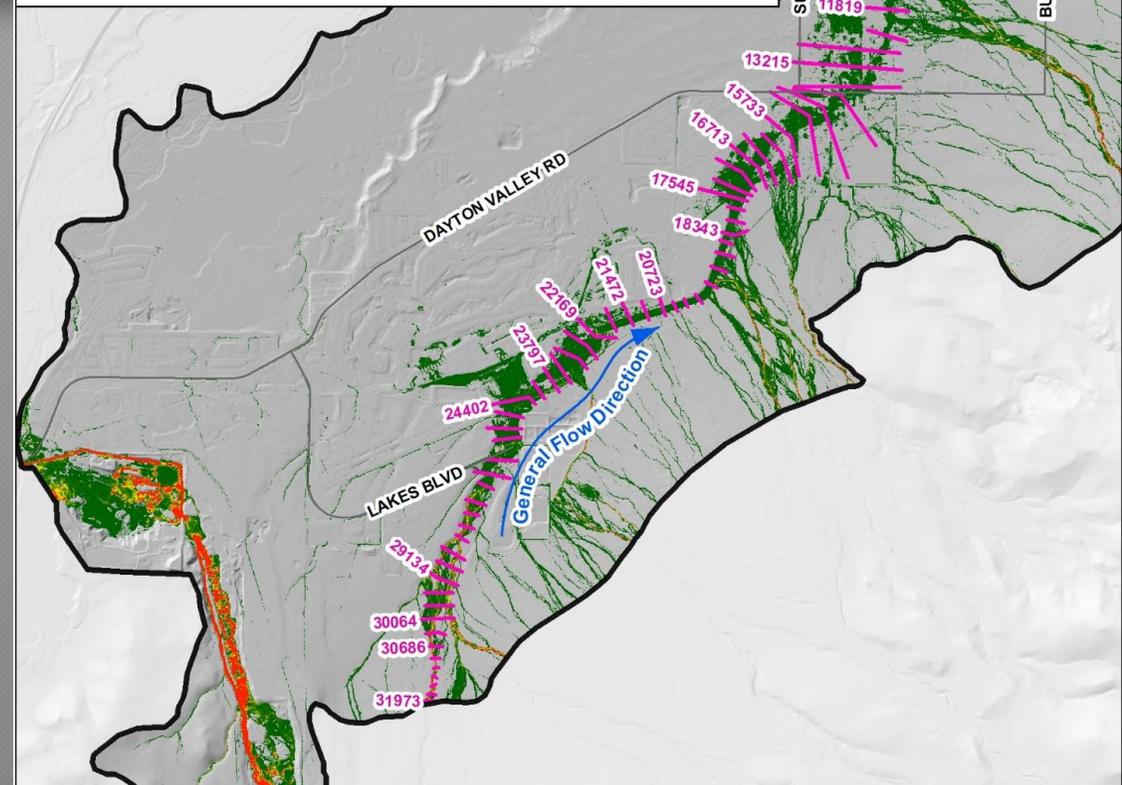
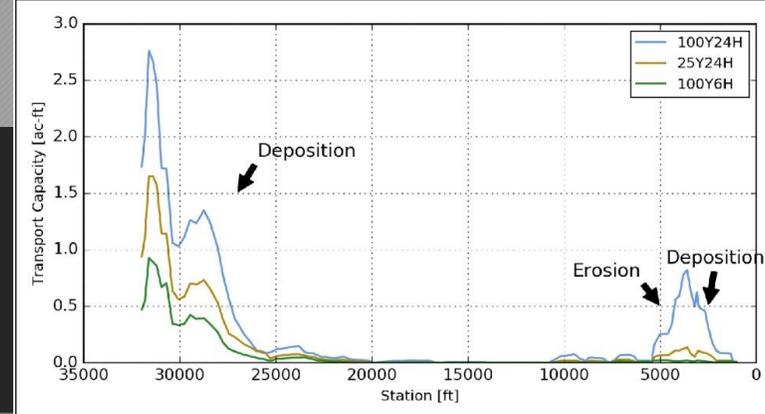
Yang Sediment Transport  SDVADMP Focus Area





Sediment Sampling Locations

- Pebble Count
- Sieve Analysis
- Model Domains



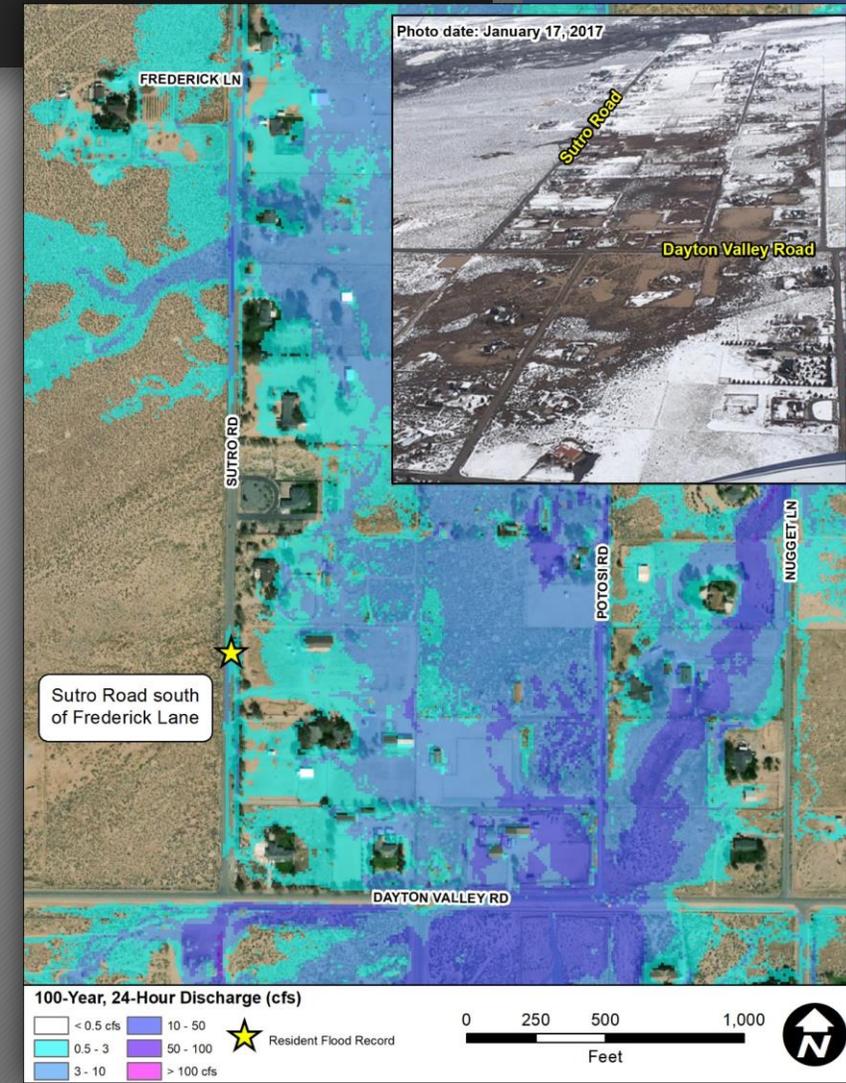
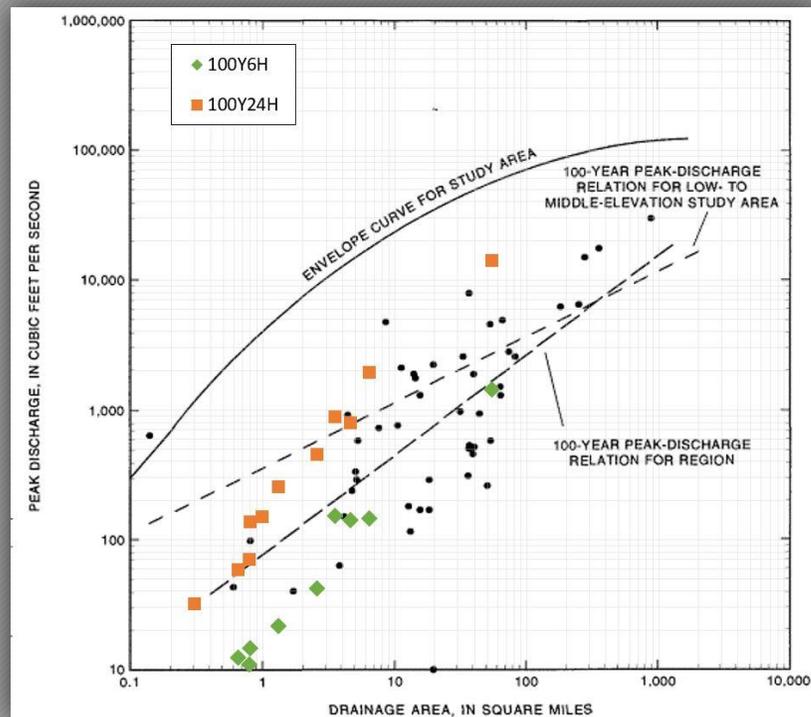
Relative Sediment Transport Capacity Profile (100-year 24-hour)

- High
- Low
- SDVADMP Focus Area
- Station
- Sediment Cross-sections



Verification of Existing Condition Results

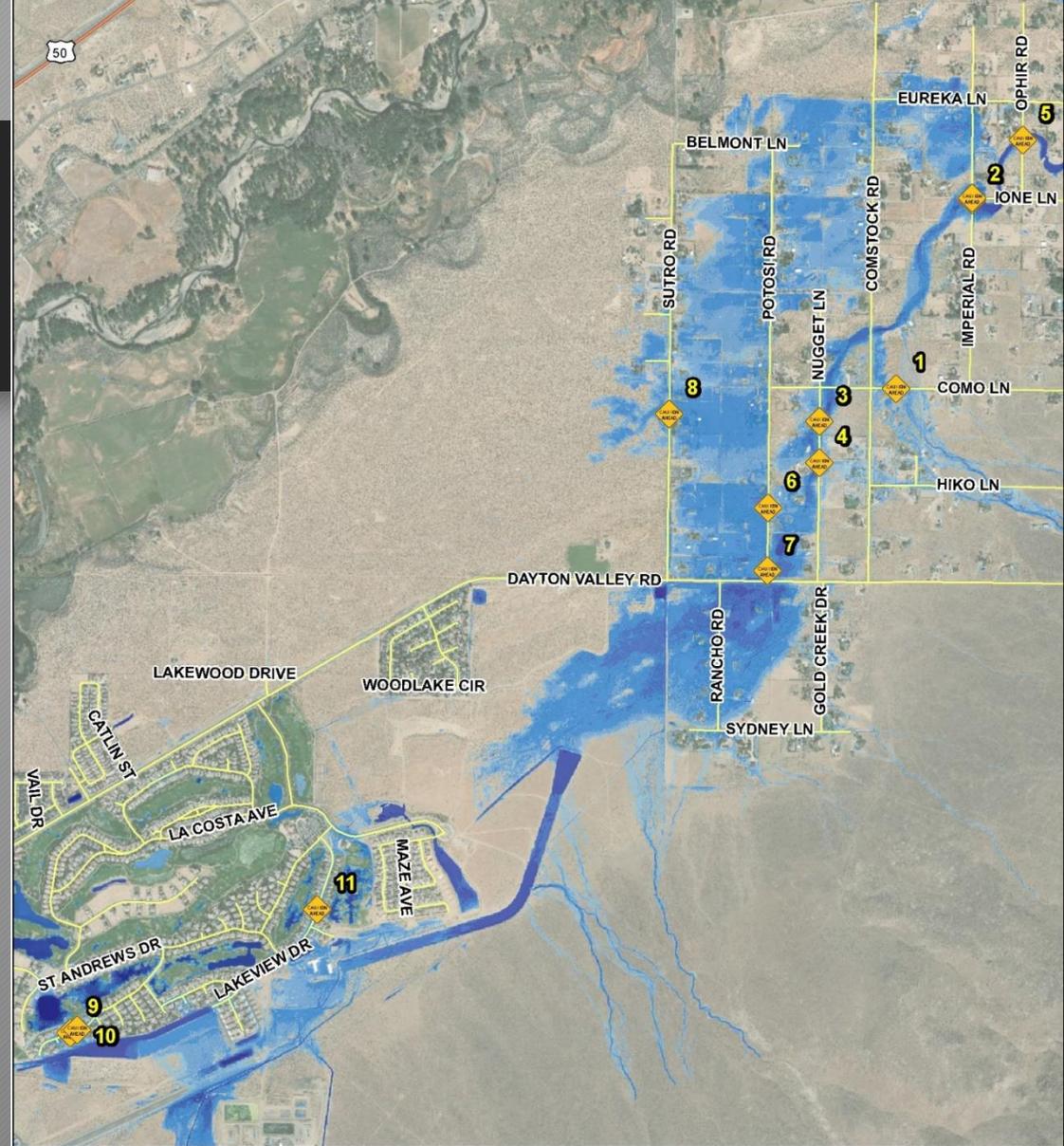
- Models should be verified if possible
 - USGS Regression
 - Resident flooding experience



Flood Risk Classification

- Identify specific flood risk areas: USBR Guidelines

- Pedestrians
- Vehicles
- Buildings



Potential Risk to Passenger Vehicles



High

100-year 24-hour Max. Depth (ft)

< 0.25

0.25 - 0.5

0.5 - 1

1 - 2

2 - 3

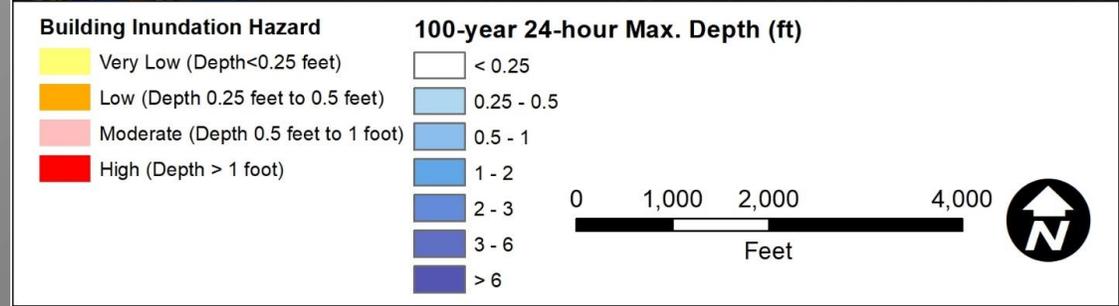
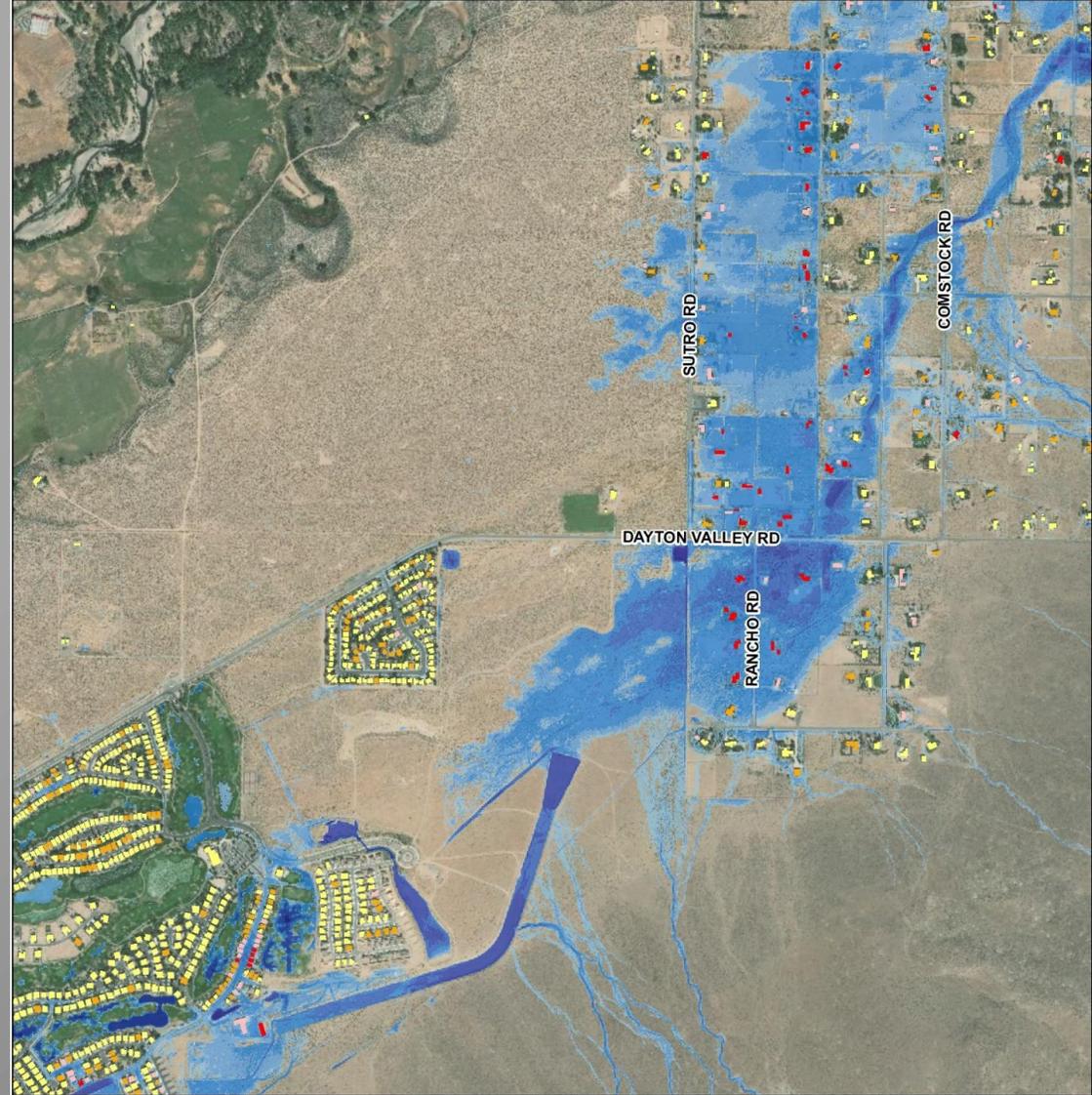
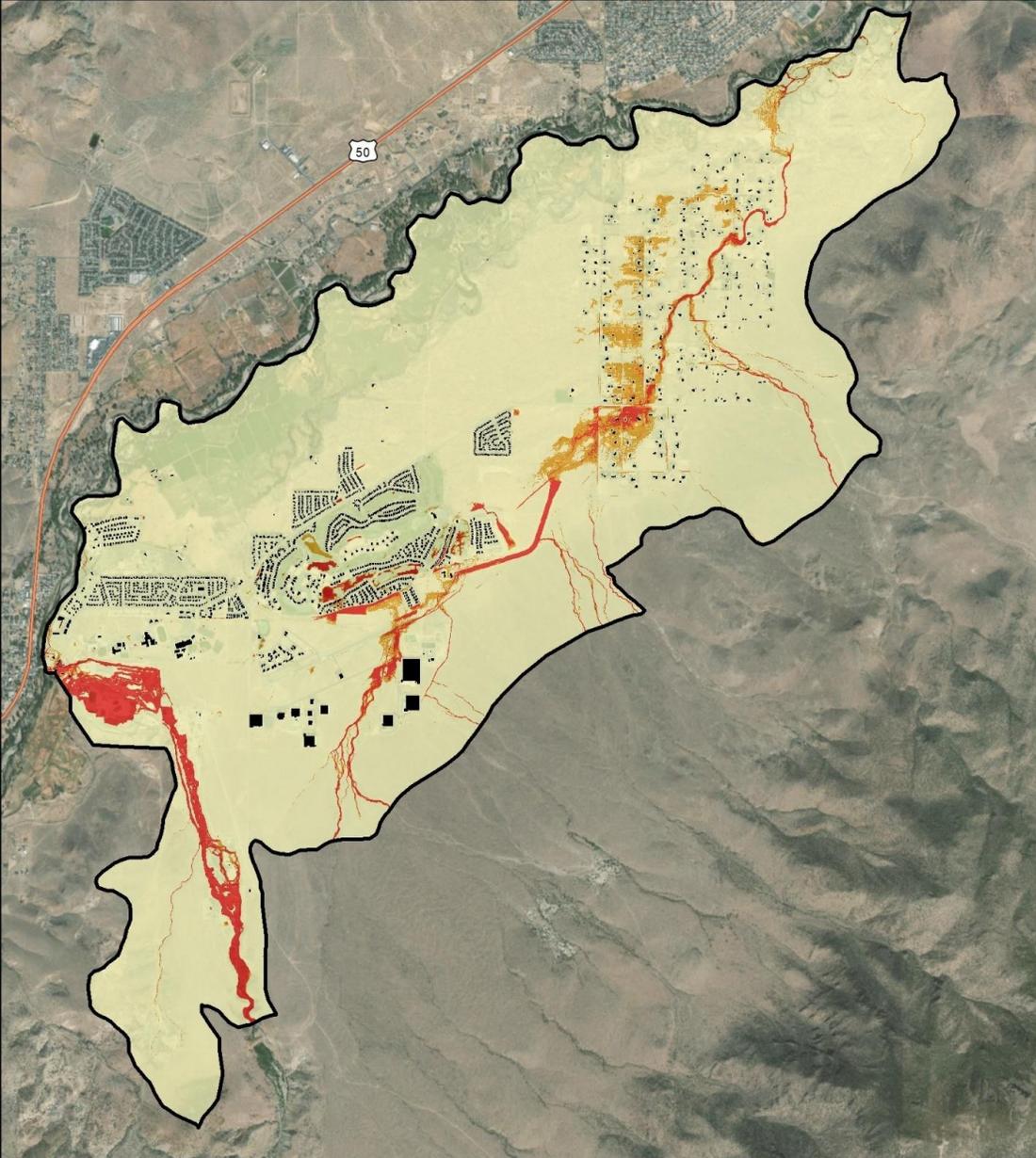
3 - 6

> 6

0 0.25 0.5 1

Miles





Flood Risk Classification

- HAZUS Analysis

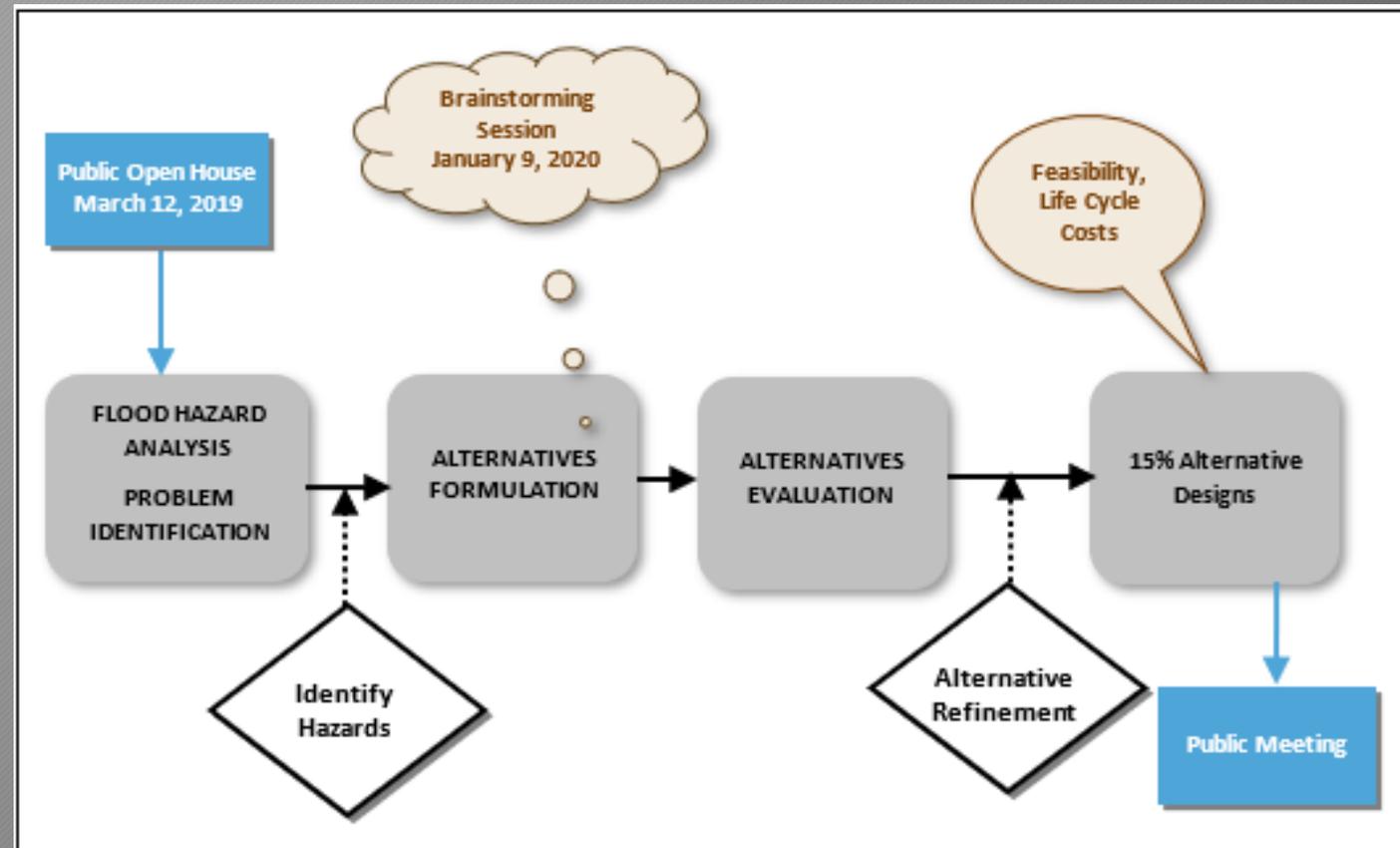
- FEMA model used for estimating potential economic losses from natural disasters

Base Conditions					
Recurrence Interval	Direct Building Economic Loss				
	Residential	Commercial	Industrial	Others	Total Property ¹
	\$ millions	\$ millions	\$ millions	\$ millions	\$ millions
25Y24H	2.68	0.21	0.45	0.43	3.77
100Y24H	5.93	0.36	0.69	0.67	7.65
100Y6H	0.78	0.05	0.08	0.06	0.97

1. May not be additive due to rounding in internal HAZUS calculations

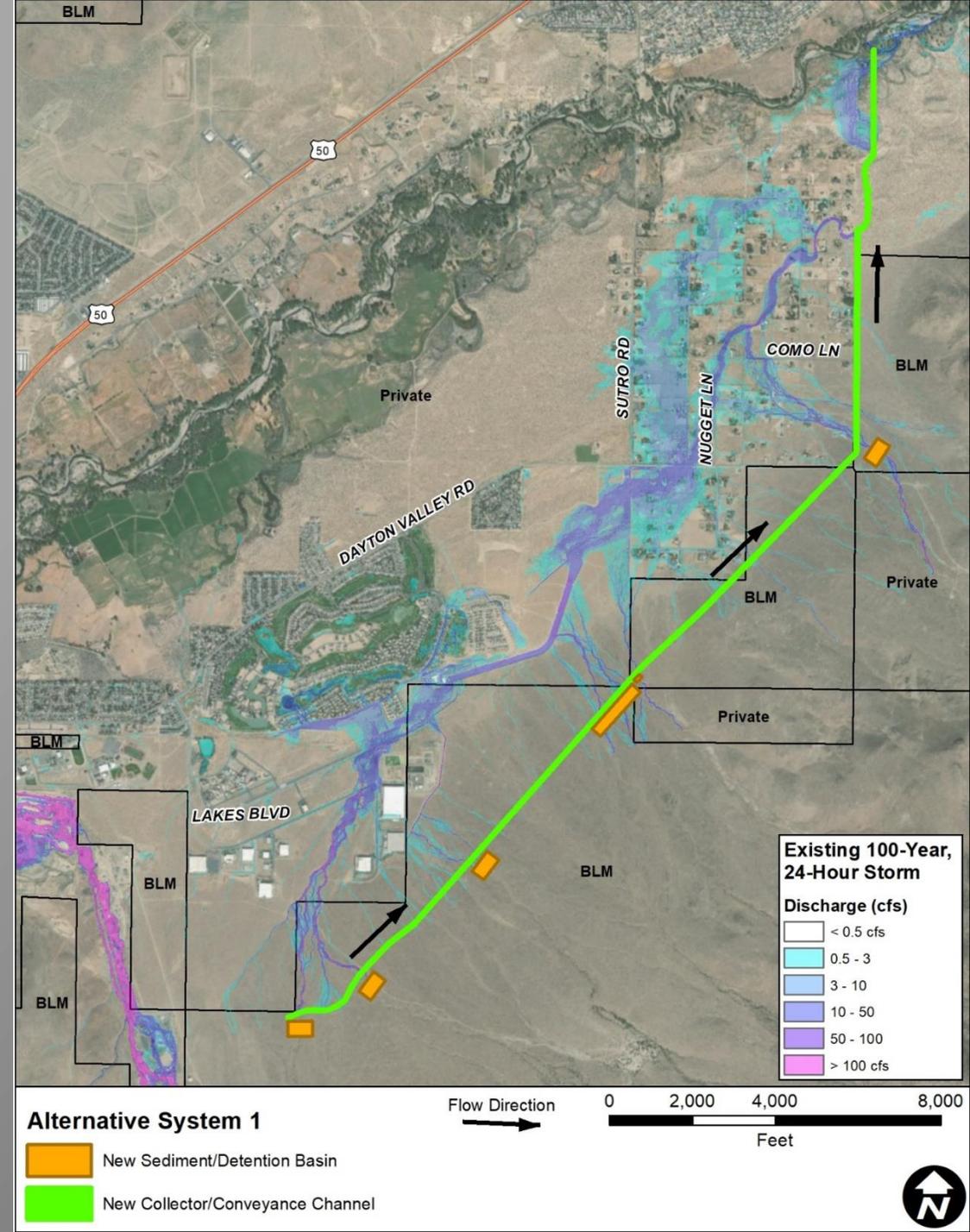
Alternatives - Regional Mitigation Alternatives

- South Dayton Valley unique challenges
 - Minimal drainage infrastructure
 - Highly distributary flow
- Community-wide solutions



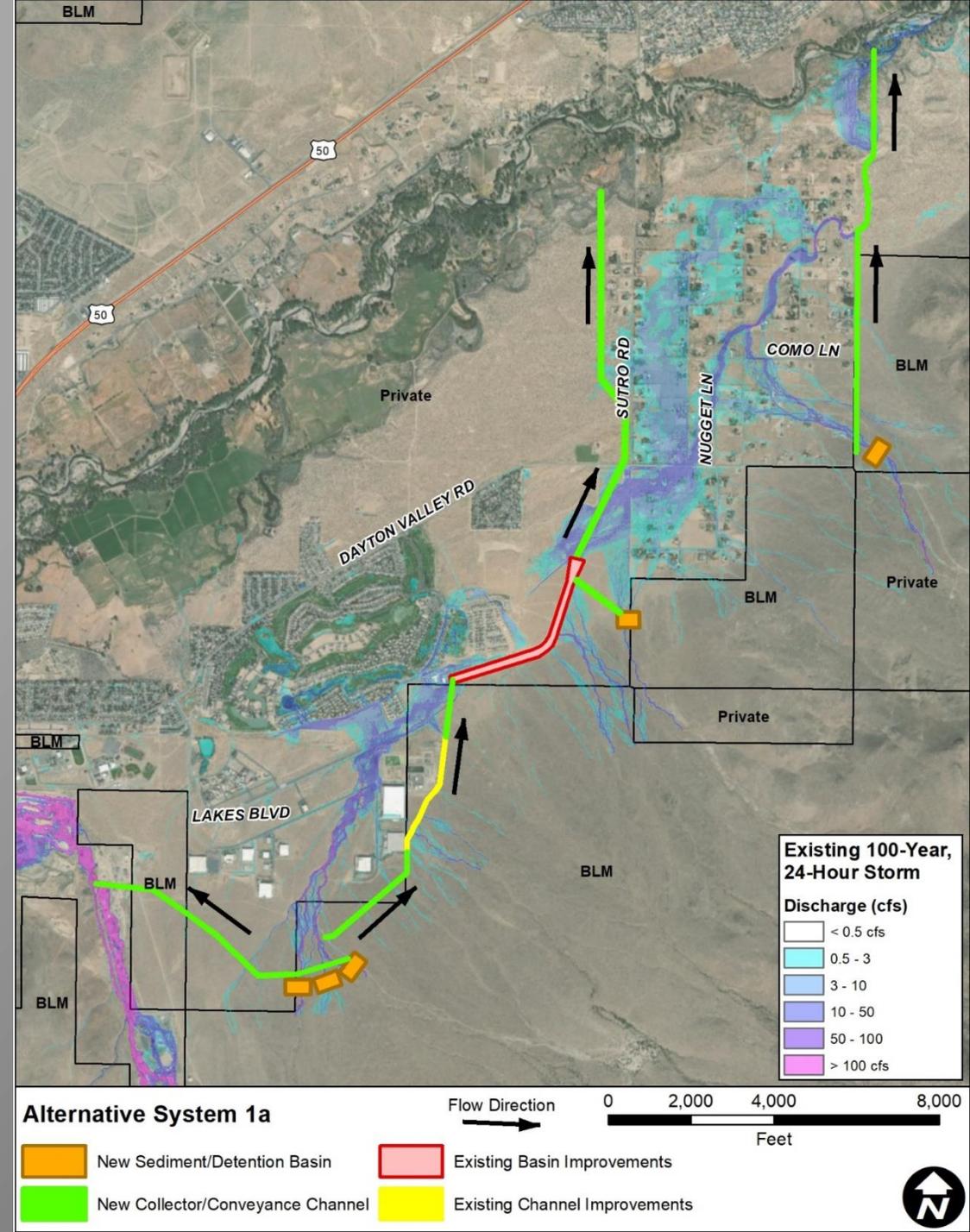
Three Mitigation Alternatives

- Detention/Sediment Basins
 - Collector Channels
 - Conveyance Channels
 - Upsized Culverts
 - New Culverts
- Provides a regional solution
 - The Lyon County Comprehensive Master Plan: South Dayton Bypass Road
 - The basins and channel are located primarily on public land
 - Minimize the number of private parcels



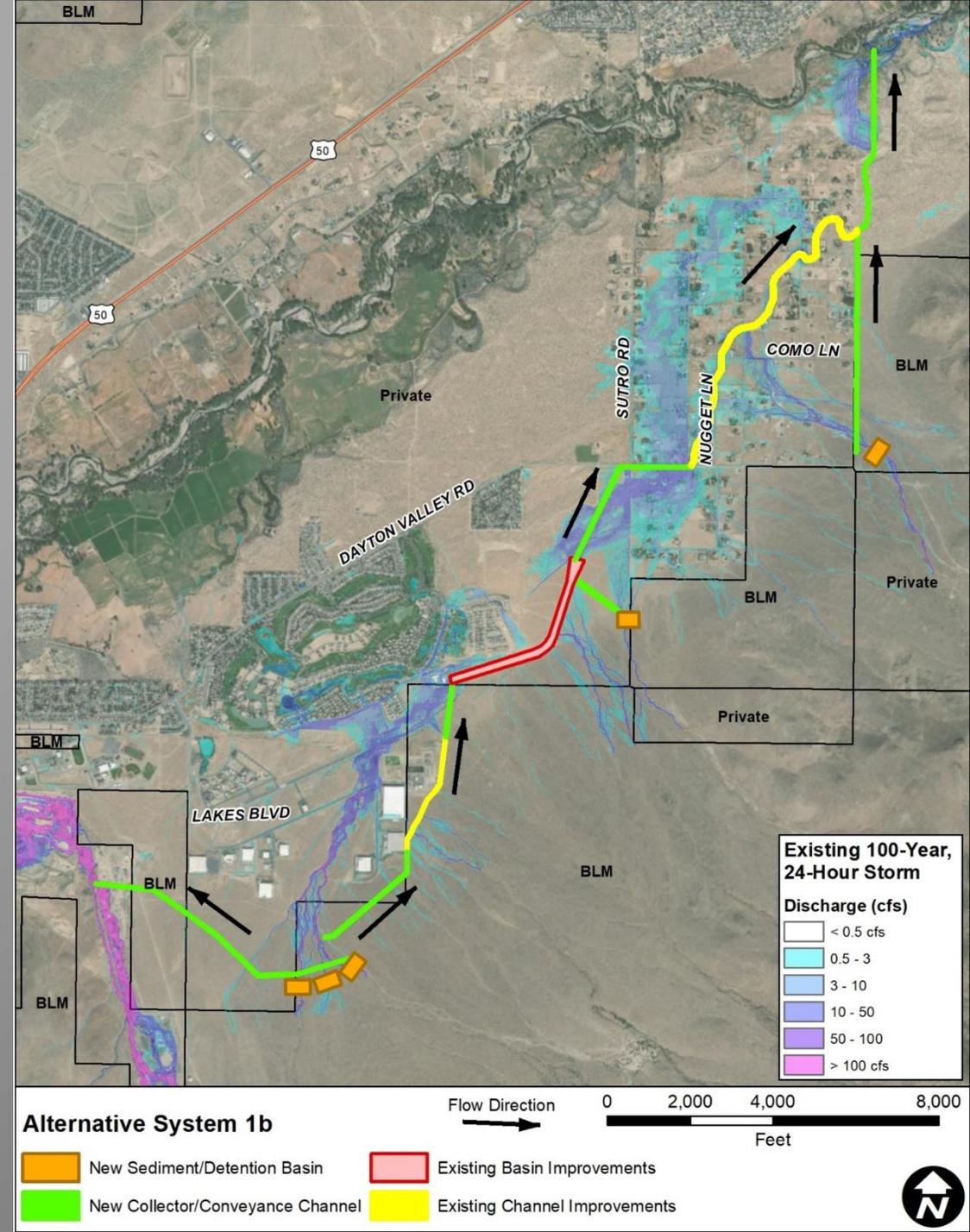
Three Mitigation Alternatives

- Detention/Sediment Basins
 - Collector Channels
 - Conveyance Channels
 - Upsized Culverts
 - New Culverts
- Provides a regional solution
 - The Lyon County Comprehensive Master Plan: South Dayton Bypass Road
 - The basins and channel are located primarily on public land
 - Minimize the number of private parcels



Three Mitigation Alternatives

- Detention/Sediment Basins
 - Collector Channels
 - Conveyance Channels
 - Upsized Culverts
 - New Culverts
- Provides a regional solution
 - The Lyon County Comprehensive Master Plan: South Dayton Bypass Road
 - The basins and channel are located primarily on public land
 - Minimize the number of private parcels



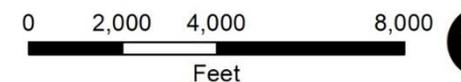
Three Mitigation Alternatives

- Detention/Sediment Basins
 - Collector Channels
 - Conveyance Channels
 - Upsized Culverts
 - New Culverts
- Provides a regional solution
 - The Lyon County Comprehensive Master Plan: South Dayton Bypass Road
 - The basins and channel are located primarily on public land
 - Minimize the number of private parcels

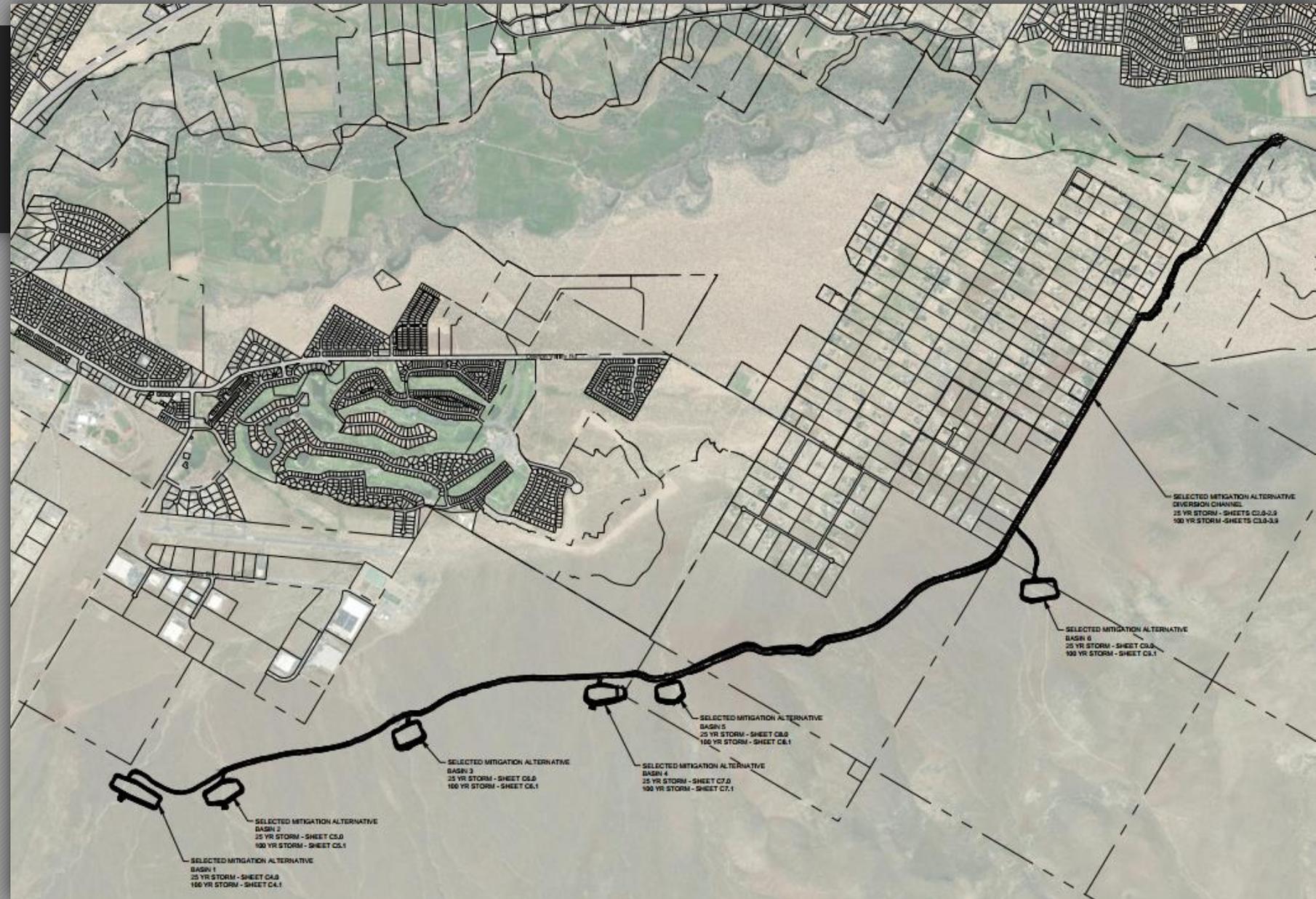


Selected Mitigation System

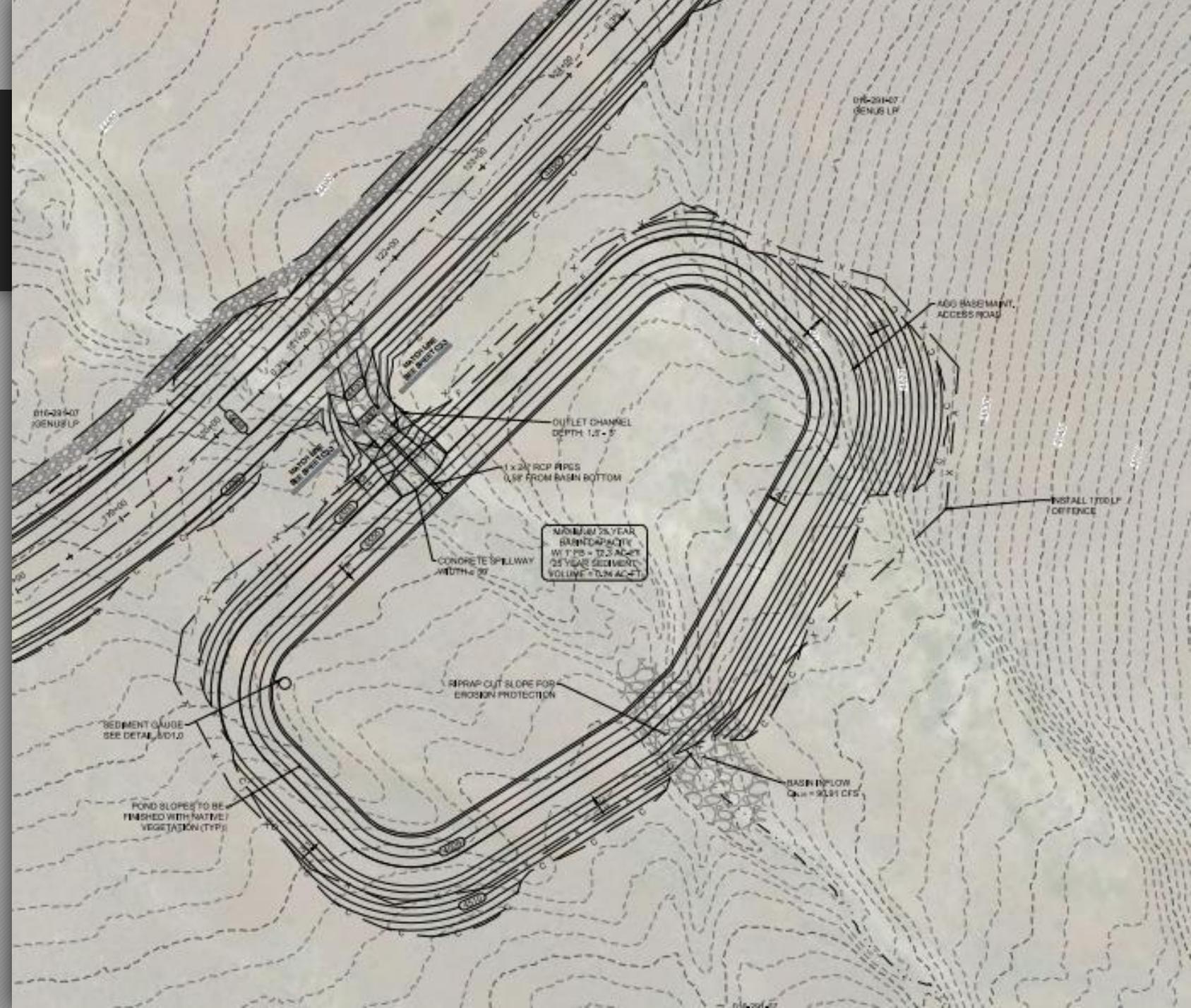
-  Collector/Conveyance Channel
-  Sediment/Detention Basin



100-Year 15% Design Overview



Sediment / Detention Basin



Building Impacts

Recurrence Interval Storm	Proposed Conditions Building Counts				Existing Conditions Building Count ¹	Buildings Removed (Benefit)
	Building Count Flow Depth	Building Count Flow Depth	Building Count Flow Depth	Total Building Count		
	0.25' < h ≤ 0.5'	0.5' < h ≤ 1'	1' < h			
Proposed Conditions (25-year System)						
25Y24H	314	47	12	373	445	72
100Y24H	351	80	27	458	580	122
100Y6H	432	53	7	492	499	7
Proposed Conditions (100-year System)						
25Y24H	314	47	12	373	445	72
100Y24H	345	62	15	422	580	158
100Y6H	432	53	7	492	499	7

Flood Risk Area Reduction Benefit

Recurrence Interval Storm	Flood Risk Inundation Area	Total Benefit
	Acres	Acres Removed from Flood Risk (depth < 0.25 feet)
Base Conditions		
25Y24H	770	-
100Y24H	1,165	-
Proposed Conditions (25-year System)		
25Y24H	347	423
100Y24H	751	414
Proposed Conditions (100-year System)		
25Y24H	337	433
100Y24H	501	664

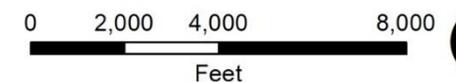
Project Phasing

Phase	Structure Elements	25-Year Structure Cost Estimate ²	100-Year Structure Cost Estimate ²
Phase 1	Conveyance Channel (5,200 LF ¹)	\$3,030,000	\$4,500,000
Phase 2	Conveyance Channel (4,500 LF)	\$2,600,000	\$3,800,000
Phase 3	Conveyance Channel (1,100 LF)	\$700,000	\$970,000
	Basin #6	\$2,400,000	\$2,800,000
Phase 4	Conveyance Channel (7,200 LF)	\$4,200,000	\$6,100,000
Phase 5	Conveyance Channel (2,300 LF)	\$1,350,000	\$2,000,000
	Basin #5	\$1,100,000	\$2,200,000
	Basin #4	\$3,100,000	\$4,400,000
Phase 6	Conveyance Channel (3,700 LF)	\$2,200,000	\$3,200,000
Phase 7	Conveyance Channel (900 LF)	\$515,000	\$760,000
	Basin #3	\$2,000,000	\$3,200,000
Phase 8	Conveyance Channel (3,300 LF)	\$1,950,000	\$3,000,000
Phase 9	Conveyance Channel (2,500 LF)	\$1,500,000	\$2,200,000
	Basin #2	\$2,000,000	\$2,200,000
	Basin #1	\$2,600,000	\$3,000,000

1. LF = linear feet (approximate)
2. Construction costs have been rounded for simplification. See Appendix B for a detailed breakdown of cost estimates.



Potential Mitigation Phasing



Submit Your Questions via Q&A Button



Prepared by:



Mike Kellogg, PG, CFM, GISP
mike@jefuller.com

Richard Waskowsky, PE
richard@jefuller.com



Ryan Spreeman, PE
rspreeman@lumosinc.com

Copies of the Technical Reports and Presentation

<https://www.lyon-county.org/1015/South-Dayton-Valley-Drainage-Master-Plan>