

Johnson Lane Area Drainage Master Plan

Carson Water Subconservancy District Board Meeting
May 16, 2018

What is an Area Drainage Master Plan (ADMP)?

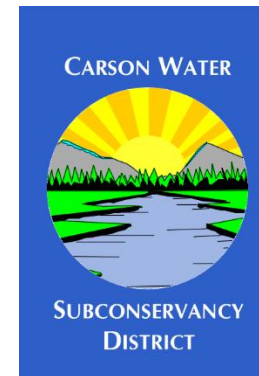
- Planning-level study of flooding hazards within a watershed
 - Multiple watercourses
- Goals:
 - Develop a comprehensive understanding of the drainage existing conditions
 - Develop alternative mitigation solutions

Project Funding

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



FEMA

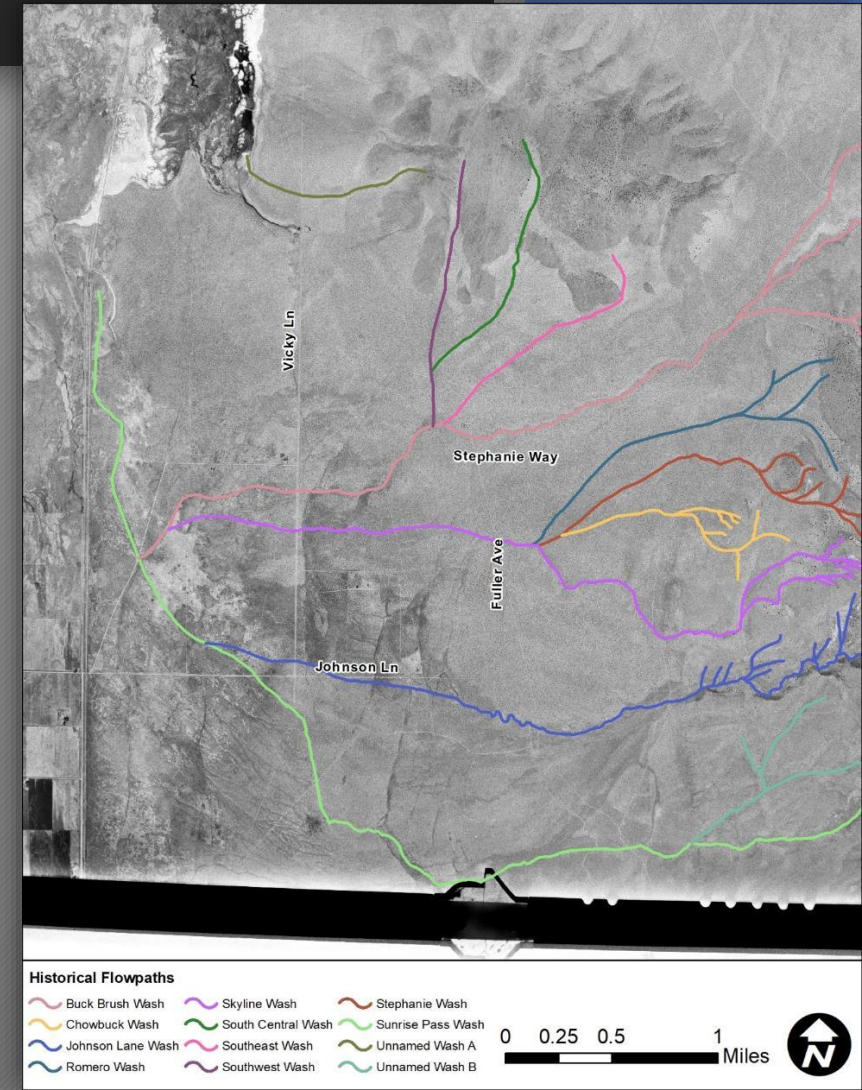


JLADMP



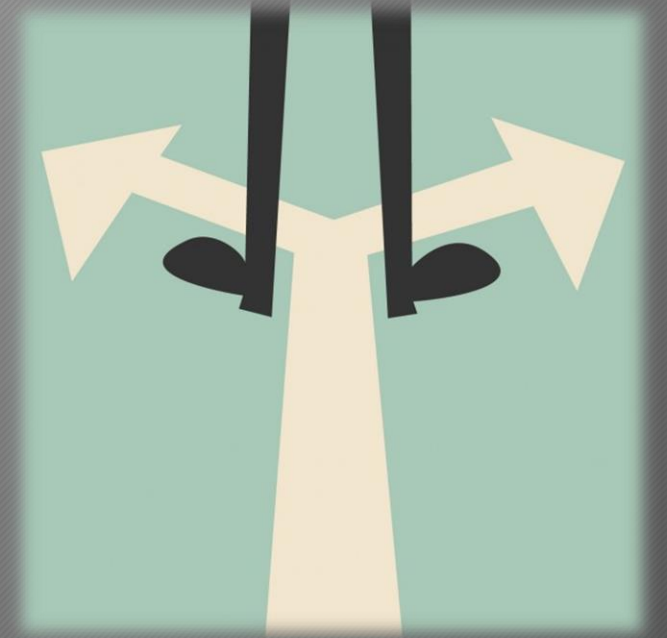
Johnson Lane ADMP Major Project Elements

- Data Collection
- Topographic Mapping (LiDAR + Survey)
- Watershed Assessment
 - Geology
 - Historical Flow Paths
- Flood Hazard Assessment
 - Hydrologic Modeling
 - Hydraulic (2D) Modeling
- Flood Hazard Classification



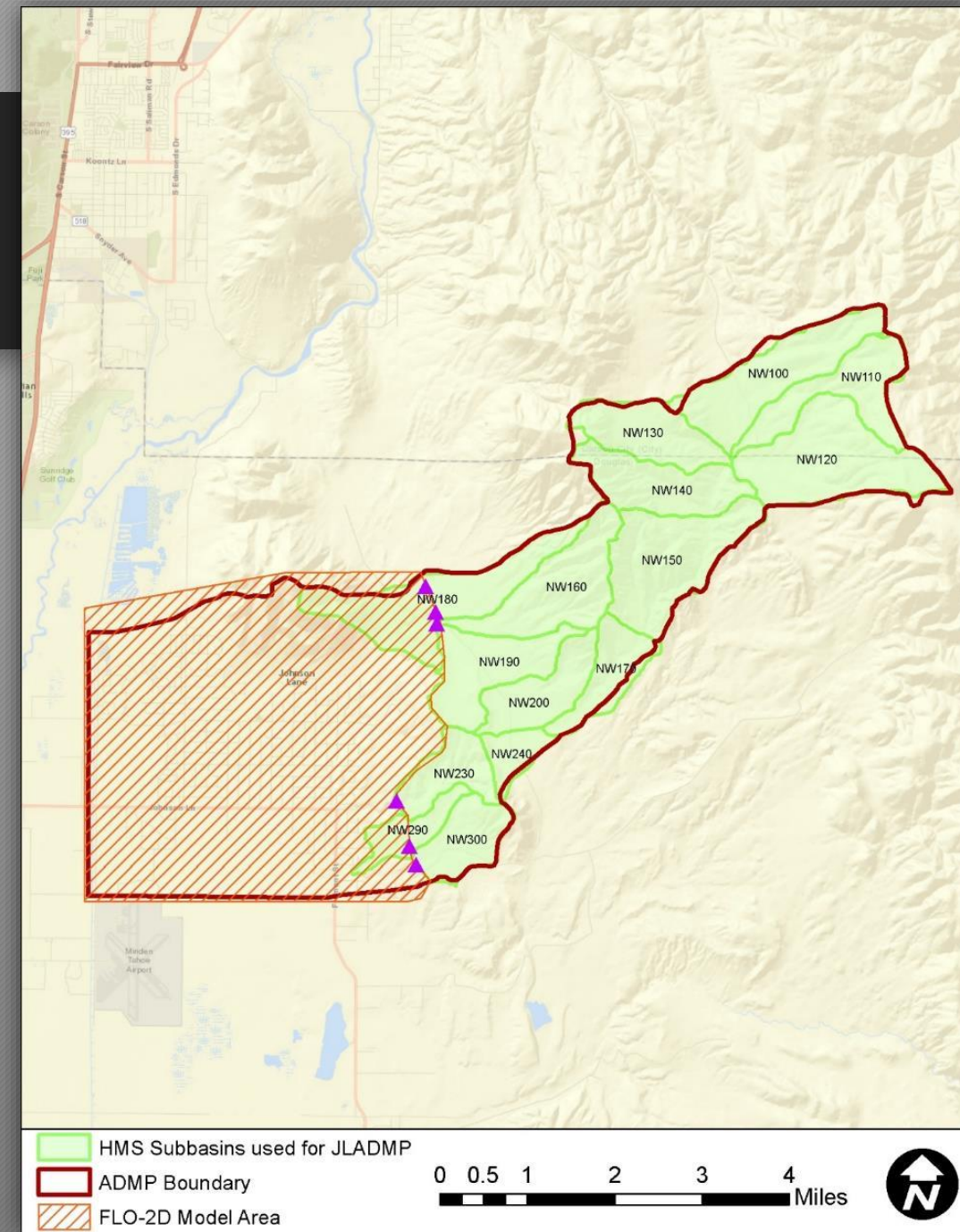
Johnson Lane ADMP Major Project Elements

- Alternatives
 - OHV Impacts
 - Individual Lot Management Plan
 - Individual Lot Retention
 - Contour Trenching
 - Arterial Road All-Weather Access
 - Roadside Ditch Lining
- Regional Alternatives



Flood Hazard Assessment

- Hydrologic Modeling (HEC-HMS)
 - Four Storm Events
 - 25-year, 24-hour storm
 - 100-year, 6-hour storm
 - 100-year, 24-hour storm
 - July 2015 storm estimate
- Hydraulic Modeling (FLO-2D)
 - 10-foot grid element (4M total grids)
- Sedimentation Engineering





Animation Legend

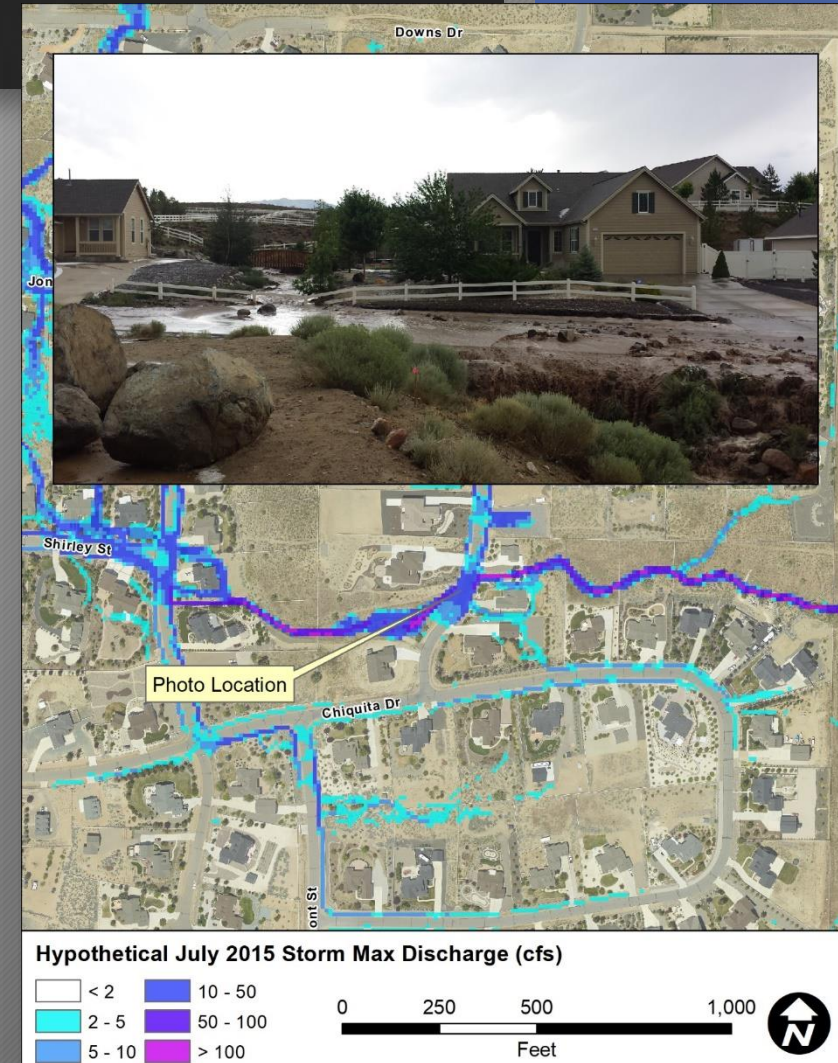
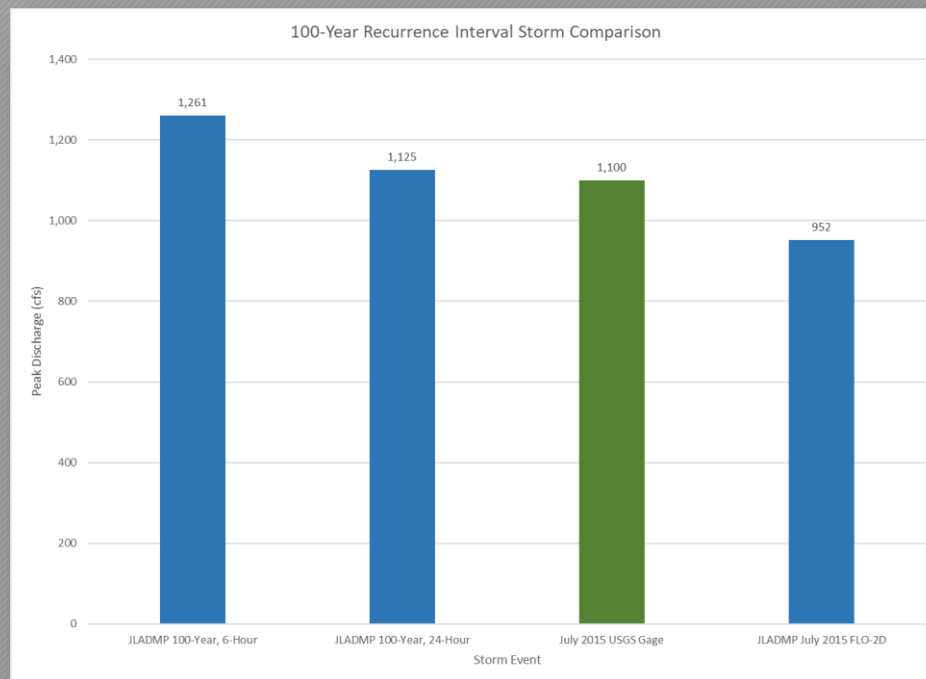
depth

0.0 ft
0.25 ft
0.5 ft
1.0 ft
2.5 ft
5.0 ft
7.5 ft
10.0 ft

Google Earth

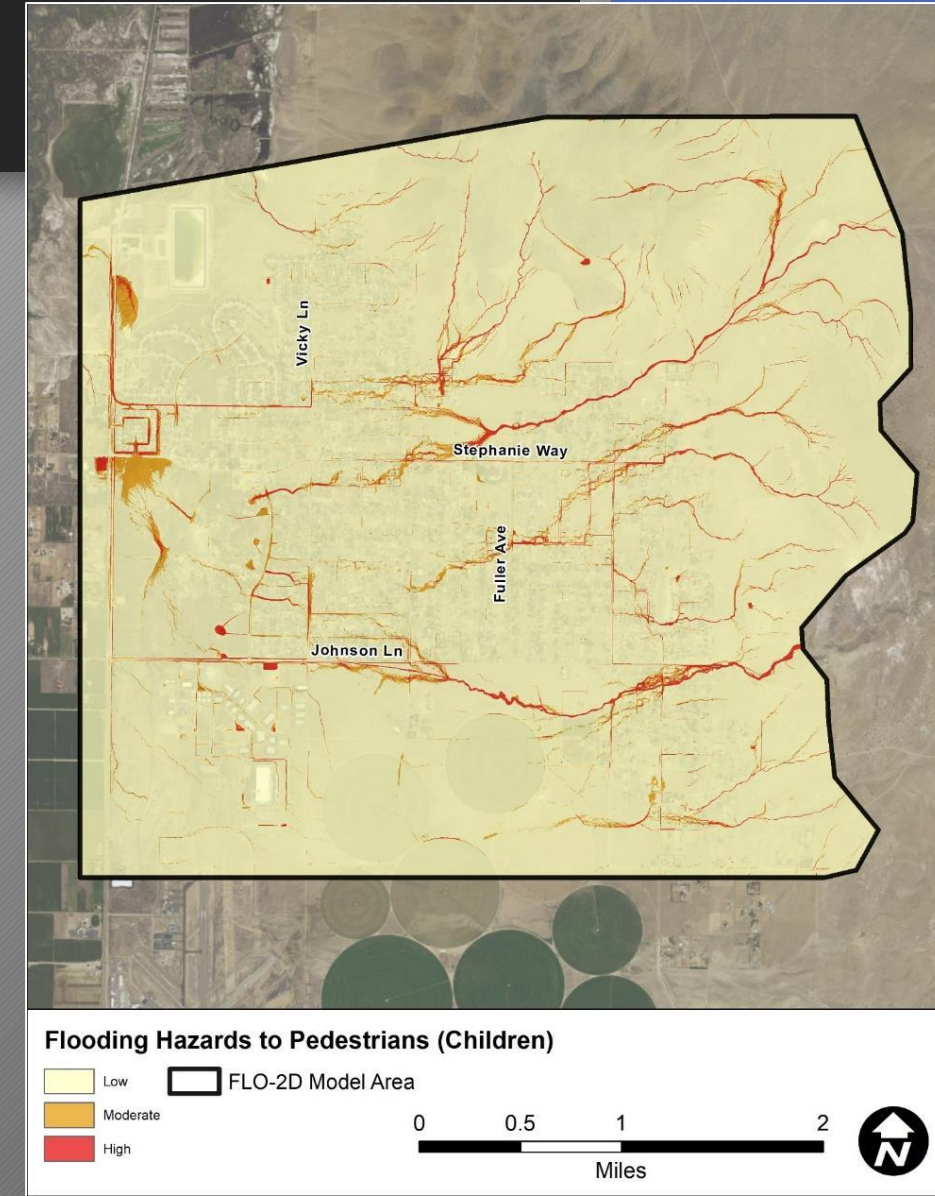
Verification of Existing Condition Results

- Models should be verified if possible
 - USGS records for Johnson Lane Wash
 - Resident flooding experience



Flood Hazard Classification

- Identify specific hazard areas for:
 - Pedestrians
 - Vehicles
 - Buildings



Flood Hazard Classification

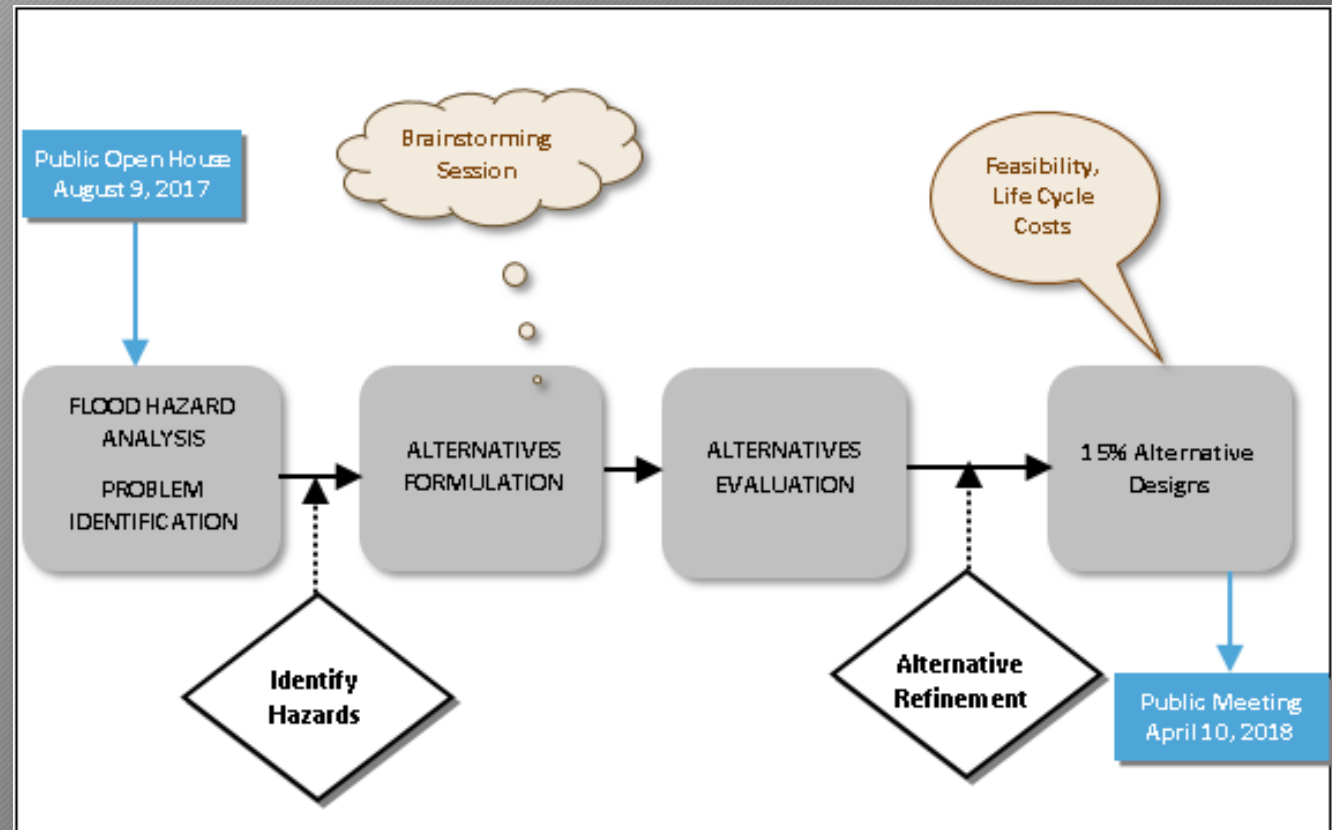
- HAZUS Analysis

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

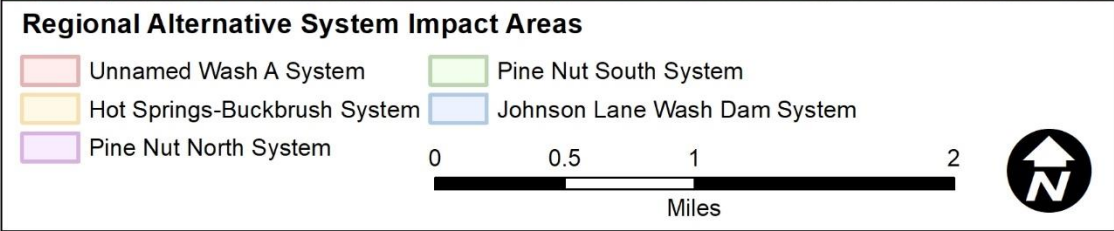
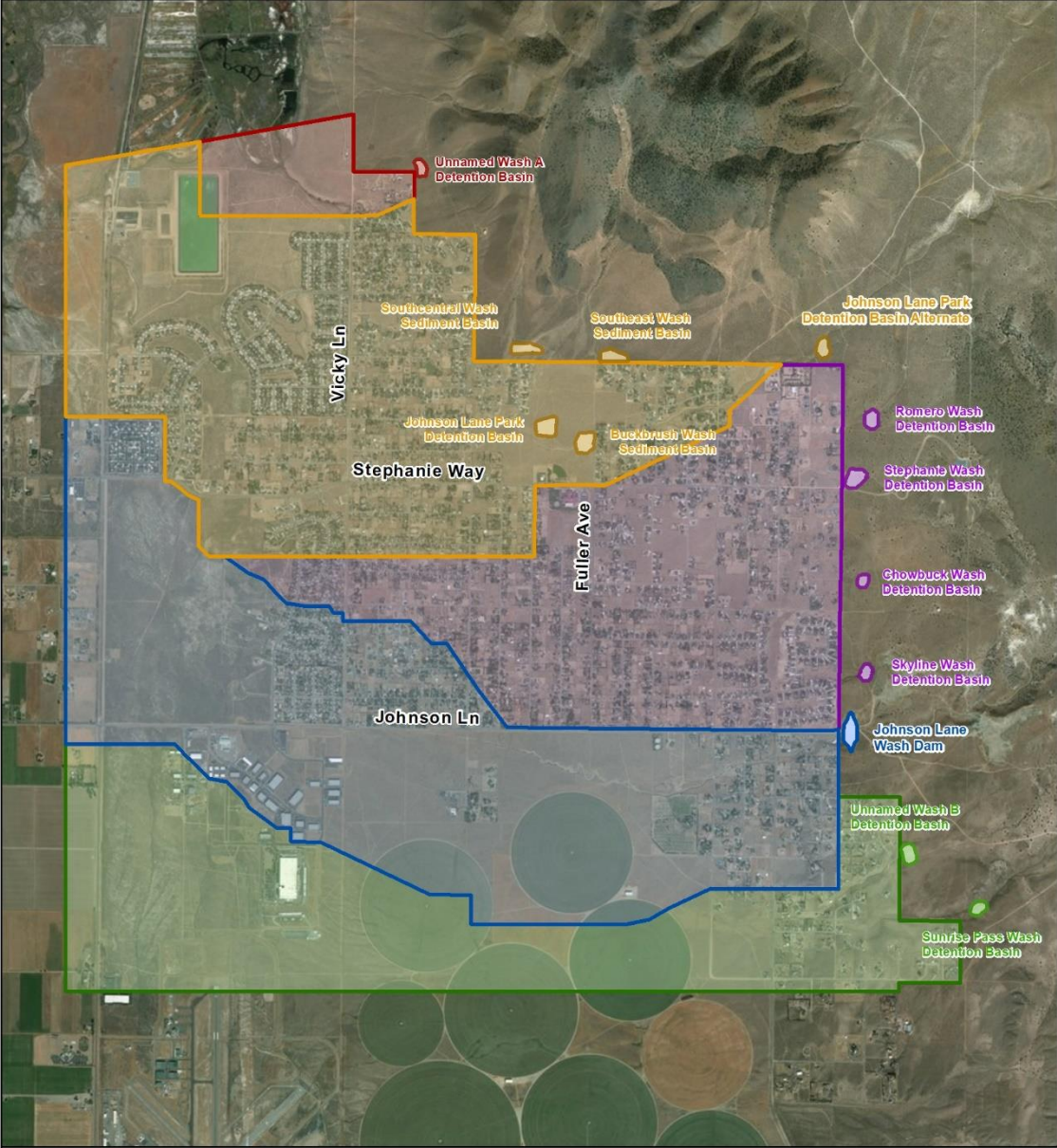
Base Conditions				
Recurrence Interval	Economic Loss			
	Residential \$ millions	Total Property \$ millions	Business Interruptions \$ millions	Total Economic Loss \$ millions
25-yr 24-hr	2.14	2.22	0.42	2.64
100-yr 24-hr	4.27	4.49	0.42	4.91
100-yr 6-hr	4.87	5.13	0.42	5.55
Hyp. July 2015	3.90	4.08	0.42	4.50

Alternatives - Regional Mitigation Alternatives

- JL unique challenges
 - Drainage infrastructure
 - High sedimentation
- On-site mitigation limited impact
- Community-wide solutions

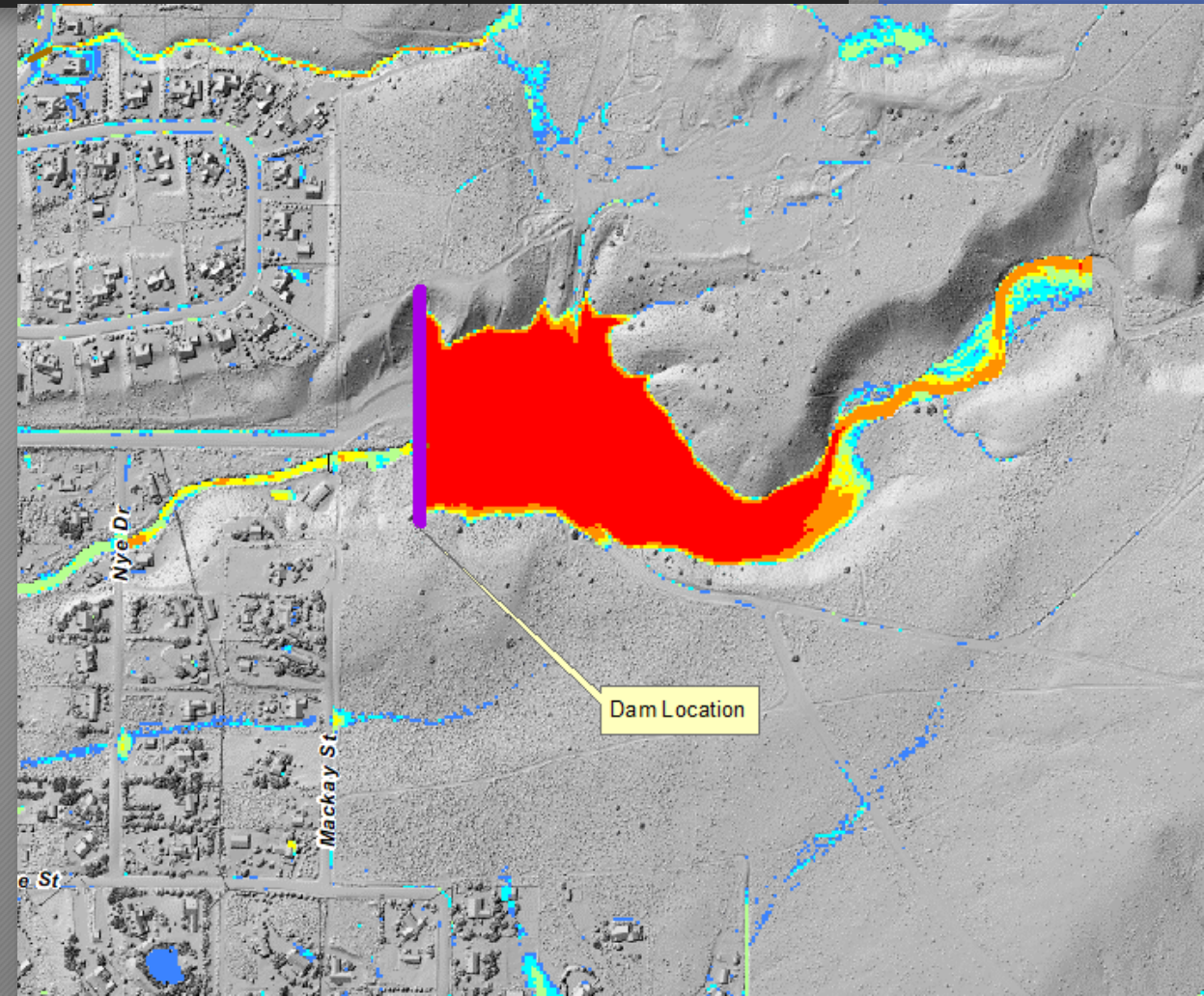


Regional Alternative Systems

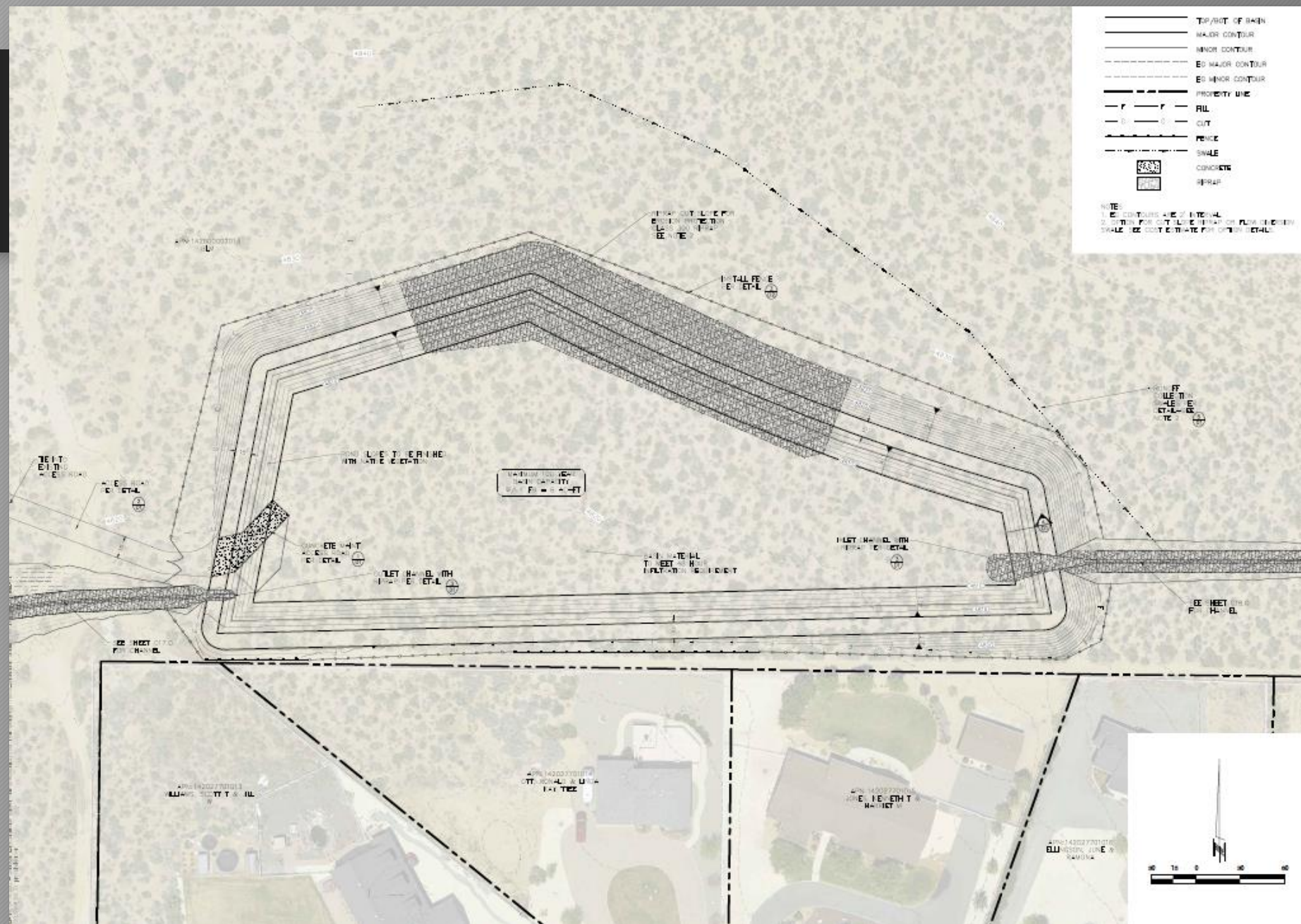


Johnson Lane Wash Alternatives

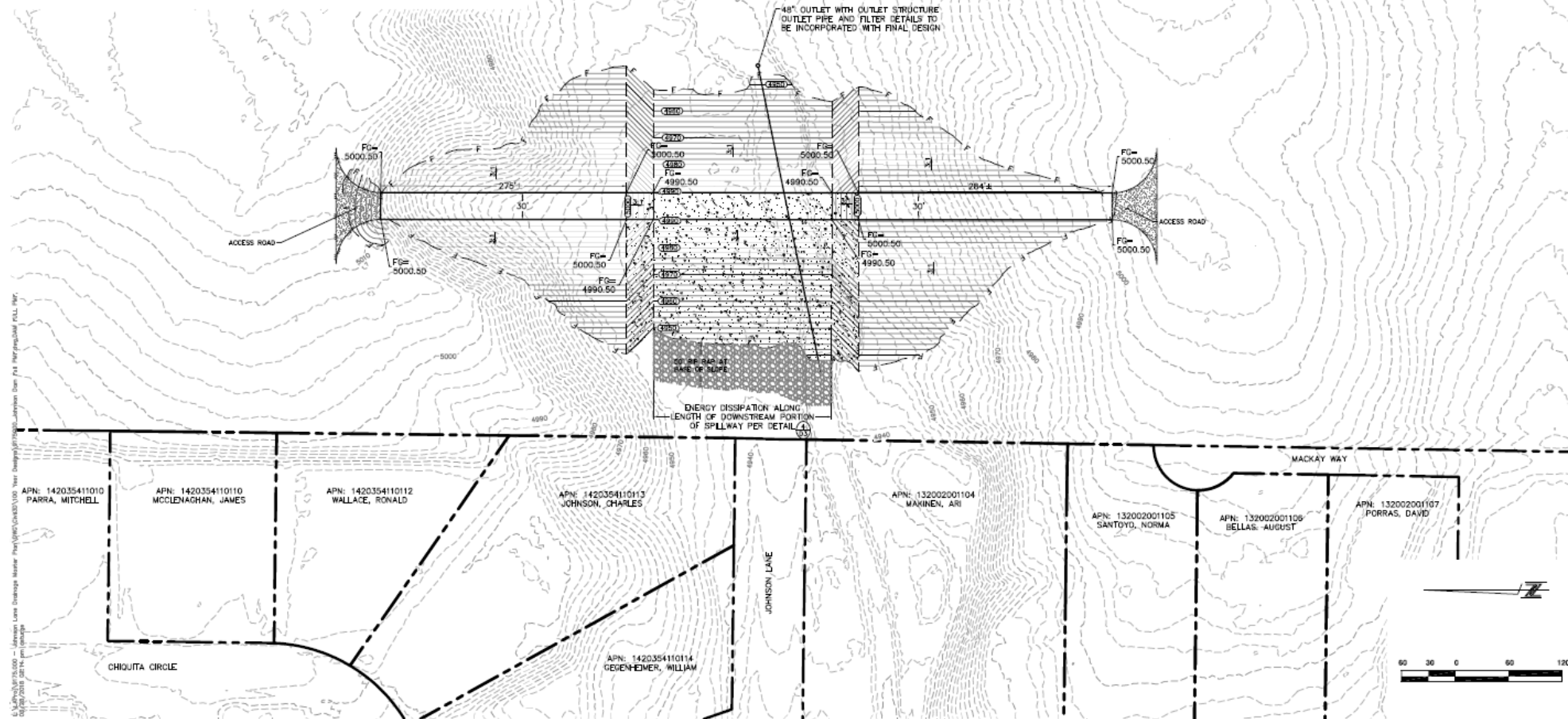
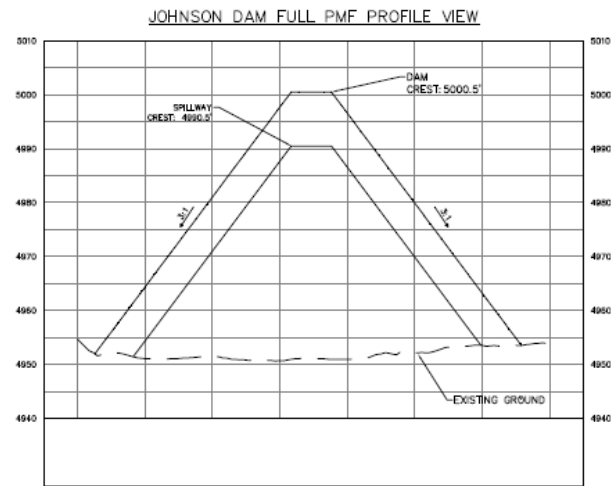
- Investigated several locations for detention basins
- Detention volume required very large, deep basins
- Most viable alternative was a dam structure upstream of Mackay St. alignment
- Designed for $\frac{1}{2}$ PMF and full PMF



Southeast 100-Year Sediment Basin



JL Wash Dam PMF



Building Impacts

Number Buildings Removed ¹ (potential inundation >0.25 feet)								
Regional Alternative System	25-Year Basins				100-Year Basins			
	25-Year, 24- Hour Storm	100-year, 6- Hour Storm	100-Year, 24- Hour Storm	Hypothetical July 205 Storm	25-Year, 24- Hour Storm	100-year, 6- Hour Storm	100-Year, 24- Hour Storm	Hypothetical July 205 Storm
Unnamed Wash A	5	3	3	4	5	3	4	5
Hot Springs- Buckbrush	48	108	114	104	48	148	150	106
Pine Nut North	25	100	90	61	25	111	90	59
Pine Nut South	4	1	0	0	4	1	2	0
TOTALS	82	212	207	169	82	263	246	170

Relative Benefit Comparison

Regional Alternative System	Percent Buildings Removed ¹ (potential inundation)	Percent Buildings Removed ¹ (potential inundation)	Buildings in System Area	Construction Cost (100-Year Basins)	Annual Maintenance Cost (100-Year Basins)	Construction Cost (25-Year Basins)	Annual Maintenance Cost (25-Year Basins)	Cumulative Loss Estimate Reduction (HAZUS)	Percent Flow Reduction at Key Locations (100-Year Basins)	Percent Flow Reduction at Key Locations (25-Year Basins)
	100-Year, 6- Hour 100-Year Basins	25-Year, 24- Hour 25-Year Basins							100-Year, 6-Hour	25-Year, 24-Hour
Unnamed Wash A	23%	63%	19	\$330,000	\$6,600	\$240,000	\$4,200	\$14,000	92%	90%
Hot Springs- Buckbrush	32%	40%	1,527	\$8,020,000	\$161,600	\$6,150,000	\$107,000	\$1,080,000	91%	89%
Pine Nut North	24%	20%	1,181	\$1,380,000	\$27,900	\$880,000	\$15,300	\$840,000	71%	0%
Pine Nut South	2%	14%	153	\$1,430,000	\$28,700	\$1,130,000	\$19,600	\$109,000	28%	50%
Johnson Lane Wash Dam (PMF)										
Johnson Lane Wash Dam	44%	-	679	\$4,900,000	\$13,900	\$4,900,000	\$13,900	\$3,220,000	82%	62%
TOTALS	69%	68%	3,532 ²	\$16,700,000	\$239,000	13,800,000	\$160,000	\$5,300,000	-	-

1. Flow depth > 0.25 feet

2. Total number of buildings within the study area is less than the sum of column 4 values due to minor overlapping between Regional Alternative Systems

Relative Benefit Comparison

Priority	System	Design Level
1	Pine Nut North	25-Year
2	Johnson Lane Wash Dam	PMF
3	Hot Springs-Buckbrush	100-Year
4	Pine Nut South	25-Year
5	Unnamed Wash A	25-Year



Potential Funding Source Examples

Grant	Funding Agency	Qualifications	Description
Pre-Disaster Mitigation (PDM)	FEMA	FEMA approved Hazard Mitigation Plan ¹ .	Awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes.
Flood Mitigation Assistance (FMA)	FEMA	Structures insured under the NFIP. Projects submitted for consideration must be consistent with the goals and objectives identified in the agency's Hazard Mitigation Plan.	Awards projects and planning grants that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP.
Hazard Mitigation Grant Program (GMGP)	FEMA	Presidential Major Disaster Declaration. 25% cost share from applicant.	Funding for projects listed in the agency Hazard Mitigation Plan.

¹ <https://www.douglascountynv.gov/DocumentCenter/View/2255>

Questions?

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