Paradise Valley Storm Water Master Plan Update

Town Council Work Session
October 9th, 2025

Kimley»Horn

Project Timeline

Project Kick Off
March 26, 2024

- Town Priorities
- Overview of Project Scope and Schedule

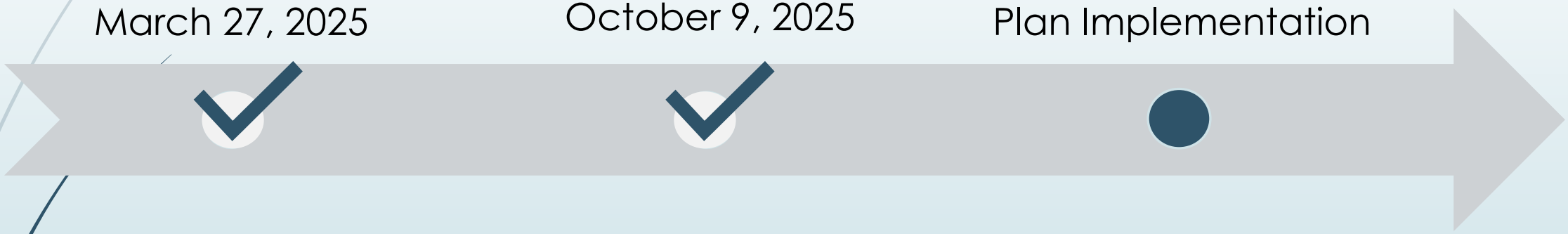
1st Council Session
June 13, 2024

- Data Collection
- Hydrology and Hydraulics Model

2nd Council Session
November 14, 2024

- Flood Hazard Analysis
- Identification of Priority Areas
- Project Ranking Criteria

Project Timeline



3rd Council Session

March 27, 2025

- Model Finalization
- Flood Hazard Area Prioritization Results
- Proposed Project Alternative Analysis

Current Council Session

October 9, 2025

- Draft Final Deliverables
- Adoption

Plan Implementation

Study Session's Topics

PRESENTATION OF DRAFT FINAL STORM WATER MASTER PLAN

POSSIBLE COUNCIL ADOPTION

Project Purpose

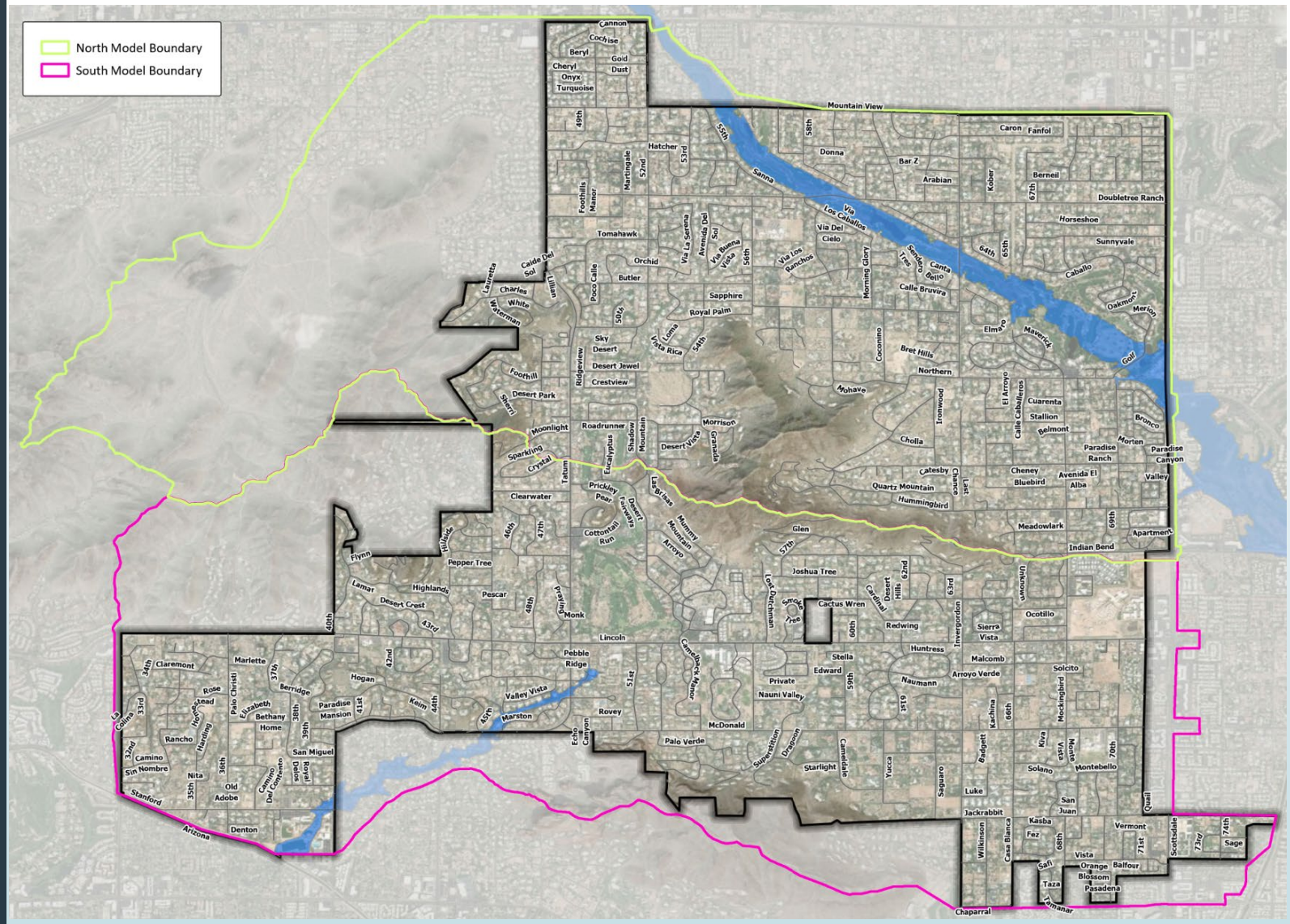
Jul 21, 2013 ABC15Arizona

- Identify flood prone areas
- Develop conceptual solutions
- Inform CIP
- Identify funding opportunities for infrastructure improvements

Methodology for Identifying Flood Hazard Areas

- Data from Town staff and residents
- Previous conceptual engineering studies
- Comprehensive Town-wide 2D hydrology and hydraulics models

Study Location

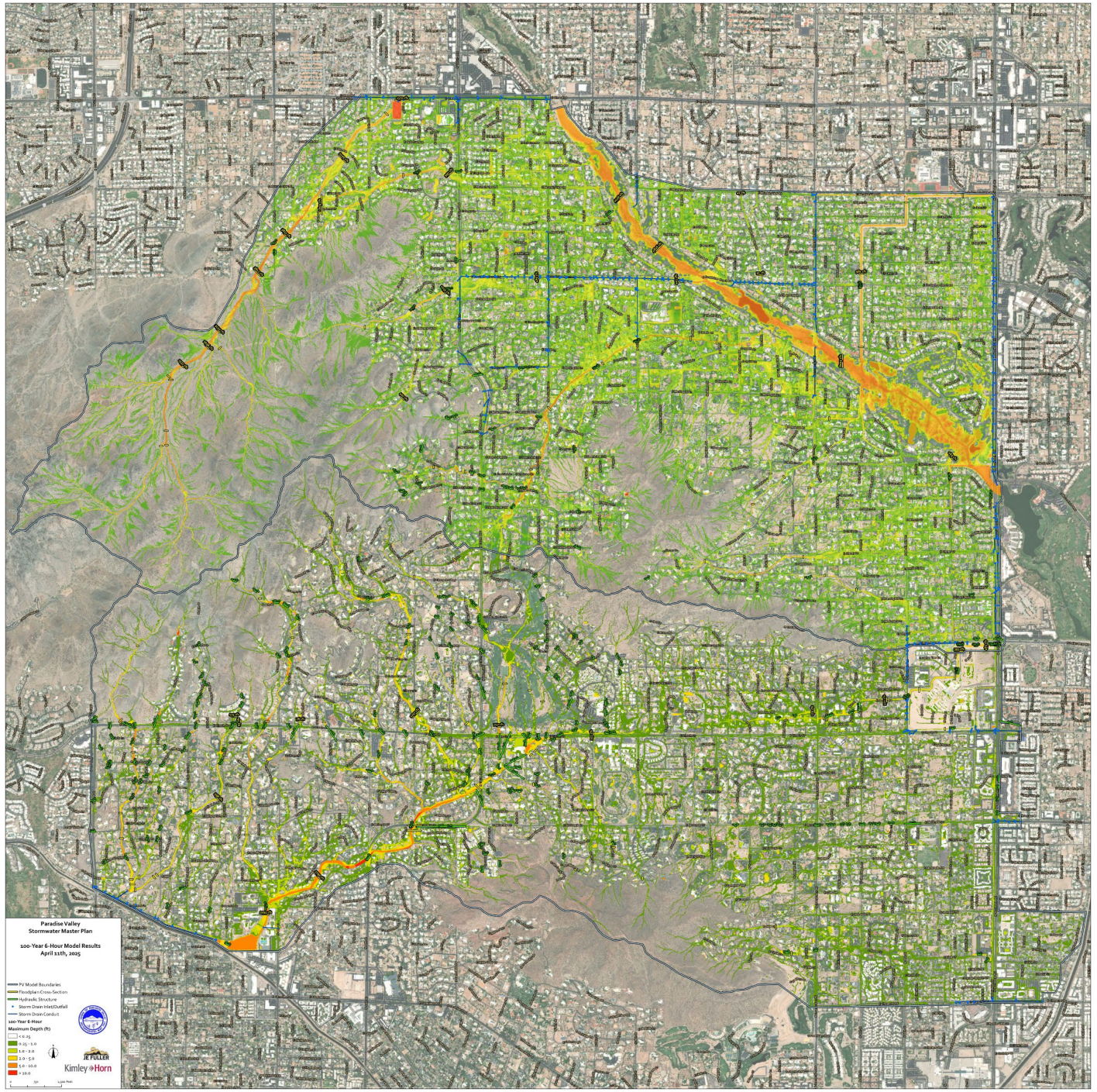


Final Deliverables

- Comprehensive Town-wide 2D Hydrology and Hydraulics Model
- Final SWMP Report
  - Summary of Data Collection
  - Existing Infrastructure Capacity
  - Flood Hazard Analysis
  - Flood Hazard Area Classification/Prioritization
  - Proposed Project Alternatives
  - Highest Priority Alternatives with Cost Analysis
  - Grant Funding Opportunities
  - Project Prioritization

Model Completion

- Reliable and accurate model
  - 2-, 10-, and 100-year results
- FCDMC reviewed and approved *

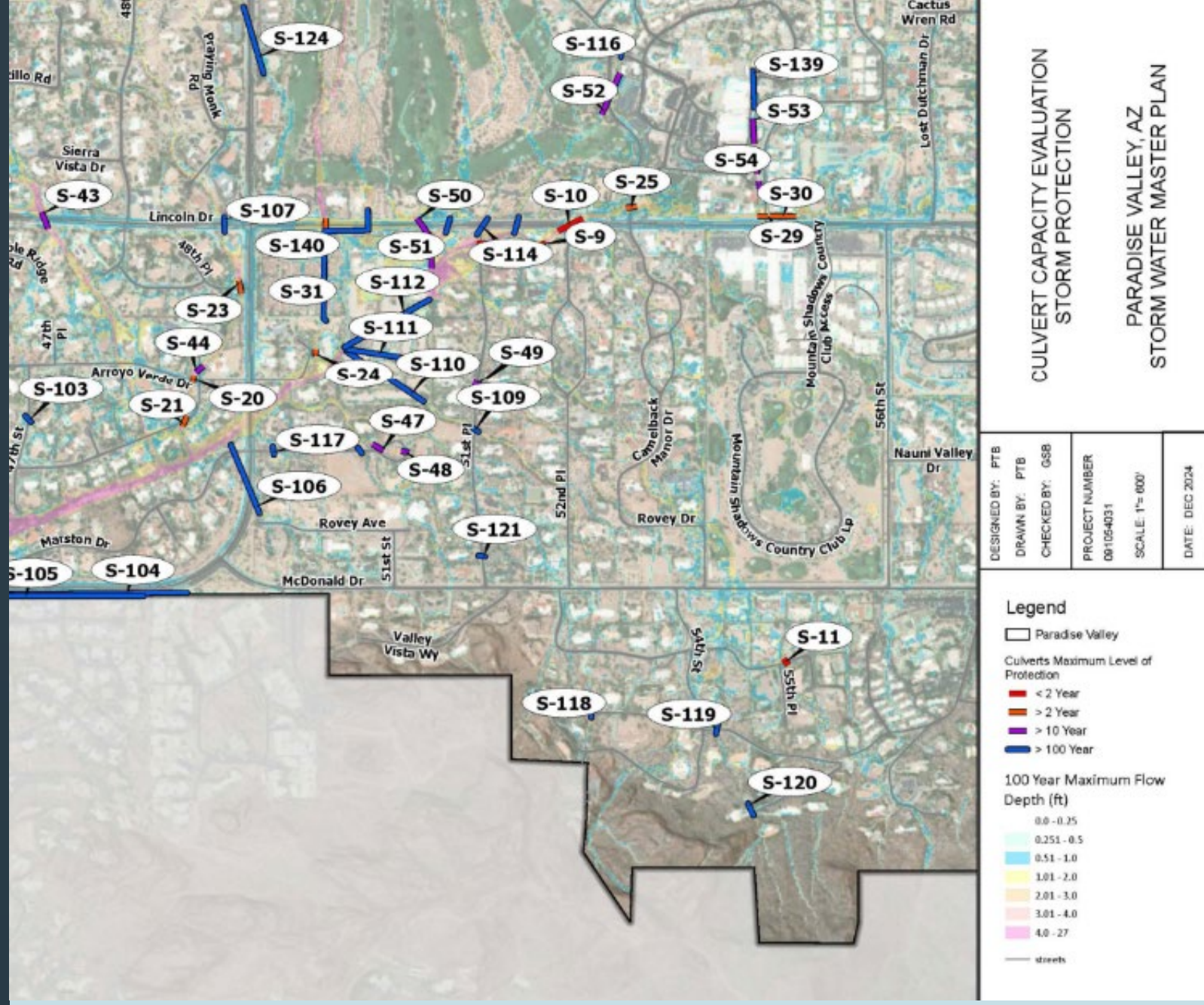


Data Collection

- 275 stormwater problem locations were identified
  - Identified by both staff and residents
  - Consists of structure (25), property(39), and road(211)flooding
- Flood hazard data and projects from regional and Town studies
  - Cheney Watershed Study - Town
  - Cudia City Wash ADMS and DCR - FCDMC
  - Lower Indian Bend Wash ADMP - FCDMC
  - Middle Indian Bend Wash ADMS – FCDMC
  - East Shea ADMS - FCDMC

Existing Infrastructure Evaluation

- Focused on street inlets and storm drain
- Used 2-, 10-, and 100-year model results to evaluate performance



Flood Hazard Analysis

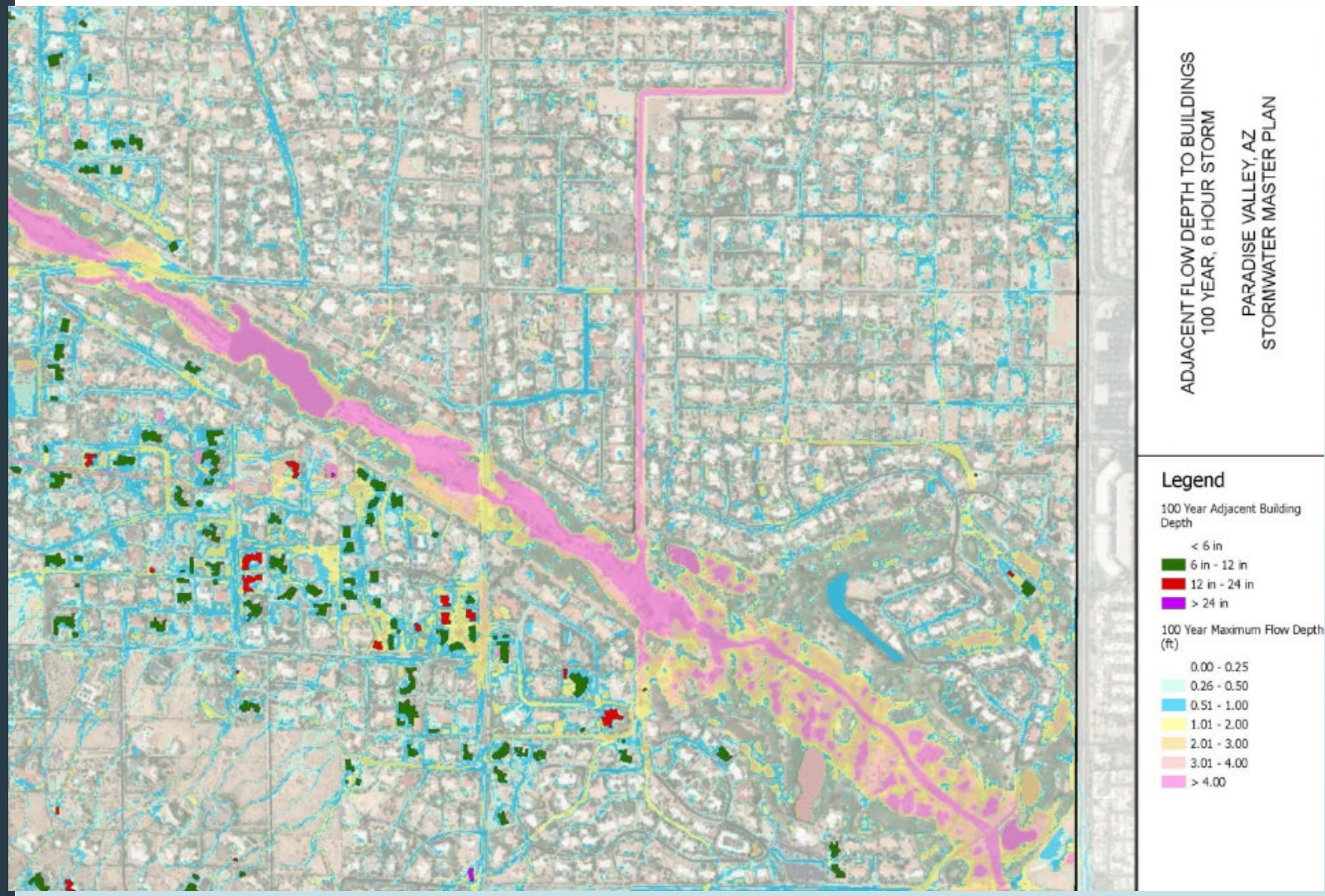
- Includes:
  - Building inundation analysis
  - Erosion potential
  - Sedimenation potential
  - Risk to passenger vehicles

Methodology	Per Storm Event		
	2-Year	10-Year	100-Year
>0.5 feet of flow depth for at least 20% of the building	43	304	857
>1 foot of flow depth for at least 15% of the building	11	43	283
>2 feet of flow depth for at least 10% of the building	6	9	52
Total Structures Impacted	60	356	1,192

Storm Event	Street Type	Extreme Erosion Risk Locations	Extreme Sediment Risk Locations
100-Year	Arterial	6	28
	Collector	29	144
	Residential	245	989
10-Year	Arterial	2	14
	Collector	12	65
	Residential	92	352

Storm Event	Street Type	High Danger Zone for Passenger Vehicles
100-Year	Arterial	29 Crossings
		3.9% of Arterial Streets
	Collector	79 Crossings
		9.7% of Collector Streets
	Residential	931 Crossings
		7.0% of Residential Streets
10-Year	Arterial	12 Crossings
		1.2% of Arterial Streets
	Collector	29 Crossings
		3.4% of Collector Streets
	Residential	220 Crossings
		1.6% of Residential Streets

Building Inundation



Flood Hazard Designations

Nuisance Flooding

0.5 ft of water at road crossings and/or properties within Flood Hazard Area

Moderate Flooding

1 ft of water at road crossings and properties within Flood Hazard Area

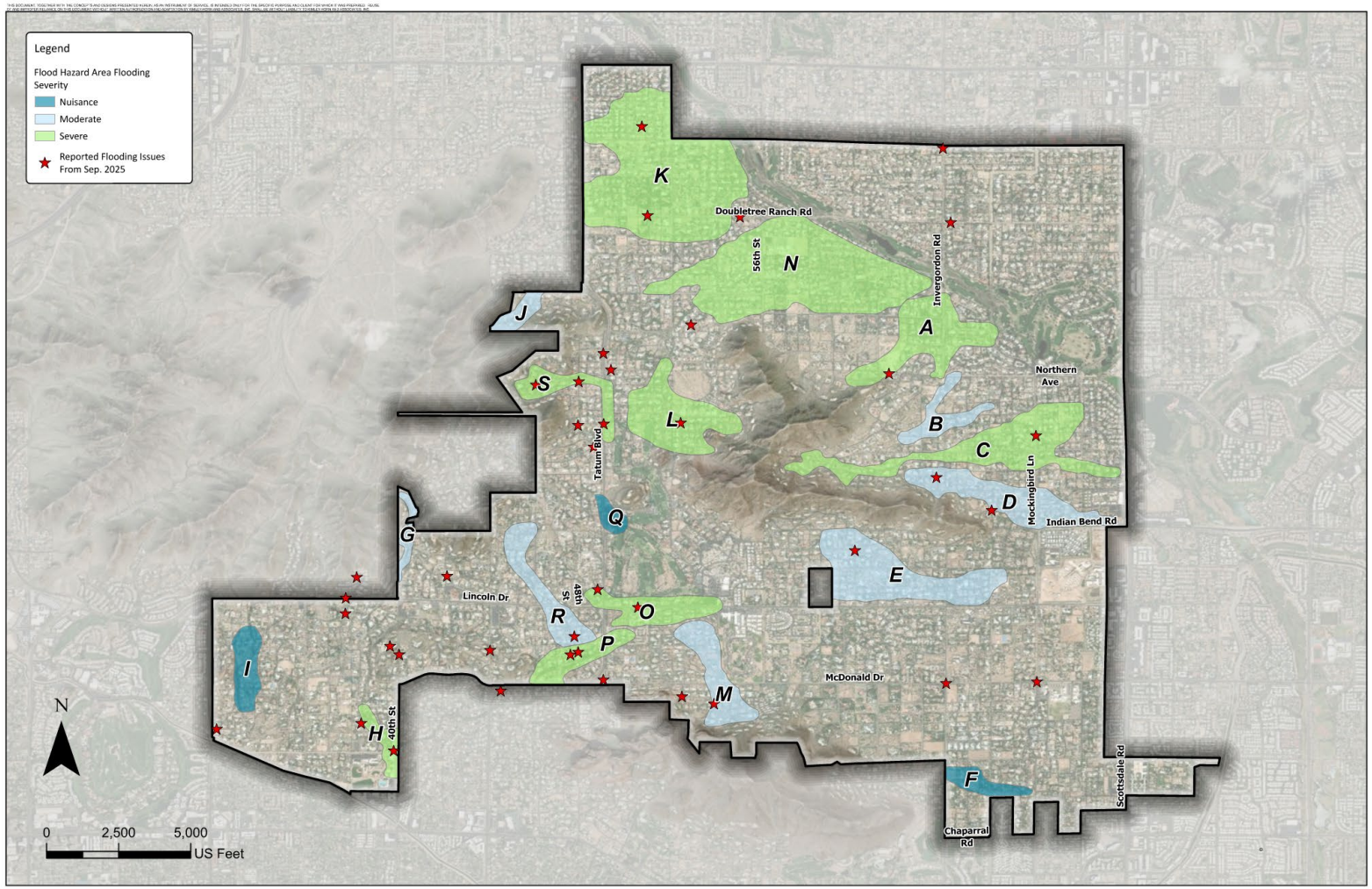
Severe Flooding

> 2 ft of water at road crossings and properties within Flood Hazard Area

- Delineation of areas based on max depth, depth x velocity, erosion & sedimentation potential, and impacted properties & structures

Flood Hazard Area Classification

- Nuisance – 3
- Moderate – 7
- Severe – 9



Flood Hazard Area Prioritization

Table 6: Flood Hazard Area Prioritization Criteria

Criteria	Scoring Criteria		Weighted Score	Highest Possible Score	Lowest Possible Score
Severity of Flooding	1-	Nuisance	5	15	5
	2-	Medium			
	3-	Severe			
Potential Structures Protected	1-	1 to 30 Structures	5	15	5
	2-	31-50 Structures			
	3-	>51 Structures			
Potential Streets Protected	1-	Local Street Benefits Only	4	12	4
	2-	Arterial/Collector Street or Multiple Local Streets Benefits			
	3-	Multiple arterial/collector & Local Street Benefits			
Restriction to Emergency Access	0-	No Impact to Emergency Access	3	6	0
	2-	Impacts to Emergency Access			
Multi-Use Opportunities	1-	No Opportunities	1	2	1
	2-	Possible Opportunities			

Flood Hazard Area Prioritization

Table 7: Flood Hazard Area Ranking and Characteristics

Flood Mitigation Alternatives Developed

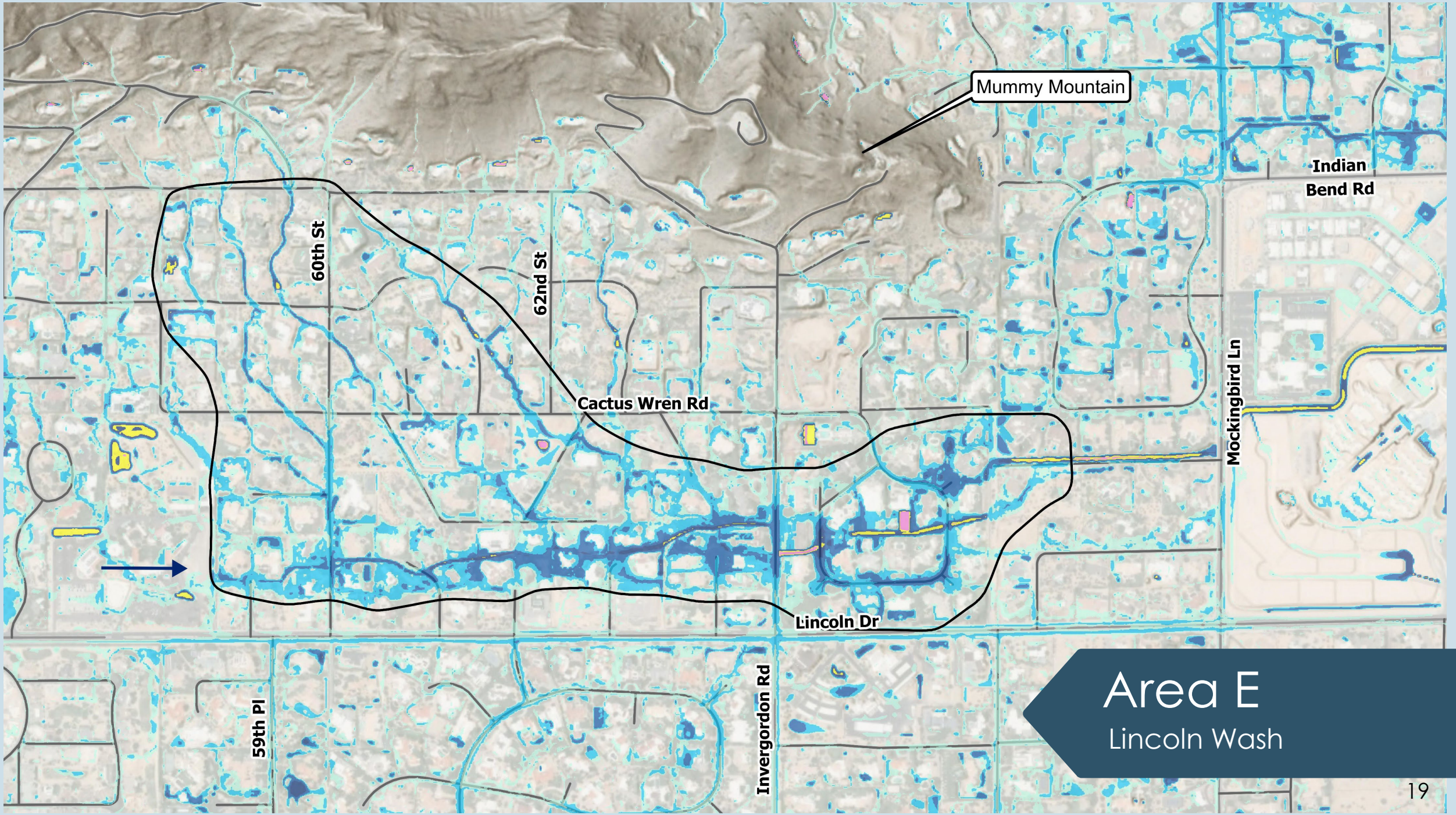
Flood Hazard Area	Matrix Score	Severity of Flooding	Structures with Adjacent Depths of at Least 0.5 ft	Streets Impacted by at Least 0.5 ft Depths	Potential Impact to Emergency Access
N	49	Severe	123	2 Collector; 8 Local	Yes
A	45	Severe	43	2 Collector; 6 Local	Yes
O	45	Severe	22	2 Collector; 4 Local	Yes
K	43	Severe	141	2 Collector; 13 Local	No
L	41	Severe	35	0 Collector; 5 Local	Yes
H	40	Severe	9	2 Collector; 2 Local	Yes
P	39	Severe	17	1 Collector; 2 Local	Yes
C	39	Moderate	70	1 Collector; 2 Local	No
E	38	Moderate	52	2 Collector; 5 Local	No
S	36	Severe	14	1 Collector; 1 Local	Yes
R	36	Severe	27	1 Collector; 5 Local	Yes
D	33	Severe	20	2 Collector; 1 Local	No
G	32	Severe	2	0 Collector; 2 Local	Yes
M	25	Moderate	19	1 Collector; 6 Local	No
B	25	Moderate	4	1 Collector; 2 Local	No
J	21	Moderate	8	0 Collector; 3 Local	No

Proposed Project Alternatives

- 2-3 projects per area
- Ranked based on Table 8 criteria
- Because of ROW constraints:
  - Cost was primary determining factor
  - Most projects are storm drain or improved road crossings

Table 8: Project Prioritization Criteria

Criteria	Scoring Criteria		Weighted Score	Highest Possible Score	Lowest Possible Score
Potential Structures Protected	1-	1 to 30 Structures	5	15	5
	2-	31 to 50 Structures			
	3-	> 51 structures			
Design & Construction Cost/Benefit	1-	Most Expensive	5	10	5
	2-	Least Expensive			
Potential Streets Protected	1-	Local Street Benefit Only	4	12	4
	2-	Arterial/Collector Street or Local Streets Benefit			
	3-	Multiple Arterial/Collector Streets and Local Streets Benefit			
Green Storm Water Infrastructure	1-	No Opportunities	1	2	1
	2-	Some Opportunities			
Project Partnership	1-	Grant Funding or Partnerships Likely	4	12	4
	2-	Local Partnership/Grant Eligible			
	3-	Local and Federal Partnerships/Grant Eligible			
Multi-Use Opportunities	1-	No Opportunities	2	4	2
	2-	Some Opportunities			
Operation and Maintenance Costs	1-	Maintenance After Every Storm Event	3	6	3
	2-	Maintenance at Standard Intervals			
Utility Constraints	1-	Major Constraints	3	6	3
	2-	Minor Constraints			

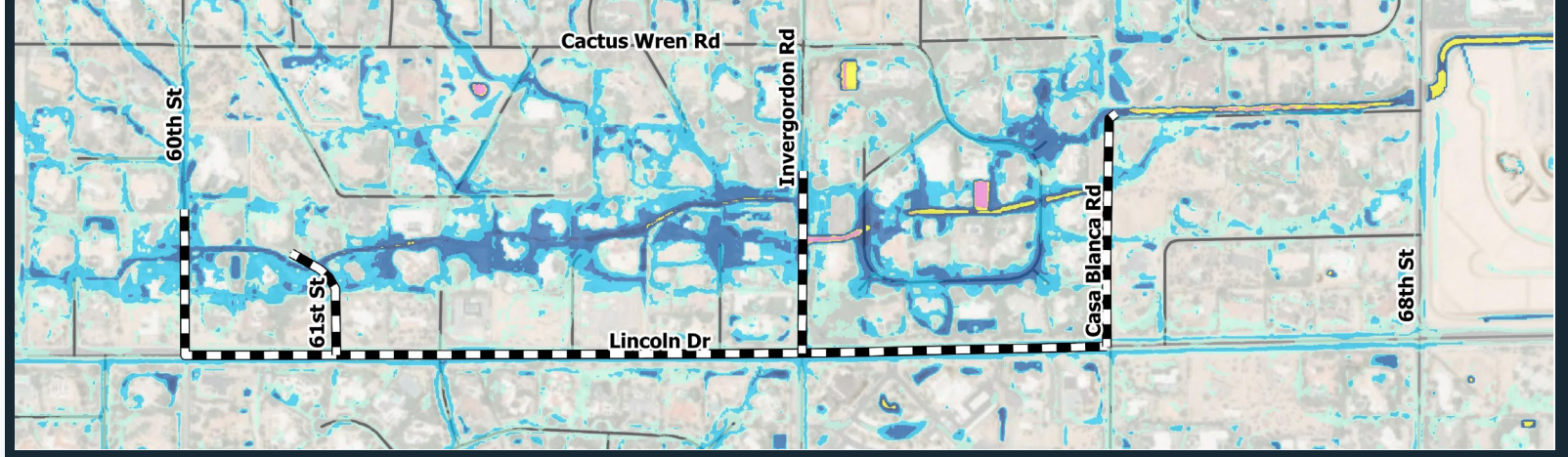


Area E

Lincoln Wash

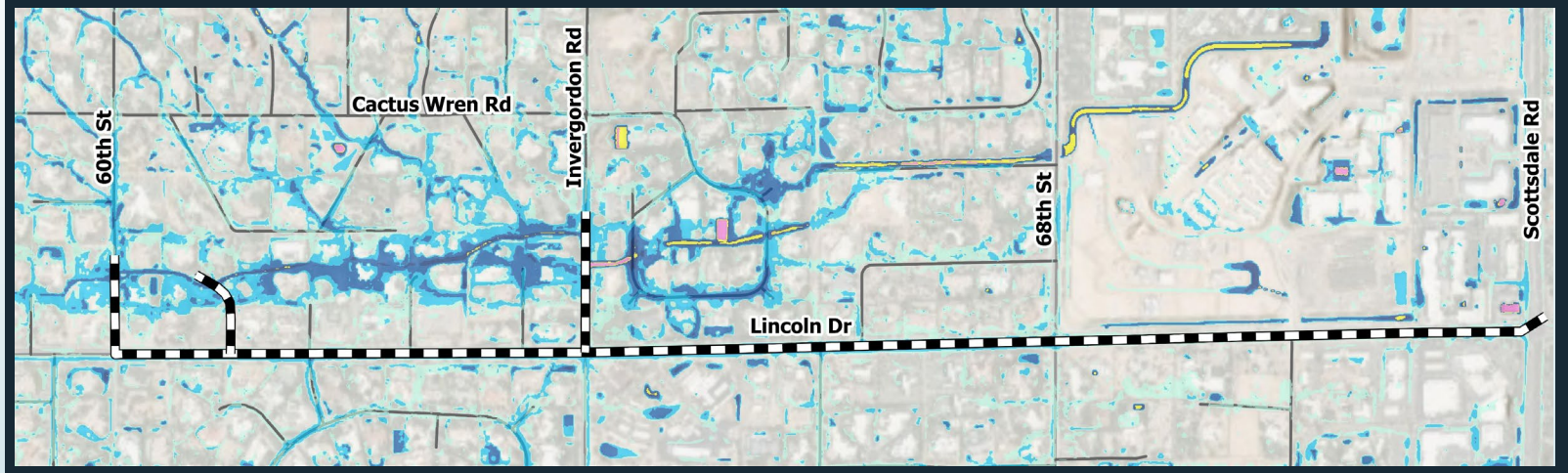
Alternative 1

- Outfall to Ritz-Carlton Channel
- 4,500 LF of 36" SD
- 2,300 LF of 48" SD
- ~$14.9 M



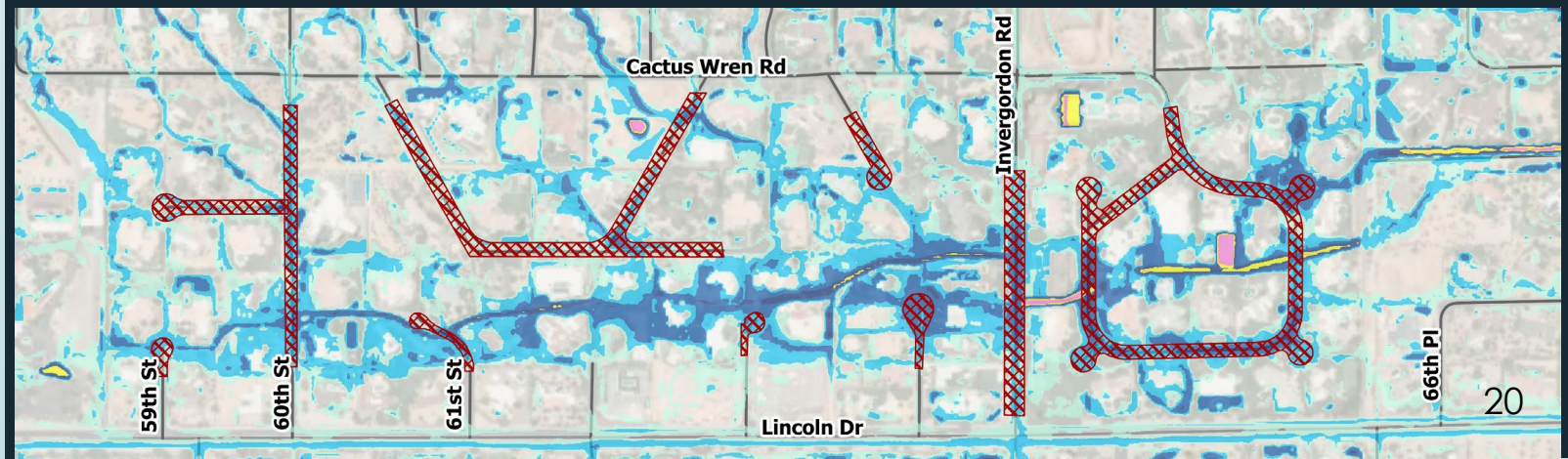
Alternative 2

- Outfall to Existing Scottsdale Rd SD
- 4,500 LF of 36" SD
- 5,250 LF of 48" SD
- ~ $9.5 M



Alternative 3

- 7,900 LF of Permeable Pavement
- ~$1.4M



Highest Priority Alternatives

- 15% Plans
- Cost Estimates
- Benefit/Cost Analysis
- Proposed Conditions Modeling

Table 29: Prioritized Projects Summary

Top Ranking Six

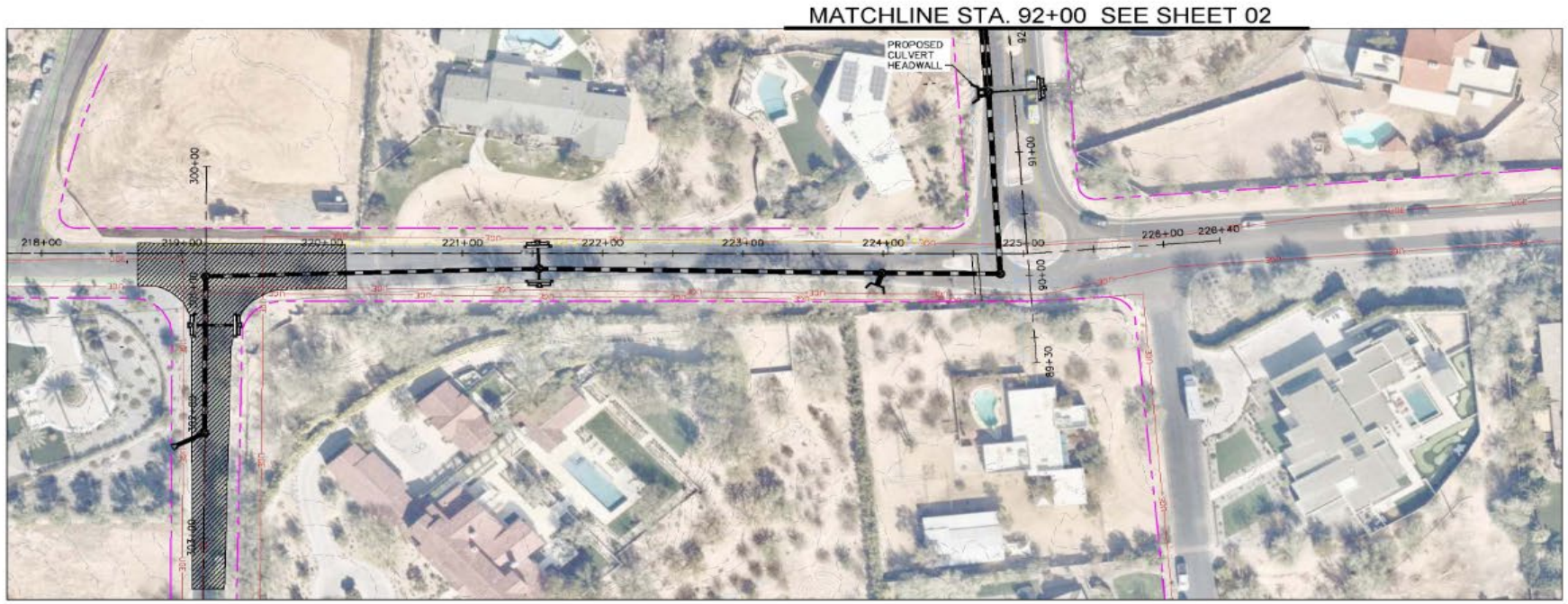
Area Identification	Selected Alternative	Ranking Score
N	Alternative 1	49
A	Alternative 1	45
O	Alternative 2	45
K	Alternative 2	43
L	Alternative 1 & 2	41
H	Alternative 2	40
P	Alternative 1	39
C	Alternative 2	39
E	Alternative 3	38

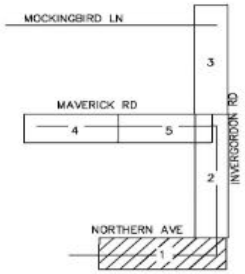
Area A Example

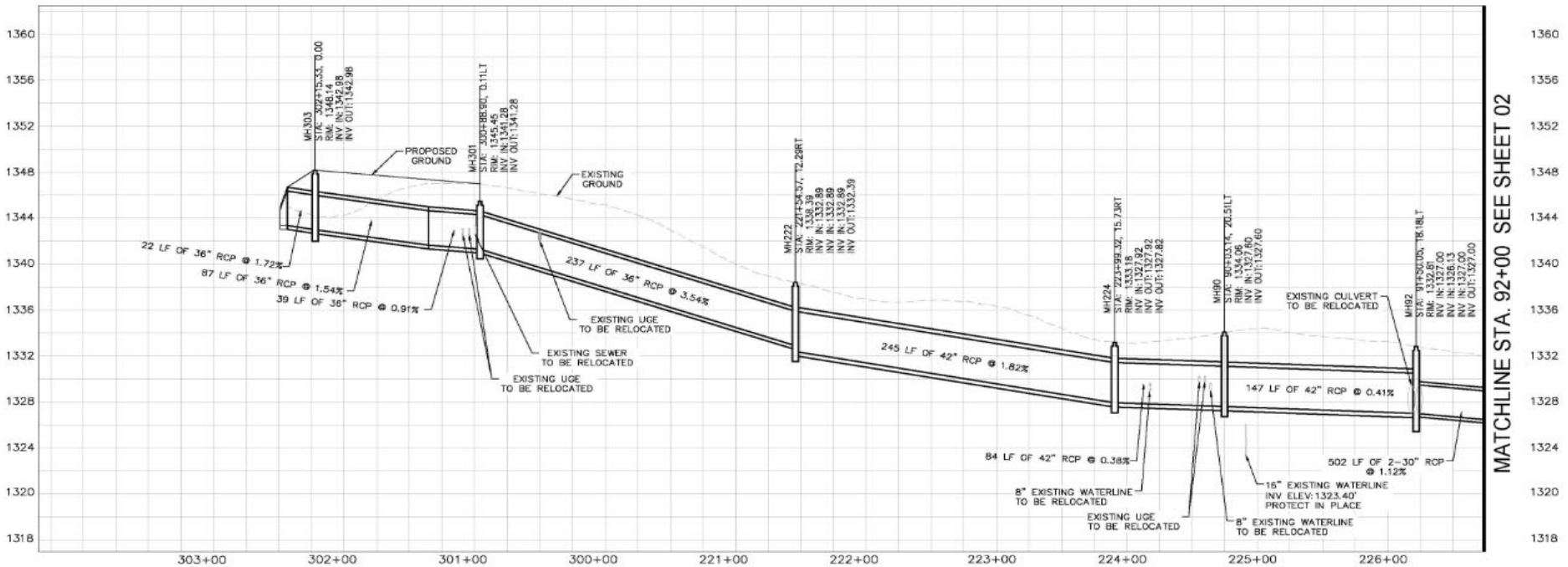
Table 30: Area A Benefit Cost Ratio Summary

Number of Properties Impacted		220
Approximate Population1		550
Benefit with Drainage Improvements in Place ($)	Damage Reduction	21,394,816
	Social Benefits	1,978,900
	Total	23,293,796
Construction Cost		11,616,355
Benefit-Cost Ratio (BCR)		2.01

1Assumed 2.5 people per household from U.S. Census for the Town of Paradise Valley.
2Social benefits are based on the number of residents impacted and are calculated using FEMA's Benefit Cost Analysis toolkit. This would account for traffic closures, interruptions to work, etc.
3Assumed at least seven 10-year storms and one 100- year storm occur during the 75-year life span of the improvements.







MATCHLINE STA. 92+00 SEE SHEET 02

NO.	REVISION	DATE

Kimley»Horn

1961 E. CAMELBACK RD # 400
PHOENIX, ARIZONA 85016 (602) 944-5500

SCALE (H): 1"=50'
SCALE (V): 1"=5'
DESIGNED BY: PTB
DRAWN BY: PTB
CHECKED BY: GSB
DATE: 05/2025

PARADISE VALLEY SWMP
AREA A SELECTED ALTERNATIVE 15% PLANS

NORTH

PROJECT NO.
091054031

DRAWING NAME
AREA A

1 OF 6


Caballo Dr
Caballo Dr
Morning Glory Rd
Sapphire Ln
61st Pl
62nd St
Sendero Tres M
Canta Bello
Canta Bello
Calle Bruvira
Pisado Bueno
Canta Redondo
64th Pl
67th St
68th St
Caballo Dr
INDIAN BEND WASH
El Maro Cir
El Maro Cir
Mockingbird Ln
TIE INTO EXISTING STORM DRAIN
882 LF OF 12' X 3' CBC STORM DRAIN
Royal Palm Rd
Royal Palm Rd
Royal Palm Rd
62nd Pl
Invergordon Rd
1,075 LF OF 54" STORM DRAIN
Maverick Rd
Maverick Rd
Maverick Rd
65th St
Coconino Rd
62nd Pl
Bret Hills
1,367 LF OF 2-30" STORM DRAIN
64th Pl
68th St
MAVERICK WASH
Q10 = 53 CFS
Q100 = 106 CFS
PROPOSED HEADWALL
EXISTING CULVERT TO
BE REMOVED
66th St
Ironwood Dr
410 LF OF 36" STORM DRAIN
Northern Ave
Mockingbird Ln
IRONWOOD WASH
Q10 = 60 CFS
Q100 = 144 CFS
Foothill Dr
Ironwood Dr
Invergordon Pl
65th St
El Arroyo Rd
Calle Caballeros
476 LF OF 42" SOTRM DRAIN
N
0 150 300 US Feet
PARADISE VALLEY, AZ
STORMWATER MASTER PLAN
PROPOSED PROJECT 10-YEAR STORM
REDUCTION IN WATER SURFACE ELEVATION
Legend
Parcels
Existing Storm Drain
Existing Culvert
Project Components
Storm Drain
Reduction of Water Surface Elevation (ft) (10-Year)
3 - 4 ft Reduced
2 -3 ft Reduced
1 - 2 ft Reduced
0 -1 ft Reduced
Kimley»Horn

Grant Funding Opportunities

- FCDMC Grants
  - Small Project Assistance Program (<$1.3M)
  - Capital Improvement Program (>$1.3M)
- Other Federal Grant Programs Identified
  - FEMA (x4)
  - US Department of Housing and Urban Development
  - EPA (x2)
  - US Army Corps of Engineers
  - US Economic Development Administration

Prioritization

Table 33: Project Prioritization

Flood Hazard Area Designation	Project Size (Medium or Large)	Primary Benefit	Cost	BCR	Project Considerations
K	Large	Residential Structures	~ $6.1 M	3.08	The recommended project alternative for Area K has the highest BCR for the projects that primarily benefit residential structures. It is also potentially more cost effective than the Area A project. Because of this, it is ranked as the highest priority large project benefiting private property.
A	Large	Residential Structures	~ $11.6M	2.01	recommended project alternative ties into the ongoing Mockingbird Lane drainage improvements, creating an overall flood mitigation project for the area.
H	Medium	Arterial Roadways	~ $1M	n/a	Area H recommended project alternative may fall within the SPAP cost criteria, making it eligible for a 75% cost share with FCDMC. Because of this, Area H was ranked as the highest priority roadway-oriented project.
O	Large	Arterial and Residential Roadways	~ $2M	n/a	Area O recommended project alternative benefits both an arterial roadway (Lincoln Drive) and residential streets. Because of this, it was ranked higher than Areas L and N.
N	Large	Residential Roadways	~ $2M	n/a	Area N was ranked higher than Area L because of the lower cost for construction.
L	Large	Residential Roadways	~ $6.1M	n/a	Area L benefits residential streets only.

Key Takeaways

- Comprehensive Town-wide flood hazard modeling
  - Regulate development
  - Design stormwater improvements
- Assessed building inundation, erosion, sedimentation, and vehicular hazards for 2-, 10-, & 100-year storms
- Identified 19 flood prone areas
- Developed project alternatives for 9 of these
- Further developed 15% plans, cost, benefit/cost for 6 of the 9
- Identified local and federal grant funding opportunities
- Cited prioritization considerations

QUESTIONS?