

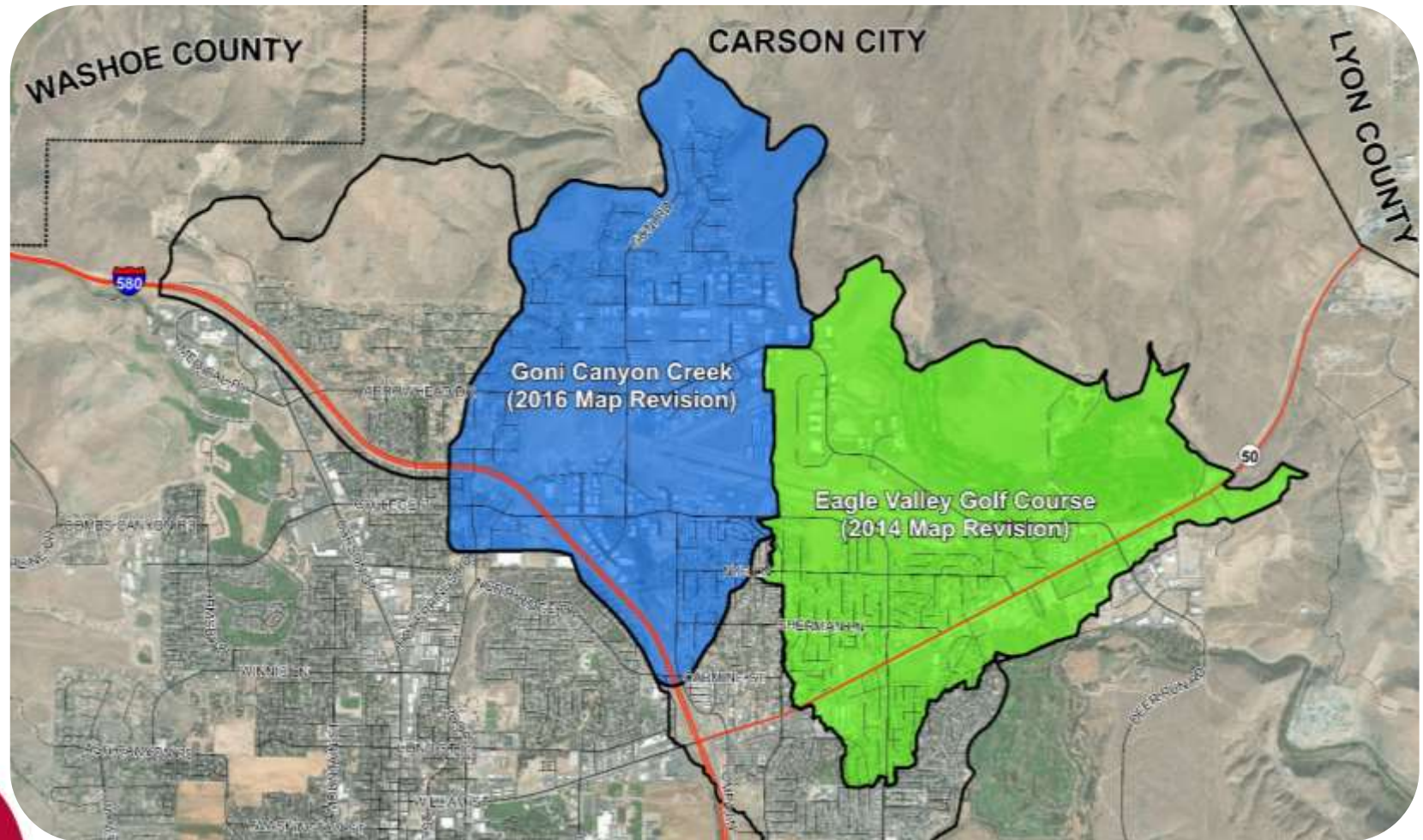
FEMA

North Carson Area DRAINAGE PLAN

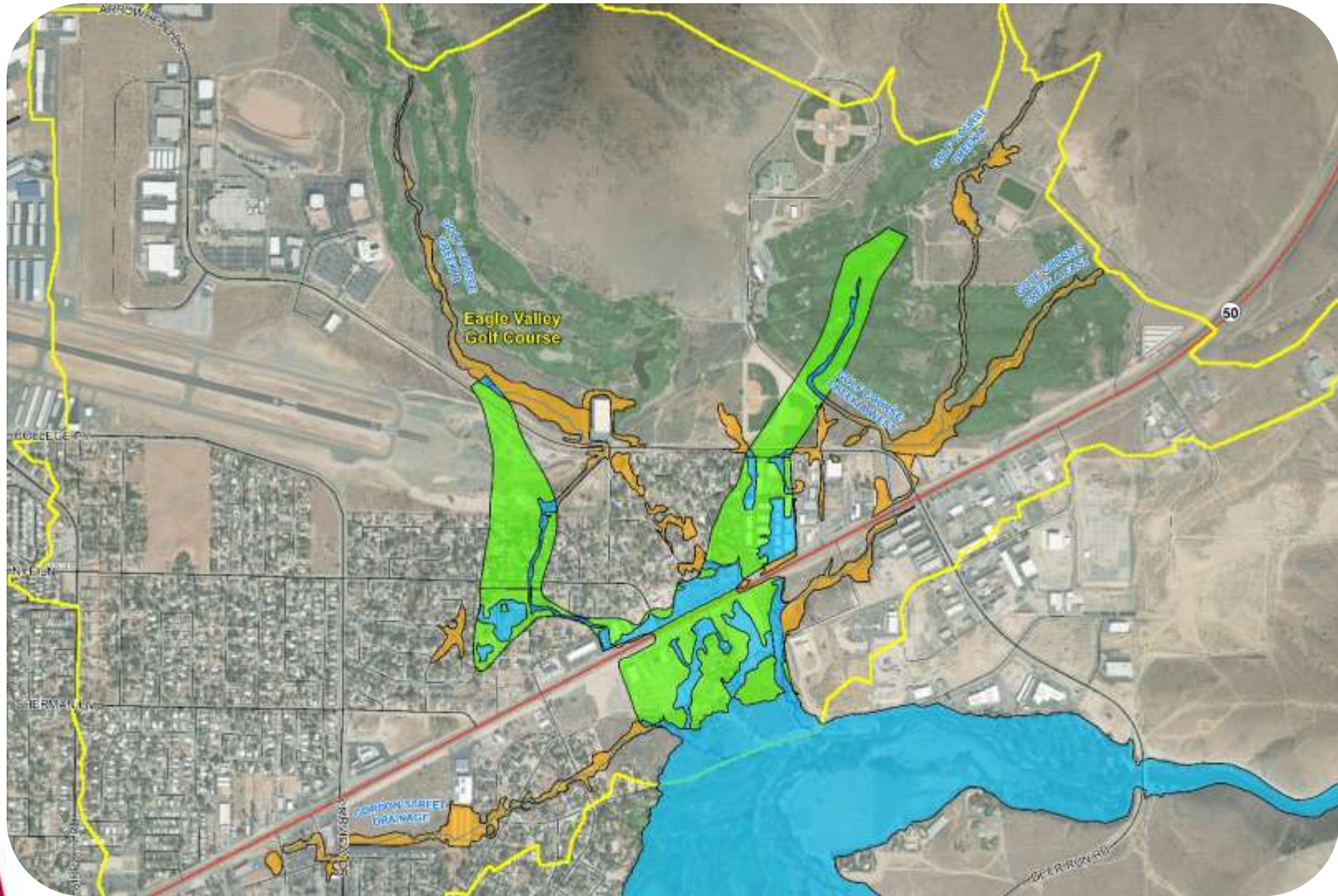
March, 2020

Kimley»Horn

Project History



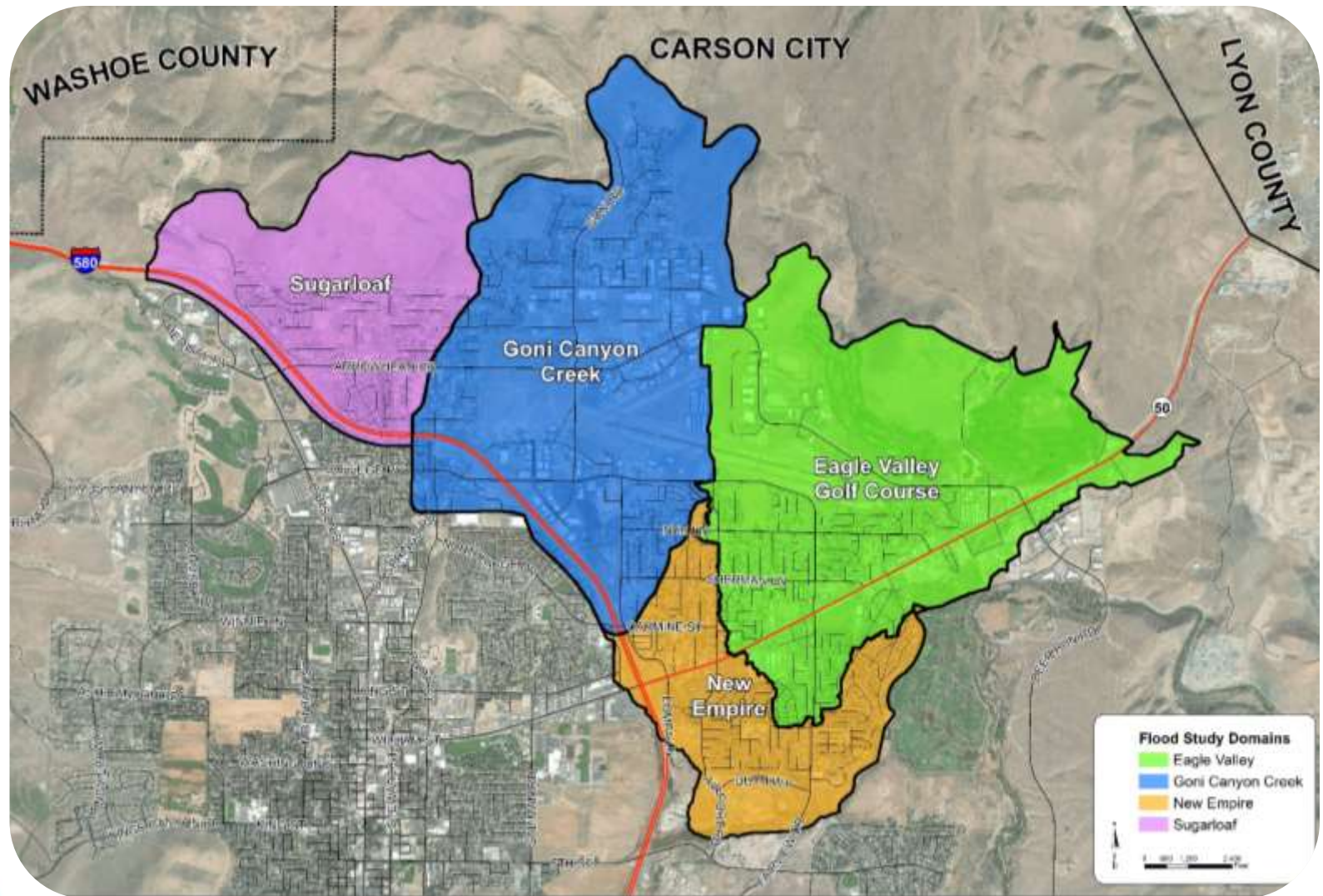
Eagle Valley Golf Course Map Changes



Goni Canyon Creek Map Changes



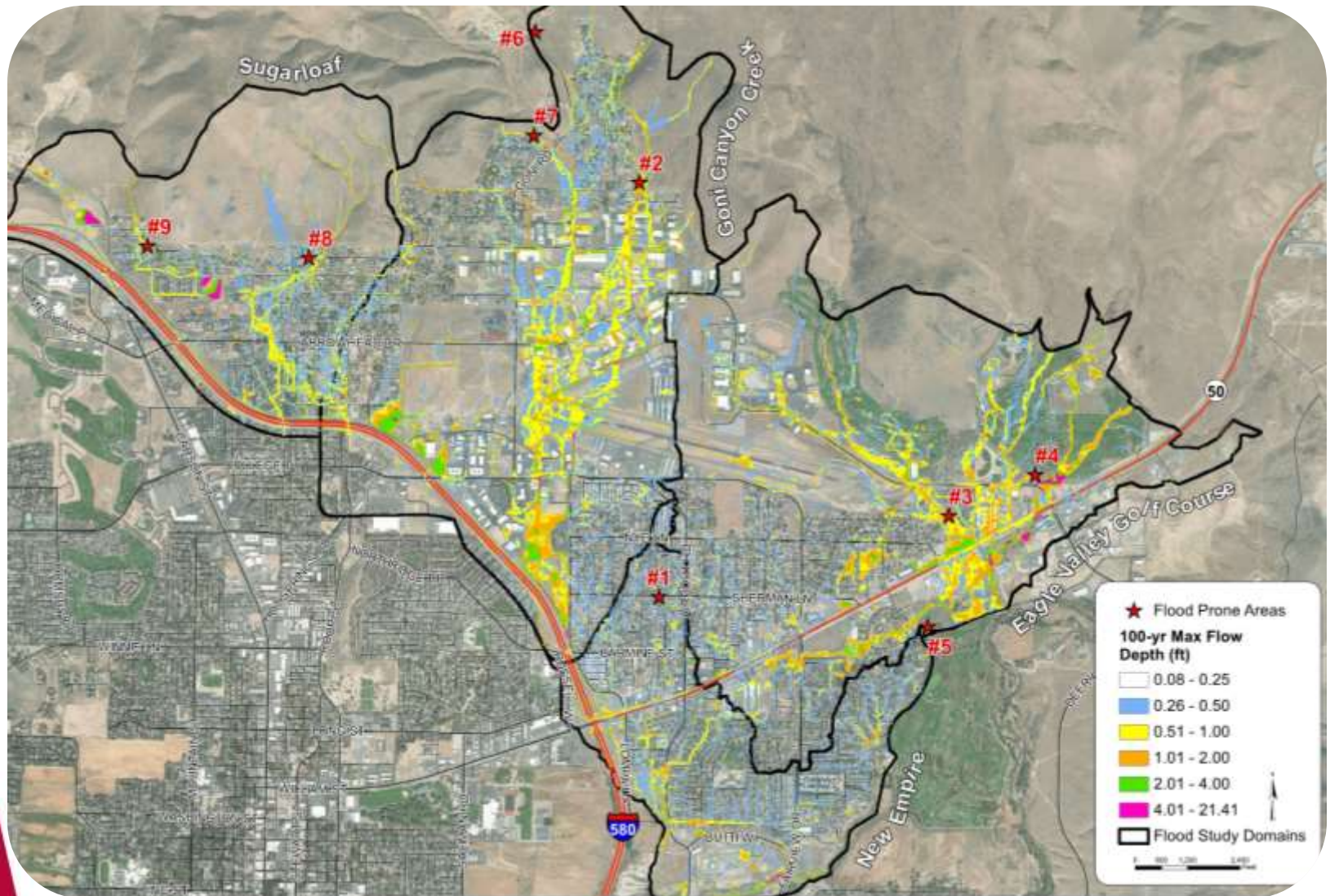
North Carson Area Drainage Plan – 2019/2020



Goals for the Project

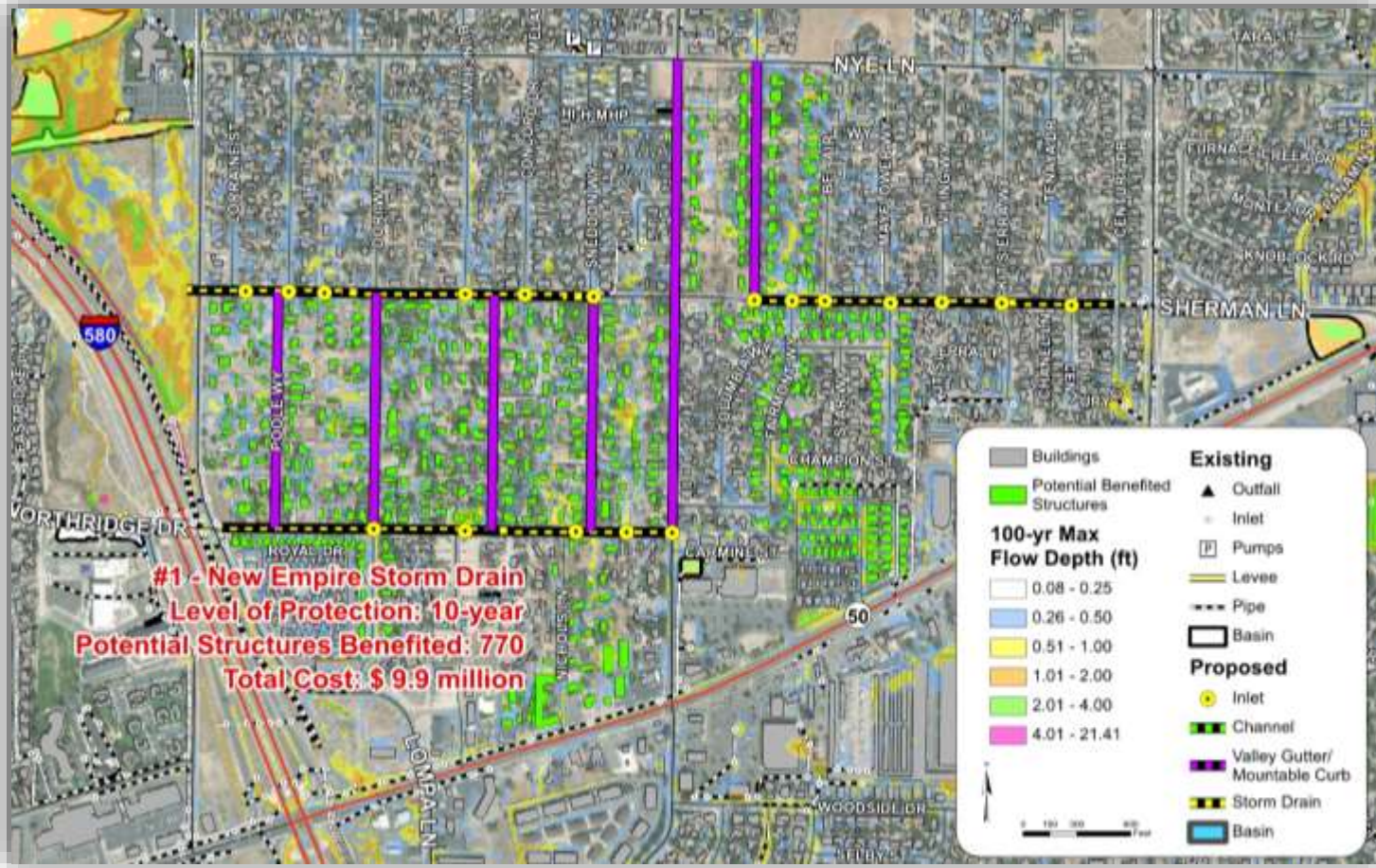
- Adhere to Carson City Hazard Mitigation Plan
- Accurately Define Flood Hazards
- Identify Areas of Mitigation Interest
- Develop Conceptual Design Solutions
 - Cost
 - Benefit
 - FEMA (or other) Grant Funding

Areas of Mitigation Interest



#1 New Empire Storm Drain

- 10-year Protection
- 770 Potential Structures Benefitted
- \$9.9 Million



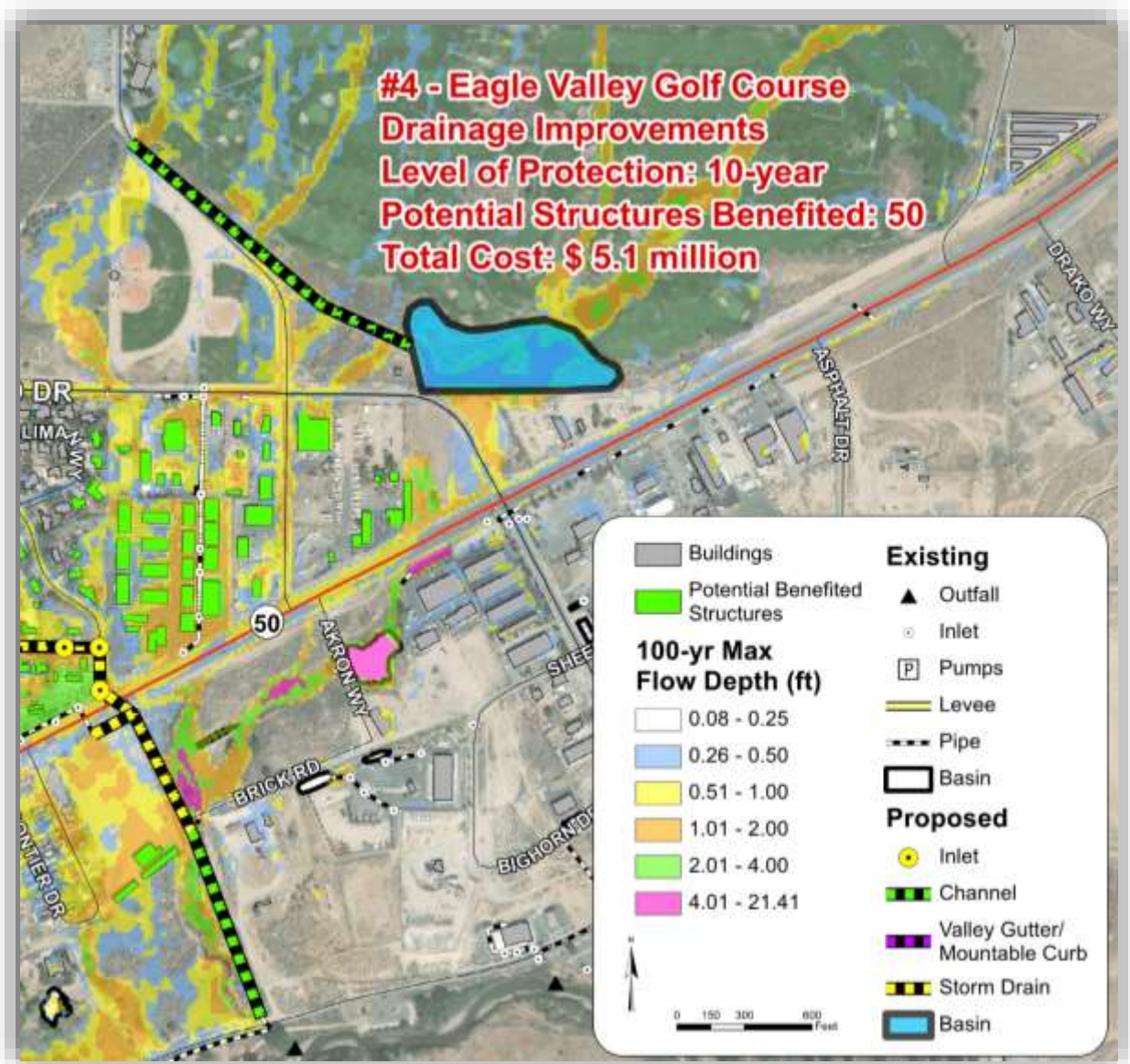
#3 Bowers Lane Storm Drain

- 10-year Protection
- 80 Potential Structures Benefitted
- \$4.9 Million



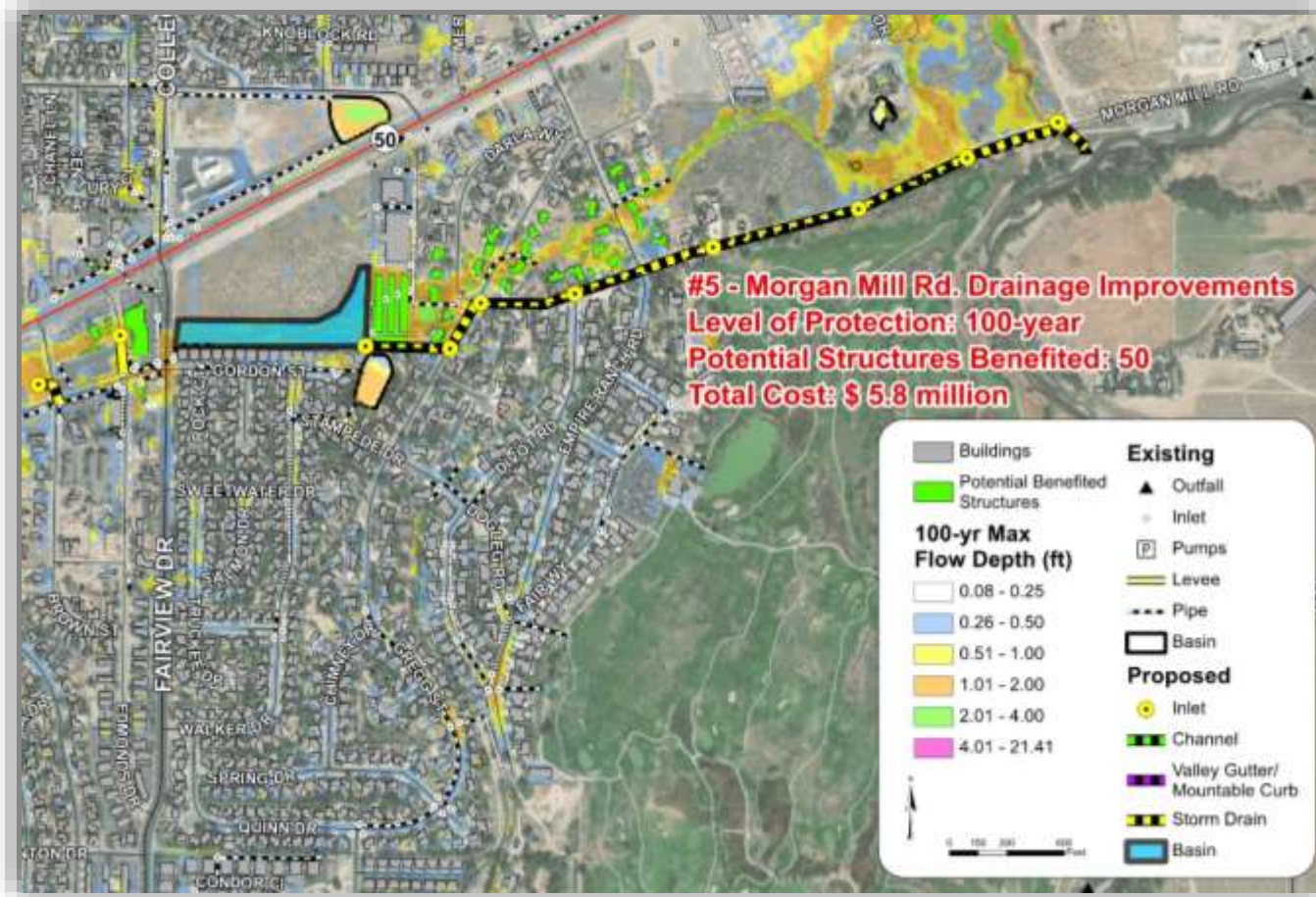
#4 Eagle Valley Golf Course Drainage Improvements

- 10-year Protection
- 50 Potential Structures Benefitted
- \$5.1 Million



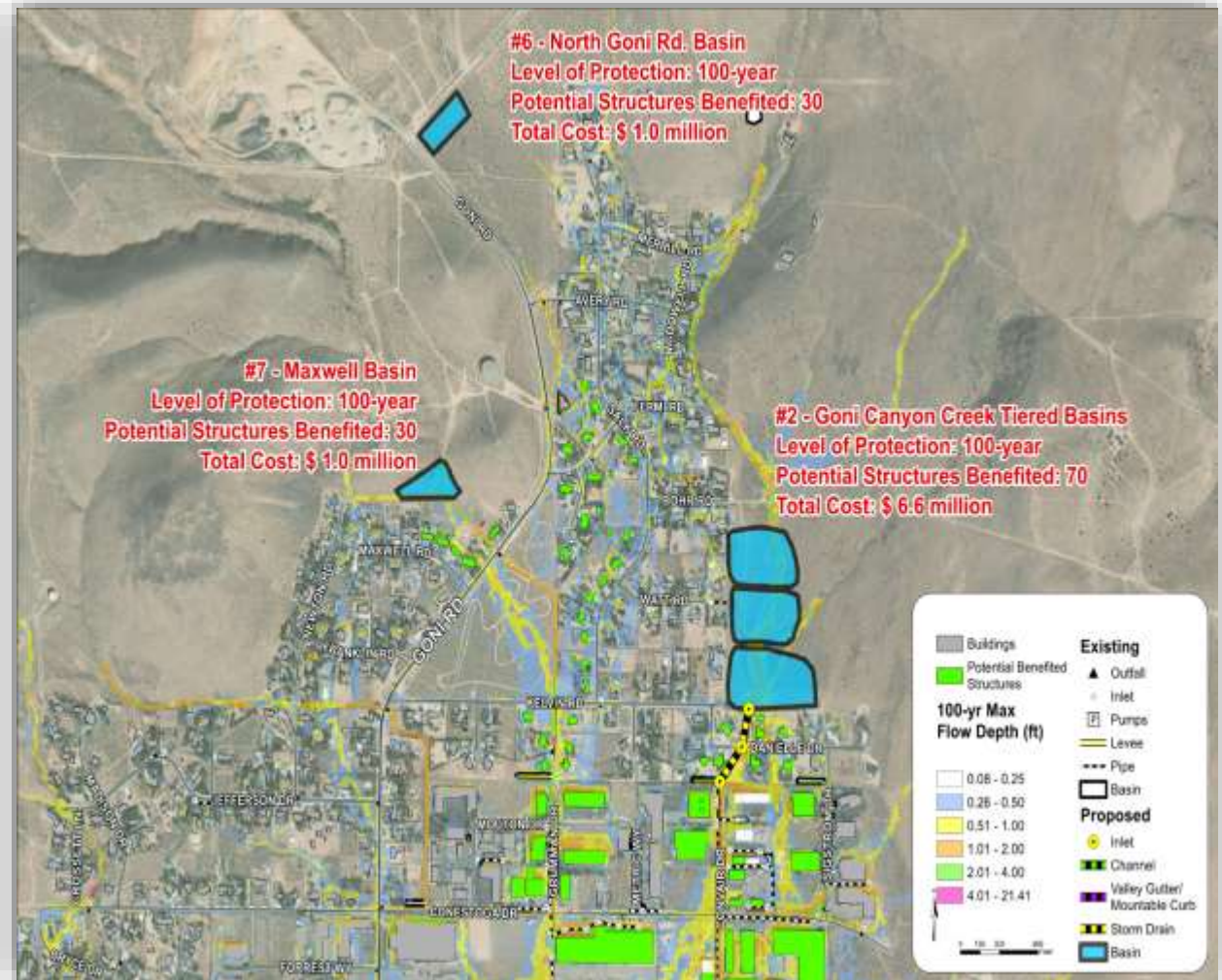
#5 Morgan Mill Road Drainage Improvements

- 100-year Protection
- 50 Potential Structures Benefitted
- \$5.8 Million



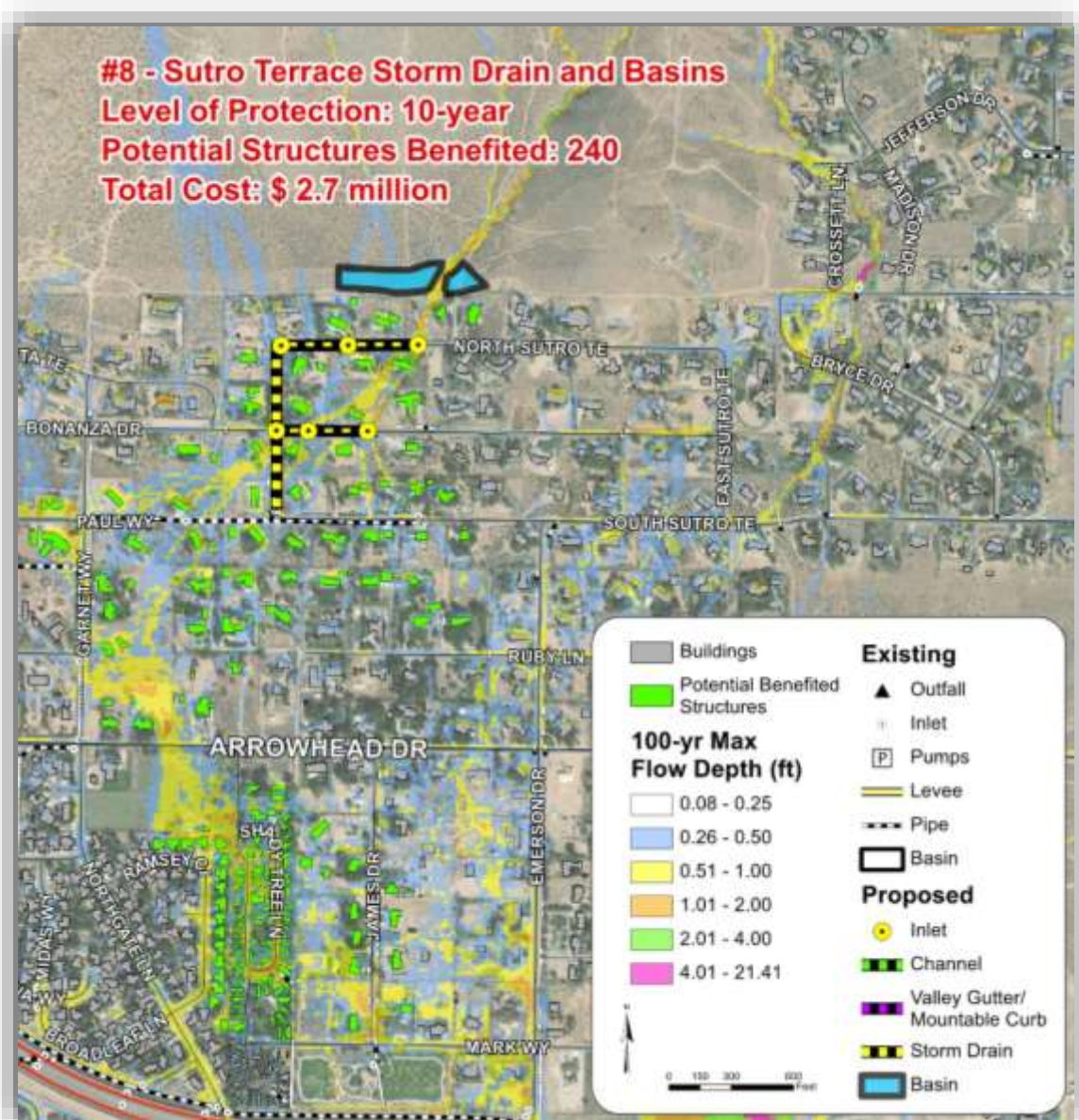
#2 Goni Canyon Creek Tiered Basins, #6 North Goni Road Basin, #7 Maxwell Basin

- 100-year Protection
- 130 Potential Structures Benefitted Total
- \$8.6 Million Total



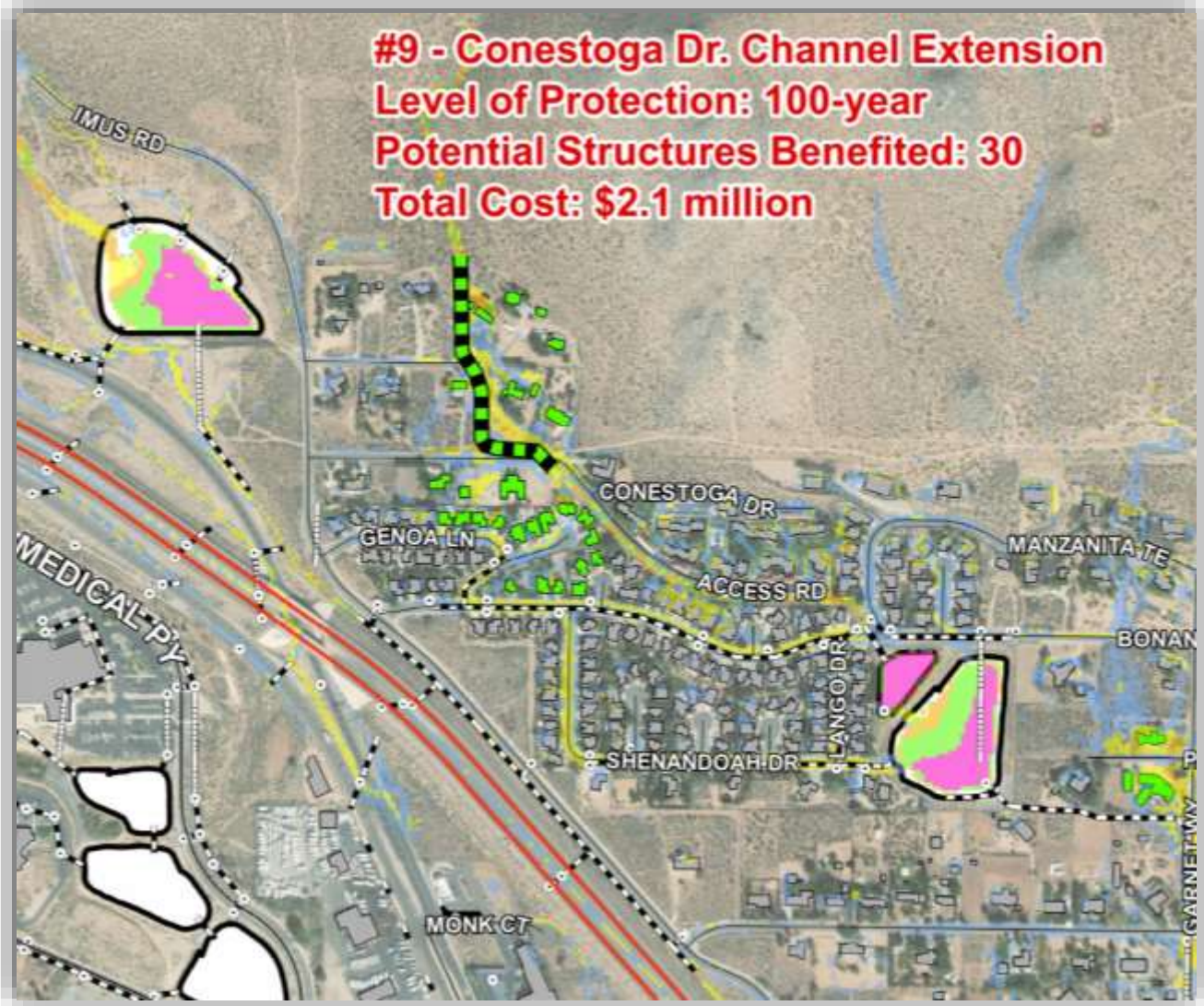
#8 Sutro Terrace Storm Drain and Basins

- 10-year Protection
- 240 Potential Structures Benefitted
- \$2.7 Million



#9 Conestoga Drive Channel Extension

- 100-year Protection
- 30 Potential Structures Benefitted
- \$2.1 Million



Preferred Alternatives

Ranking	AOI ID	Name	Level of Protection	Project's Initial Cost (\$)	No. of Potential Structures Benefited	No. Structures > 0.5 ft in the 100-year storm	No. Structures > 1 ft in the 100-year storm	No. of Structures in ex FEMA Floodplain	10-yr Potential Damage (\$)	25-yr Potential Damage (\$)	50-yr Potential Damage (\$)	100-yr Potential Damage (\$)	500-yr Potential Damage (\$)	Annualized Loss (\$)	Present Day Benefit Value (75 year service life)	Maximum Probable BCR*	Public Input No. of Dots	Removes SFHA?	Impacts Regional Traffic Flow?	Impacts Businesses?	Impacts Critical Facilities?
1	7	Maxwell Basin	100-year	\$ 1,000,000	19	4	2	7	\$ 1,700,000	\$2,400,000	\$3,200,000	\$ 5,000,000	\$ 13,500,000	\$ 321,000	\$ 4,557,031	4.56	3	y	y	y	n
2	6	North Goni Road Basin	100-year	\$ 1,000,000	22	4	2	0	\$ 600,000	\$ 700,000	\$ 900,000	\$ 1,300,000	\$ 2,100,000	\$ 83,800	\$ 1,189,655	1.19	8	y	y	y	n
3	2	Goni Canyon Creek Tiered Basins	100-year	\$ 6,600,000	59	11	3	20	\$ 3,600,000	\$4,500,000	\$6,100,000	\$ 8,100,000	\$ 16,200,000	\$ 549,600	\$ 7,802,319	1.18	4	y	y	y	n
4	8	Sutro Terrace Storm Drain and Basins	10-year	\$ 2,700,000	166	16	6	0	\$ 2,300,000	\$3,000,000	\$3,600,000	\$ 4,200,000	\$ 5,700,000	\$ 315,000	\$ 4,471,853	1.66	9	n	n	n	n
5	1	New Empire Storm Drain	10-year	\$ 9,900,000	547	1	0	0	\$ 1,900,000	\$2,100,000	\$2,300,000	\$ 2,400,000	\$ 2,900,000	\$ 214,500	\$ 3,045,119	0.31	7	n	y	n	n
6	3	Bowers Lane Storm Drain	10-year	\$ 4,900,000	62	15	8	29	\$ 1,500,000	\$1,800,000	\$2,200,000	\$ 2,900,000	\$ 4,100,000	\$ 200,700	\$ 2,849,209	0.58	0	y	y	y	n
7	4	Eagle Valley Golf Course Drainage Improvements	10-year	\$ 5,100,000	45	15	8	19	\$ 1,900,000	\$2,700,000	\$3,400,000	\$ 4,000,000	\$ 5,600,000	\$ 285,600	\$ 4,054,480	0.79	3	y	y	y	n
8	5	Morgan Mill Road Drainage Improvements	100-year	\$ 5,800,000	37	7	1	16	\$ 700,000	\$1,200,000	\$1,600,000	\$ 2,100,000	\$ 3,200,000	\$ 131,100	\$ 1,861,143	0.32	4	y	y	y	n
9	9	Conestoga Drive Channel Extension	100-year	\$ 2,100,000	30	2	0	0	\$ 200,000	\$ 300,000	\$ 400,000	\$ 600,000	\$ 1,800,000	\$ 40,200	\$ 570,694	0.27	3	n	n	n	n

	Max Probable BCR > 1
	0.5 < Max Probable BCR < 1
	Max Probable BCR < 0.5

*Max Probable BCR is where the expected damages after the mitigation solution is zero. Typically, the mitigation solution does not remove all the expected damage. The BCR formula is: (Expected damage before the mitigation - the expected damage after the mitigation)/Cost.

North Carson Area Drainage Plan
Location #7 - Maxwell Basin

Protection: 100-year
 Signed by: ATC
 Checked by: GSB

Date: 2/5/2020
 Date: 2/5/2020

Item Description	Unit	Unit Price	Qty	Cost
Earthwork (Export)	CY	\$ 10	56,600	\$ 566,000
p	SY	\$ 75	800	\$ 60,000
n Drain (30" RCP)	LF	\$ 190	375	\$ 71,250
n Drain (42" RCP)	LF	\$ 250	100	\$ 25,000
y Conflict	EA	\$ 30,000	2	\$ 60,000
tenance Roadway	SY	\$ 15	330	\$ 4,950
en Channel	CY	\$ 14	3,820	\$ 53,088

Item Description	Unit	Unit Price	Qty	Cost
Basin Earthwork (Export)	CY	\$ 10	56,600	\$ 566,000
Riprap	SY	\$ 75	800	\$ 60,000
Storm Drain (30" RCP)	LF	\$ 190	375	\$ 71,250
Storm Drain (42" RCP)	LF	\$ 250	100	\$ 25,000
Utility Conflict	EA	\$ 30,000	2	\$ 60,000
Maintenance Roadway	SY	\$ 15	330	\$ 4,950
Earthen Channel	CY	\$ 14	3,820	\$ 53,098
Basin Landscaping (Passive)	SF	\$ 2	139,300	\$ 278,600
Roadway Pavement	SF	\$ 5	360	\$ 1,800
Construction Subtotal				\$ 1,121,000
Removals (5%)				\$ 56,050
Miscellaneous Construction Costs (30%) ¹				\$ 337,000
Contingency (20%)				\$ 225,000
CONSTRUCTION TOTAL				\$ 1,739,050
Final Design				\$ 150,000
Permitting				\$ 35,000
PLANNING/DESIGN TOTAL				\$ 185,000
TOTAL PROJECT COST				\$ 1,925,000

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Legend

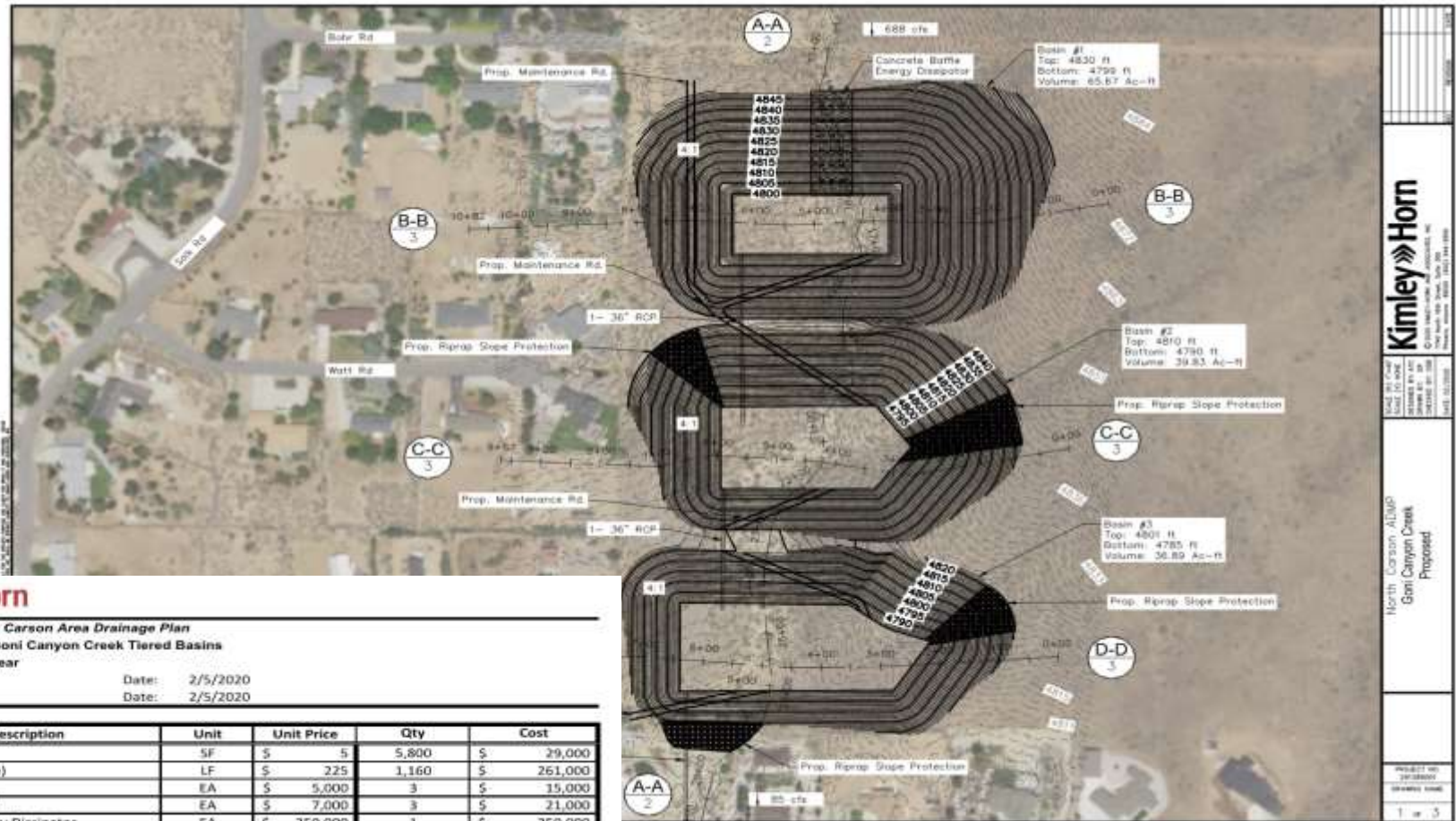
- Manholes
- Catch Basins

Project: North Carson Area Drainage Plan
Location: #8 - Sutro Terrace Storm Drain and Basins
Level of Protection: 10-year
Designed by: ATC **Date: 2/5/2020**
Checked by: GSB **Date: 2/5/2020**

Item Description	Unit	Unit Price	Qty	Cost
Storm Drain (24" Pipe)	LF	\$ 155	2,520	\$ 390,600
Catch Basins	EA	\$ 5,000	5	\$ 25,000
Storm Drain Manhole	EA	\$ 7,000	4	\$ 28,000
Basin Earthwork (Export)	CY	\$ 10	37,500	\$ 375,000
Riprap	SY	\$ 75	1,010	\$ 75,750
Basin Landscape (Passive)	SF	\$ 2	92,700	\$ 185,400
Land Acquisition	SF	\$ 4	115,875	\$ 463,500
Utility Conflicts	EA	\$ 30,000	10	\$ 300,000
Maintenance Roadway	SY	\$ 15	200	\$ 3,000
Roadway Pavement	SF	\$ 5	13,210	\$ 66,050
Construction Subtotal				\$ 1,913,000
Removals (5%)				\$ 95,650
Miscellaneous Construction Costs (30%) ³				\$ 574,000
Contingency (20%)				\$ 383,000
CONSTRUCTION TOTAL				\$ 2,965,650
Design Concept Report				\$ 75,000
Final Design				\$ 250,000
Permitting				\$ 35,000
PLANNING/DESIGN TOTAL				\$ 360,000
TOTAL PROJECT COST				\$ 3,326,000

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Goni Canyon Creek Tiered Basins



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Project: **North Carson Area Drainage Plan**

Location: **#2 - Goni Canyon Creek Tiered Basins**

Level of Protection: **100-year**

Designed by: **ATC** Date: **2/5/2020**

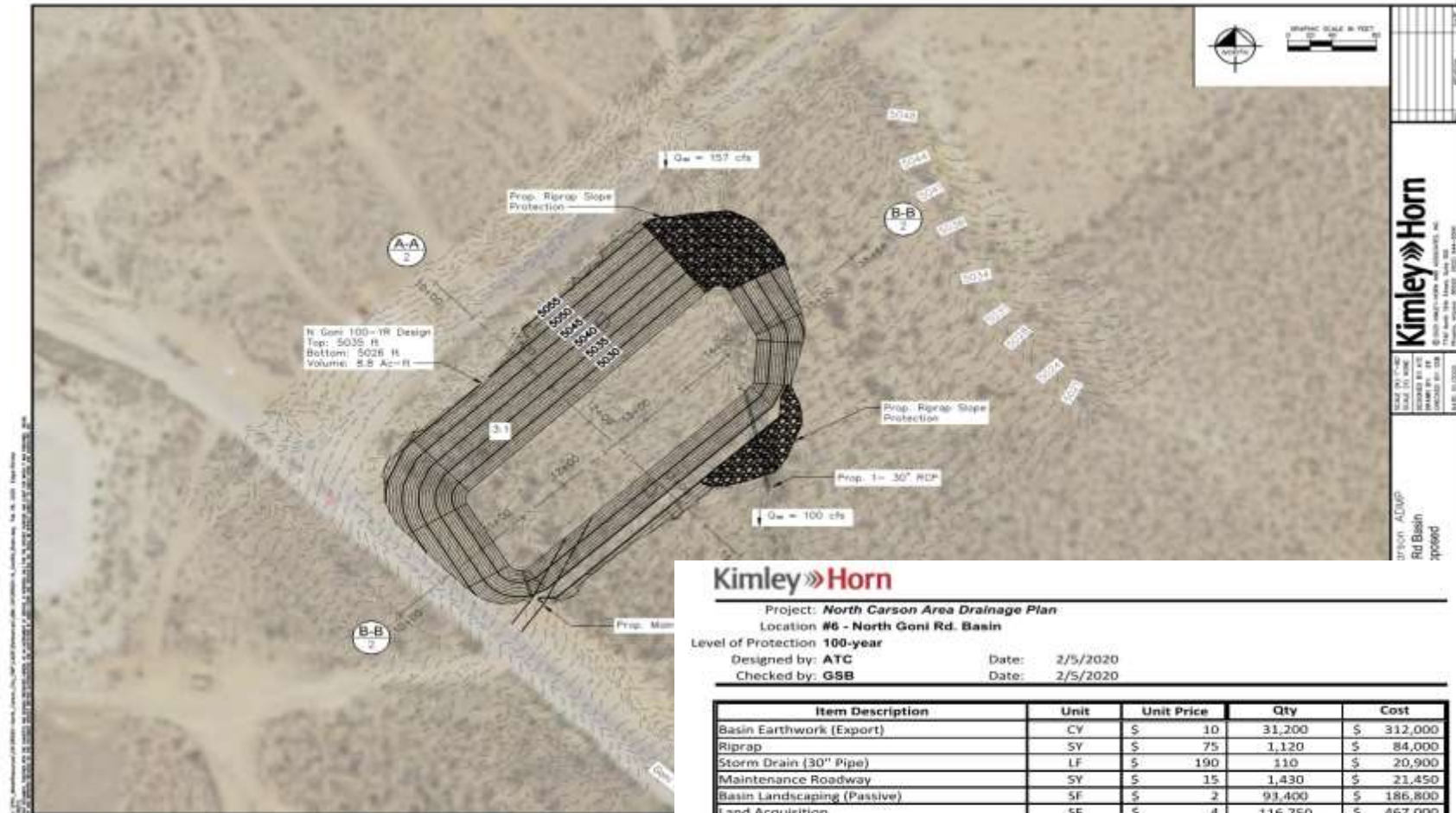
Checked by: **GSB** Date: **2/5/2020**

Item Description	Unit	Unit Price	Qty	Cost
Roadway Pavement	SF	\$ 5	5,800	\$ 29,000
Storm Drain (36" Pipe)	LF	\$ 225	1,160	\$ 261,000
Catch Basins	EA	\$ 5,000	3	\$ 15,000
Storm Drain Manhole	EA	\$ 7,000	3	\$ 21,000
Concrete Baffle Energy Dissipator	EA	\$ 250,000	1	\$ 250,000
Maintenance Roadway	SY	\$ 15	2,280	\$ 34,200
Utility Conflicts	EA	\$ 30,000	4	\$ 120,000
Basin Earthwork (Export)	CY	\$ 10	420,800	\$ 4,208,000
Riprap	SY	\$ 75	2,660	\$ 199,500
Basin Landscaping (Passive)	SF	\$ 2	716,200	\$ 1,432,400
Construction Subtotal				\$ 6,571,000
Removals (5%)				\$ 328,550
Miscellaneous Construction Costs (30%) ⁽¹⁾				\$ 1,972,000
Contingency (20%)				\$ 1,315,000
CONSTRUCTION TOTAL				\$ 10,186,550
Design Concept Report				\$ 120,000
Final Design				\$ 450,000
Permitting				\$ 150,000
PLANNING/DESIGN TOTAL				\$ 720,000
TOTAL PROJECT COST				\$ 10,907,000

(1) Includes Mobilization, Traffic Control, Construction Staking, Quality Control, SWPPP, and Construction Management

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North Goni Road Basin



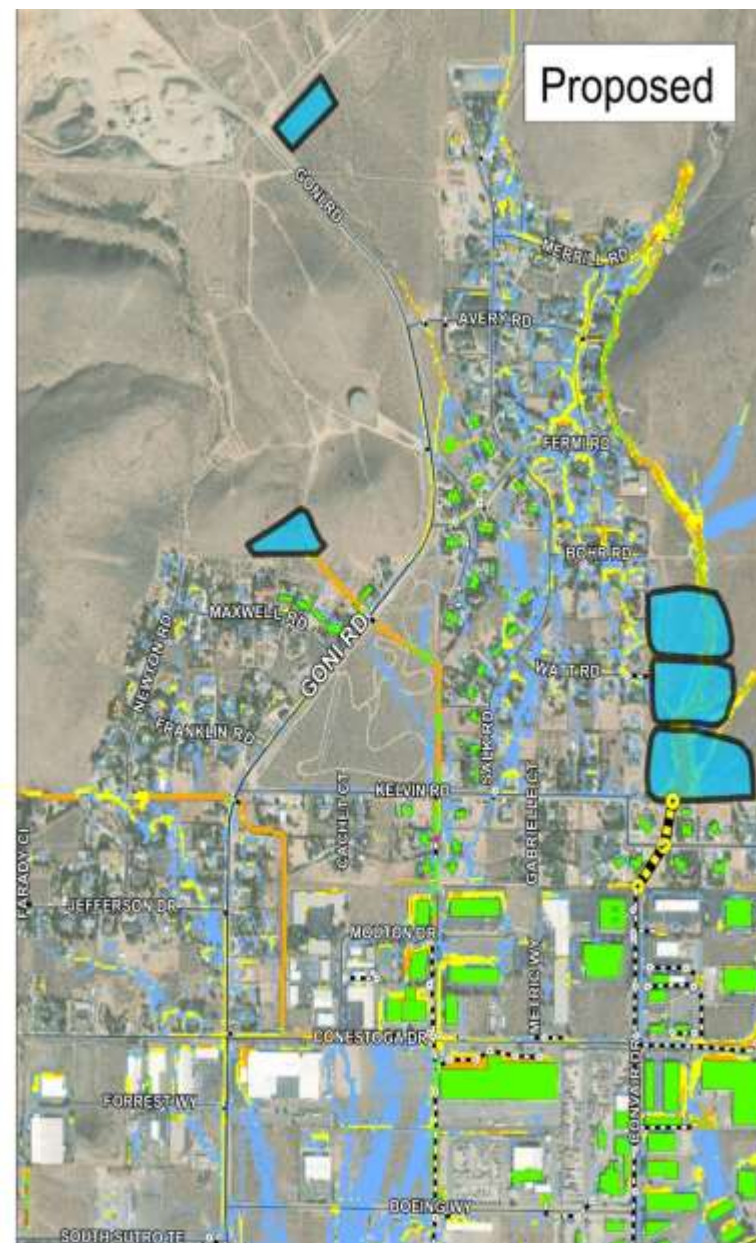
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Project: **North Carson Area Drainage Plan**
 Location: **#6 - North Goni Rd. Basin**
 Level of Protection: **100-year**
 Designed by: **ATC** Date: **2/5/2020**
 Checked by: **GSB** Date: **2/5/2020**

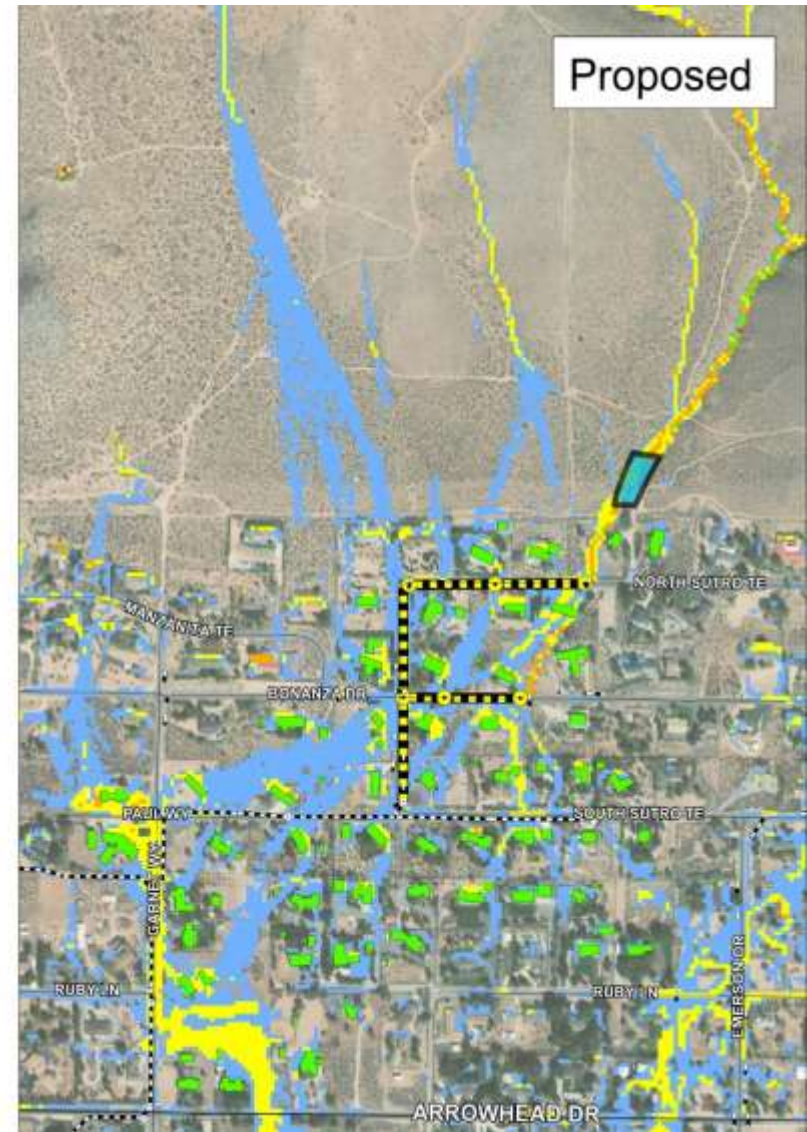
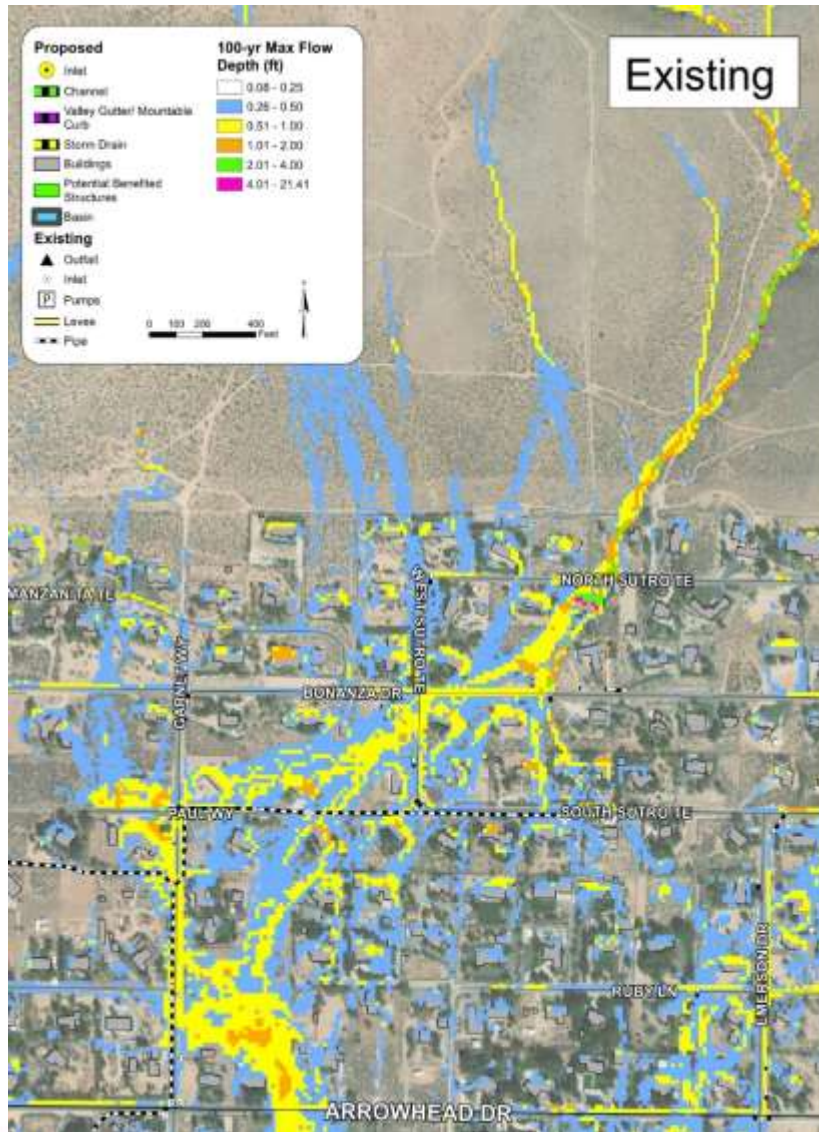
Item Description	Unit	Unit Price	Qty	Cost
Basin Earthwork (Export)	CY	\$ 10	31,200	\$ 312,000
Riprap	SY	\$ 75	1,120	\$ 84,000
Storm Drain (30" Pipe)	LF	\$ 190	110	\$ 20,900
Maintenance Roadway	SY	\$ 15	1,430	\$ 21,450
Basin Landscaping (Passive)	SF	\$ 2	93,400	\$ 186,800
Land Acquisition	SF	\$ 4	116,750	\$ 467,000
Construction Subtotal				\$ 1,093,000
Removals (5%)				\$ 54,650
Miscellaneous Construction Costs (30%) ⁽¹⁾				\$ 328,000
Contingency (20%)				\$ 219,000
CONSTRUCTION TOTAL				\$ 1,694,650
Final Design				\$ 150,000
Permitting				\$ 35,000
PLANNING/DESIGN TOTAL				\$ 185,000
TOTAL PROJECT COST				\$ 1,880,000

(1) Includes Mobilization, Traffic Control, Construction Staking, Quality Control, SWPPP, and Construction Management

Results



Results



Revised BCR

Ranking	AOI ID	Name	Level of Protection	Project's Initial Cost (\$)	No. of Potential Structures Benefited	Maximum Probable BCR*	Public Input No. of Dots	Removes SFHA?	Impacts Regional Traffic Flow?	Impacts Businesses ?	Impacts Critical Facilities?
1	7	Maxwell Basin	100-year	\$ 1,925,000	19	2.37	3	y	y	y	n
2	8	Sutro Terrace Storm Drain and Basins	10-year	\$ 3,326,000	166	1.34	9	n	n	n	n
3	2	Goni Canyon Creek Tiered Basins	100-year	\$ 10,907,000	59	0.72	4	y	y	y	n
4	6	North Goni Road Basin	100-year	\$ 1,880,000	22	0.63	8	y	y	y	n



Questions?