

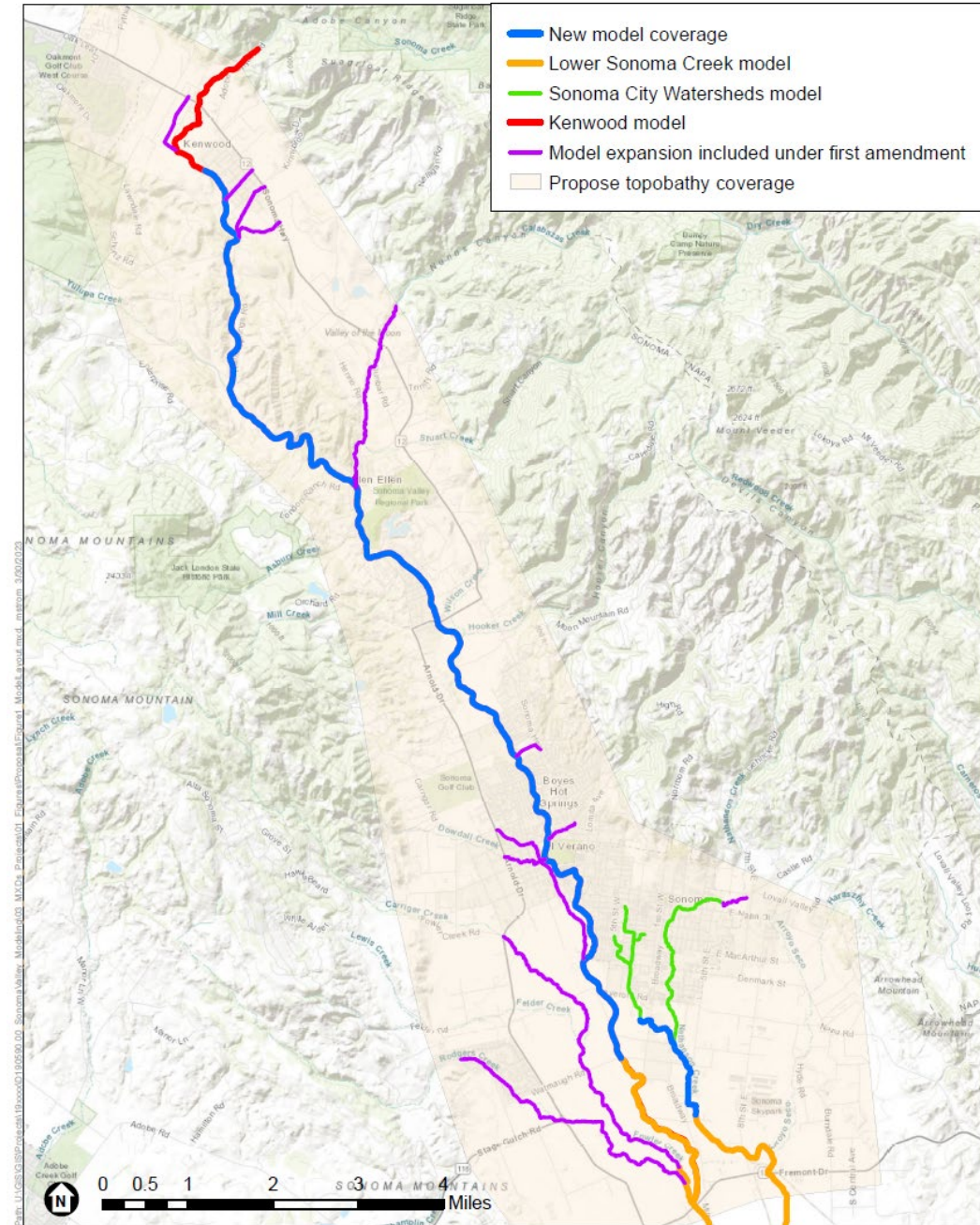
Flood Zone 3A Committee Meeting



December 10, 2024

Project background and overview

- In 2012 and 2013 ESA developed screening and prioritization criteria for Sonoma Valley flood and groundwater enhancement projects
- In 2021-2023 we constructed and calibrated a new valley-wide flood model
 - Sonoma Creek, Fryer Creek, Nathanson Creek
 - Topobathymetric LiDAR flown for valley
 - Ground survey at 28 structure crossings (culverts and bridges)
- In 2023-2024 we expanded and recalibrated the model
 - Sonoma Creek tributaries added:
 - Felton Creek
 - Kenwood Creek
 - Fisher Creek (N and S)
 - Calabazas Creek
 - Agua Caliente Creek
 - Dowdall Creek
 - Carriger Creek
 - Fowler Creek
 - Rodgers Creek
 - Ground survey at 50 additional bridges on tributaries
 - Model calibrated to NYE05 event and run for 2-500yr flood events
- Currently applying calibrated flood model to identify potential flood reduction projects



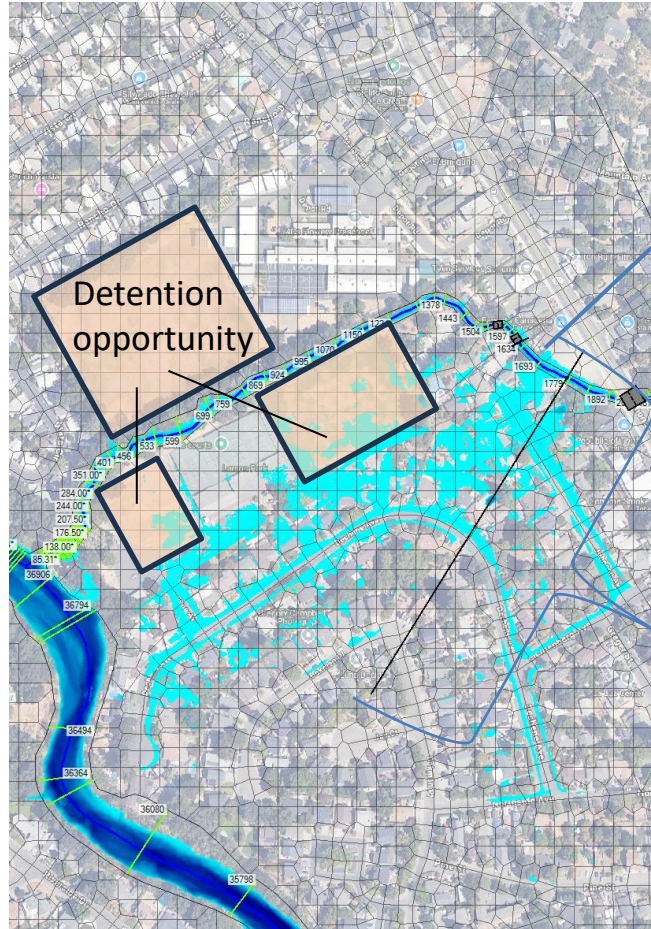
Preliminary Alternatives

- ESA formulated a set of three conceptual flood reduction alternatives
 - Detention
 - Bridge expansions
 - Channel capacity increase
 - High flow diversions
- **Alternative 1 – Conservative**
 - Public parcels for off-line detention
 - Key bridge/channel upgrades to route overbank flow to detention
 - Bridge upgrades where constriction causes significant flooding to insurable structures
- **Alternative 2 – Intermediate**
 - All components of Alternative 1
 - Private parcels for detention with substantial flood benefit potential
 - Kenwood diversion downstream of Highway 12
 - Key bridge/channel upgrades for Kenwood flood benefit
- **Alternative 3 – Optimistic**
 - All components of Alternatives 1 and 2
 - Private cultivated parcels around Nathanson Creek (including some identified by SEC)
 - Bridge/channel upgrades on Nathanson, Rodgers, and Carriger
 - High flow diversion on Fryer Creek to Sonoma

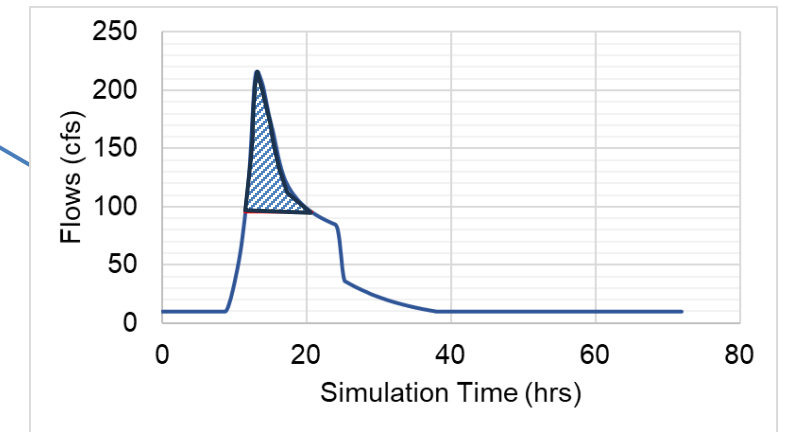
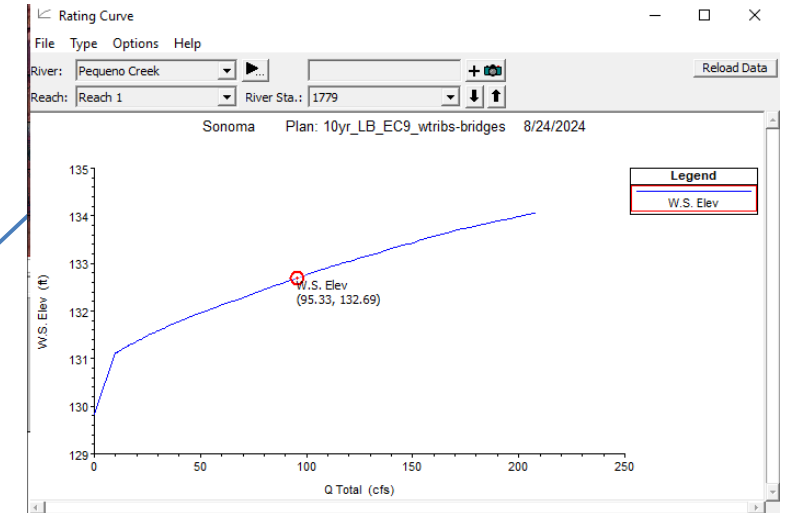
Detention

Detention Identification Process

1. Quantify Q10 breakout volumes on each tributary.
2. Identify parcels for detention.
3. Screen
 1. Parcel size/potential storage volume
 2. Proximity to channel and/or overtopping location
 3. Ownership status (public/private)
 4. Landuse (open space/cultivated)
4. Rank and sort parcels into the three alternatives.

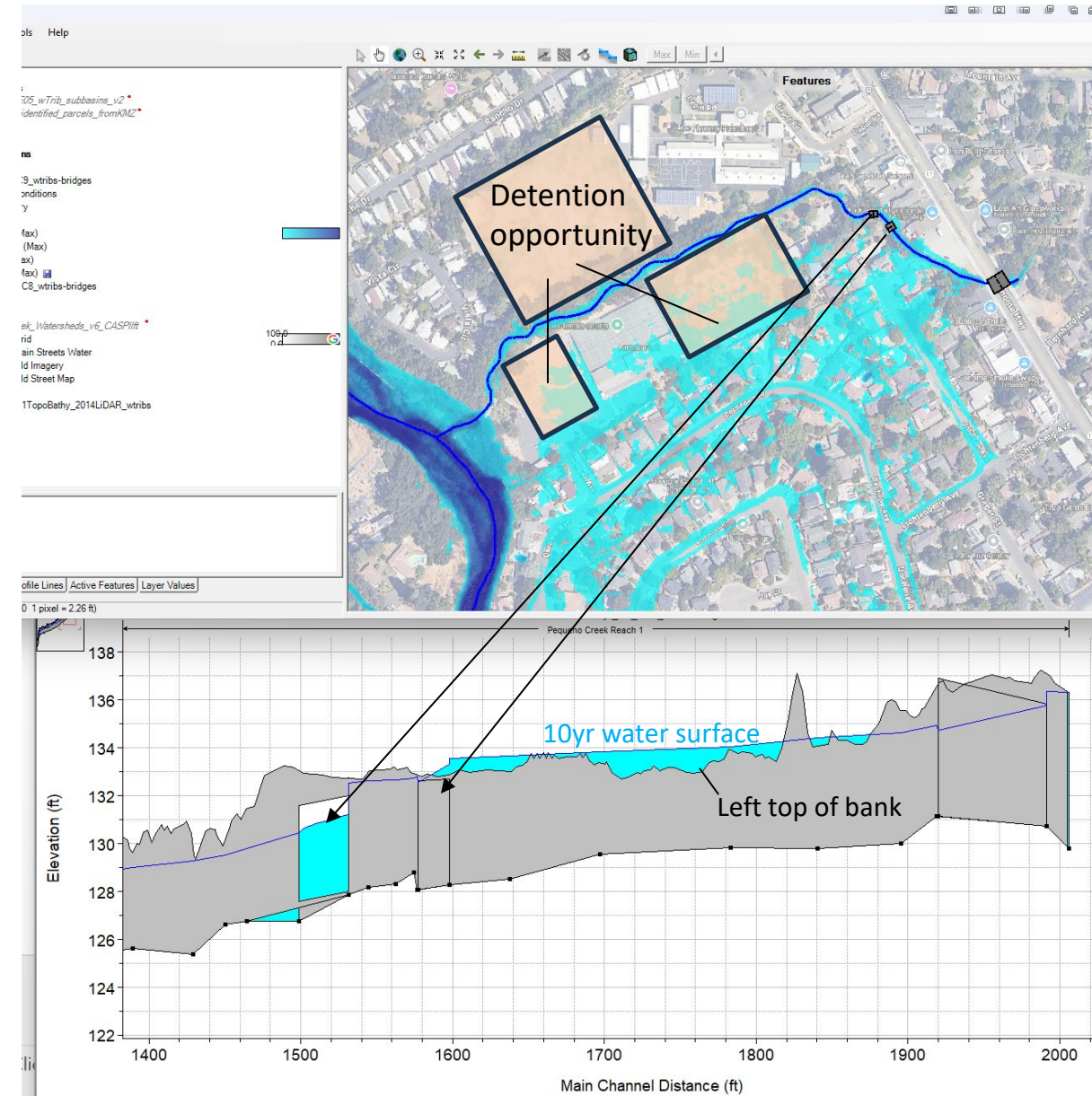


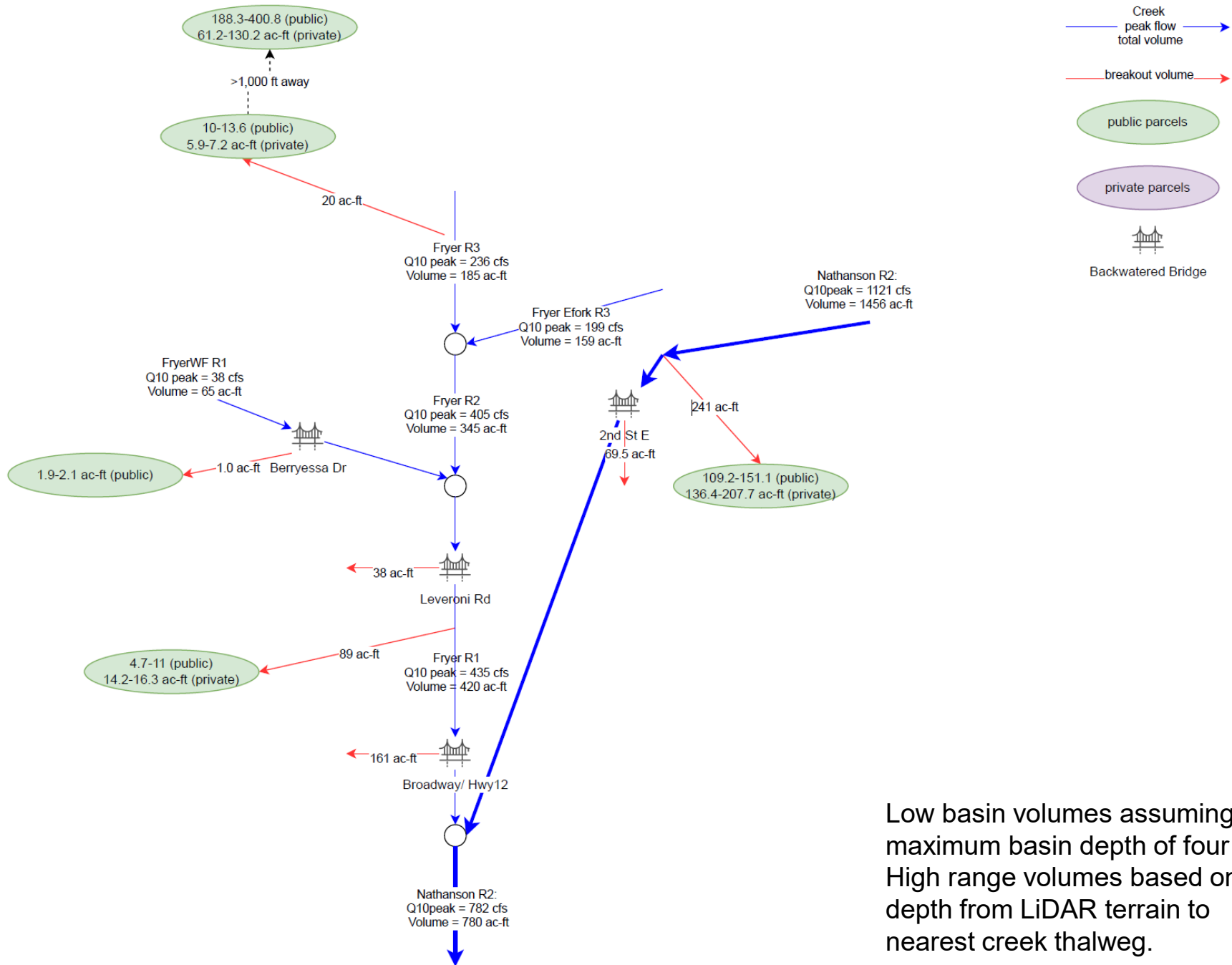
Q10, Pequeno Creek



Bridge and channel capacity enhancement

- ESA identified hydraulic structures that induce backwatering and overtopping during the 10-year event.
- Criteria considered:
 - Landuse of flooded area (developed or undeveloped)
 - Magnitude of overtopping
 - Proximity to nearby storage opportunities to offset increase in downstream flow



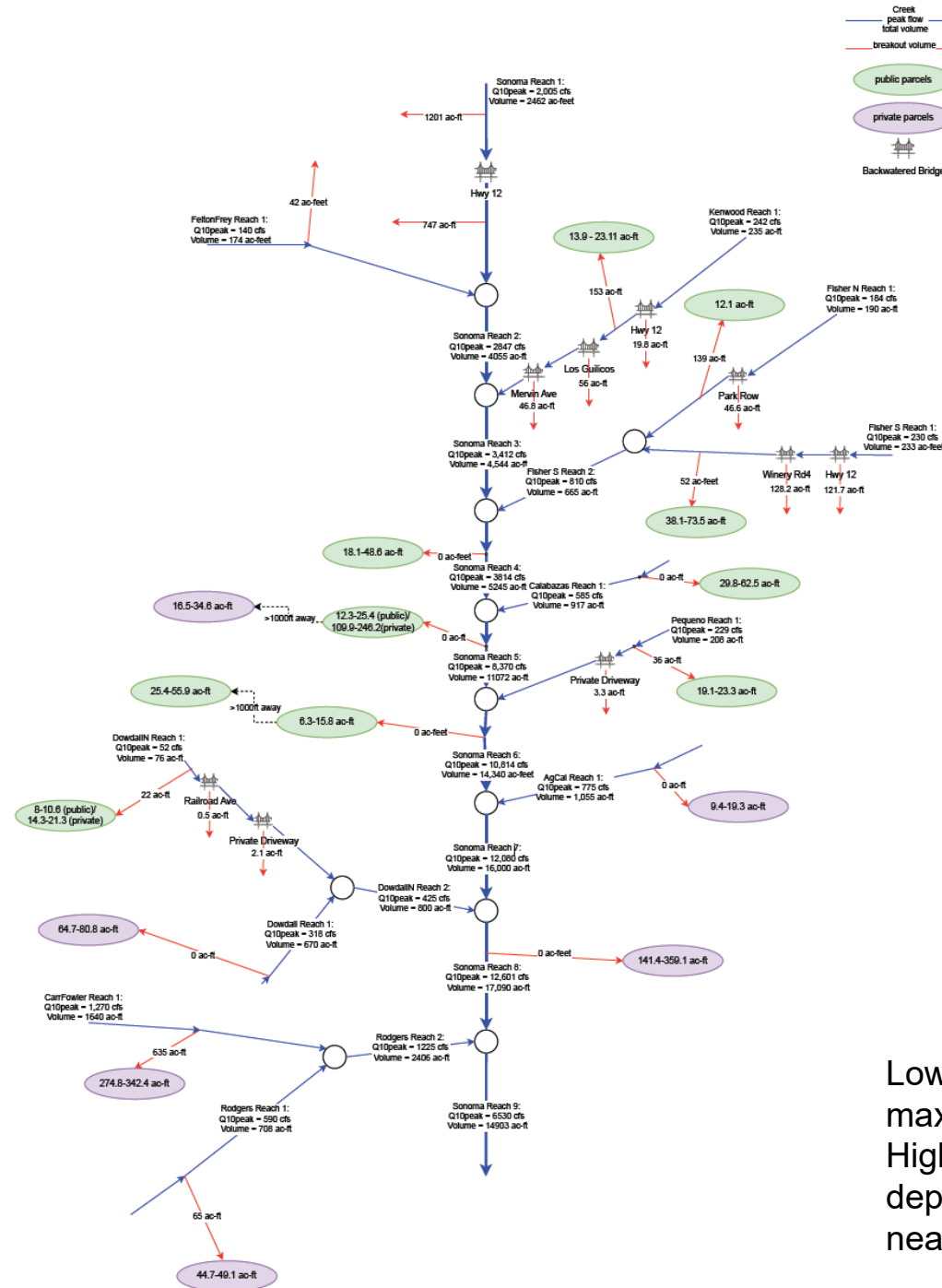


Low basin volumes assuming maximum basin depth of four feet. High range volumes based on depth from LiDAR terrain to nearest creek thalweg.





Sonoma Creek



Low basin volumes assuming maximum basin depth of four feet. High range volumes based on depth from LiDAR terrain to nearest creek thalweg.



Alternative 1 detention opportunities (29 total)

APN	UseCodeDes	Descr	Volume (acft)	Ownership	Creek	Distance (ft)
050-275-027	COUNTY PARK/OTHER REC FACILITY	Shaw Park	11	Public	Kenwood	433
053-130-004	SCHOOL DISTRICT PROPERTY	Dunbar Elementary	36.5	Public	Calabazas unnamed tributary	330
056-201-027	SCHOOL DISTRICT PROPERTY	Flowery Elementary School ballfields	13.3	Public	Pequeno	0
092-010-022	COUNTY PARK/OTHER REC FACILITY	Arnold Field	58.7	Public	Fryer	1500
053-040-038	COUNTY PARK/OTHER REC FACILITY	Calabazas Creek former quarry	12.4	Public	Calabazas	0
127-141-014	COUNTY PARK/OTHER REC FACILITY	Maxwell Regional Farms ball fields (1)	19.8	Public	Sonoma	740
133-150-053	SCHOOL DISTRICT PROPERTY	Altamira Middle School ball fields	7.7	Public	Sonoma	1835
052-261-024	MISCELLANEOUS DISTRICT	Ernie Smith ball fields	10.6	Public	DowdallIN	0
054-090-001	STATE HOSPITAL	15000 ARNOLD DR (ballfields)	25.4	Public	Sonoma	305
056-201-021	MISCELLANEOUS DISTRICT	Larson Park ball fields (1)	2.8	Public	Pequeno	0
056-201-059	MISCELLANEOUS DISTRICT	Larson Park ball fields (2)	7.2	Public	Pequeno	0
050-274-002	SCHOOL DISTRICT PROPERTY	Kenwood Elementary School ball fields (1)	9.4	Public	Sonoma	230
050-274-002	SCHOOL DISTRICT PROPERTY	Kenwood Elementary School ball fields (2)	2.7	Public	Sonoma	660
052-272-010	SCHOOL DISTRICT PROPERTY	El Verano Elementary ball fields	15.8	Public	Sonoma	810
018-281-021	SCHOOL DISTRICT PROPERTY	Sassarini Elementary ball fields	13.6	Public	Fryer	0
018-421-002	SCHOOL DISTRICT PROPERTY	Prestwood Elementaryball fields	56.9	Public	Nathanson	0
018-071-006	STATE BUILDING	Vallejo SP 6	54.4	Public	Fryer	2200
018-071-008	MISCELLANEOUS CITY PROPERTY	Vallejo SP 5	46.1	Public	Fryer	2200
018-061-002	VACANT STATE LAND	Vallejo SP 2	92	Public	Fryer	2200
128-172-048	CITY PARK/OTHER REC FACILITY	Carter Park	11	Public	Fryer	260
023-030-001	PASTURE - ongoing construction from sat	Sonoma Valley HS	37	Public	Nathanson	0
018-121-014	VACANT STATE LAND	Vallejo SP 4	23.3	Public	Fryer	1700
018-121-014	VACANT STATE LAND	Vallejo SP 3	65.2	Public	Fryer	1700
018-061-001	VACANT STATE LAND	Vallejo SP 1	33.8	Public	Fryer	2200
023-030-001	SCHOOL DISTRICT PROPERTY	Sonoma Valley HS soccer fields	17.2	Public	Nathanson	0
018-421-002	SCHOOL DISTRICT PROPERTY	Sonoma Valley HS football fields	40	Public	Nathanson	0
128-061-023	CITY PARK/OTHER REC FACILITY	Hertenstein Park	2.1	Public	Fryer	0
133-150-053	SCHOOL DISTRICT PROPERTY	Altamira Middle School ball fields	48.2	Public	Sonoma	1550
127-141-014	COUNTY PARK/OTHER REC FACILITY	Maxwell Regional Farms ball fields (2)	75	Public	Nathanson	1490

Additional Parcels under Alternative 2 (9 additional)

APN	UseCodeDes	Descr	Volume (acft)	Ownership	Alternative	Creek	Distance (ft)
050-262-006	COUNTY PARK/OTHER REC FACILITY	Kenwood Park	12.1	Public	2	Fisher Creek N	0
018-241-054	VACANT LOTS ZONED APARTMENTS	Vacant lot adjacent to Safeway	7.2	Private	2	Fryer	0
055-230-034	RURAL RES/SINGLE RES	9525 BENNETT VALLEY RD (private pasture)	48.6	Private	2	Sonoma unnamed tributary	90
127-231-011	RURAL RES/2 OR MORE RES	680 E NAPA ST	22.9	Private	2	Nathanson	0
018-011-017	PASTURE WITH RESIDENCE	Montini Property	113.1	Private	2	Fryer	2770
127-231-004	RURAL RES/2 OR MORE RES	680 E NAPA ST (Open fields adjacent to St Francisc Solano Cemetery)	6.9	Private	2	Nathanson	0
050-180-006	PREMIUM IRRIGATED VINEYARDS	18950 5TH STREET W	60.5	Private	2	Fisher N	0
133-112-020	PASTURE WITH RESIDENCE	Hana Boys Center open pasture	246.2	Private	2	Sonoma	0
050-161-002	IRR VINEYD/PREMIUM W/RES	8725 HWY 12 (Egg Farm Road Ag property)	145.5	Private	2	Sonoma	2400

Additional Parcels under Alternative 3 (34 additional)

APN	UseCodeDes	Descr	Volume (acft)	Ownership	Alternative	Creek	Distance (ft)
050-263-076	COUNTY PARK/OTHER REC FACILITY	Alder Park	16.9	Public	2	Kenwood	0
128-013-002	IRRIGATED PASTURE	16202 5TH STREET W	222.9	Private	3	Sonoma	0
127-071-012	VACANT COMMERCIAL LND/UNDEVEL	Heritage Center open fields	19.3	Private	3	Agua Caliente	110
128-590-037	VACANT LOT/TOTALLY UNUSABLE	Cooper St open field	16.3	Private	3	Fryer	610
133-220-001	PAROCHIAL SCHOOL	Hana Center Parochial School ball fields	34.6	Private	3	Sonoma unnamed tributary	0
127-202-006	VACANT RESIDENTIAL LOT/UNDEVEL	Open fields adjacent to Valley Oak Homes	15.7	Private	3	Sonoma	600
127-094-067	VACANT RESIDENTIAL LOT/UNDEVEL	Open fields adjacent to Iglesia Lighthouse Youth Group	17.1	Private	3	Fryer	4500
052-251-037	RURAL RES/SINGLE RES	1008 CRAIG AVE	21.3	Private	3	DowdallIN	0
052-251-042	RURAL RES/VACANT HOMESITE	1100 CRAIG AVE	80.8	Private	3	Dowdall	0
142-180-001	PASTURE WITH RESIDENCE	1920 GROVE ST	82.7	Private	3	Carriger	310
052-431-019	PASTURE	1240 SOLANO AVE	41.4	Private	3	Carriger	0
127-172-019	IRRIGATED VINEYD/PREMIUM VAR	19200 GEHRICKE RD	81.6	Private	3	Nathanson	90
127-161-010	IRR VINEYD/PREMIUM W/RES	577 LOVALL VALLEY RD	49.9	Private	3	Nathanson	420
127-051-049	IRR VINEYD/PREMIUM W/RES	19080 GEHRICKE RD	57.7	Private	3	Nathanson	0
128-011-006	IRR VINEYD/PREMIUM W/RES	601 LEVERONI RD	136.2	Private	3	Sonoma	0
142-200-017	PASTURE	Pastures adjacent to Westerbeke Ranch Rd and Carriger Creek	218.3	Private	3	Carriger	0
142-160-070	COMMON AREA WITHOUT STRUCTURES	Temelec Circle	49.1	Private	3	Rodgers	0
127-162-018	IRRIGATED VINEYD/PREMIUM VAR	560 LOVALL VALLEY RD	241.3	Private	3	Nathanson	770
127-680-002	IRR VINEYD/PREMIUM W/RES	18900 7TH STREET E	99.9	Private	3	Nathanson	450
127-111-005	SINGLE FAMILY DWELLING	1535 N CASTLE RD	70.4	Private	3	Nathanson	840
127-111-054	IRRIGATED VINEYD/PREMIUM VAR	1170 Castle Rd	38.8	Private	3	Nathanson unnamed trib	0
127-051-038	IRR VINEYD/PREMIUM W/RES	1990 CASTLE RD	81.8	Private	3	Nathanson unnamed trib	0
127-111-003	RURAL RES/SINGLE RES	19020 7TH STREET E	25.5	Private	3	Nathanson unnamed trib	560
127-172-032	RURAL RES/SINGLE RES	844 GRAPESTONE LN	12.9	Private	3	Nathanson	0
127-172-008	RURAL RES SFD W/GRANNY UNIT	19135 7TH STREET E	11.6	Private	3	Nathanson	0
127-231-011	RURAL RES SFD W/GRANNY UNIT	940 E NAPA ST	19.7	Private	3	Nathanson	0
052-461-016	RURAL RES/SINGLE RES	301 PETALUMA AVE	20.6	Private	3	DowdallIN	0
128-311-077	RELIGIOUS BUILDING	Sonoma 7th Day Adventist ball fields	8.5	Private	3	Fryer	0
128-361-007	PASTURE	20301 5TH STREET E	209.9	Private	3	Nathanson	0
128-322-024	RURAL RES/SINGLE RES	195 FISHER LN	24.4	Private	3	Fryer	0
127-022-062	RURAL RES/2 OR MORE RES	18125 NORRBOM RD	19.5	Private	3	Nathanson unnamed trib	0
127-181-034	IRR VINEYD/PREMIUM W/RES	1195 CASTLE RD	5.8	Private	3	Nathanson unnamed trib	610
127-051-038	IRR VINEYD/PREMIUM W/RES	1990 CASTLE RD	11.1	Private	3	Nathanson unnamed trib	0
127-051-074	IRR VINEYD/PREMIUM W/RES	GEHRICKE RD & 7th St E Vineyard	23.3	Private	3	Nathanson unnamed trib	0



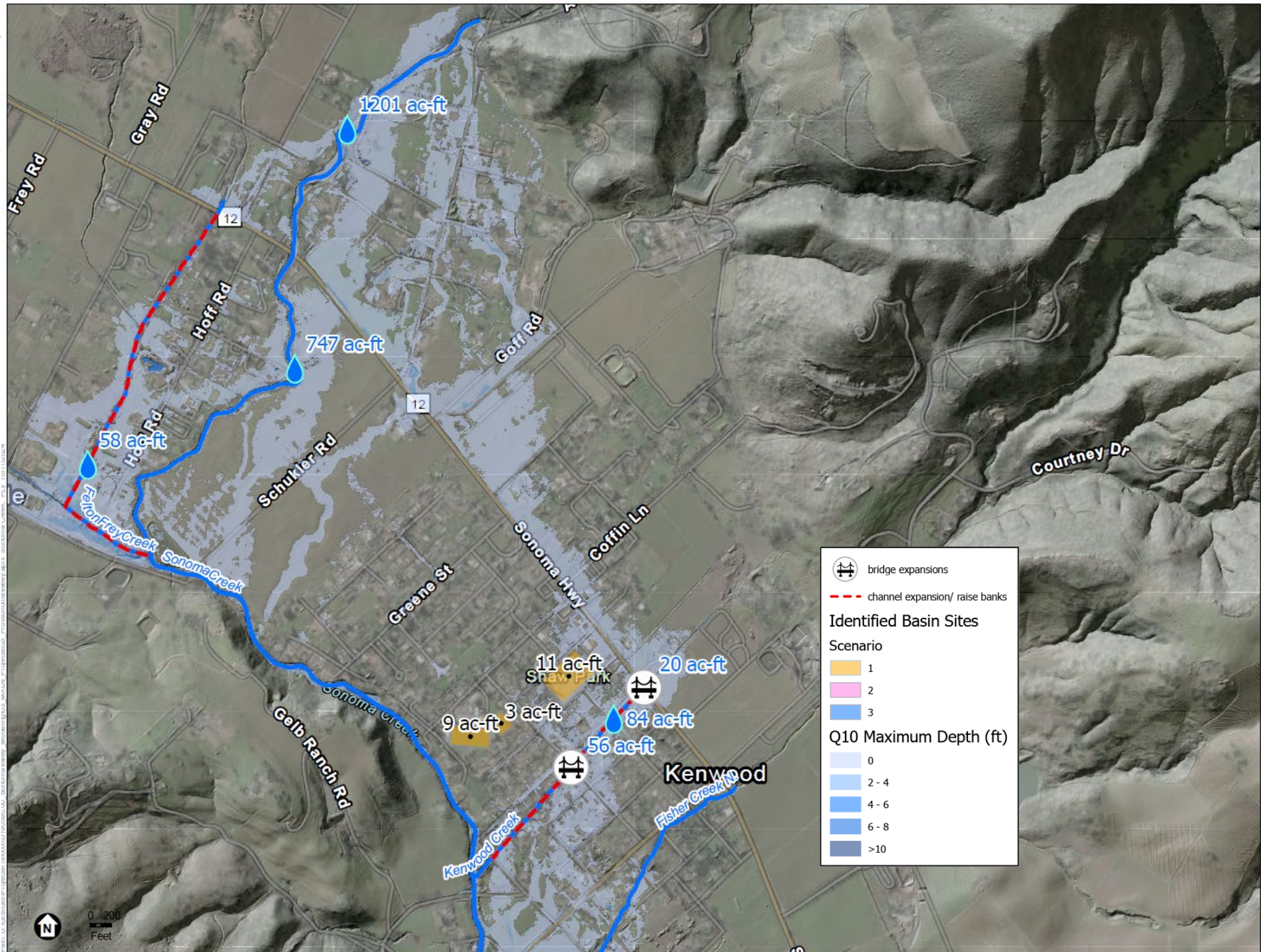
Bridge Expansions

Creek	Name	River Sta	US WSE (ft NAVD88)	DS WSE (ft NAVD88)	Backwater Height (ft)	10-yr Overtopping Volume (ac-ft)	Flooded landuse	Nearby storage? (Y/N)	Alternative
Nathanson	2nd St E	32502.5	86.5	85.4	1.1	70	residential	Y	1
Kenwood	Los Guilicos	1420	412.1	409.8	2.3	56	residential	Y	1
Kenwood	Hwy12	2430	418.4	417.1	1.2	20	agriculture	Y	1
Pequeno	PrivateDriveway1	1600	133.6	132.6	1.0	40	residential/ commercial	Y	1
Pequeno	PrivateDriveway2	1530	132.5	130.5	2.1		commercial	Y	1
Fryer W Fork	Berryessa Dr	701	65.3	63.2	2.1	1	public park	Y	1
Fryer Creek	W MacArthur St	8391	67.3	64.9	2.4	<1	residential	Y	1
Kenwood	Mervin Ave	260	402.1	400.8	1.3	47	residential	Y	2
Fisher Creek N	Park Row	2290	408.5	406.4	2.1	46	public park	Y	2
Fryer Creek	Broadway/Hwy12	2530	49.7	49.1	0.6	161	ag/residential	Y	3
Fryer Creek	Leveroni Road	5044	57.7	55.9	1.7	38	ag/residential	Y	3

Kenwood

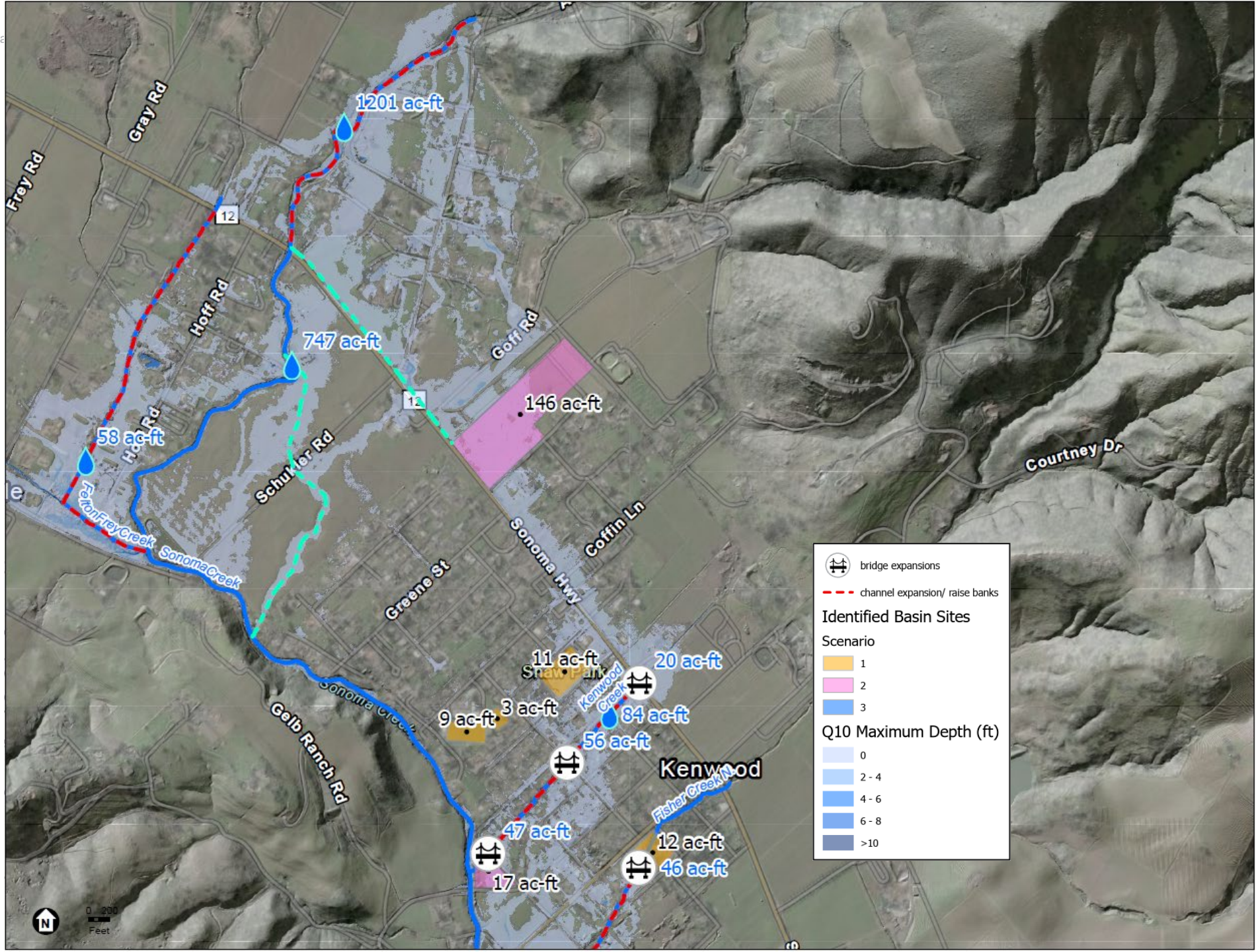
Alternative 1

PRELIMINARY



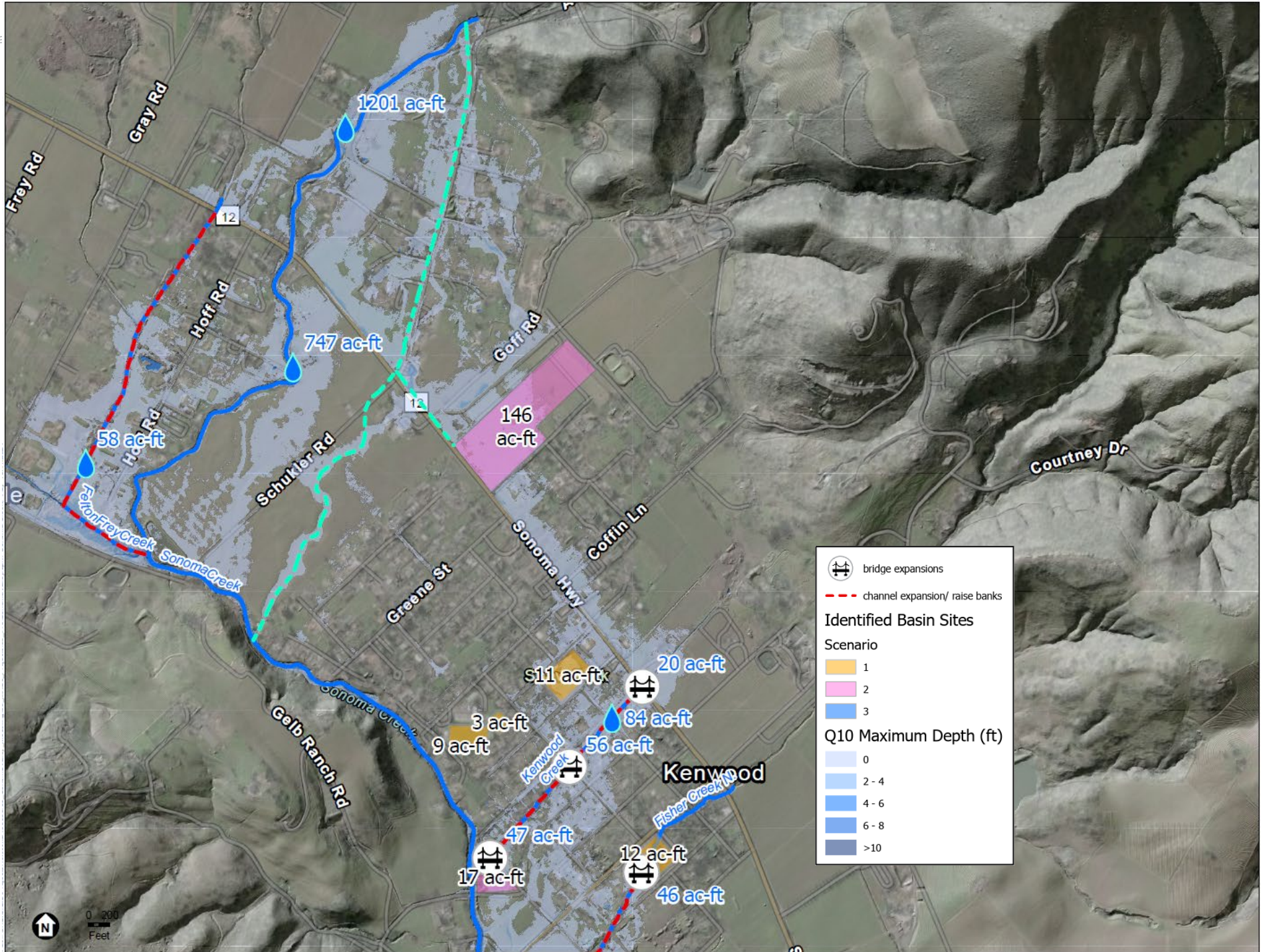
Alternative 2

PRELIMINARY



Alternative 3

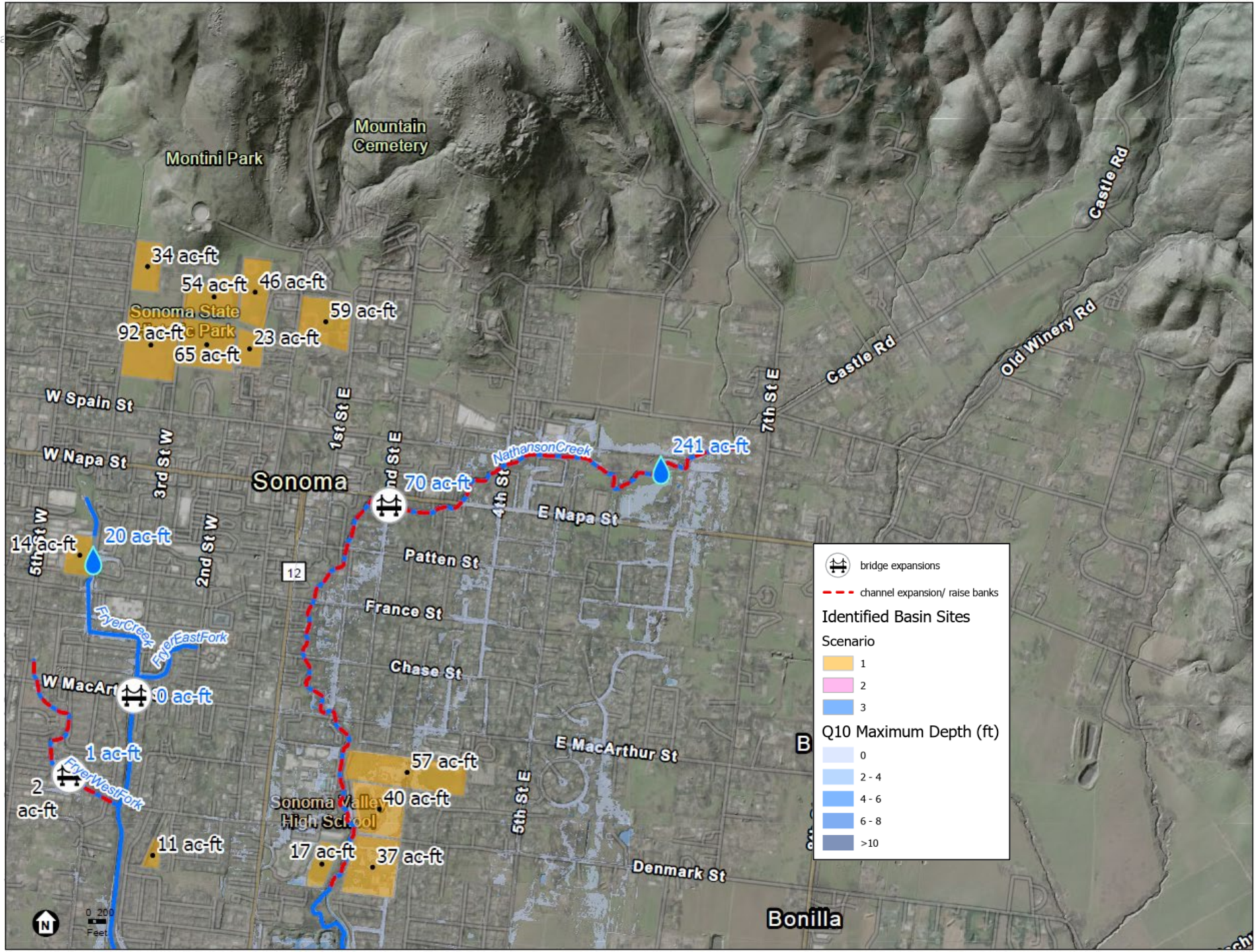
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Upper Nathanson/ Fryer Creek

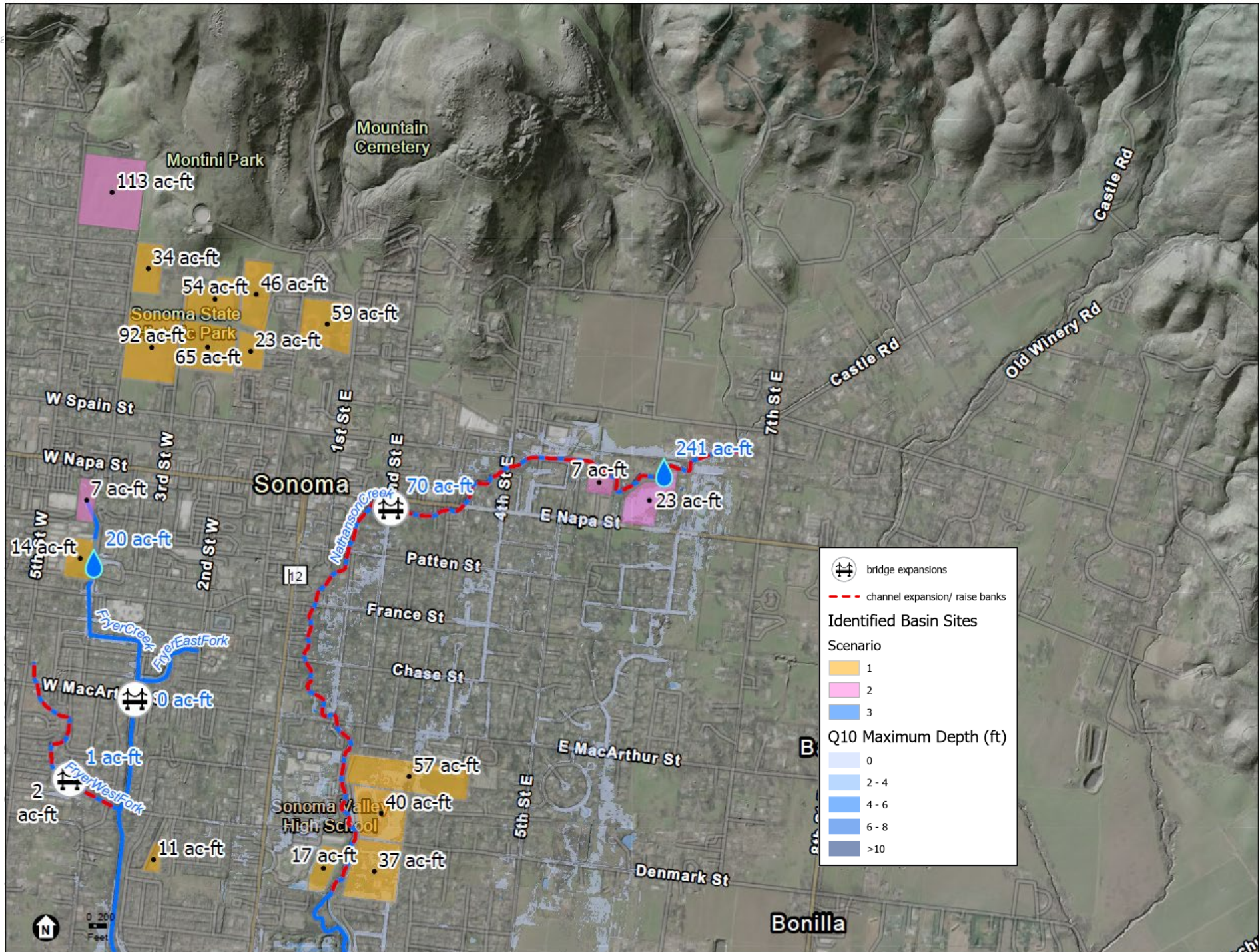
Alternative 1

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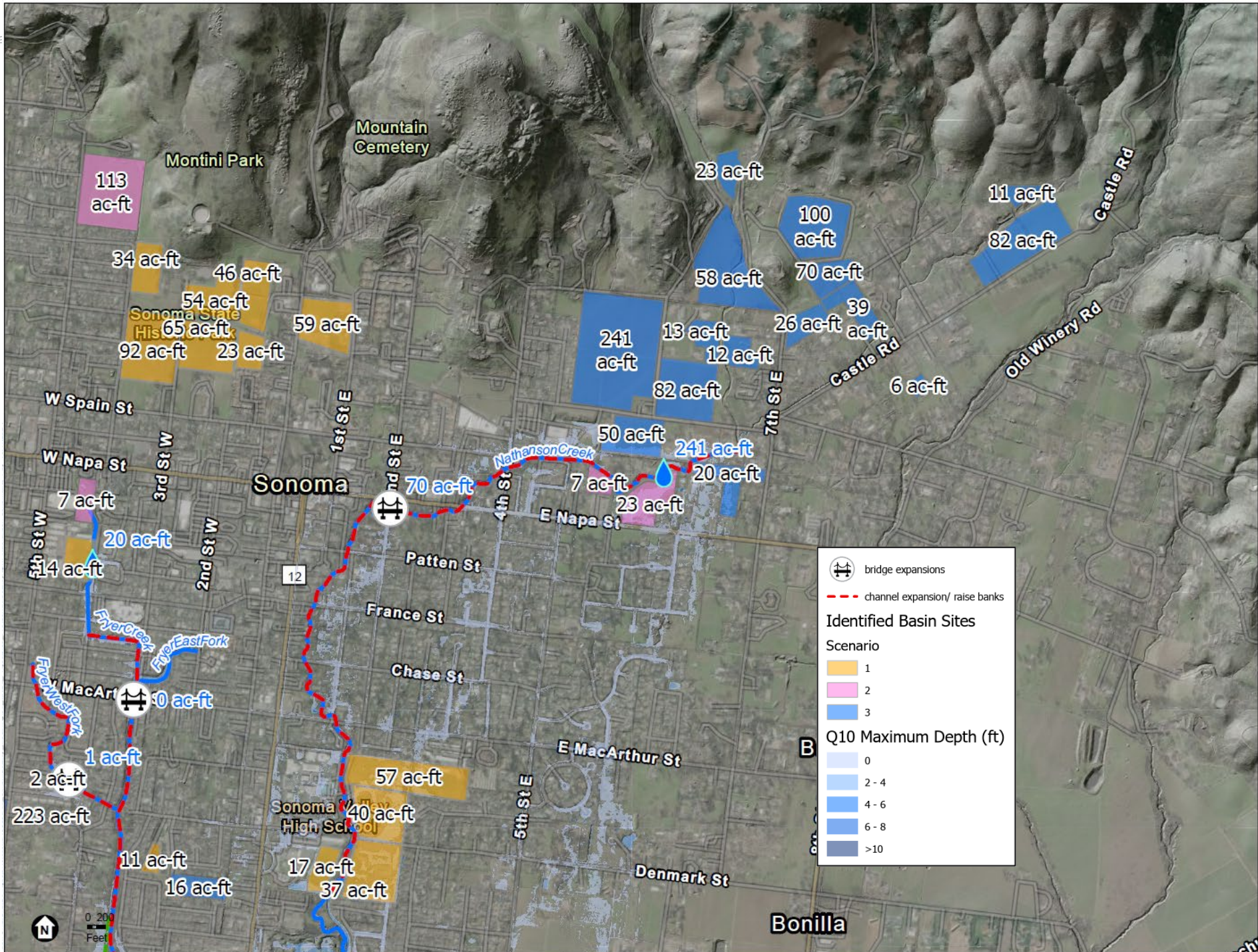
Alternative 2

PRELIMINARY



Alternative 3

PRELIMINARY



SEC 2019 study

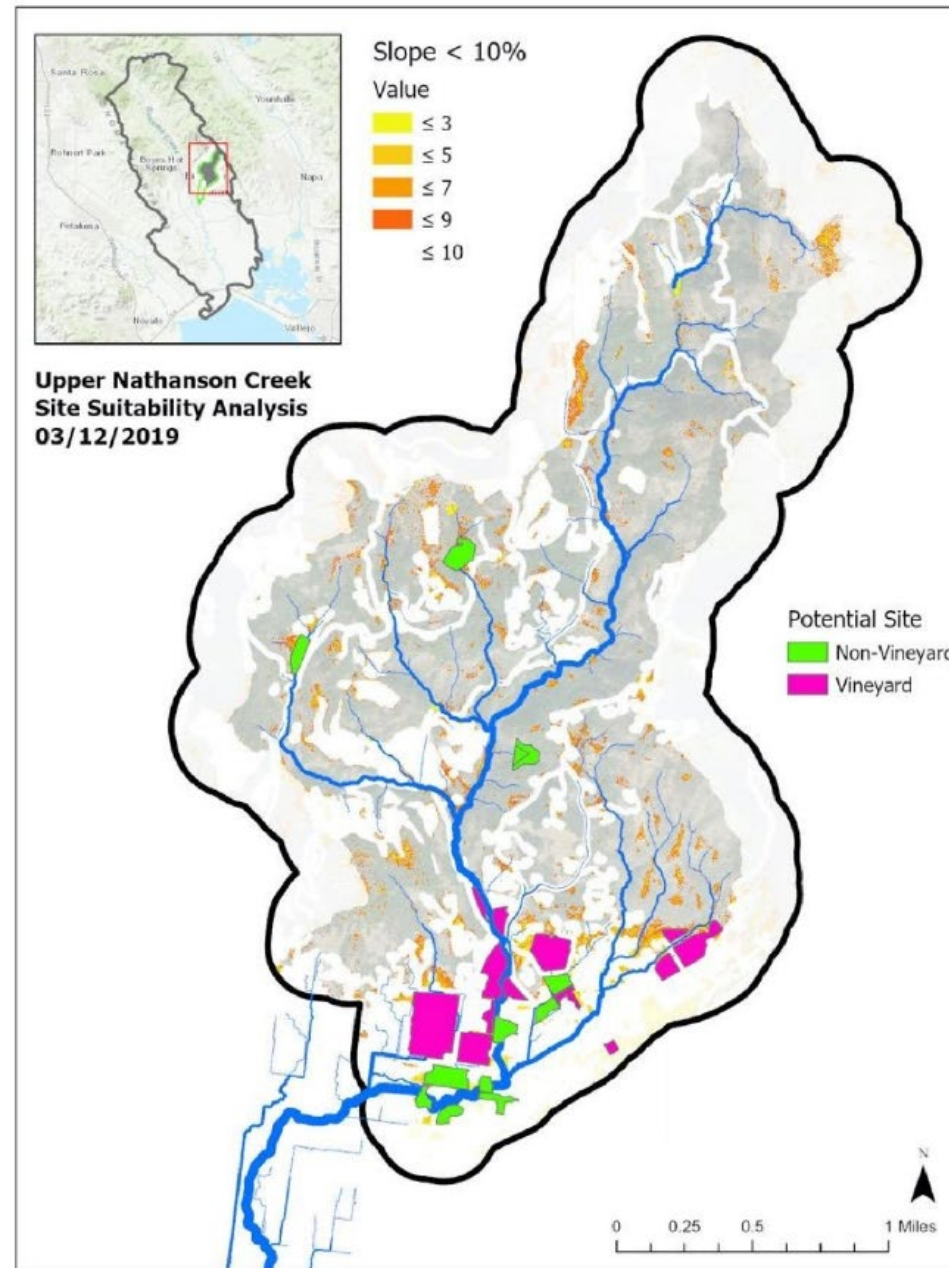
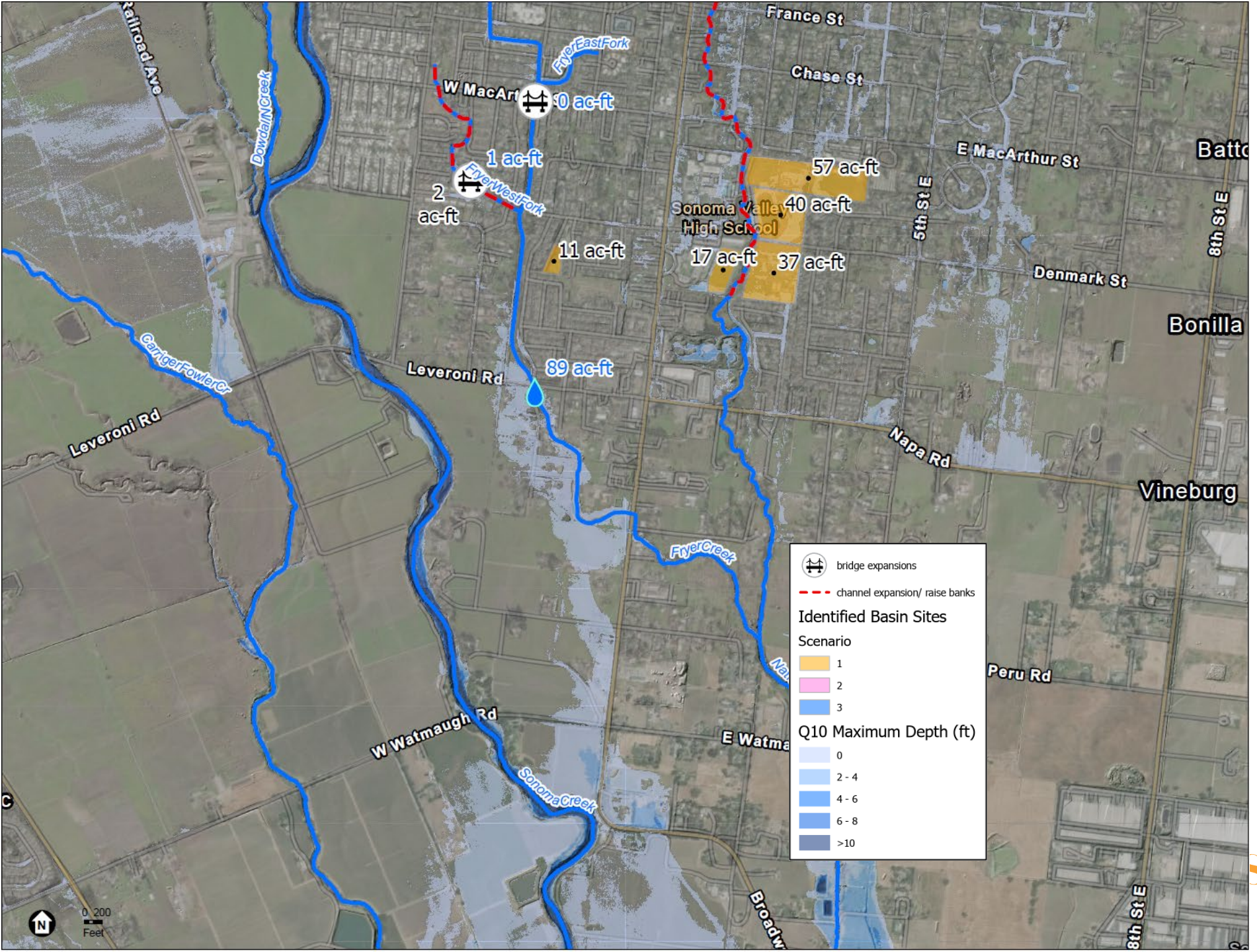


Figure 5. Areas in Upper Nathanson Creek with suitable slope, and with vineyard areas added for potential consideration for stormwater retention.

Lower Nathanson/ Fryer Creek

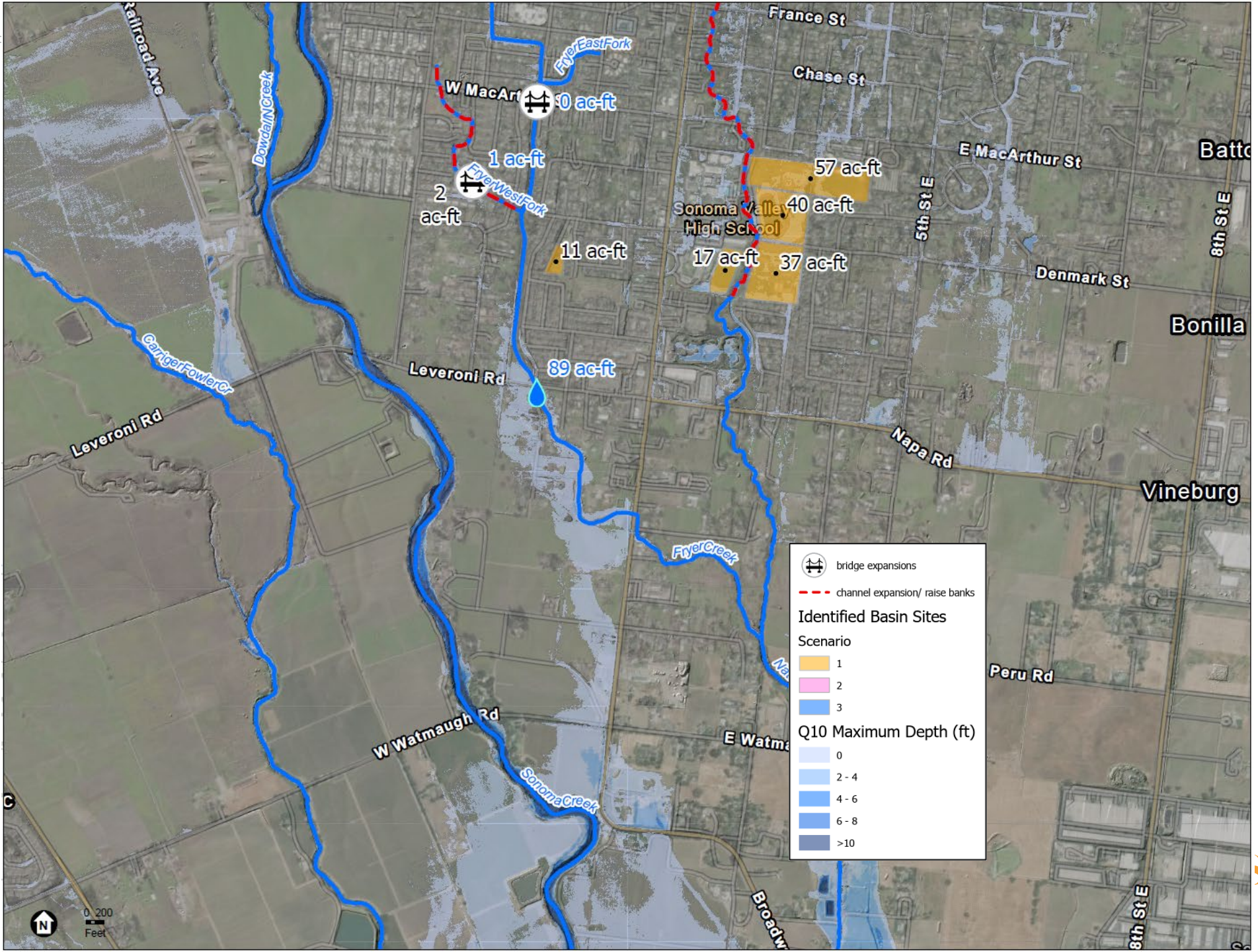
Alternative 1

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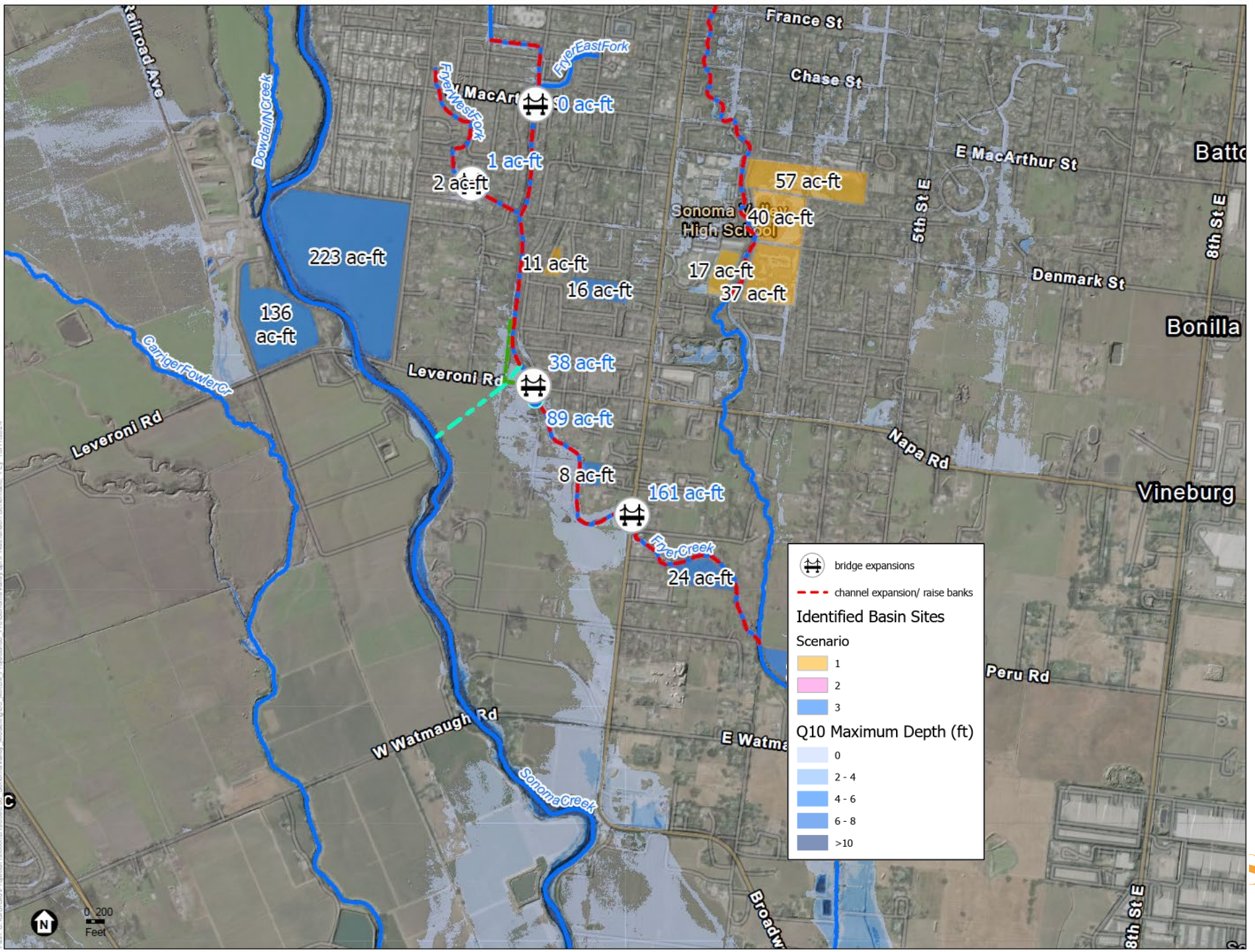
Alternative 2

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Alternative 3

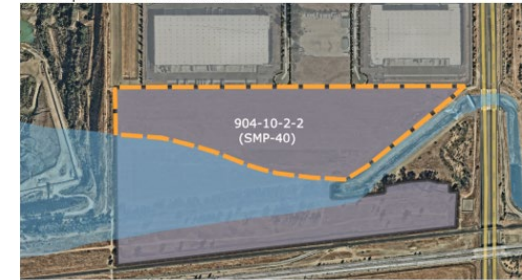
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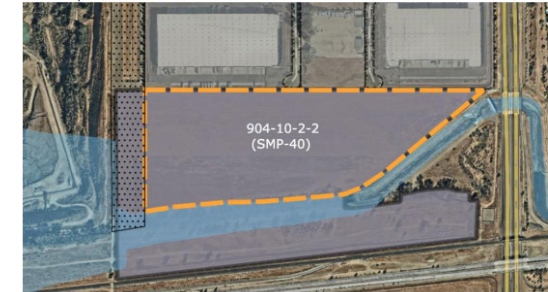
Next Steps: Conceptual project analysis and BCA

- ESA will model conceptual alternatives for up to three priority projects
- ESA will develop conceptual-level cost estimates for project elements and identify where further detail is needed for analysis and cost-estimation
- Radbridge will conduct an economic benefits analysis for the project scenarios as well as a screening-level BCA of other potential flood risk reduction project

Developable Land – No Action Alternative
Developable land: 32.02 acres



Developable Land – Alternative 4
Developable land: 39.02 acres



Developable Land – Alternatives 2b, 2c, 3
Developable land: 43.60 acres



	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4
Project Benefits						
Travel Time Savings	\$2,910,410	\$2,910,410	\$2,910,410	\$2,910,410	\$2,910,410	\$2,910,410
Avoided Motor Vehicle Traffic Collisions	\$466,191	\$466,191	\$466,191	\$466,191	\$466,191	\$466,191
Avoided Greenhouse Gases	\$29,695	\$29,695	\$29,695	\$29,695	\$29,695	\$29,695
Avoided Infrastructure Damage	\$2,380,576	\$2,380,576	\$2,380,576	\$2,380,576	\$2,380,576	\$2,380,576
Future Commercial Development Taxes	\$0	\$0	\$13,081,109	\$13,081,109	\$13,081,109	\$7,915,112
Total Project Benefits	\$5,786,872	\$5,786,872	\$18,867,981	\$18,867,981	\$18,867,981	\$13,701,984
Project Costs						
Construction	\$820,700	\$3,447,423	\$3,362,203	\$5,406,660		
Contingency	\$287,250	\$1,206,598	\$1,176,771	\$1,892,331		
Planning & Permitting	\$88,000	\$522,000	\$364,000	\$584,000		
Design	\$166,000	\$698,000	\$681,000	\$1,095,000		
Construction Phase	\$133,000	\$558,000	\$545,000	\$876,000		
Escalation (6%)	\$418,000	\$2,920,000	\$2,822,000	\$4,537,000		
Total Construction Costs	\$1,912,950	\$9,352,021	\$8,950,974	\$14,390,991		
O&M (Lifetime)	\$291,779	\$1,426,448	\$1,365,277	\$2,195,034		
Total Project Costs	\$2,204,729	\$10,778,469	\$10,316,251	\$16,586,025	No data	No data
Benefit-Cost Ratio	2.62	0.54	1.83	1.14		