The HMP requires that the low threshold results be compared with the critical stress calculator results. The Critical Flow Calculator (spreadsheet provided by the County of San Diego) results are included in Appendix B for Reach 1. The channel dimensions were estimated from the topographic mapping and site visit, while the additional input parameters are from Form 1 in Appendix A. The critical stress results returned a low threshold for Reach 1. Therefore, the SCCWRP analyses and critical flow calculator demonstrate that the project can be designed assuming a low susceptibility to erosion, i.e., $0.5Q_2$.

Figure 1. Double 18-inch RCP Outlets at Upper End of Reach 1

Figure 2. Looking Downstream towards Reach 1 from Upper End at Double 18-Inch RCPs

Figure 3. Looking Downstream from Middle of Reach 1 near POC

Figure 4. Looking Upstream from 90 Degree Bend in Reach 1

Figure 5. Looking Downstream from 90 Degree Bend in Reach 1

Figure 6. Pond at Lower End of Reach 1 (Outlet of Reach 1 into Pond is at Left near Tree)

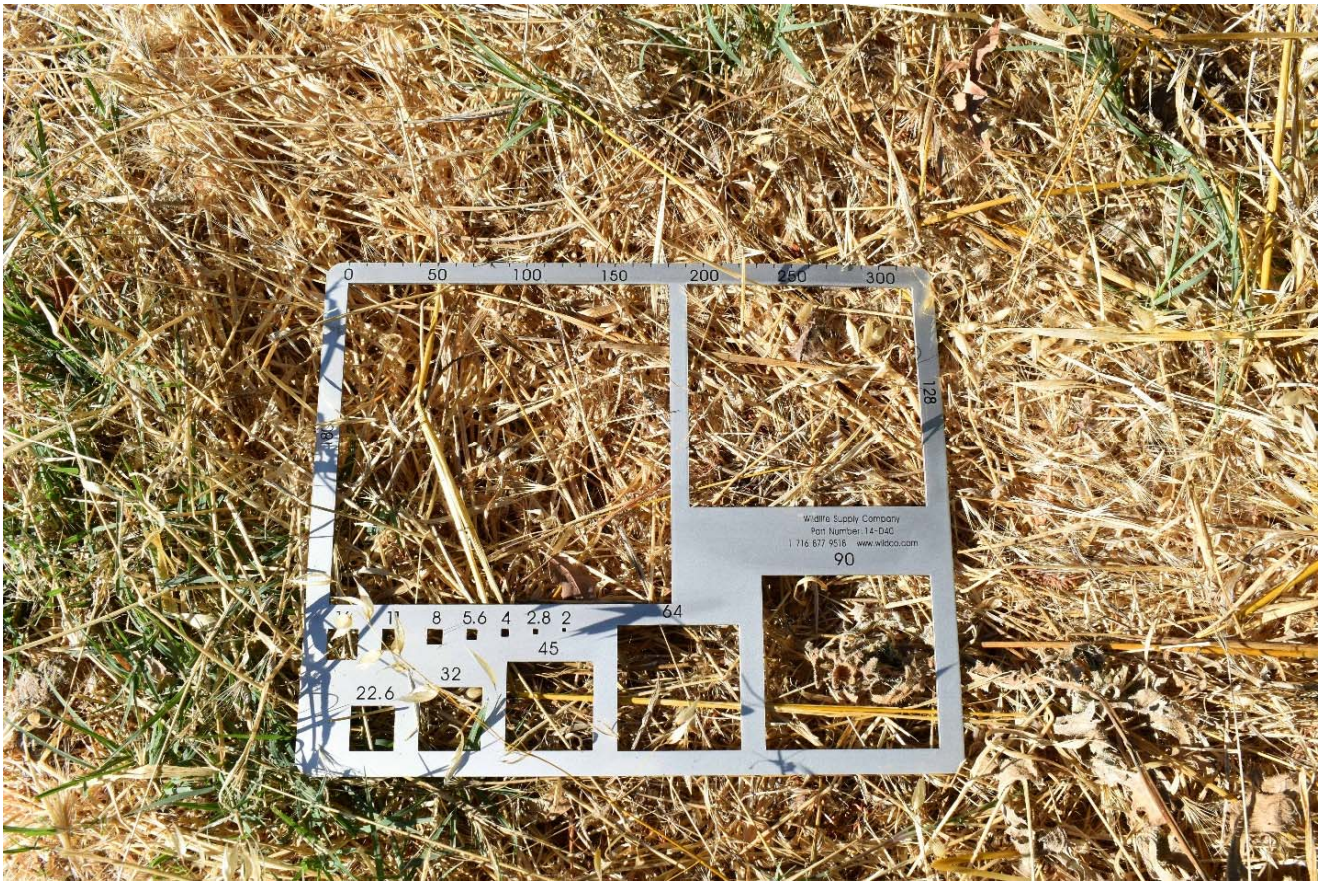


Figure 7. Gravelometer on Channel Bed

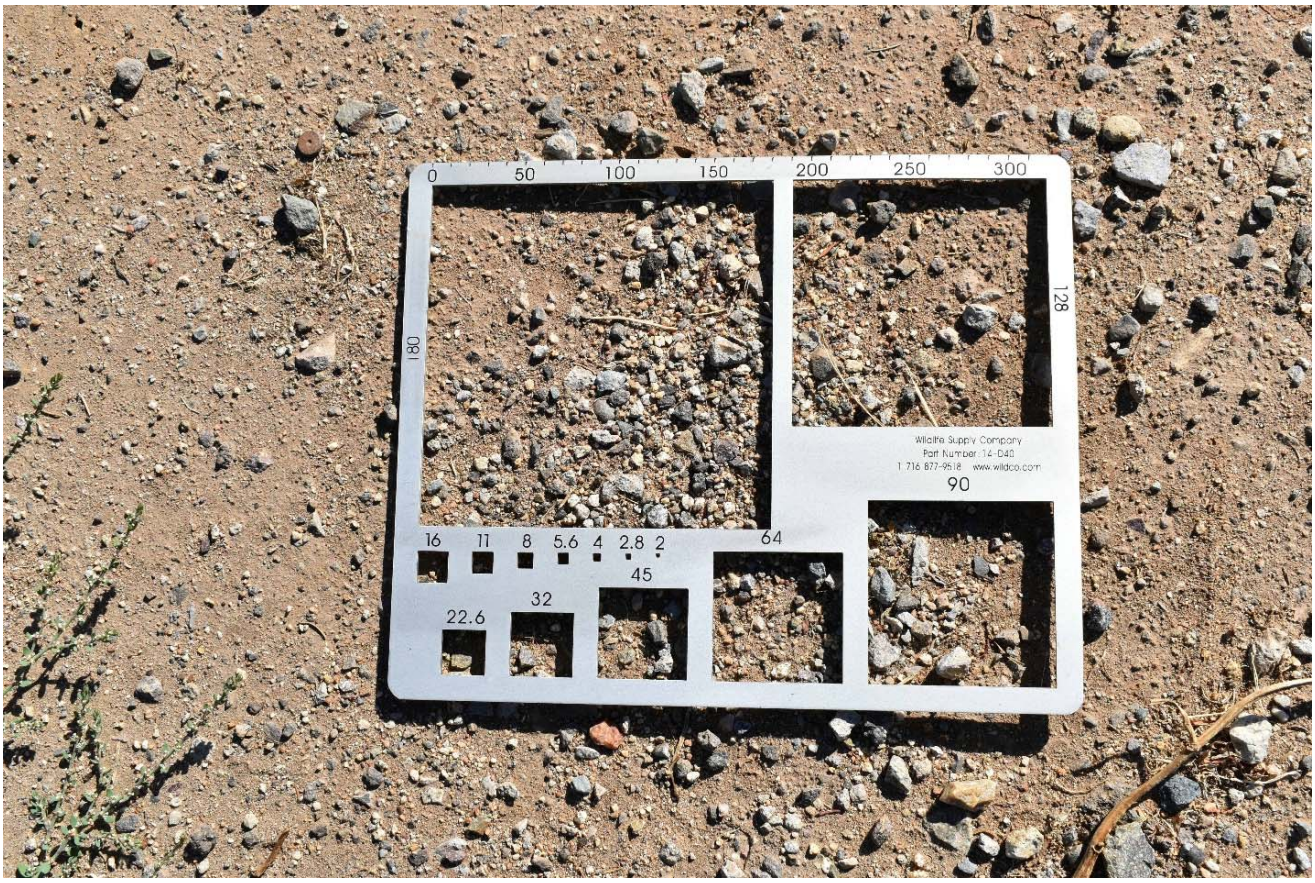


Figure 8. Gravelometer along Channel

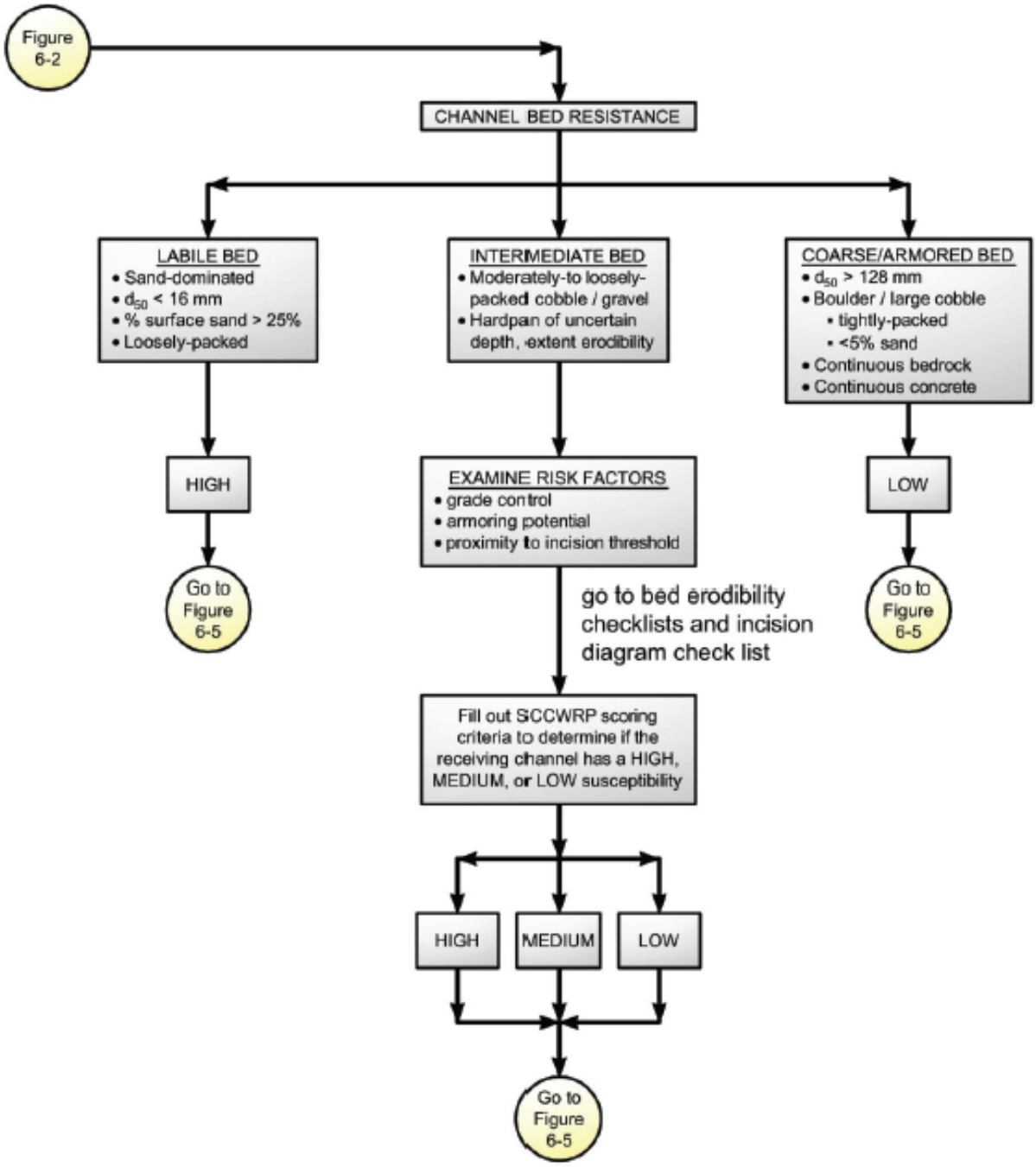


Figure 6-4. SCCWRP Vertical Susceptibility

Figure 9. SCCWRP Vertical Channel Susceptibility Matrix

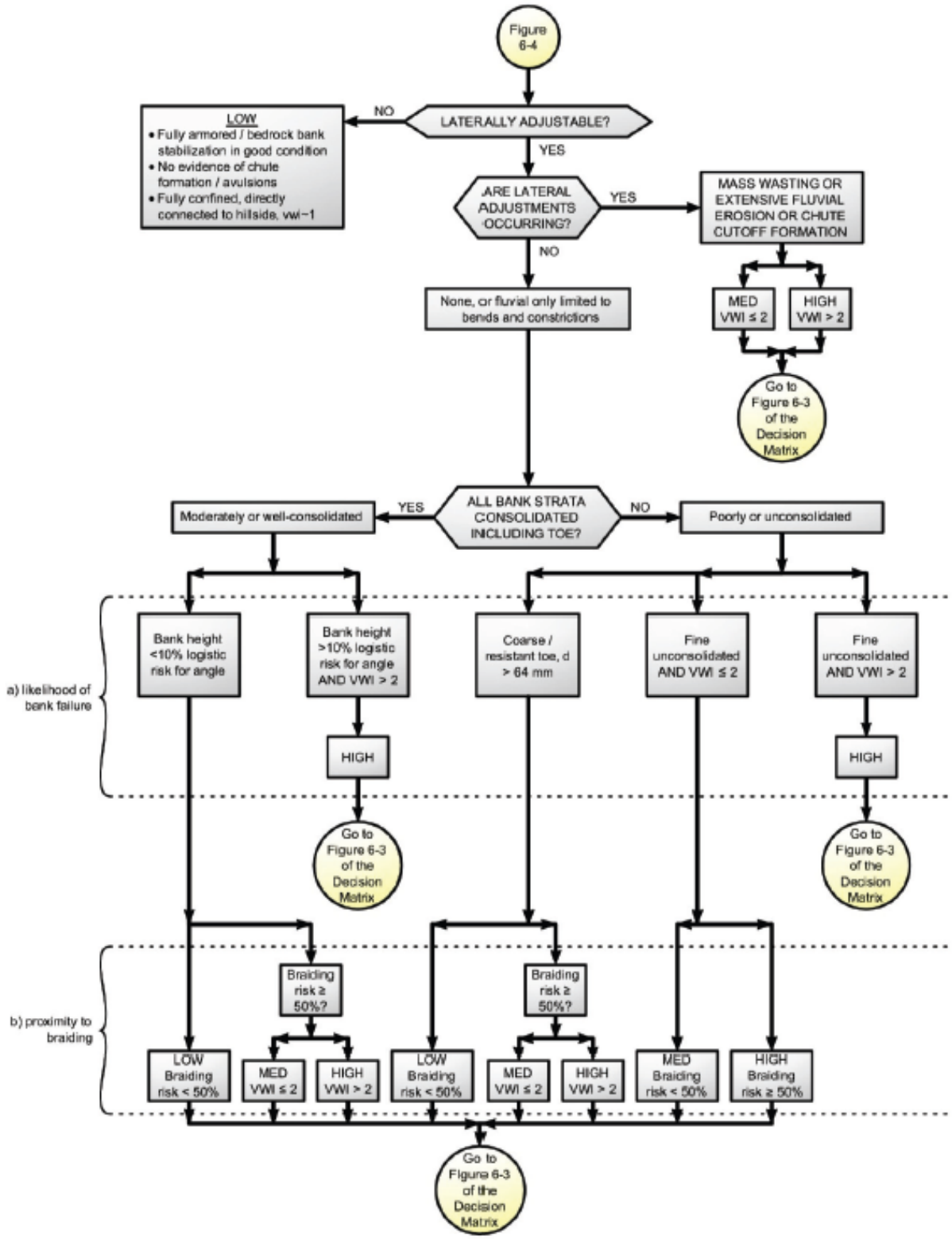


Figure 6-5. Lateral Channel Susceptibility

Figure 10. SCCWRP Lateral Channel Susceptibility Matrix

APPENDIX A

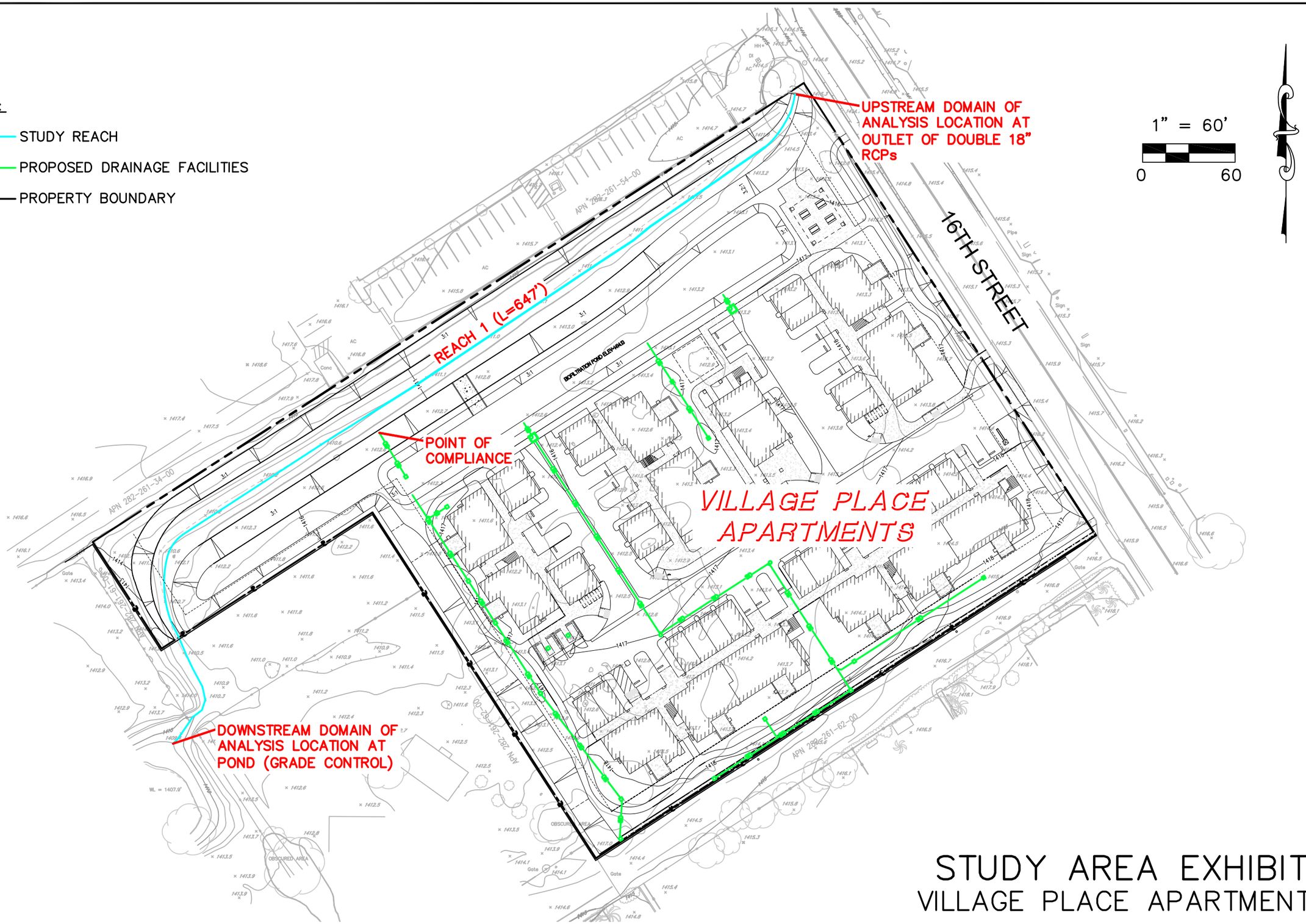
SCCWRP INITIAL DESKTOP ANALYSIS

LEGEND:

STUDY REACH

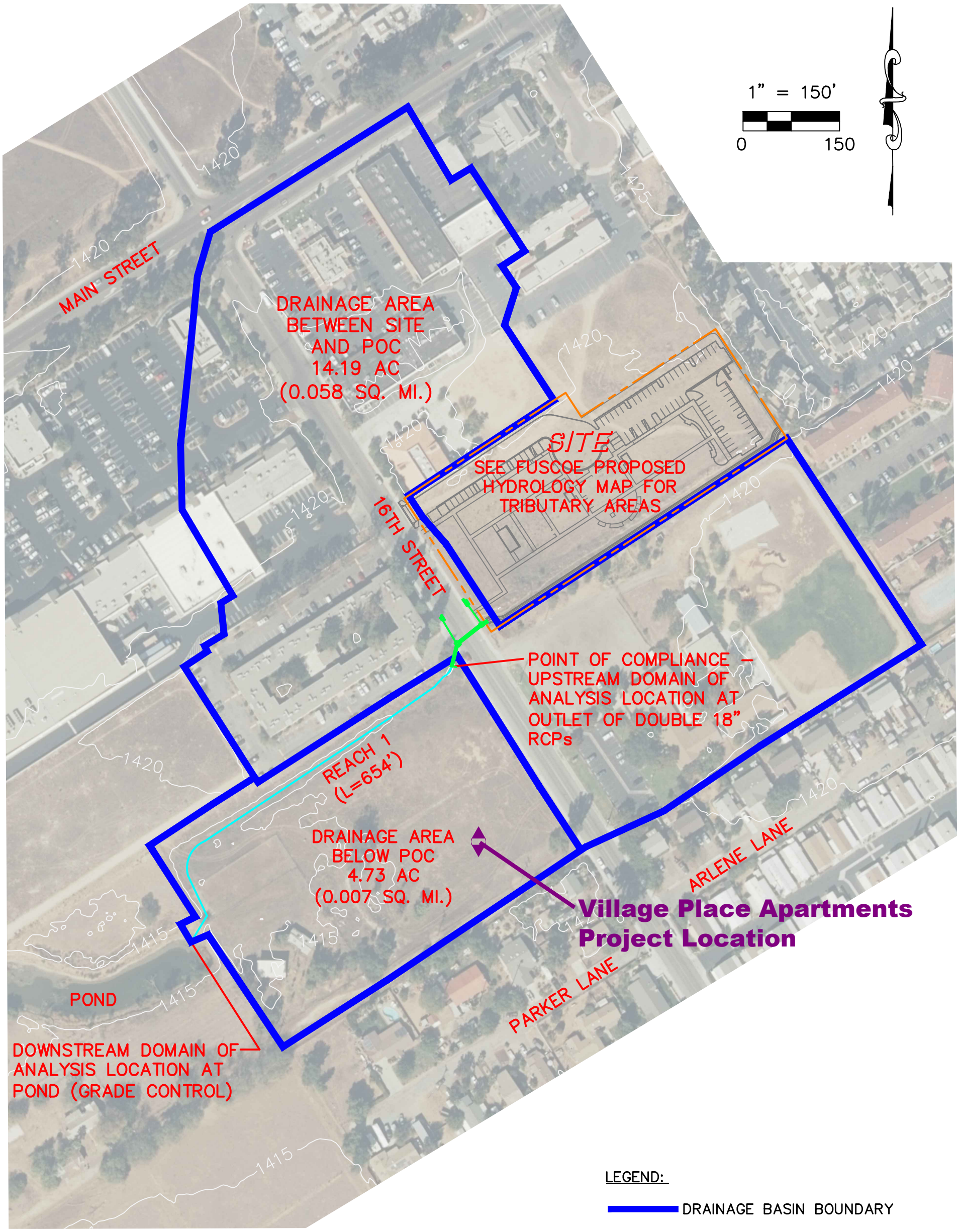
PROPOSED DRAINAGE FACILITIES

PROPERTY BOUNDARY



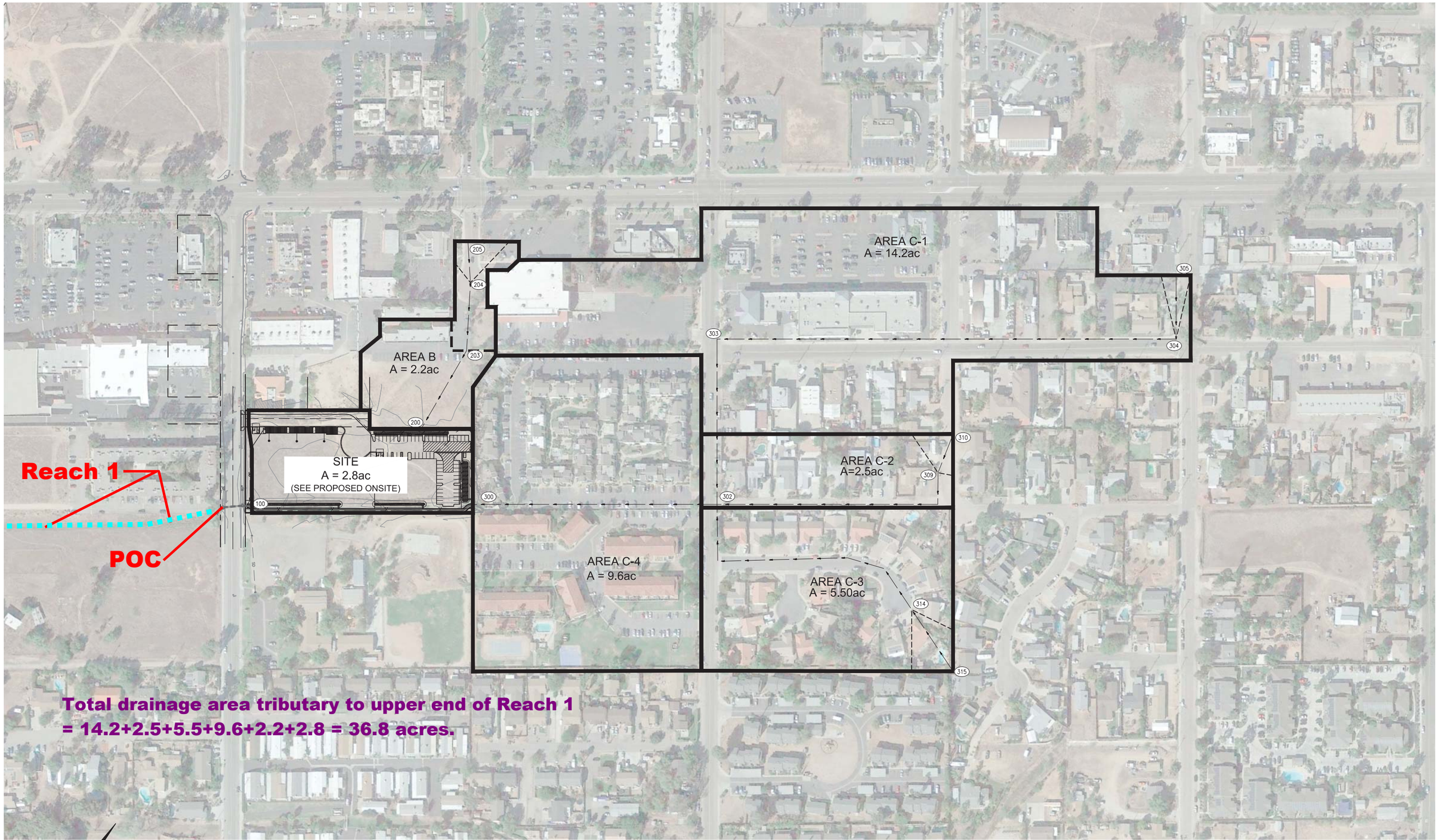
STUDY AREA EXHIBIT

VILLAGE PLACE APARTMENTS



This Study Area Exhibit and the Proposed Hydrology Map on the next page are from the Ramona Senior Apartments project and provide the total drainage area tributary to Reach 1 (36.80 + 14.19 + 4.73 = 55.72 acres or 0.0871 square miles). Reach 1 for the Ramona Senior Apartments is generally the same as Reach 1 for the Village Place Apartments. The POC for the Ramona Senior Apartments is at the upper end of Reach 1, while the POC for the Village Place Apartments is near the middle of Reach 1.

STUDY AREA EXHIBIT
RAMONA SENIOR APARTMENTS



100' 0' 50' 100'

SCALE: 1" = 100'

PROPOSED HYDROLOGY MAP

RAMONA SENIORS CIC LP

JULY 25, 2017

FUSCOE ENGINEERING
6390 Greenwich Dr., Suite 170, San Diego, California 92122
tel 858.554.1500 • fax 858.597.0335 • www.fuscoe.com

FORM 1: INITIAL DESKTOP ANALYSIS

Complete all shaded sections.

IF required at multiple locations, circle one of the following site types:

Applicant Site / Upstream Extent / Downstream Extent

Location: Latitude: 33.0343 Longitude: -116.8777

Description (river name, crossing streets, etc.): Village Place Apartments - 521 16th Street, Ramona, between Main Street and H Street

GIS Parameters: The International System of Units (SI) is used throughout the assessment as the field standard and for consistency with the broader scientific community. However, as the singular exception, US Customary units are used for contributing drainage area (A) and mean annual precipitation (P) to apply regional flow equations after the USGS. See SCCWRP Technical Report 607 for example measurements and "Screening Tool Data Entry.xls" for automated calculations.

Form 1 Table 1. Initial desktop analysis in GIS.

Symbol		Variable	Description and Source	Value
Watershed properties (English units)	**A**	Area (mi^2)	Contributing drainage area to screening location via published Hydrologic Unit Codes (HUCs) and/or ≤ 30 m National Elevation Data (NED), USGS seamless server	See attached Form 1 table on next page for calculated values for study reach.
	P	Mean annual precipitation (in)	Area-weighted annual precipitation via USGS delineated polygons using records from 1900 to 1960 (which was more significant in hydrologic models than polygons delineated from shorter record lengths)	
Site properties (SI units)	**S_v**	Valley slope (m/m)	Valley slope at site via NED, measured over a relatively homogenous valley segment as dictated by hillslope configuration, tributary confluences, etc., over a distance of up to ~500 m or 10% of the main-channel length from site to drainage divide	
	W_v	Valley width (m)	Valley bottom width at site between natural valley walls as dictated by clear breaks in hillslope on NED raster, irrespective of potential armoring from floodplain encroachment, levees, etc. (imprecise measurements have negligible effect on rating in wide valleys where VWI is >> 2, as defined in lateral decision tree)	

Form 1 Table 2. Simplified peak flow, screening index, and valley width index. Values for this table should be calculated in the sequence shown in this table, using values from Form 1 Table 1.

Symbol	Dependent Variable	Equation	Required Units	Value
Q_{10cfs}	10-yr peak flow (ft^3/s)	$Q_{10cfs} = 18.2 * A^{0.87} * P^{0.77}$	A (mi^2) P (in)	See attached Form 1 table on next page for calculated values for study reach.
Q_{10}	10-yr peak flow (m^3/s)	$Q_{10} = 0.0283 * Q_{10cfs}$	Q_{10cfs} (ft^3/s)	
INDEX	10-yr screening index ($m^{1.5}/s^{0.5}$)	$INDEX = S_v * Q_{10}^{0.5}$	Sv (m/m) Q_{10} (m^3/s)	
W_{ref}	Reference width (m)	$W_{ref} = 6.99 * Q_{10}^{0.438}$	Q_{10} (m^3/s)	
VWI	Valley width index (m/m)	$VWI = W_v/W_{ref}$	W_v (m) W_{ref} (m)	

(Sheet 1 of 1)

SCCWRP FORM 1 ANALYSES

Reach	Area A, sq. mi.	Mean Annual Precip. P, inches	Valley Slope Sv, m/m	Valley Width Wv, m	10-Year Flow Q10cfs, cfs	10-Year Flow Q10, cms
1	0.0871	16.22	0.0034	6.10	19	0.5

Reach	10-Year Screening Index INDEX	Reference Width Wref, m	Valley Width Index VWI, m/m
1	0.002	5.3	1.16

RAMONA FIRE DEPT, CALIFORNIA (047228)

Period of Record Monthly Climate Summary

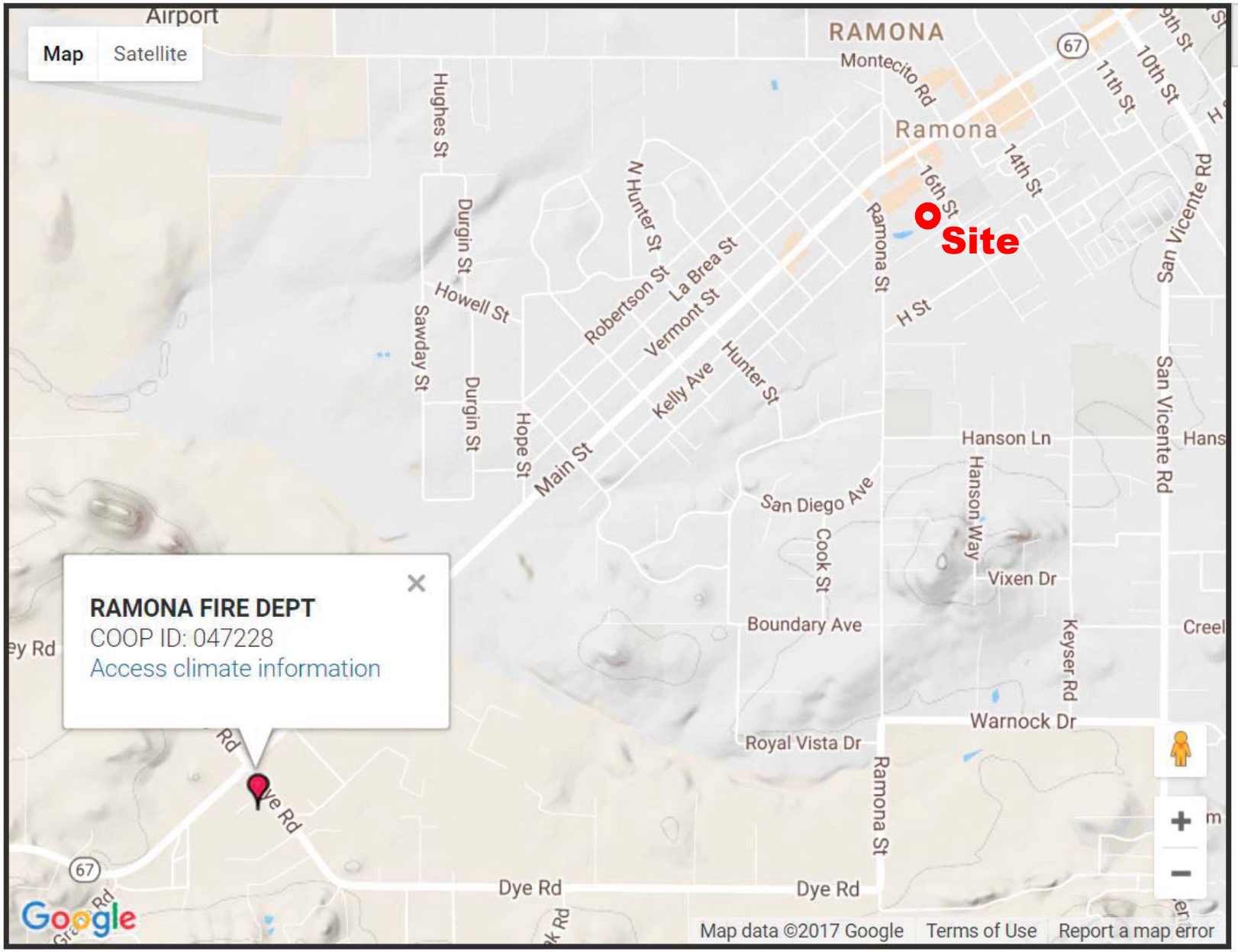
Period of Record : 2/ 1/1974 to 9/30/2008

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.6	67.2	68.4	72.6	76.7	84.4	90.2	91.1	88.1	80.5	73.1	67.4	77.2
Average Min. Temperature (F)	38.1	39.1	41.0	43.1	48.3	51.7	56.3	57.4	55.2	48.1	41.9	36.8	46.4
Average Total Precipitation (in.)	3.47	3.53	3.17	1.21	0.39	0.07	0.11	0.16	0.33	0.68	1.36	1.71	16.22
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 93.8% Min. Temp.: 93.8% Precipitation: 93.9% Snowfall: 94.4% Snow Depth: 94.3%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

US COOP Station Map



Rain Gage Location

APPENDIX B

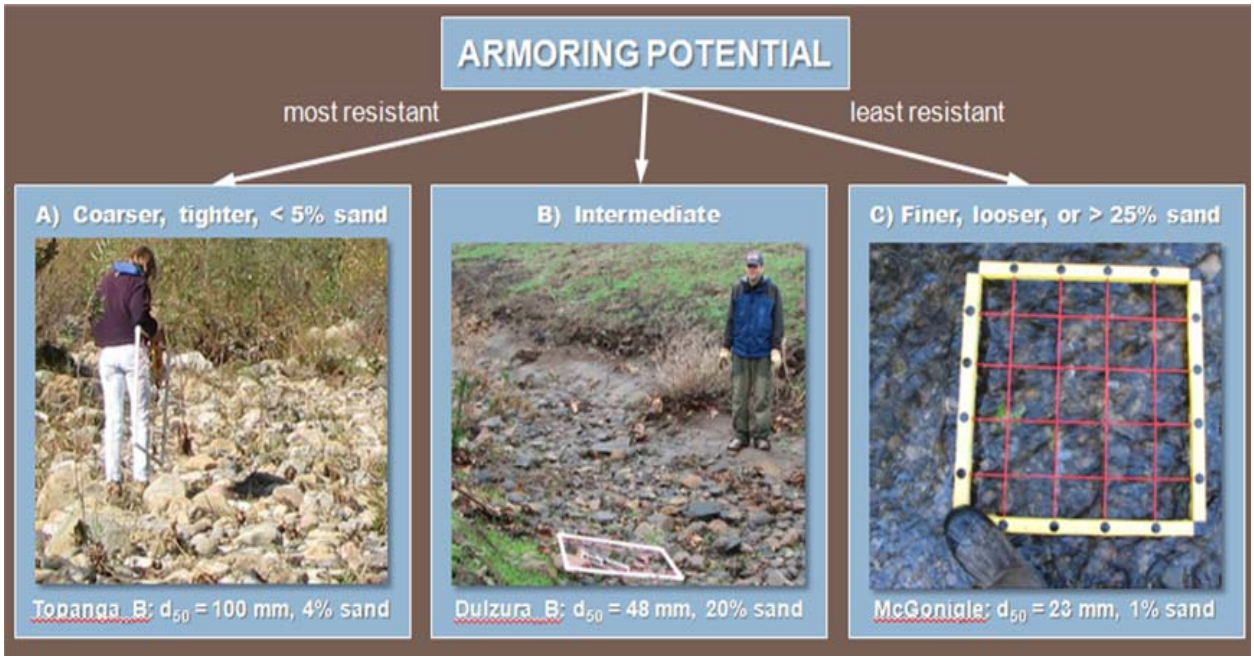
SCCWRP FIELD SCREENING DATA

Form 3 Support Materials

Form 3 Checklists 1 and 2, along with information recording in Form 3 Table 1, are intended to support the decisions pathways illustrated in Form 3 Overall Vertical Rating for Intermediate/Transitional Bed.

Form 3 Checklist 1: Armoring Potential

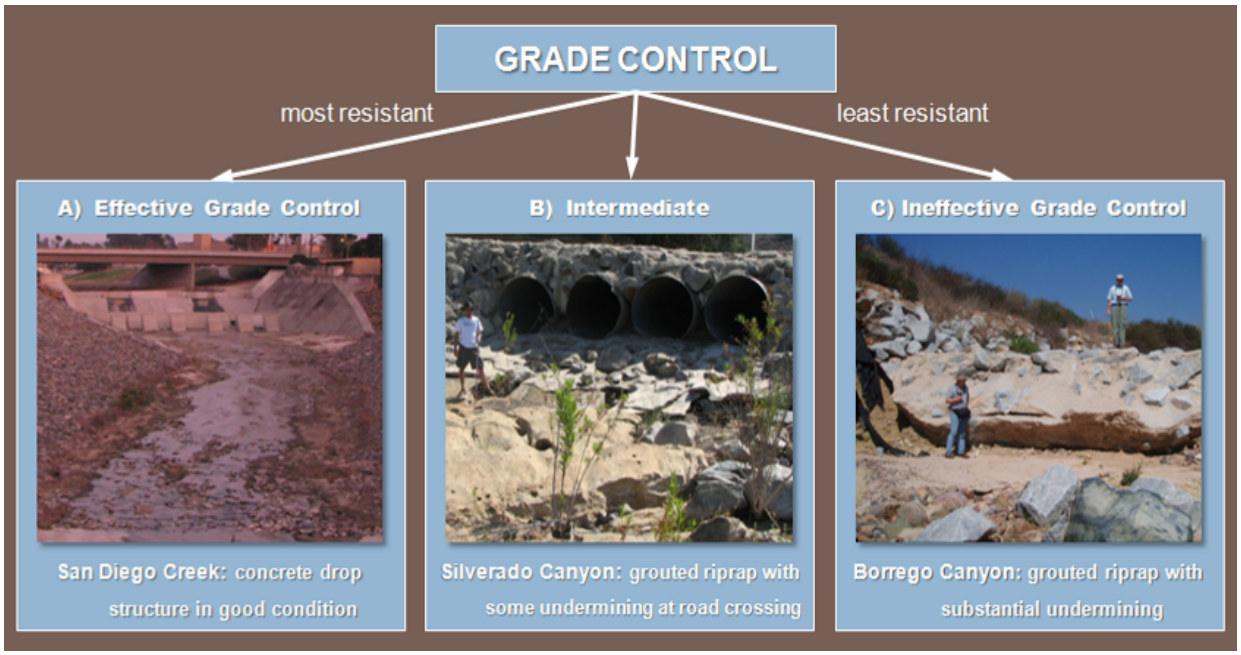
□	A	A mix of coarse gravels and cobbles that are tightly packed with <5% surface material of diameter <2 mm
☒	B	Intermediate to A and C or hardpan of unknown resistance, spatial extent (longitudinal and depth), or unknown armoring potential due to surface veneer covering gravel or coarser layer encountered with probe
□	C	Gravels/cobbles that are loosely packed or >25% surface material of diameter <2 mm



Form 3 Figure 2. Armoring potential photographic supplement for assessing intermediate beds (16 < d_{50} < 128 mm) to be used i**n conjunction with Form 3 Checklist 1.**

Form 3 Checklist 2: Grade Control

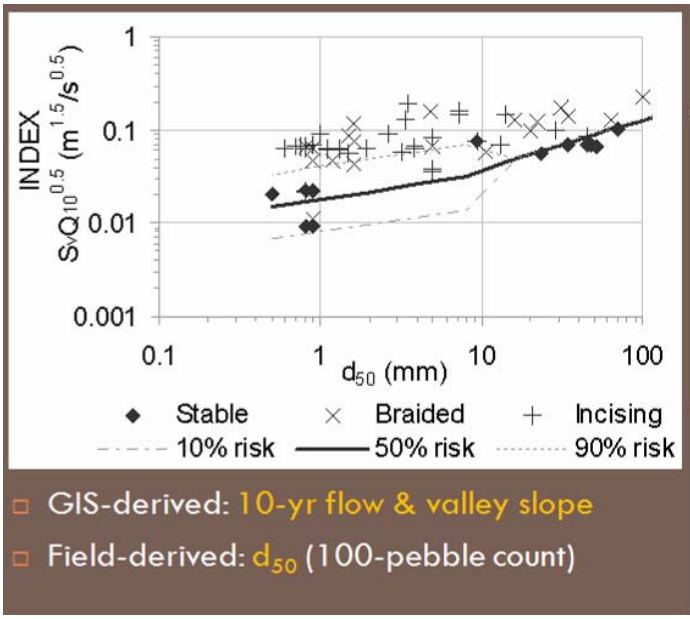
☒	A	Grade control is present with spacing <50 m or $2/S_v$ m • No evidence of failure/ineffectiveness, e.g., no headcutting (>30 cm), no active mass wasting (analyst cannot say grade control sufficient if mass-wasting checklist indicates presence of bank failure), no exposed bridge pilings, no culverts/structures undermined • Hard points in serviceable condition at decadal time scale, e.g., no apparent undermining, flanking, failing grout • If geologic grade control, rock should be resistant igneous and/or metamorphic; For sedimentary/hardpan to be classified as 'grade control', it should be of demonstrable strength as indicated by field testing such as hammer test/borings and/or inspected by appropriate stakeholder
☐	B	Intermediate to A and C – artificial or geologic grade control present but spaced 2/Sv m to 4/Sv m or potential evidence of failure or hardpan of uncertain resistance
☐	C	Grade control absent, spaced >100 m or $>4/S_v$ m, or clear evidence of ineffectiveness



Form 3 Figure 3. Grade-control (condition) photographic supplement for assessing intermediate beds ($16 < d_{50} < 128$ mm) to be used in conjunction with Form 3 Checklist 2.

Regionally-Calibrated Screening Index Threshold for Incising/Braiding

For transitional bed channels (d_{50} between 16 and 128 mm) or labile beds (channel not incised past critical bank height), use Form 3 Figure 3 to determine Screening Index Score and complete Form 3 Table 1.



Model Type	d_{50} (mm)	50% Risk $S_vQ_{10}^{0.5}$ ($m^{1.5}/s^{0.5}$)
Logistic Regression $d_{50} \geq 16$ mm	128	0.145
	96	0.125
	80	0.114
	64	0.101
	48	0.087
	32	0.070
	16	0.049
Logistic Reg. $d_{50} < 16$ mm	8	0.031
	4	0.026
	2	0.022
	1	0.018
	0.5	0.015

Form 3 Figure 4. Probability of incising/braiding based on logistic regression of Screening Index and d_{50} to be used in conjunction with Form 3 Table 1.

Form 3 Table 1. Values for Screening Index Threshold (probability of incising/braiding) to be used in conjunction with Form 3 Figure 4 (above) to complete Form 3 Overall Vertical Rating for Intermediate/Transitional Bed (below).. Screening Index Score: A = <50% probability of incision for current Q_{10}, valley slope, and d_{50}; B = Hardpan/d_{50} indeterminate; and C = ≥50% probability of incising/braiding for current Q_{10}, valley slope, and d_{50}.

d_{50} (mm) *From Form 2*	$S_v*Q_{10}^{0.5}$ ($m^{1.5}/s^{0.5}$) *From Form 1*	$S_v*Q_{10}^{0.5}$ ($m^{1.5}/s^{0.5}$) *50% risk of incising/braiding from table in Form 3 Figure 3 above*	Screening Index Score (A, B, C)

Overall Vertical Rating for Intermediate/Transitional Bed

Calculate the overall Vertical Rating for Transitional Bed channels using the formula below. Numeric values for responses to Form 3 Checklists and Table 1 as follows: A = 3, B = 6, C = 9.

$$Vertical\ Rating = \sqrt{\{(\sqrt{armoring} * grade\ control) * screening\ index\ score\}}$$

6 x 3 x 3 = 3.6

Vertical Susceptibility based on Vertical Rating: <4.5 = LOW; 4.5 to 7 = MEDIUM; and >7 = HIGH.