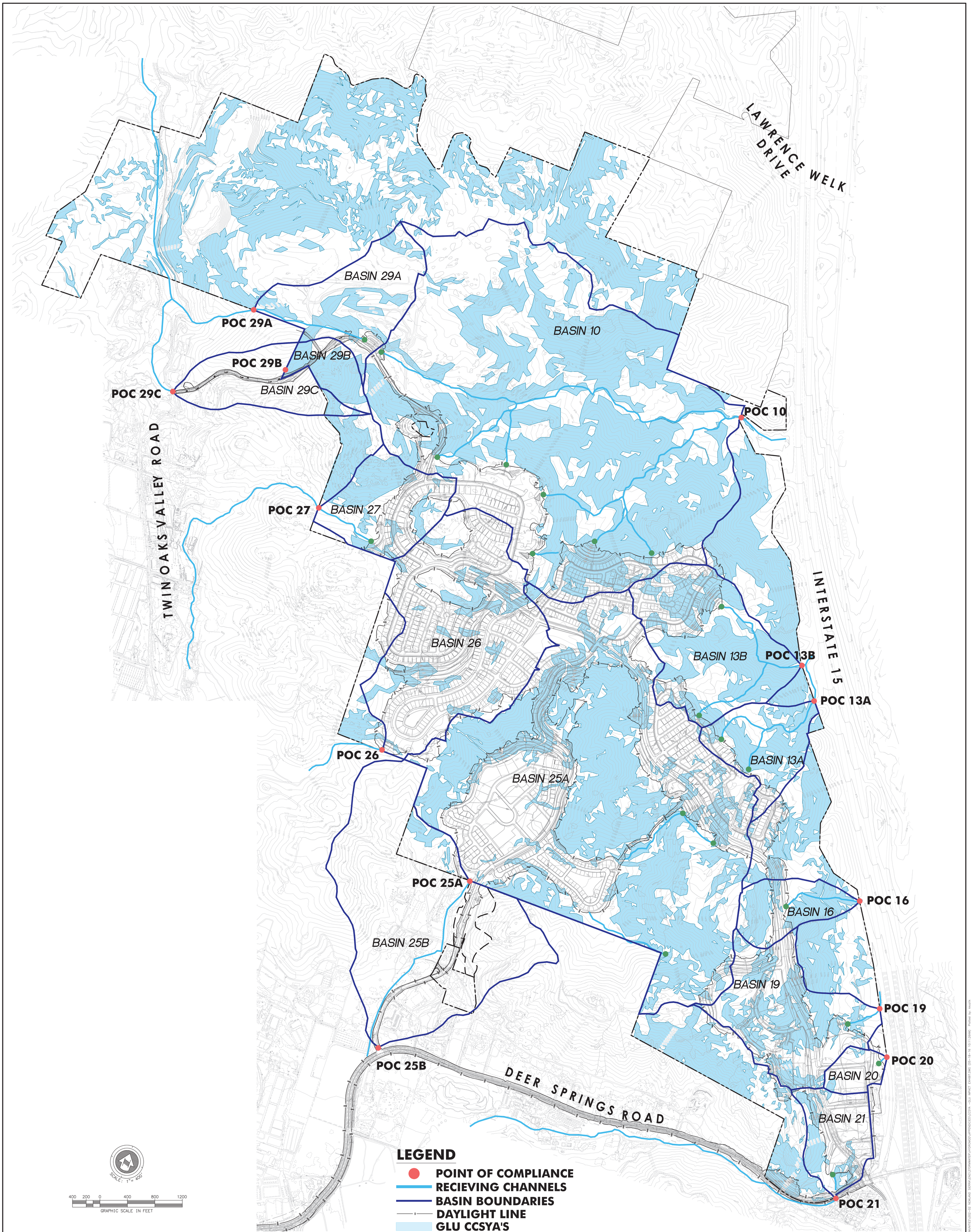


FUSCOE ENGINEERING
full circle thinking

NEWLAND SIERRA
CRITICAL COARSE SEDIMENT YIELD IMPACT EXHIBIT
FEBRUARY 2016

Leighton and Associates, Inc.	**PHOTOGRAPHIC RECORD** **December 14, 2016**	
Client Name: **Newland Sierra, LLC**	**Site Location:** **San Diego County, California**	**Project No.** **10618.002**

Photo No. 1 **View Direction of Photo:** West **Description:** View of POC 19, hard rock waterfall and resulting grade control structure.	

Photo No. 2 **View Direction of Photo:** West **Description:** View of POC 19, Grass growing in hard rock channel with hard bedrock visible at surface of channel	

Leighton and Associates, Inc.	**PHOTOGRAPHIC RECORD** **December 14, 2016**	
Client Name: **Newland Sierra, LLC**	**Site Location:** **San Diego County, California**	**Project No.** **10618.002**

Photo No. 3 **View Direction of Photo:** Southwest **Description:** View of POC 19, Hard rock pile and resulting waterfall grade control structure.	

Photo No. 4 **View Direction of Photo:** East **Description:** View of upper POC 13B Reach C with large boulders.	

Leighton and Associates, Inc.	PHOTOGRAPHIC RECORD December 14, 2016	
Client Name: **Newland Sierra, LLC**	**Site Location:** **San Diego County, California**	**Project No.** **10618.002**

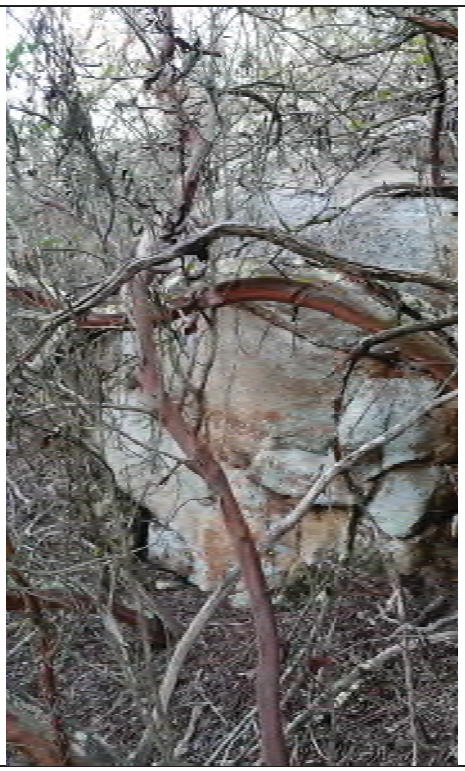
Photo No. 5 **View Direction of Photo:** South **Description:** View of upper area of POC 13B Reach C, dense brush, large boulder control structure, dense brush and leaves	

Photo No. 6 **View Direction of Photo:** South **Description:** View of upper area of POC 13B Reach C, where very hard bedrock is exposed in channel bottom. Note a lack of sediment to sample.	

Leighton and Associates, Inc.	PHOTOGRAPHIC RECORD December 14, 2016	
Client Name: **Newland Sierra, LLC**	**Site Location:** **San Diego County, California**	**Project No.** **10618.002**

Photo No. 7 **View Direction of Photo:** South **Description:** View of upper area of POC 13B Reach B, dense brush, large boulder control structure.	

Photo No. 8 **View Direction of Photo:** East **Description:** View of upper area of POC 13B Reach B, standing above the dense brush and large boulder control structures.	

Leighton and Associates, Inc.	PHOTOGRAPHIC RECORD December 14, 2016	
Client Name: **Newland Sierra, LLC**	**Site Location:** **San Diego County, California**	**Project No.** **10618.002**

Photo No. 9	
View Direction of Photo: North	
Description: View of upper portion of POC 26, note large bedrock exposures at surface of channel creating a control structure. Also note very dense brush and a lack of sediment.	

Photo No. 10	
View Direction of Photo: West	
Description: View of POC 26, note large boulders in channel creating a massive control structure through out the drainage. Also note very dense brush and a lack of sediment.	

APPENDIX A

SCCWRP INITIAL DESKTOP ANALYSIS

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: 33.2060 Longitude: -117.1393

Description (river name, crossing streets, etc.): Newland Sierra

North of Deer Springs Road and West of Interstate 15

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 each 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 Tabl e 2. Simplif ied peak flo w, 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 each 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)	

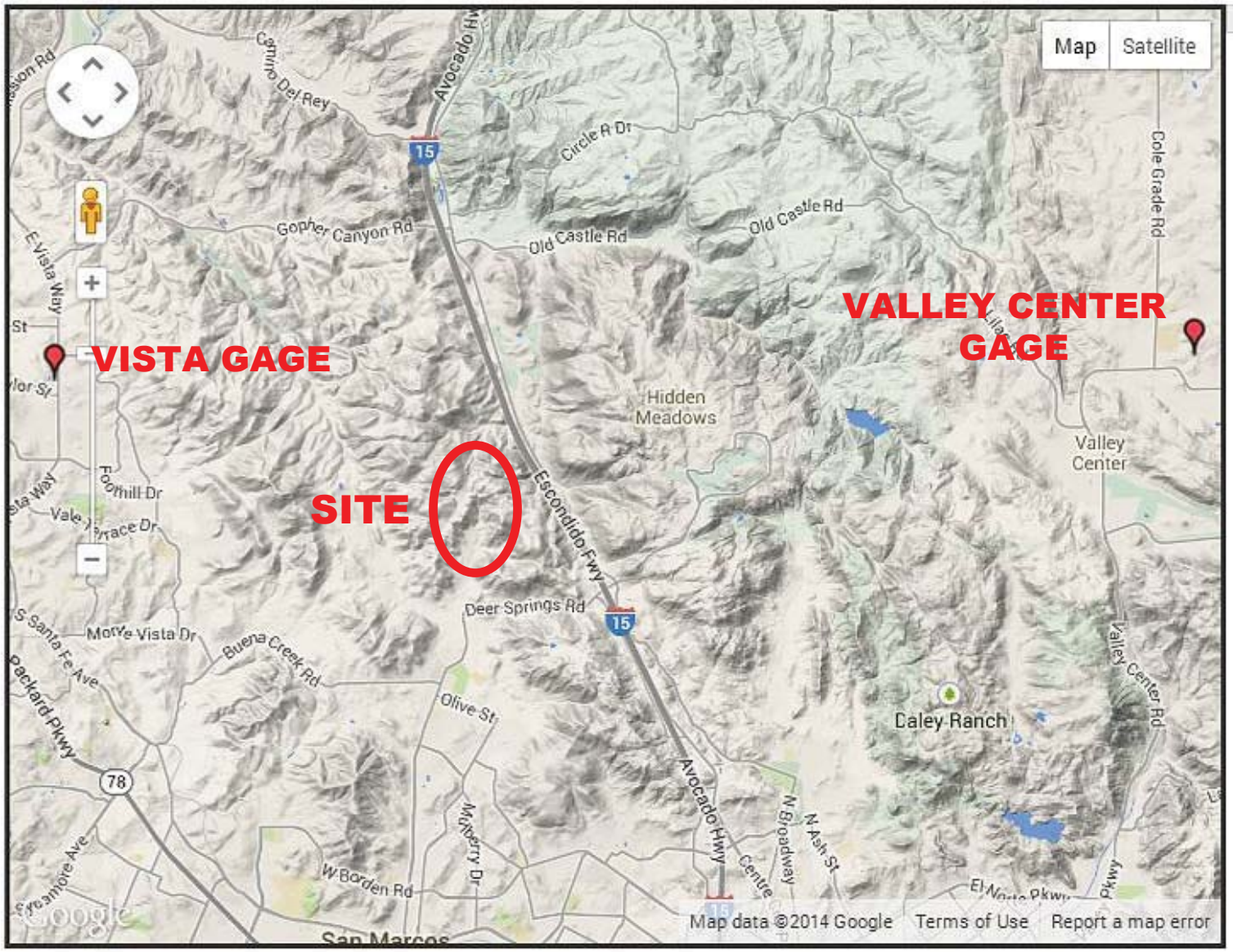
(Sheet 1 of 1)

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	0.1187	14.6	0.1047	1.2	22	0.6
2	0.0446	14.6	0.1250	1.5	10	0.3
3	0.0213	14.6	0.3604	3.0	5	0.1
4	0.2376	14.6	0.0584	2.4	41	1.2

Reach	10-Year Screening Index INDEX	Reference Width Wref, m	Valley Width Index VWI, m/m
1	0.083	5.7	0.21
2	0.065	3.9	0.39
3	0.136	3.0	1.02
4	0.063	7.5	0.33

US COOP Station Map



RAIN GAGES NEAREST TO STUDY AREA

VISTA 1 NE, CALIFORNIA (049378)

Period of Record Monthly Climate Summary

Period of Record : 8/ 1/1957 to 3/31/2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	67.4	67.8	68.2	70.8	72.9	76.3	81.3	83.0	82.2	77.9	72.3	67.4	74.0
Average Min. Temperature (F)	44.0	45.0	46.3	48.5	53.5	56.6	60.3	61.6	60.0	55.0	48.3	44.0	51.9
Average Total Precipitation (in.)	2.76	2.55	2.24	1.05	0.22	0.11	0.06	0.07	0.25	0.54	1.40	1.83	13.09
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	0.1
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.: 86.6% Min. Temp.: 87% Precipitation: 87.6% Snowfall: 87.7% Snow Depth: 87.3%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

VALLEY CENTER 2 NNE, CALIFORNIA (049232)

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1969 to 4/30/1978

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)					Insufficient Data								
Average Min. Temperature (F)					Insufficient Data								
Average Total Precipitation (in.)	3.23	3.82	3.93	1.09	0.59	0.09	0.02	0.00	0.51	0.46	1.41	2.30	17.46
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.: 0.9% Min. Temp.: 0.9% Precipitation: 83.8% Snowfall: 83.8% Snow Depth: 83.8%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

APPENDIX B

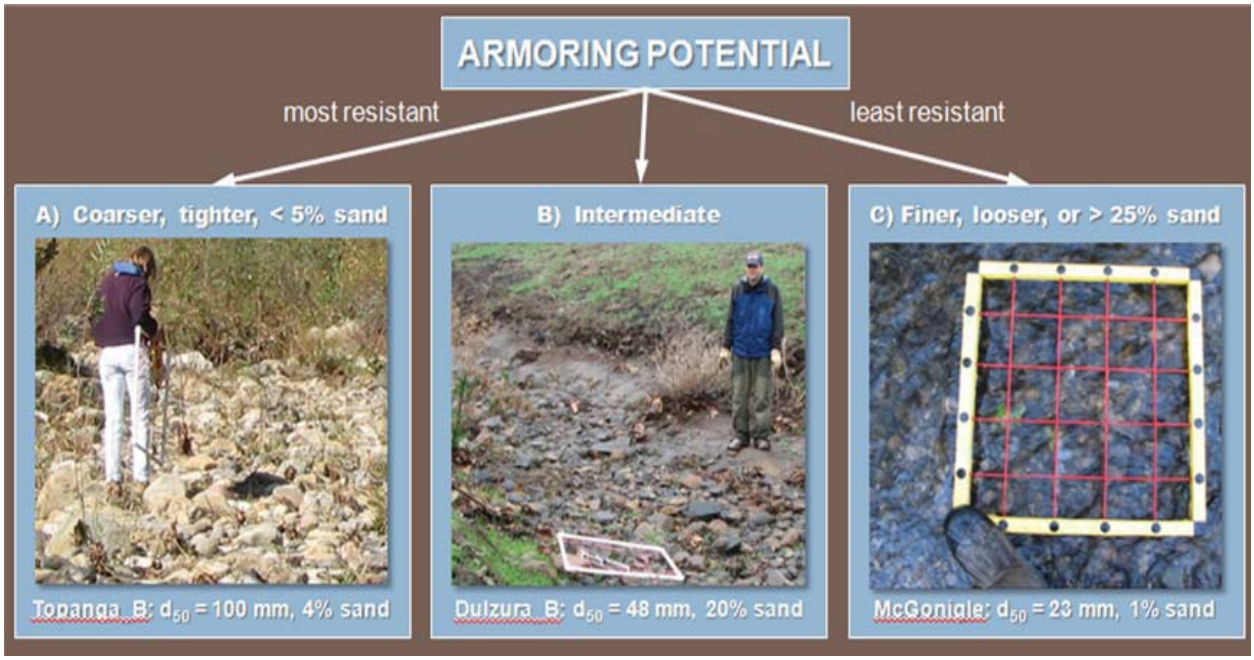
SCCWRP FIELD SCREENING DATA

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

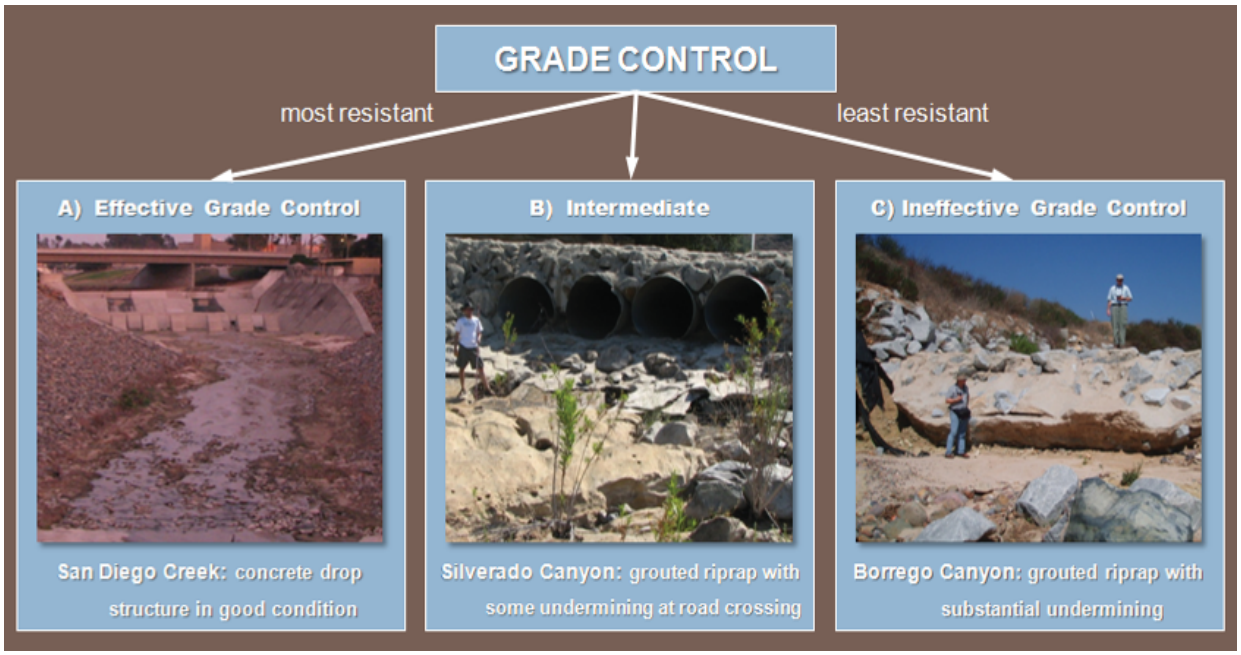
☒	A	A mix of coarse gravels and cobbles that are tightly packed with <5% surface material of diameter <2 mm
☐	B	Intermediate to A and C or hardpan of unknown resistance, spatial extent (longitudinal and depth), or unknown armoring potential due to surface veneer covering gravel or coarser layer encountered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

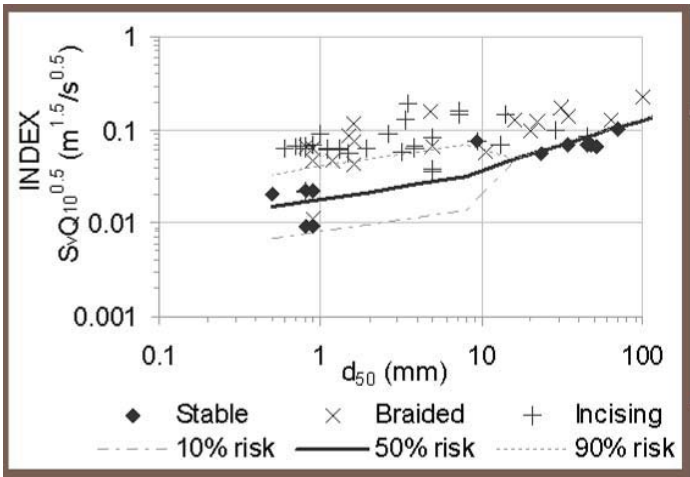
☒	A	Grade control is present with spacing <50 m or $2/S_v$ m • No evidence of failure/ineffectiveness, e.g., no headcutting (>30 cm), no active mass wasting (analyst cannot say grade control sufficient if mass-wasting checklist indicates presence of bank failure), no exposed bridge pilings, no culverts/structures 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.

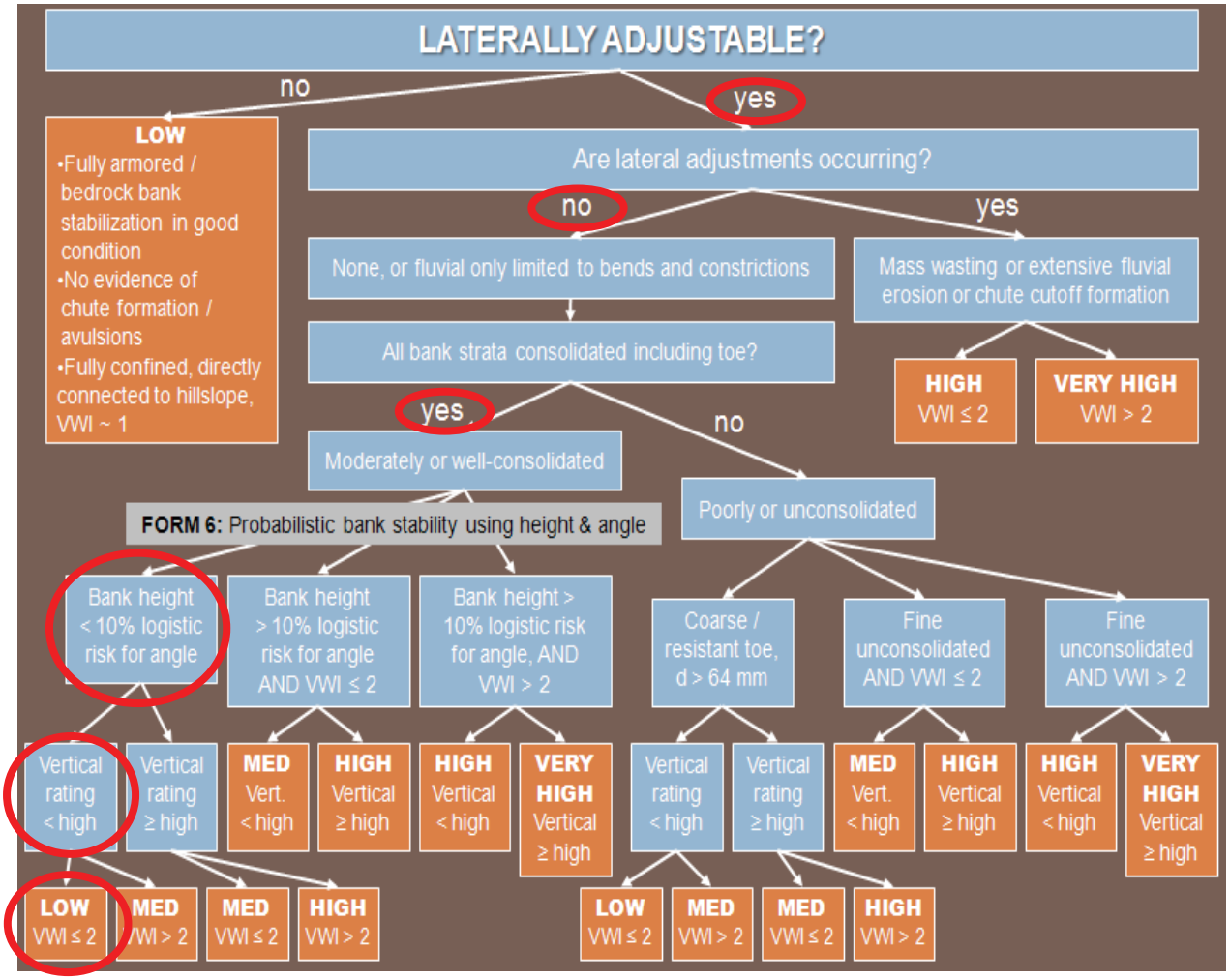
$$Vertical\ Rating = \sqrt{\{(\sqrt{armoring} * grade\ control) * screening\ index\ score\}}$$

See Table 4 in Report for Vertical Rating Results

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

FORM 4: LATERAL SUSCEPTIBILTY FIELD SHEET

Circle appropriate nodes/pathway for proposed site
OR use sequence of questions provided in Form 5.



(Sheet 1 of 1)

REACH 1 THROUGH 4 RESULTS