Preliminary Floodplain Analysis

Stevenson Creek and
Twin Oaks Valley Creek

Newland Sierra
County of San Diego, CA

February 14, 2017

Prepared by:

2/14/17

Kenneth T. Kozlik, P.E. RCE 71883 Date: EXP: 12-31-17
Foscoe Engineering, San Diego, Inc.
6390 Greenwich Dr., Suite 170
San Diego, CA 92122

TABLE OF CONTENTS

REFERENCES

HEC-RAS River Analysis System User's Manual, Version 4.0, US Army Corp of Engineers Hydrologic Engineering Center, March 2008.

HEC-RAS River Analysis System Hydraulic Reference Manual, Version 3.1, US Army Corp of Engineers Hydrologic Engineering Center, November 2002.

San Diego County Hydraulic Design Manual, County of San Diego Department of Public Works Flood Control Section, September 2014.

INTRODUCTION

This Floodplain Revision and No-Rise report has been prepared to address potential impacts to the Stevenson Creek and Twin Oaks Valley Creek floodplains as a result of the Newland Sierra project. The project proposes to improve Sarver Lane south of the project boundary to Deer Springs Road, as well as Deer Springs Road from I-15 to Twin Oaks Valley Road. These offsite road improvements impact the FEMA-mapped floodplain and floodway for both Stevenson Creek and Twin Oaks Valley Creek. To reduce impacts and to remove Twin Oaks Valley Road from the floodplain, the project proposes to construct an open channel for Stevenson Creek along the easterly side of Deer Springs Road and several culvert crossings. This study calculates the impacts to the floodway/floodplain width and elevations due to these improvements, and verifies that there will be no increase in water surface elevations due to the project. The analysis was performed using the HEC-RAS Version 4.1 software produced by the US Army Corp of Engineers.

METHODOLOGY

DATUMS

The project topography and grading design are based on NAVD 88. This was compared to the effective model to ensure consistency in the datums used. While the Base Flood Elevations (BFEs) in the Effective FIRM maps are based on NAVD 88, it appears the effective HEC-2 model was based on NGVD 29. This can be seen by comparing the FIRM maps and Floodway Data in Appendix A. The BFEs on the FIRM maps differ from the Floodway Data by 2.4 ft, which corresponds to the shift from NGVD 29 to NAVD 88 in the project area. Using the National Geodetic Survey's VERTCON program, the shift from NGVD 29 to NAVD 88 at the project location is approximately 2.37'. Output from this program has been included in Appendix A for reference. Therefore, when cross section data was imported from the effective HEC-2 model, the cross section elevations were increased by 2.37' to account for the datum shift.

CROSS SECTIONS

Both existing and proposed models were analyzed to compare changes in the water surface elevation. Cross section data was taken from a variety of sources as appropriate, including the effective FEMA model for Twin Oaks Valley Creek, the aerial topography of the existing conditions, and the proposed grading for Sarver Lane and Deer Springs Road.

For the majority of Stevenson Creek, cross section data was taken from the aerial topography for existing conditions since significant modifications are proposed along Stevenson Creek. The proposed model incorporates the proposed grading of the streets and channels. The downstream end of Stevenson Creek model terminates at cross section 9+84, upstream of the confluence with Twin Oaks Valley Creek. The downstream water surface elevation was set at normal depth at this cross section. At the upstream end of Stevenson Creek, the model ties back into the effective model for Sections 57+17, 57+67, and 59+72, which correspond to effective Sections M, N, and O respectively.

For Twin Oaks Valley Creek, on the other hand, the crossing of Deer Springs Road is a relatively short impact. Adjacent to the crossing, the existing aerial topography and proposed grading are used, but upstream cross sections were imported from the effective model. The Twin Oaks Valley Creek model extends downstream past the confluence with Stevenson Creek to Section 1+00, which corresponds to Section U in the effective model. All the channel characteristics for this cross section were imported from the effective model. The downstream water surface elevation at Section 1+00 was set to the Base Flood Elevation from the effective model.

The effective FEMA floodplain/floodway, cross sections, and Base Flood Elevations (BFEs) can be seen on the attached Effective FEMA Floodplain/Floodway Exhibit included in Appendix B. The existing model results can be seen overlaid on the Existing Conditions Analysis Exhibit in Appendix C. The proposed cross sections can be seen on the attached Proposed Floodplain/Floodway Exhibit included in Appendix D.

MANNING'S "N"

Manning's roughness coefficients, "n", were assigned using the effective FEMA model and guidance from the *San Diego County Hydraulic Design Manual (HDM)*. For the overbank areas and where no work is proposed in the existing channel, the "n" values from the effective FEMA model were used. For the proposed channel, a final channel material will be selected during final engineering. For the purposes of this study, a Manning's "n" representative of ungrouted ¼ ton riprap was used for the proposed Stevenson Creek channel. Per Table 5-4 of the HDM, the corresponding "n" value is 0.044. This resulted in velocities in the 9-10 feet per second range, with a maximum value of 10.2 feet per second.

For freeboard and floodplain/floodway calculations, the model was run with a Manning's "n" of 0.150 for all proposed channels per Section 5.3.7 of the HDM. This "High 'n'" run was used for all water surface elevation comparisons.

FLOW RATE

Flow rates for the reaches modeled were taken from the effective FEMA models. The 100-year peak flow rate for Stevenson Creek and Twin Oaks Valley Creek is 900 cfs and 1,750 cfs, respectively. Downstream of their confluence at Section 8+00 a combined flow rate of 2,650 cfs is used. At the downstream control station at 1+00, Deer Springs Creek adds a further 1,550 cfs to bring the total flow rate to 4,200 cfs.

FREEBOARD

Per the *San Diego County Drainage Design Manual* Section 5.3.7, freeboard should be a minimum of 1.0 feet.

STEVENSON CREEK SPLIT FLOW

In the existing conditions, Stevenson Creek runs along the west side of Deer Springs Road, and then crosses over the east side in a culvert. While the culvert is undersized for the full flow and the roadway in inundated in the existing floodpain/floodway, the full flow

eventually crosses the road to the east side. This can be seen in cross section 14+44 of the existing conditions model.

In the proposed conditions model, a split flow condition will occur along each side of Deer Springs Road from the Stevenson Creek culvert to the Twin Oaks Valley Creek culvert. The proposed Stevenson Creek culvert crossing Deer Springs Road will not capture the full flow in Stevenson Creek due to the breadth of the floodplain to the west of the culvert. This split flow condition was analyzed to ensure no adverse impacts occur on the west side of Deer Springs Road. The perform this analysis, the flow rate on the west side of Deer Springs Road is assumed to be equal to the right overbank flow at cross section 38+82. Cross section 38+82 was selected as it is far enough upstream of the culvert to not reflect the localized impacts of grading at the culvert entrance, while still being representative of the topography and flow patterns as the flow approaches the culvert. The right overbank flow rate of 559 cfs at this cross section was then used for the split flow analysis.

Since the split flow model assumes that 559 cfs will bypass the culvert crossing Deer Springs Road, this means that the flow entering the culvert will be 341 cfs. However, this culvert and the channel downstream was conservatively sized for 500 cfs since the split flow calculation is approximate and more flow may enter the culvert. This also allows for some reserve capacity if future improvements are constructed to direct more flow to the culvert.

The cross sections for the split flow analysis were taken from the full Stevenson Creek model, but truncated at Deer Springs Road. The split flow parallels Deer Springs Road southerly to approximately section 17+00. Here, a channel is proposed in the adjacent field to collect the split flow and direct it to a culvert crossing of Deer Springs Road. This culvert reunites the split flow with the Stevenson Creek channel at section 16+44. The split flow model terminates at section 16+24, which is the downstream expansion section for the culvert. The downstream water surface elevation at this section is set at the water surface elevation from the main Stevenson Creek model. The full Stevenson Creek flow of 900 cfs is conveyed entirely within the proposed channel on the east side of Deer Springs Road from cross section 16+44 to the confluence with Twin Oaks Valley Creek.

TWIN OAKS VALLEY CREEK CROSSING

In the existing condition, the culverts for the Twin Oaks Valley Creek crossing of Deer Springs Road are undersized for the 100-year storm. This results in a wide area of weir flow overtopping the road. Sycamore Drive lies opposite the approach of Twin Oaks Valley Creek, and effectively splits this weir flow into northerly and southerly components. The proposed condition attempts to mimic this split flow to avoid impacts to the southeast of the crossing.

To determine the existing condition flowrate on the left (north) and right (south) side of Sycamore Drive, the existing culvert and weir flow rates were determined from the model. The culvert conveys approximately 335 cfs to the left side of Sycamore Drive, and the remaining 1,415 cfs overtops the road. This weir flow occurs to the south of Sycamore Drive, near the intersection with North Twin Oaks Valley Road. Thus, the full weir flow

crosses onto the right side of Sycamore Drive. This gives a total flowrate of 335 cfs on the left side, and 1,415 cfs on the right. Calculations of the flow distribution can be found in Appendix E.

To mimic this flow distribution in the proposed condition, culverts were sized for both the left and right sides to match the existing flowrate. A single 7.25'x4' culvert will convey approximately 335 cfs to the left side. A concrete apron will be constructed at the downstream end of this culvert, where Stevenson Creek confluence with Twin Oaks Valley Creek. A series of fourteen 6'x2' box culverts will convey approximately 1,415 cfs to the right side. The 6'x2' box culverts will be raised so that in small to medium sized storm events all flows will be conveyed through the double box culvert to left side into the main channel of Twin Oaks Valley Creek. To additionally mimic the weir flow over the road in existing conditions, the 6'x2' box culverts on the right side will discharge to a flow spreader. This will distribute the 1,415 cfs throughout the width of the existing floodway and will prevent the discharge of concentrated flows onto the south side of Sycamore Drive.

CALCULATIONS/RESULTS

The parameters discussed above where input into the HEC-RAS models for Stevenson Creek and Twin Oaks Valley Creek. The proposed channel and culverts were then sized to adequately convey the 100-year flow rate without increasing the water surface over the existing conditions model, and also without flooding the proposed roadways.

The tables on the following page illustrate the results of the HEC-RAS modeling. The "High n" model uses an "n" value of 0.150 for the proposed channel which is used for freeboard calculations and WSE comparison. The "Low n" models uses an "n" value appropriate for the channel material as discussed above. This model is primarily used to check velocities in the channel to ensure they are within the design range of the channel materials. A "Floodway Run" was also prepared for both creeks. This run is based on the "High n" run and adds encroachments into the floodplain to determine how much encroachment can be allowed without increasing the WSE more than 1' or above the effective BFE. The area between the encroachments is then designated as the floodway. Results from the Split Flow models on Stevenson Creek and Twin Oaks Valley Creek are also shown on the tables.

As shown in the tables, there is one location that exhibits a slight increase (0.01') in water surface elevation from the existing model to the proposed model. This increase occurs at Twin Oaks Valley Creek cross section 13+67, where no improvements are proposed and where there is no change in the flowrates. During the modeling, various characteristics of the adjacent cross sections where work is proposed were modified to see what could be done to eliminate the increase. However, no changes were successful. The error messages for this cross section state that the model defaulted to critical depth as it was not able to reach a subcritical solution for the water surface elevation. This same error message is present in the existing conditions model at this cross section. Thus, the slight increase appears to be due to an

irregularity in the model and not due to the proposed project. During final engineering, more accurate data and more frequent cross sections will be added to the model, which will likely eliminate the slight increase.

Based on the results of this analysis, the limits of the revised floodplain and floodway were determined. These can be seen on the attached Proposed Floodplain/Floodway Exhibit.

Stevenson Creek

	Existing Model	High n Model		Low n Model		Floodway Run		Westerly Split Flow	
Station	Computed WSE	WSE	Change from Ex	WSE	Velocity	WSE	Change from High n WSE	WSE	Change from Ex
5972	817.21	817.21	0.00	817.21	7.98	818.21	1.00		
5767	813.89	813.89	0.00	813.89	7.80	814.89	1.00		
5717	813.35	813.35	0.00	813.35	7.06	814.03	0.68		
5134	800.16	800.16	0.00	800.16	6.96	801.14	0.98		
4724	792.50	792.49	-0.01	792.50	7.15	793.11	0.62		
4674	791.27	791.26	-0.01	791.27	6.42	792.04	0.78		
4254	780.66	780.66	0.00	780.67	5.44	781.64	0.98		
3882	771.63	771.63	0.00	771.63	6.70	772.60	0.97	771.63	0.00
3824	770.49	770.27	-0.22	770.14	6.29	770.93		770.21	-0.28
3743	769.38	768.82	-0.56	768.73	3.90	769.19	0.37	768.86	-0.52
3488	Culvert								
3354	760.07	758.15	-1.92	755.46	7.84	758.15	0.00	759.91	-0.16
3334		757.70		754.67	9.03	757.70	0.00	759.21	
3144		753.84		750.92	7.63	753.84	0.00	755.38	
2996	751.93	750.81	-1.12	747.88	9.01	750.81	0.00	751.90	-0.03
2844		747.34		744.28	8.63	747.34	0.00	748.43	
2666	744.74	743.87	-0.87	740.83	8.49	743.87	0.00		
2572		740.97		739.52	7.36	740.93	-0.04		
2560		740.13		738.77	9.03	740.02	-0.11		
2494	Culvert								
2407		739.76		735.90	8.33	739.68	-0.08	739.76	
2387		739.48		735.40	9.08	739.39	-0.09	739.48	
2352	739.33	739.03	-0.30	735.11	8.33	738.92	-0.11		
2289	738.50	738.18	-0.32	733.70	9.91	738.00	-0.18		
1795	731.47	728.93	-2.54	725.87	8.40	729.45	0.52		
1783		728.66		724.98	10.24	729.24	0.58		
1719	Culvert								
1644		727.91		724.46	6.83	728.44	0.53		
1624		727.78		724.60	4.33	728.34	0.56		
1444	727.12	726.31	-0.81	723.75	5.92	727.06	0.75		
1184	723.62	723.62	0.00	722.07	6.55	724.58	0.96		
984	722.01	721.69		721.76	3.81	721.49	-0.20		
800	721.68	721.37		721.53	5.02	721.36	-0.01		
567	721.31	721.31		721.47	3.08	721.31	0.00		
100	717.51	717.51	0.00	717.51	7.77	717.51	0.00		

Twin Oaks Valley Creek

	Existing Model			High n Model						Low n Model					
				Main Stream		Left Split Flow		Right Split Flow				Left Split Flow		Right Split Flow	
Station	Computed WSE	Left Split Flow WSE	Right Split Flow WSE	WSE	Change from Ex	WSE	Change From Ex	WSE	Change from Ex	WSE	Velocity	WSE	Velocity	WSE	Velocity
2436	743.99			743.99	0.00					743.99	6.73				
2291	741.83			741.83	0.00					741.83	6.12				
1900	735.69			735.69	0.00					735.69	6.52				
1800	734.42			734.42	0.00					734.42	6.17				
1667	731.88			731.37	-0.51					731.37	7.51				
1367	726.48			726.49	0.01					726.50	6.66				
1067	724.89					724.26	-0.63	724.28	-0.61			724.26	0.44	724.28	0.95
1012	724.88			Culvert		Culvert		Culvert		Culvert		Culvert		Culvert	
950	Culvert														
800		721.68	719.16			720.23	-1.45	719.16	0.00			720.23	7.38	719.22	1.99
567		721.31	717.39			719.83	-1.48	717.39	0.00			719.83	6.57	717.58	2.98
100		717.51	717.40			717.40	-0.11	717.40	0.00			717.40	0.19	717.40	0.10

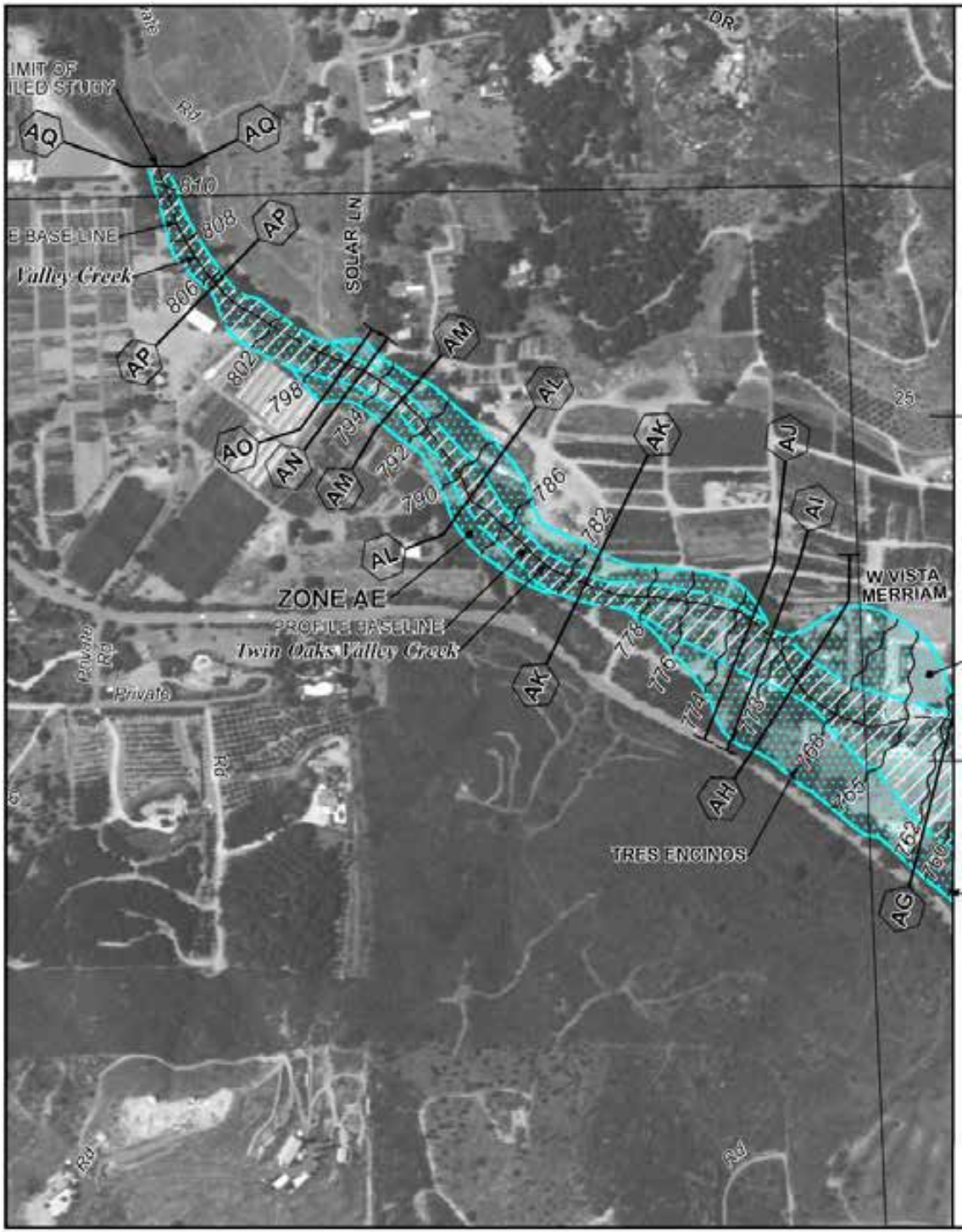
CONCLUSION

As seen in the results, the proposed channels and culverts are adequately designed to convey the 100-year flows in Stevenson Creek and Twin Oaks Valley Creek. The proposed WSEs are all at are below the existing conditions model. The proposed roads of Sarver Lane and Deer Springs Road are out of the 100-year floodplain. Therefore, the proposed Newland Sierra project and its associated offsite road improvements will not adversely impact the floodplains/floodways for these creeks.

At the time of final engineering, a more detailed analysis based on design level information will be conducted and a No-Rise Certification will be prepared. Additionally, a Conditional Letter of Map Revision (CLOMR) will be processed with FEMA to formalize the revisions to the effective floodplain and floodway. Upon completion of the improvements, a Letter of Map Revision (LOMR) will be processed.

APPENDIX A

FEMA Firm Maps, FIS Excerpts and
Datum Conversion Reference



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0783G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 783 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

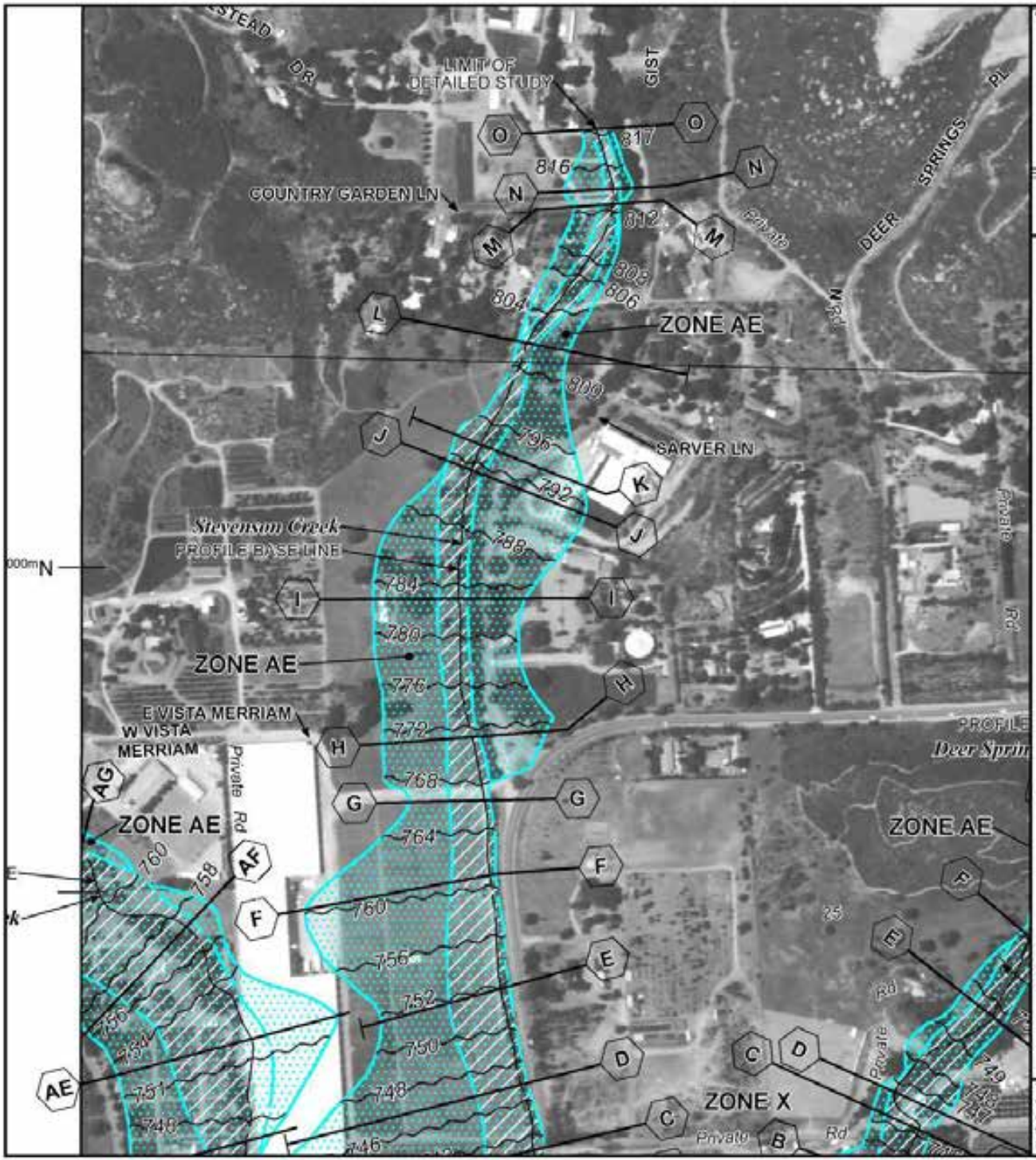
COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO COUNTY	060284	0783	G
SAN MARCOS, CITY OF	060295	0783	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C0783G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0784G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 784 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

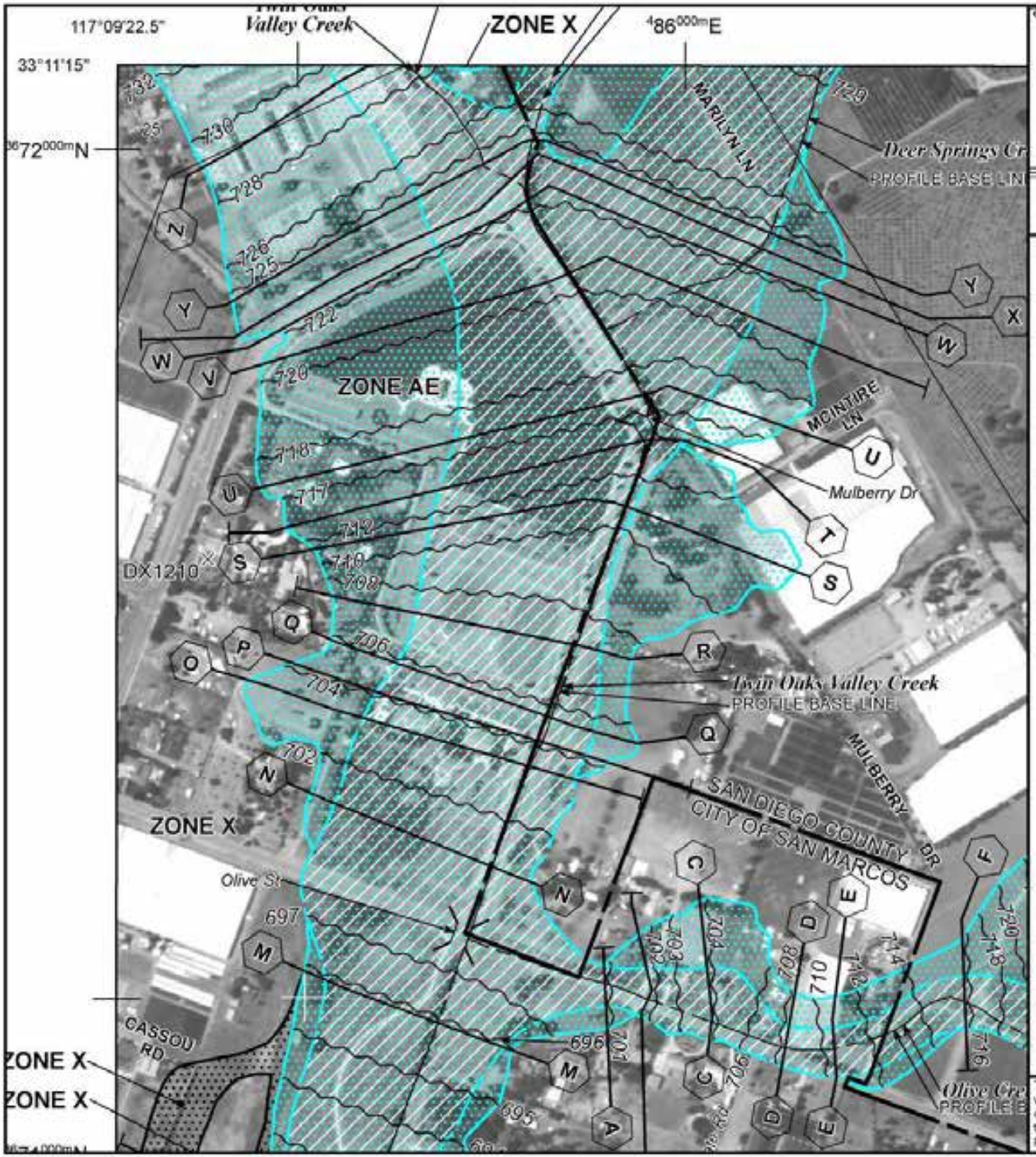
COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO COUNTY	060284	0784	G
SAN MARCOS, CITY OF	060295	0784	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C0784G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0792G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 792 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ESCONDIDO, CITY OF	060290	0792	G
SAN DIEGO COUNTY	060284	0792	G
SAN MARCOS, CITY OF	060295	0792	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C0792G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Stevenson Creek								
A	900	175	226	4.0	731.7	731.7	732.2	0.5
B	1,395	240	195	4.6	737.3	737.3	737.9	0.6
C	1,555	207	248	3.6	739.6	739.6	740.4	0.8
D	1,773	165	199	4.5	744.6	744.6	745.1	0.5
E	2,103	195	208	4.3	749.8	749.8	750.5	0.7
F	2,463	143	215	4.2	758.6	758.6	759.3	0.7
G	2,733	126	199	4.5	765.1	765.1	765.2	0.1
H	2,930	99	142	6.3	769.8	769.8	770.4	0.6
I	3,365	103	161	5.6	780.7	780.7	780.7	0.0
J	3,780	129	173	5.2	789.9	789.9	790.5	0.6
K	3,870	127	254	3.5	792.2	792.2	793.2	1.0
L	4,240	53	105	8.6	800.1	800.1	800.1	0.0
M	4,809	50	107	8.4	810.9	810.9	811.0	0.1
N	4,858	60	233	3.9	812.9	812.9	813.6	0.7
O	5,060	44	103	8.7	814.9	814.9	814.9	0.0

[1]Feet Above Confluence With Twin Oaks Valley Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

FLOODWAY DATA

STEVENSON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Twin Oaks Valley Creek								
A	915	400	1,753	4.1	569.6	569.6	570.0	0.4
B	1,928	430	3,625	2.0	579.4	579.4	579.4	0.0
C	2,748	332	1,802	3.9	580.3	580.3	580.4	0.1
D	3,588	360	1,820	3.9	583.6	583.6	583.8	0.2
E	5,227	255	778	9.1	602.9	602.9	603.1	0.2
F	6,357	170	1,172	6.1	606.1	606.1	606.7	0.6
G	7,917	130	1,128	5.9	622.1	622.1	622.6	0.5
H	8,916	155	1,220	5.5	628.8	628.8	629.5	0.7
I	10,929	110	931	7.0	647.2	647.2	647.7	0.5
J	12,158	110	870	7.5	663.1	663.1	663.5	0.4
K	13,658	239	716	9.1	674.4	674.4	674.7	0.3
L	15,203	414	1,151	5.6	688.3	688.3	688.4	0.1
M	16,039	615	1,391	4.7	693.5	693.5	693.6	0.1
N	16,582	701	2,333	2.2	699.3	699.3	699.3	0.0
O	16,932	713	823	6.3	700.6	700.6	701.0	0.4
P	17,040	705	1,291	4.0	702.5	702.5	702.8	0.3
Q	17,089	690	991	5.2	703.0	703.0	703.0	0.0
R	17,359	628	1,292	4.0	705.3	705.3	705.7	0.4
S	17,844	672	1,243	4.2	708.7	708.7	709.3	0.6
T	18,084	800	1,308	3.2	711.0	711.0	711.2	0.2
U	18,264	830	2,287	1.8	715.1	715.1	715.1	0.0
V	18,734	1,040	1,225	3.4	718.2	718.2	718.2	0.0
W	18,994	1,185	1,538	2.7	719.4	719.4	720.3	0.9
X	19,109	1,275	2,342	1.8	722.2	722.2	722.3	0.1
Y	19,199	385	482	5.5	722.3	722.3	722.9	0.6
Z	19,594	253	396	4.4	726.4	726.4	727.4	1.0

[1]Feet Above Confluence With San Marcos Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Twin Oaks Valley Creek (Cont'd)								
AA	20,034	247	308	5.7	734.9	734.9	735.5	0.6
AB	30,414	145	314	5.6	739.5	739.5	740.2	0.7
AC	20,554	145	263	6.6	741.6	741.6	742.1	0.5
AD	20,749	181	293	6.0	744.8	744.8	745.0	0.2
AE	21,079	325	368	4.8	749.4	749.4	749.5	0.1
AF	21,500	324	416	4.2	754.8	754.8	755.6	0.8
AG	21,960	339	426	4.1	759.2	759.2	760.1	0.9
AH	22,450	115	243	7.2	768.3	768.3	768.8	0.5
AI	22,605	164	304	5.7	770.5	770.5	771.1	0.6
AJ	22,676	178	300	5.8	771.4	771.4	771.8	0.4
AK	23,215	74	187	9.4	778.5	778.5	778.6	0.1
AL	23,660	98	224	7.8	786.3	786.3	786.7	0.4
AM	24,000	57	187	9.3	790.9	790.9	791.2	0.3
AN	24,155	86	284	6.2	792.6	792.6	793.4	0.8
AO	24,204	89	392	4.5	794.5	794.5	795.5	1.0
AP	24,684	61	177	9.9	803.7	803.7	803.7	0.0
AQ	25,094	65	256	6.8	808.8	808.8	808.8	0.0

[1]Feet Above Confluence With San Marcos Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

FLOODWAY DATA

TWIN OAKS VALLEY CREEK

Datum Conversion using
National Geodetic Survey's
VERTCON program.

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 33 11 26.000

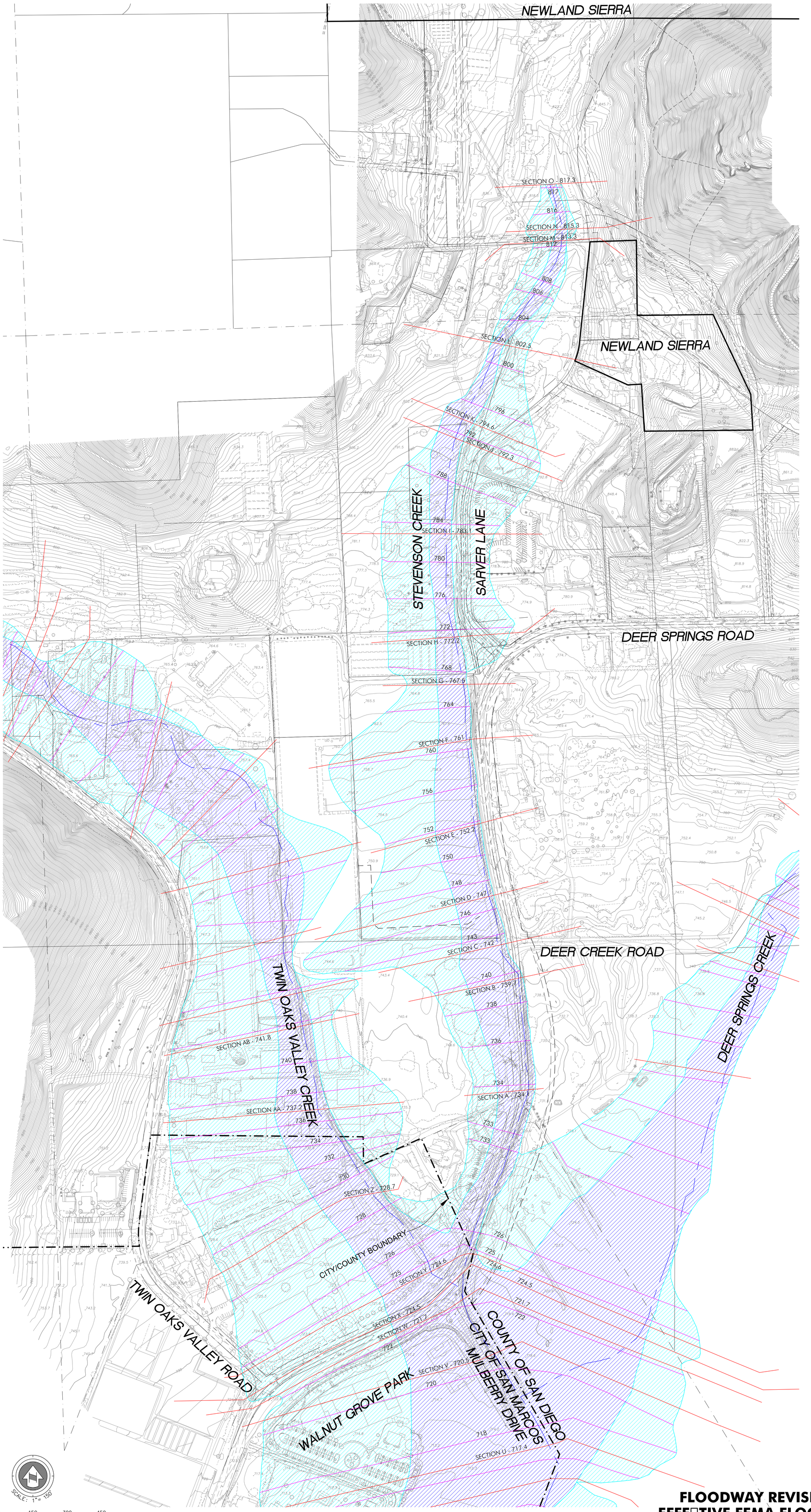
Longitude: 117 09 05.000

NAVD 88 height:

Datum shift(NAVD 88 minus NGVD 29): 0.723 meter = 2.37 ft

APPENDIX B

Effective FEMA Floodplain/Floodway Exhibit



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

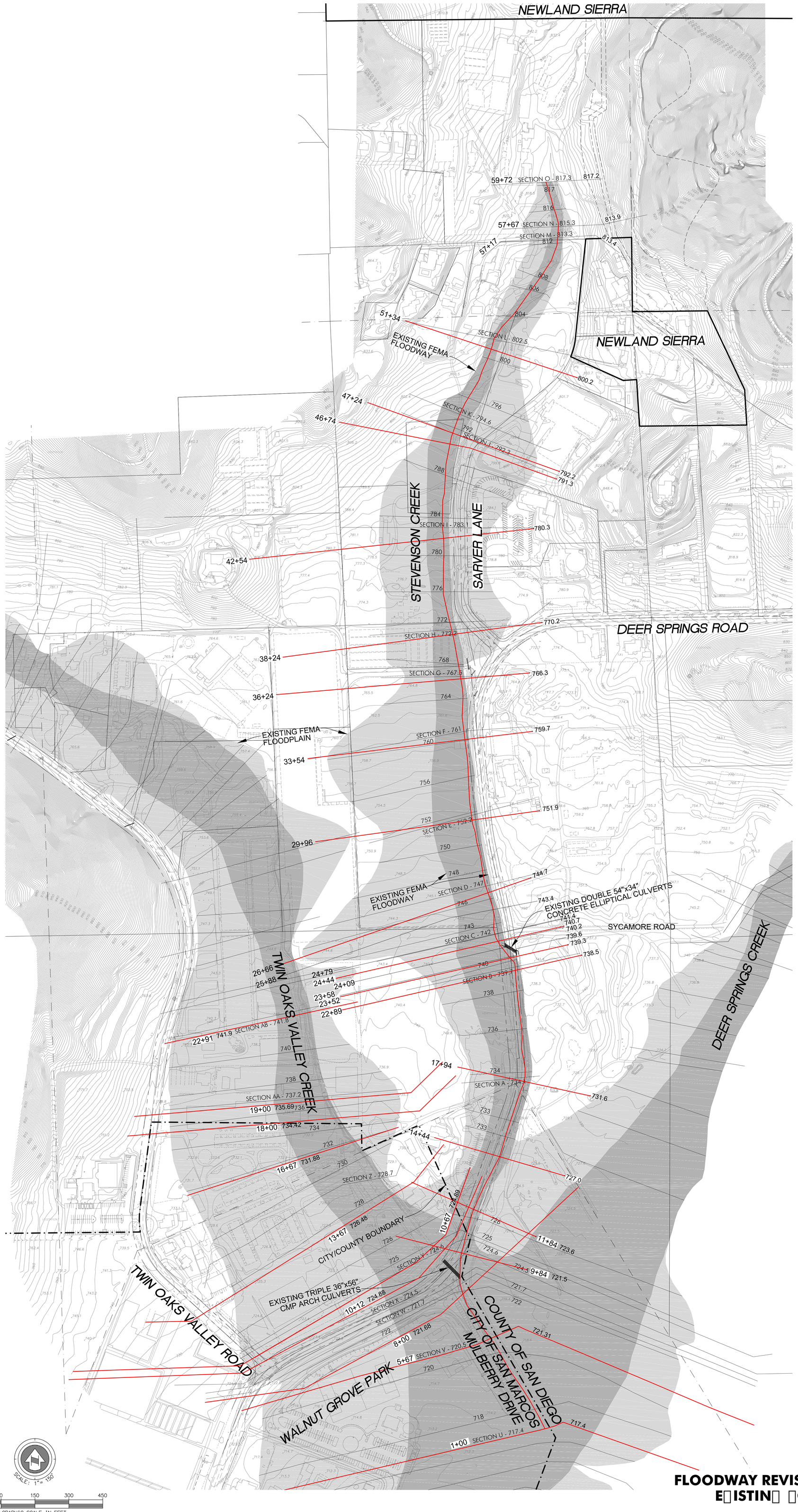
SCALE: 1"= 150

150 75 0 150 300 450
GRAPHIC SCALE IN FEET

NEWLAND SIERRA
FLOODWAY REVISION/NO-RISE REPORT
EFFECTIVE FEMA FLOODPLAIN/FLOODWAY
DECEMBER 1[illegible]201[illegible]

APPENDIX C

Existing Conditions Analysis Exhibit



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

NEWLAND SIERRA
FLOODWAY REVISION/NO-RISE REPORT
E□ISTIN□ □ONDITIONS ANALYSIS
DE□EMBER 1□□201□

APPENDIX D

Proposed Floodplain/Floodway Exhibit