



May 3, 2010

Mr. Anthony Sanchez, Ph.D., P.E.
T.Y. Lin International
5030 Camino de la Siesta, Suite 204
San Diego, California 92108

SUBJECT: SUMMARY OF RESULTS FOR THE FEASIBILITY OF THE PROPOSED
ROSE CREEK PEDESTRIAN AND BICYCLE BRIDGE AND THE ROSE
CREEK WATER QUALITY TREATMENT WETLANDS
(RICK ENGINEERING COMPANY JOB NUMBER 16282)

Dear Mr. Sanchez:

I am writing you to inform you of our findings in assessing the feasibility of the Rose Creek Pedestrian and Bicycle Bridge and the implementation of the Rose Creek Water Quality Treatment Wetlands. Currently the City of San Diego is proposing the construction of a free-span bridge, known as the Rose Creek Pedestrian and Bicycle Bridge (Plan # 33769-D, prepared by T.Y. Lin International), across Rose Creek at the southern boundary of Mission Bay High School and Mission Bay Golf Course and north of the Campland on the Bay and De Anza leasehold sites. However, concern has been raised about the potential for the bridge to impede the opportunity for the current Campland on the Bay site to be converted to a large treatment marsh when the Campland lease terminates in 2017, as stated in the Mission Bay Master Plan. The current design of the treatment marsh (known as the Rose Creek Water Quality Treatment Wetlands) provided by Keith Merkel on March 29, 2010, utilizes two berms to direct flow westerly towards the wetlands and into Mission Bay. The possibility of these berms to raise the water surface elevations (WSELs) in Rose Creek is also a concern. Therefore, we have assessed the feasibility of constructing the bicycle bridge along with conversion of the Campland on the Bay site to a treatment marsh.

In order to assess the feasibility of the two projects, the FLO-2D: 2-Dimensional Flood Routing Model Software was used. FLO-2D is a two-dimensional modeling program that utilizes a grid system, with elevations based on the supplied topographic information, along with the full dynamic wave momentum equation. A finite routing scheme with eight potential flow directions allows FLO-2D to predict the progression of a flood hydrograph over the defined grid system. With these features, FLO-2D is capable of simulating a flood over complex topography and roughness while reporting accurate flood distribution information. FLO-2D is also capable of computing sediment transport for both channel and overland flow using one of nine available equations with sediment volume being conserved on a grid element basis. Sediment routing by size fraction and armoring can also be simulated.

Keith Merkel of Merkel & Associates, Inc. provided us with two surfaces; one reflecting the pre-project condition, and the other reflecting the proposed grading for the Rose Creek Water Quality Treatment Wetlands. With these surfaces, two FLO-2D models were created utilizing the same downstream water surface elevation (WSEL) equal to 6.4 feet per the preliminary FIS San Diego D-FIRM information at this location; a reduced scale version of D-FIRM is attached with this letter (Exhibit 1). It is important to note that the preliminary San Diego D-FIRM (on NAVD88) matches the current effective FIRM (on NGVD29) with the NGVD29 to NAVD88 conversion. Both models also utilized the same hydrograph (*Hydrograph for the 100-yr flood*), provided in the "Hydraulic and Scour Studies for Rose Creek Bikeway Bridge," prepared by Howard H. Chang, Ph.D, P.E.

Based on the proposed wetlands grading provided by Keith Merkel on March 29, 2010, the FLO-2D models show a reduction of water surface elevations with the construction of the wetlands in Rose Creek for the 100-year storm event. The berms as shown in the proposed grading, will not adversely affect the upstream water surface elevations for the 100-year storm event. Attached with this letter are exhibits showing the WSELs for the Pre-Project and Proposed Conditions (Exhibits 2 and 3), as well as exhibits showing the Flood Depths for each condition (Exhibits 5 and 6). A profile comparing the WSELs for the two conditions can be seen on Exhibit 4. Below

is a table comparing WSELs for the Pre-Project and Proposed Conditions. The locations can be seen on Exhibit 7 attached with this letter.

**Table 1: 100-Year WSEL Comparison of
Pre-Project Condition and Proposed Condition**

Location	Pre-Project WSEL (feet)	Proposed WSEL (feet)
1. Upstream of Proposed Bridge (Approx. 800' U/S of Proposed Bridge)	14.8	12.6
2. At Proposed Location of Bridge (North Mission Bay Drive)	12.2	10.4
3. At Pre-Project Mouth of Rose Creek (Approx. 1000' D/S of Proposed Bridge)	9.2	8.2

Furthermore, considering the current wetland design provided by Keith Merkel, the proposed bridge will not consume essential area for treatment marsh development, as it is currently designed both as a free-span bridge and upstream of the proposed wetlands. Neither will the proposed bridge alter the ability to capture and divert flows into the Rose Creek Water Quality Treatment Wetlands, as the water is able to transition with the berms as currently designed, downstream of the proposed bridge location. Fixing the location and width of the Rose Creek channel by the construction of bridge abutments at the proposed location will also not preclude the ability to alter the course of Rose Creek as it enters Mission bay; with the current design proposing to direct the flows from Rose Creek westward towards the Rose Creek Water Quality Treatment Wetlands, our calculations show a reduction in WSELs. Therefore the proposed locations of the Rose Creek Pedestrian and Bicycle Bridge and the Rose Creek Water Quality Treatment Wetlands are feasible.

It is anticipated that smaller storm events will have a potential to deposit sediment at the mouth of Rose Creek / Mission Bay entrance and the entrance to the wetlands. If the intent of the wetlands design is to have constant grades reflecting the design provided by Keith Merkel on March 29, 2010, then maintenance may have to be performed in this area. However, the current proposed location of the bridge would not adversely affect the deposition in the wetlands area.

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Final design of the proposed grading should include slope protection to the berms, as well as well as a sediment maintenance plan. If the sediment elevations shown in the proposed grading of the Rose Creek Water Quality Treatment Wetlands are intended to remain the same as shown on the plans, then maintenance will most likely be required. Maintenance may also be required after larger storm events to ensure that low flows are redirected to the proposed Rose Creek Water Quality Treatment Wetlands. The necessity of this maintenance, however, is in no way due to the proposed Rose Creek Pedestrian and Bicycle Bridge. If the number or location of berms changes in future designs, the feasibility of such designs should be analyzed.

If you have any questions regarding this package or need any additional information about this project, please contact Jennifer Wirsing at 619-908-3594.

Sincerely,

RICK ENGINEERING COMPANY



Dennis C. Bowling, M.S.
R.C.E. #32838 Exp. 06/10
Principal

DCB:JM:vs:files/.001

Attachments: Exhibit 1: Reduced Scale Preliminary D-FIRM
Exhibit 2: 100-Year Pre-Project Limits of Inundation and WSELs (Feet)
Exhibit 3: 100-Year Proposed Limits of Inundation and WSELs (Feet)
Exhibit 4: 100-Year Pre-Project and Proposed Condition WSEL Profiles
Exhibit 5: 100-Year Pre-Project Flow Depths
Exhibit 6: 100-Year Proposed Flow Depths
Exhibit 7: WSEL Comparison Locations (Reference Table 1)

cc: Keith Merkel -Merkel and Associates, Inc., w/enclosures
Jennifer Wirsing - Rick Engineering Company, w/out enclosures

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.

EXHIBIT 1



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD:

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet*

Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-meter Universal Transverse Mercator grid ticks, zone 11

5000-foot grid ticks: California State Plane coordinate system, VI zone (FIPSZONE 0406), Lambert Conformal Conic

Bench mark (see explanation in Notes to Users section of this FIRM panel)

River Mile

MAP REPOSITORIES

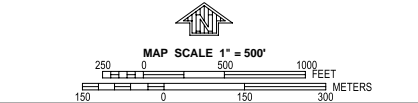
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



PANEL 1611J

FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 1611 OF 2375
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY: SAN DIEGO, CITY OF
NUMBER: 060295
PANEL SUFFIX: 1611 J

PRELIMINARY

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
06073C1611J
EFFECTIVE DATE

Federal Emergency Management Agency



Rose Creek Exhibit 2 - 100-Year Pre-Project Limits of Inundation & WSELs (Feet)

Filepath: W:\16282\GIS\Exhibit2_ExistingWSELs_9-3.mxd

Exhibit Date: 04/30/2010

REC JN: 16282



0 150 300 600
Feet

Data Sources:
SanGIS Roads - March 2010
Eagle Aerial Photo: March 2009



Note: Proposed Locations are approximate and for graphical purposes only



Rose Creek Exhibit 3 - 100-Year Post-Project Limits of Inundation & WSELs (Feet)

Filepath: W:\16282\GIS\Exhibit3_ProposedWSELs_9-3.mxd

Exhibit Date: 04/30/2010

REC JN: 16282

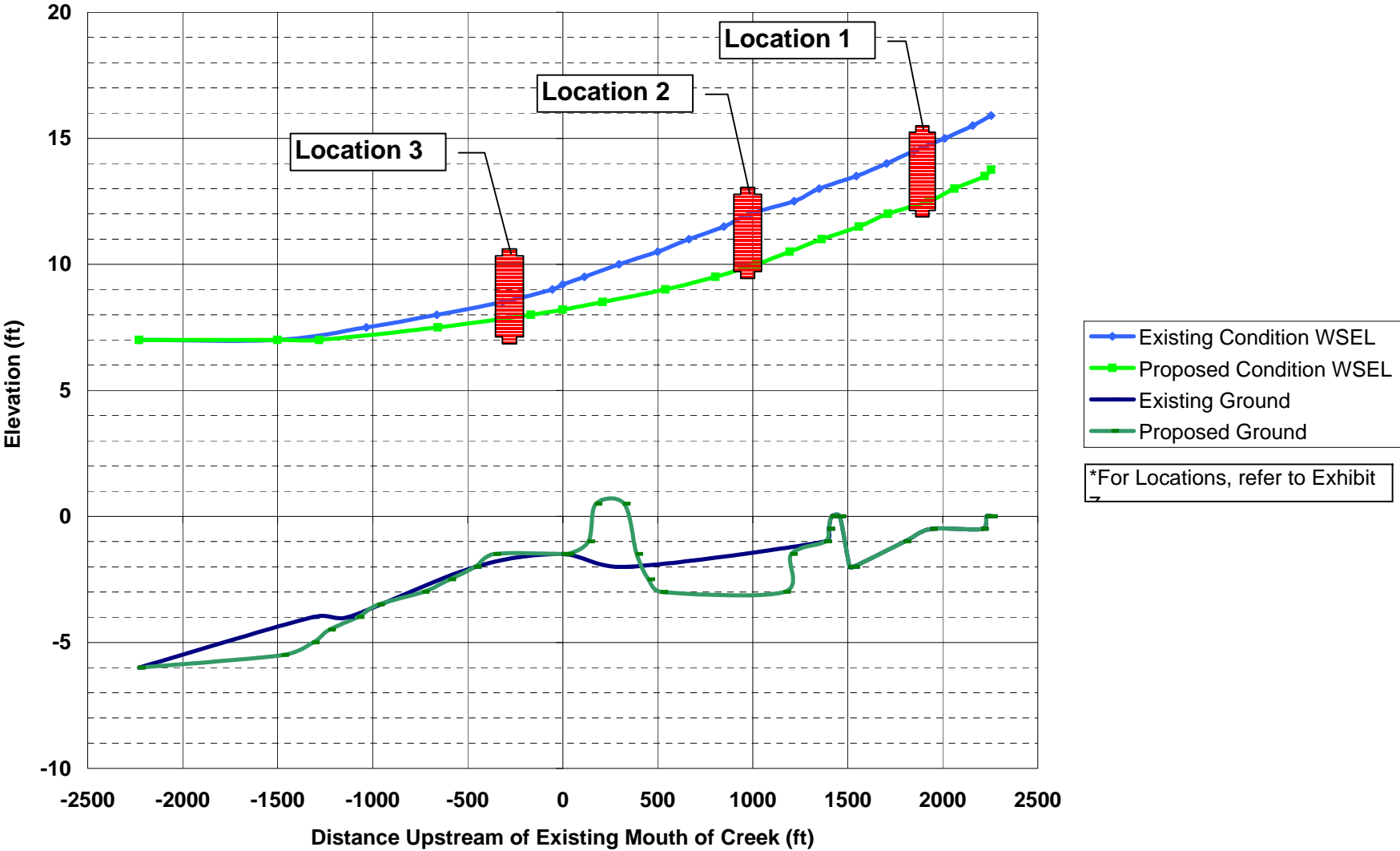


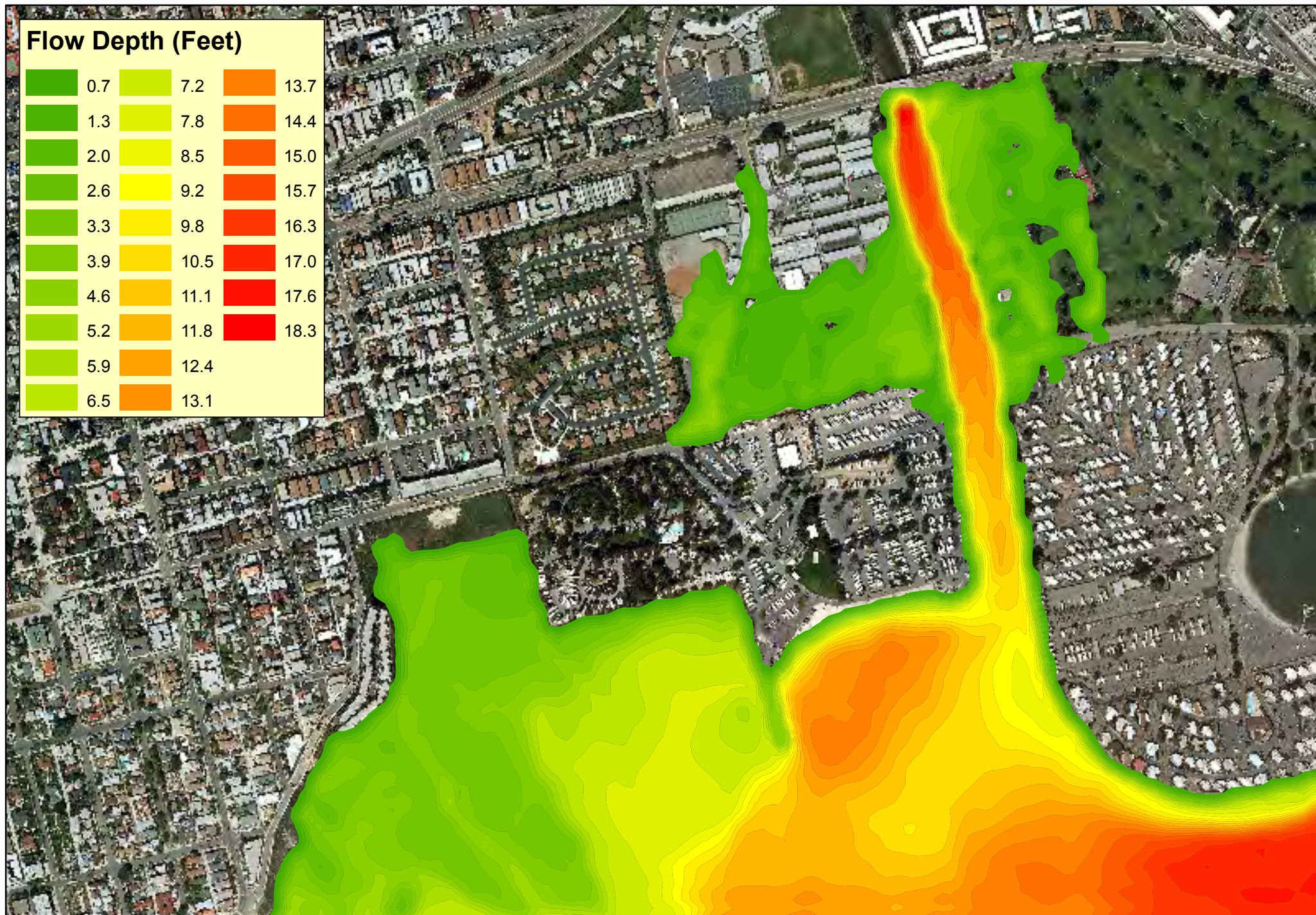
0 150 300 600
Feet

Data Sources:
SanGIS Roads - March 2010
Eagle Aerial Photo: March 2009



Exhibit 4: 100-Year Pre-Project and Proposed Condition WSEL Profiles





Rose Creek Exhibit 5 - 100-Year Pre-Project Flow Depths

Filepath: W:\16282\GIS\Exhibit5_ExistingDepths_9-3.mxd
Exhibit Date: 04/30/2010
REC JN: 16282



0 150 300 600
Feet

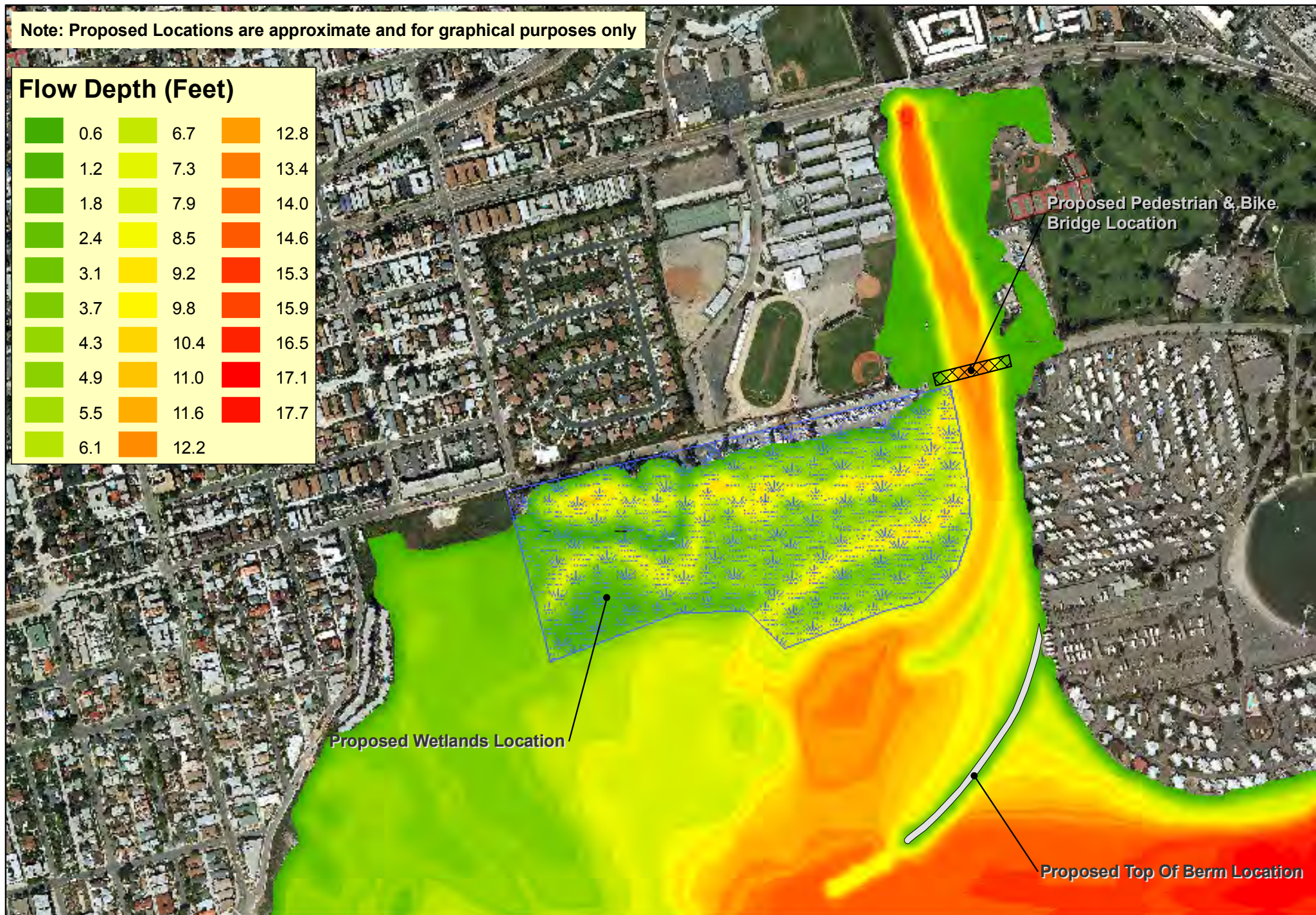
Data Sources:
SanGIS Roads - March 2010
Eagle Aerial Photo: March 2009



Note: Proposed Locations are approximate and for graphical purposes only

Flow Depth (Feet)

0.6	6.7	12.8
1.2	7.3	13.4
1.8	7.9	14.0
2.4	8.5	14.6
3.1	9.2	15.3
3.7	9.8	15.9
4.3	10.4	16.5
4.9	11.0	17.1
5.5	11.6	17.7
6.1	12.2	



Rose Creek Exhibit 6 - 100-Year Proposed Flow Depths

Filepath: W:\16282\GIS\Exhibit6_ProposedDepths_9-3.mxd

Exhibit Date: 04/30/2010

REC JN: 16282



0 150 300 600
Feet

Data Sources:
SanGIS Roads - March 2010
Eagle Aerial Photo: March 2009

RICK
ENGINEERING COMPANY



Rose Creek Exhibit 7 - WSEL Comparison Locations (Reference Table 1)