WRIME Water Resources & Information Management Engineering, Inc.

DRAFT MEMORANDUM

To:	Kim Hudson, Gene Smith Quad Knopf	**CC:**	Ali Taghavi, Matt Zidar Wrime
From:	Reza Namvar	**Date**	December 14, 2005
Subject:	**Peer Review of the Placer Vineyards Master Project Drainage Study** (Dated August 23, 2005)		
Project Reference:	186.T01.00		

INTRODUCTION

Objective

The purpose of this memorandum is to document the work performed in reviewing the Placer Vineyards Master Project Drainage Study (August, 2005) prepared by Civil Engineering Solutions, Inc. (CS). This review is performed at the request of the Placer County, and is focused on the technical adequacy of the subject report and its consistency pursuant to the Placer County *Stormwater Management Manual* (SWMM), the Placer County *Land Development Manual* (LDM), and the Phase II *National Pollutant Discharge Elimination System* (NPDES).

Basis of Peer Review

This memorandum presents the findings of our review, which was primarily based on the following information:

1. Information and data provided in the project kick-off meeting held on November 10, 2005. This meeting was attended by Wes Zicker and Phillip Frantz (Placer County Public Works Department), Andrew Darrow (Placer County Flood Control and Water Conservation District), Kent MacDiarmid and Sean MacDiarmid (The MacDiarmid Company), James Ray (MacKay & Somps), Thomas Plummer (Civil Engineering Solutions) and Matt Zidar and Reza Namvar (WRIME). Discussion items included the Placer Vineyards project overview, purpose of WRIME's review, drainage plan overview, Placer County and developer expectations, communications protocols and the pending tasks.
2. Review of the report, maps, tables, calculations, model input and output files, model results, and project photos and maps included in the CD and hardcopy report (Table 1) provided to WRIME.
3. Review of additional information provided by CS (Table 1).
4. Review comments provided by Placer County Public Works Department.

5. Review comments provided by Placer County Flood Control and Water Conservation District.
6. Meeting with Tom Plummer of CS on December 9, 2005. The preliminary findings of this review were shared with Mr. Plummer and his responses to our questions were obtained.
7. Meeting with Andrew Darrow (Placer County Flood Control and Water Conservation District) and Phillip Frantz (Placer County Public Works Department) on December 12, 2005. Placer County's requirements for the Placer Vineyards Mater Project Drainage Study were discussed.
8. Visit to the project site on December 12, 2005.

Additional Tasks

Two additional tasks were identified at the kick-off meeting for which, results of the analysis were pending from CS at the time of kick-off meeting. These are:

1. NEMDC Analysis - Volumetric analysis for the Steelhead Creek, and
2. Blueprint Alternative Analysis – Evaluation of a 20,000-unit alternative.

The results of these tasks were anticipated to be delivered to WRIME for review by November 28, 2005. The NEMDC Analysis was emailed to WRIME on Tuesday December 6, 2005. The Blueprint Alternative Analysis is pending, as of the date of this memorandum. WRIME is reviewing the NEMDC analysis and will deliver the findings as Addendum I to this memorandum by December 22, 2005. The review of the Blueprint Alternative will be completed two weeks after we receive the analysis from CS and will be delivered as Addendum II to this memorandum.

Peer Review Results

The results of our review of the Placer Vineyards Master Project Drainage Study (Drainage Study) are presented in two sections:

- Review summary, and
- Review details.

The review summary section presents a brief description of the project, project impacts, the proposed mitigations, and summary of review results. To facilitate the response to the review, an action list is provided in this section.

The review details section presents detailed results of our review. The presentation of this section follows the outline of the Drainage Study report. The paragraph numbers are consistent with those in the report. The page and section numbers refer to the Placer Vineyards Master Project Drainage Study report. The review figures and tables are presented at the end of the memorandum.

REVIEW SUMMARY

The review summary section presents a brief description of the project, project impacts, the proposed mitigations, and summary of review results. To facilitate the response to the review an action list is provided in this section.

Project Description

The proposed Placer Vineyards development includes approximately 5,200 acres of mixed use development, of which 4,214 acres is planned for urban development (Figure 1). The remaining 934 acres is reserved as Special Planning Area (SPA) and will continue to be utilized for large lot rural residential development. The proposed development includes residential, employment, commercial, open space, recreational and public/quasi-public land uses. The project is located in the extreme western portion of Placer County. The project drains to Curry Creek in the northeast area, Dry Creek in the southeastern area, and Steelhead Creek (Natomas East Main Drainage Canal, NEMDC) in the central and western areas.

Impacts

The major impacts of the proposed development include:

- Increased peak flows rates at Curry Creek,
- Increased runoff volumes at Curry Creek,
- Increased peak flow rates at Steelhead Creek,
- Increased runoff volumes at Steelhead Creek,
- Increased peak flow rates at Dry Creek, and
- Water quality degradation of runoff from paved and other developed areas.

Mitigation Methods

Mitigation of impacts of the Placer Vineyard development is proposed to be provided within and outside the project area. Proposed mitigation method(s) for each impact is briefly described below:

- *Peak flow rates at Curry Creek* - Mitigation to increased peak flow rates is proposed to include detention facilities at Curry Creek with estimated 112 AF of 100-year peak storage. Runoff is also transferred from Curry Creek watershed to Dry Creek watershed. The proposed mitigation methods would result in 142 cfs reduction in peak flow rates of 100-year event at the project exit point in Curry Creek.
- *Runoff volume at Curry Creek* - The volumetric impacts at Curry Creek are proposed to be mitigated by an on-site 25 AF retention facility.
- *Peak flow rates at Steelhead Creek* - Mitigation to increased peak flow rates is proposed to include detention facilities at Steelhead tributaries with estimated 570 AF of 100-year peak storage. The proposed mitigation methods would result in 498 cfs reduction in peak flow rates of 100-year event at the project exit points.
- *Runoff volume at Steelhead Creek* - Review of the mitigation method of the volumetric impacts at the Steelhead Creek is underway by WRIME and will be added to this memorandum as Addendum I.

- *Peak flow rates at Dry Creek* – Detention at the project site has adverse impact on peak flow rates downstream of the project. Therefore, no on-site mitigation is proposed for increased peak flow impacts at Dry Creek.
- *Water quality* - The proposed water quality treatment includes 68 AF of storm water quality basins and several best management practices (BMP). The BMPs include installation of petroleum absorbing insert assemblies in the project drop inlets, placement of water quality interceptor devices.

Review Results/Opinions

Based on our review of the analysis of the project impacts and the proposed mitigation measures, the proposed drainage system is technically adequate and generally meets the requirements of the Placer County. However, three major issues are to be addressed, so that the report reflects adequate and correct technical analysis. These are:

(i) discrepancies in hydrologic soil parameters;
(ii) discrepancies in watershed routing**;** and
(iii) higher post-project water elevations at the boundaries of the project require that hydrologic and hydraulic analyses be repeated.

The resulting changes to the drainage system should be identified and reported in the next revision of the Drainage Study. Since the effects of the above changes and corrections on the analysis results are not apparent, we recommend that the revised analysis be reviewed for technical adequacy.

Action List

The Placer Vineyard Master Project Drainage Study should be revised based on the following actions:

1. Revise the hydrologic soil parameters and watershed routing and repeat the hydrologic and hydraulic analysis. The new analysis should have acceptable post-project water levels at the project boundaries.
2. Determine any changes in the attenuation facilities, hydraulic elevation, water quality facilities, and identify any other major changes to the system as a result of new hydrologic and hydraulic analysis. The changes should be reported in the next revision of the Drainage Study.
3. Correct the report (text, figures, tables, and exhibits) according to review comments of Tables 2 to 4.
4. Add elevation information to the cross-sections.
5. Add a map that illustrates the locations of the project photos.
6. Review the revised report to ensure technical adequacy.

REVIEW DETAIL

This section presents details of our review. The presentation of this section follows the outline of the Drainage Study report. The paragraph and page numbers are consistent with those in the report. The review figures and tables are presented at the end of the Memorandum.

The Placer Vineyards Drainage Study report generally matches the report requirements of the Placer County. However, there are several editorial changes and missing information that should be incorporated in the next revision of the report. Lists of editorial changes and missing information are provided in Tables 2, 3, and 4. No map scale is provided for many of the figures and exhibits. The titles of most of the project photos are partially missing. A map illustrating the locations of the project photos should be included in the Drainage Study report.

II. Hydrology (page 7)

The HEC-1 software was used to develop the hydrologic models of the Placer Vineyards project. HEC-1 is a widely accepted model and Placer County recommends using HEC-1 model for areas larger than 200 acres (SWMM, page V-9).

Review Results: The use of HEC-1 software for the Placer Vineyards project is consistent with the Placer County requirement.

II.1 Standards (page7)

The Placer County PDP software was used to determine the precipitation rates for the 2-year, 10-year, 25-year, 50-year, 100-year, 200-year, and 500-year design events. The County provides this software and its use is consistent with the design methodology outlined in SWMM. Even though the overall study area is 13.2 square miles; the storm centering was not utilized in this analysis. The individual tributaries are not of sufficient size for storm centering to have an effect. This is consistent with the Placer County SWMM (Table 5-1, page V-3).

Review Results: The methodology used for developing the design precipitation events is technically adequate and consistent with the Placer County requirements.

II.2 Soils (pages7-9)

WRIME downloaded the latest soils data from NRCS in November 2005. The project area lies completely within Placer County; however, soils data was obtained for adjacent Sacramento County to the south and Sutter County to the west to create a complete soils map of the region. For the most part, the NRCS soils map (Figure 2) was consistent with the Drainage Study soil map (Drainage Study, Figure IIA2, page 9) and the model files. The majority of the project area has a hydrologic soils type D, which was shown in both the NRCS map and Drainage Study map; however, some differences were found. Table 5 and the text below summarize the differences.

The Curry Creek watershed in the project area contains soil keys 141, 182, and 195. All of these soils are type D soils, as is shown in both the NRCS and Drainage Study Soils Maps. However, the model file contains some type C soils for the Curry Creek watershed. It is recommended that these soils types be changed from C to D in the model.

Soil key 174 is present in the EMGS watershed as well as small sections of the EMAS and EMFS watersheds. The NRCS map shows soil key 174 as being type C soil; however, both the Drainage Study map and model files both use type B soils for this soil key. It is recommended that these soil types be changed from B to C in both the model and the map.

Soils key 142 and 157 have two different hydrologic group interpretations, C or D. Without more specific information, there is no way to determine from the NRCS data set, which is the correct hydrologic soils group to assign to these soils. Group D soils were used for both these soils keys. Soil key 142 is widespread throughout the project area. Soil key 157 is present in the EMD watershed. It is our recommendation to leave these soils groups as type D.

Hydrologic soil parameters specified in Table IIA2 (Drainage Study, page 8) for various land use types are consistent with SWMM, Table 5-3 (SWMM, page V-6). However, some of the soil parameters used in HEC1 model are not consistent with the NRCS soil types. Hydrologic soil parameters of soil type C is used for Curry Creek area, however, the NRCS and Drainage Study soil maps suggest a soil type D for this area. Using soil type C would result in underestimating Curry Creek runoff.

Lists of subwatersheds that require hydrologic soil parameter modification for pre- and post-project analyses are presented in Tables 6 and 7. It is necessary to modify the soil parameters and repeat the analysis again to obtain accurate flow rates. The hydrologic soil parameters discrepancy was shared with Mr. Plummer in our meeting of December 9, 2005. He indicated that CS would repeat the analysis using the modified hydrologic soil parameters.

Review Results: The discrepancy in soil parameters is expected to result in underestimating the flow rates that could potentially impact the size of the on-site attenuation facility. The soil parameters should be modified and the analysis repeated to determine the flow rates.

II.4 Other Factors (page 10)
The following Manning's n values were used for overland flow:

- 0.11 for roadways,
- 0.4 to 0.6 for open space and wooded areas,
- 0.24 for landscaped areas.

Review Results: The Manning's n values used for Placer Vineyards Drainage Study are consistent with the SWMM requirements.

II.5 Watershed Delineation (page 10)
Project topography maps (1 foot contours), USGS topography maps, field survey information, and the proposed development requirements were used for watershed delineation. These maps were not included in the report and the watershed delineation could not be independently verified in this review. However, the pre-project watershed delineation was reviewed using the following steps:

1. Check the pre-project watersheds with other watershed coverage's developed for the area,
2. Recreate the watershed coverage from a digital elevation coverage, and

3. Spot-check the pre-project watersheds with the local topography in the area.

The only watershed coverage that was readily available was the Hydrologic Basin coverage available from the California state GIS webpage. This coverage does not have enough detail to verify the pre-project watersheds. The state coverage only has the project area divided into two basins, Lower American Basin in the south and Pleasant Grove Basin in the north.

A new watershed coverage was developed from the 30-meter digital elevation model obtained from the state GIS webpage. A flow direction raster and a hydrologic basin raster were developed from the elevation coverage using ArcGIS spatial analysis. The resulting hydrologic basin coverage was compared to the pre-project watersheds. It was verified that the major watershed divisions in the project were correct. However, the resulting hydrologic basin coverage was not detailed enough to independently verify the pre-project sub-watersheds.

The hard copy topographic map provided by CS with land surface elevations to the nearest 1/10-foot was used to verify the pre-project sub-watersheds. Four sub-watersheds were selected in the CUS, EMA, EMF, and EMC watersheds and checked to ensure that the watershed boundaries were consistent with the elevations on the topographic map. No major problems were found with these four spot-checked watersheds.

Due to the proposed land surface grading and development, the post-project watersheds are different than the pre-project watersheds in many areas. There was no way to verify the post - project watersheds because the post-project grading plan is not completed yet. The grading plan is expected to be developed consistent with the proposed post-project watersheds.

Review Results: The pre- and post-project watershed delineation is technically adequate. The post-project grading plan should be developed consistent with the proposed post-project watersheds.

II.A, II.B, II.C Pre- and Post-Project Models (pages 11 – 23)

Three models were developed as part of the requirements for Placer Vineyards drainage plan analysis. These models are listed below.

- *Pre-Project Model* – This model was developed to determine the required detention volumes and impacts at the project boundary.
- *Post-Project Unmitigated Model* – This model includes the pre-project flow attenuation which will remain in the post-project conditions but not any of the post-project proposed attenuation facilities. It is a requirement of Placer County to report the hydraulic elevations for the unmitigated condition passing through the channels. It is required to use the elevations of this model for designing the connecting systems and adjacent structures.
- *Post-Project Mitigated Model* – This model represents the post-project hydrologic conditions of the Placer Vineyards project development area and includes the mitigation facilities.

The inflow/outflow/storage rating curve information for the proposed detention and water quality facilities were developed from the proposed grading parameters and design outflow pipe sizes.

The development of these models is consistent with the design requirements of the Placer County as specified in the SWMM.

The estimated post-project mitigated peak flow rates were compared to the pre-project peak flow rates at eleven exit points (Drainage Study, Table VII, page 23). One exit point represents the peak flow at Curry Creek. The peak flows at Steelhead Creek are compared at ten exit points. The peak flows at all of the exit points are reduced to below pre-project levels.

Review Results: The use of three hydrologic models is consistent with the Placer County requirements. However, due to discrepancies in soil parameters and routing methodology the analysis should be repeated. The resulting changes to the drainage system should be included in the next revision of the report. The post-project models with mitigation indicate that the peak flows at all of the exit points are reduced to below pre-project levels.

Routing Method

The routing methodology used in the Drainage Study was reviewed to verify that modeled flow was correctly routed from one watershed to the next. Pre-project routing was verified based on the pre-project topographic map (Drainage Study, Exhibit SH-1) and the existing stream locations. The post-project routing was also verified based on the pre-project topographic map (Drainage Study, Exhibit SH-1), post-project watershed map (Drainage Study, Exhibit SH-2), and the drainage facility maps (Drainage Study, Exhibit DR-1). More potential issues were found in the post-project routing than the pre-project routing. The reason may be because the drainage facility map is only a rough layout and not the real schematic and because there is no post-project grading map.

Table 8 summarizes all of the potential routing issues that were found. These routing issues were shared with Thomas Plummer in the meeting at CS on 12/09/2005. The routing issues should be corrected in a new analysis. The resulting changes in the project design should be reported. The table also includes a few editorial issues that will not affect the results of the model but it is still recommended that they be fixed (for example, a watershed was named incorrectly but had the correct characteristics).

Review Results: There are several routing discrepancies that should be corrected in the new analysis. The correction of the discrepancies is not anticipated to result in major changes. However, accurate flow estimates are necessary for proper sizing of the drainage facilities.

II.E Proposed Attenuation at Dry Creek Tributaries (pages 25-26)

The Dry Creek Watershed Flood Control Plan states, "There are certain areas in the watershed where on-site detention will not be effective in reducing flows in the major streams and in fact may aggravate the existing problem." Figure 3 (adapted from Dry Creek Plan, Figure ES-1) shows that no local detention facilities are recommended for the Dry Creek Watersheds in and adjacent to the project areas. During a major storm event, runoff from the project area would naturally enter Dry Creek, well before peak flows from upstream. Therefore it is likely that detaining the flow could actually increase Dry Creek peak flows.

A separate analysis was conducted by CS to evaluate the hydrologic impacts at Dry Creek. This analysis determined that onsite detention in the project area may increase peak flow rates

downstream of the project by 15 cfs. This was to be expected based on the Dry Creek Study of 1992. The Drainage Study does not recommend any detention at Dry Creek for the Placer Vineyard project. However, the project is subject to regional mitigation fees for its impacts.

Review Results: Not using local detention at project areas adjacent to Dry Creek is technically sound and consistent with previous studies.

III. Hydraulics (page 32)

III.A Flood Plain Analysis (pages 32-36)

The water levels of 10-year and 100-yr flood events are provided on pre-project and post-project flood plains (Drainage Study, Exhibits FP-1 and FP-2). We compared the pre- and post-project water levels at the project boundaries and found that the post-project water levels are higher at several contact points. Table 9 present the water level differences. An increase of 1.67 feet was observed at station EMAS2 at northwestern project boundary.

The issue of higher post-project water levels was shared with Mr. Plummer. He indicated that he would analyze the problem and modify the design to produce lower water levels. Mr. Phillip Frantz (Placer County Public Works Department) indicated that 0.5 feet of higher water level may be acceptable but information on the size and location of the impacted area should be provided.

Review Results: We recommend that the analysis be modified to produce lower post-project water levels. The results should be provided in next revision of the Drainage Study report.

III.B Proposed Culvert Sizing (page 37)
The culvert sizing is optimized to maximize the onsite attenuation, while providing the passage of the 100-year peak flows. The suggested culvert sizing may change depending on the outcome of the revised hydrologic and hydraulic analysis.

Review Results: The adequacy of the proposed culvert sizing should be verified with the results of the revised hydrologic and hydraulic analysis. Any changes in culvert sizing should be included in the revised Drainage Study report.

III.C Proposed Channels and Attenuation Facilities (page38-48)
Cross-sections provided in Exhibit SEC-1 of Drainage Study show a concept of how the channelization and avoidance areas would be located within the project open space areas. Although, the cross-section drawings are conceptual, they should include hydraulic grade lines and surrounding elevations to show the available free board.

Review Results: The 10-year and 100-year hydraulic grade lines and surrounding area elevations should be added to the cross-sections.

III.D Trunk Storm Drain Facilities (page 49)
Trunk storm drainage facilities are shown on Exhibit DR-1 of Drainage Study. The detailed layout of storm drains in Curry Creek and EMC watershed was compared to the post-project

watershed delineation. The general layout of trunk storm drainage facilities of other areas was also compared with the general watershed layout of the proposed drainage plan. One drain line was found at the northern boundary of the project area that showed storm water is transferred from Curry Creek to Steelhead Creek. This is in contrast to the proposed routing method. Mr. Plummer indicated that this is a drawing error and no water should be exchanged between the two watersheds. We recommend that DR-1 map be modified so the trunk storm drainage facilities correspond to the suggested routing method.

In the post project, many of the EMG watersheds have been converted to the EMFS11C – EMFS11G watersheds; however, it is not clear how these watersheds drain from the project area.

Review Results: An explanation should be provided in the revised Drainage Study report to clarify how the EMG watershed is proposed to drain from the project area.

IV. Water Quality (page 52)

The report proposes 68 AF of storm water quality basins and several best management practices for water quality treatment of runoff from paved and other developed areas. The Best Management Practices (BMPs) consists of several effective methods including the installation of petroleum absorbing insert assemblies and the placement of sediment basins adjacent to the proposed regional detention facilities.

Review Results: The proposed methods appear to be adequate in providing sufficient treatment for project runoff.

V. Volumetric Impacts (page 58)

V.A. Hydrologic Storm Parameters (page 58-59)
The precipitation data of the mid February 1986 storm events was used as the worst 8-day storm event. Placer County requires use of this specific storm event for volumetric impact calculations. The precipitation data was extrapolated so that the sum of the values for the 8-day period would equal the 100-year precipitation amounts specified in the Placer County SWMM.

Review Results: Use of 1986 storm event is consistent with Placer County requirements.

V.C. Proposed Mitigation (page 61)
The volumetric impacts at Curry Creek are proposed to be mitigated by an on-site 25 AF retention facility. The Drainage Study states that the operation requirements of this mitigation facility would have to be agreed upon by the managing agencies, however the readings from the Verona Stream Gage, ½ mile upstream of Cross Canal, in the Sacramento River was used in the past to operate the gates. This is the closest gage to the project; however, gages at locations closer to the project area will become available in the future and should be used for the operation of the gates. A more detailed operation strategy is required for the volumetric mitigation facility.

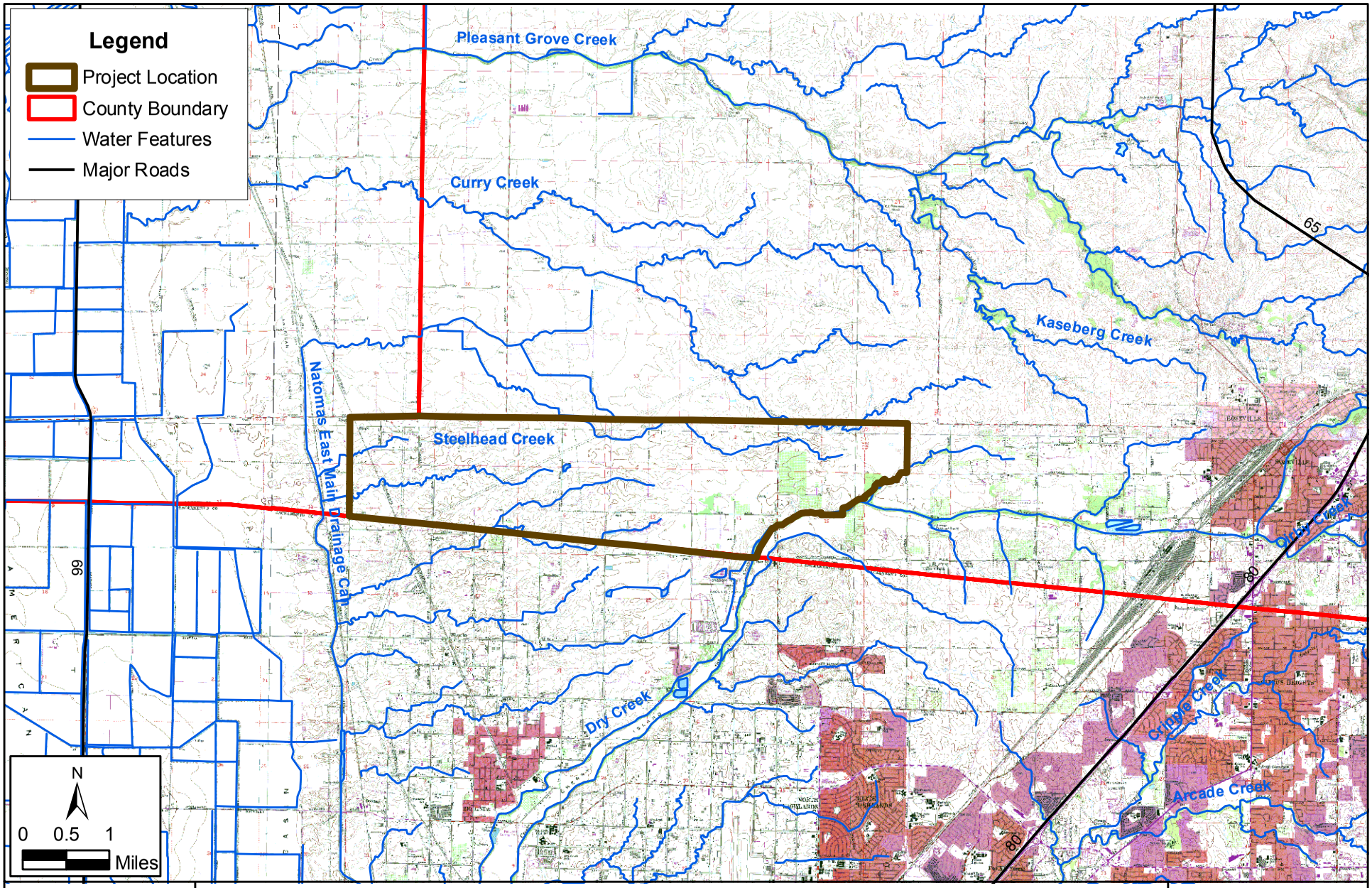
Review Results: The on-site 25 AF retention facility appear to provide adequate retention volume. However, its effectiveness is dependent on proper operation of the facility. A more detailed operation strategy is necessary.

REFERENCES

1. Assessment of potential peak flood impacts – Steelhead Creek, Draft, November 2005. Civil Engineering Solutions.
2. California Spatial Information Library. http://gis.ca.gov
3. Dry Creek Watershed Flood Control Plan – Final Report, April 1992. James Montgomery.
4. Placer County Land Development Manual, 1996. Departments of Facility Services, Health, Planning, and Public Works.
5. Placer Vineyards Master Project Drainage Study, August 2005. Civil Engineering Solutions.
6. Stormwater Management Manual, February 1994. Placer County Flood Control and Water Conservation District.
7. Stormwater Management Manual – Addendum 1, July 1997. Placer County Flood Control and Water Conservation District.

FIGURES

1. Project Area.
2. NRCS soils map for Placer Vineyard Project Area.
3. Areas of Dry Creek watershed that do not require local detention (adapted from Dry Creek Watershed Flood Control Plan, Figure ES-1).

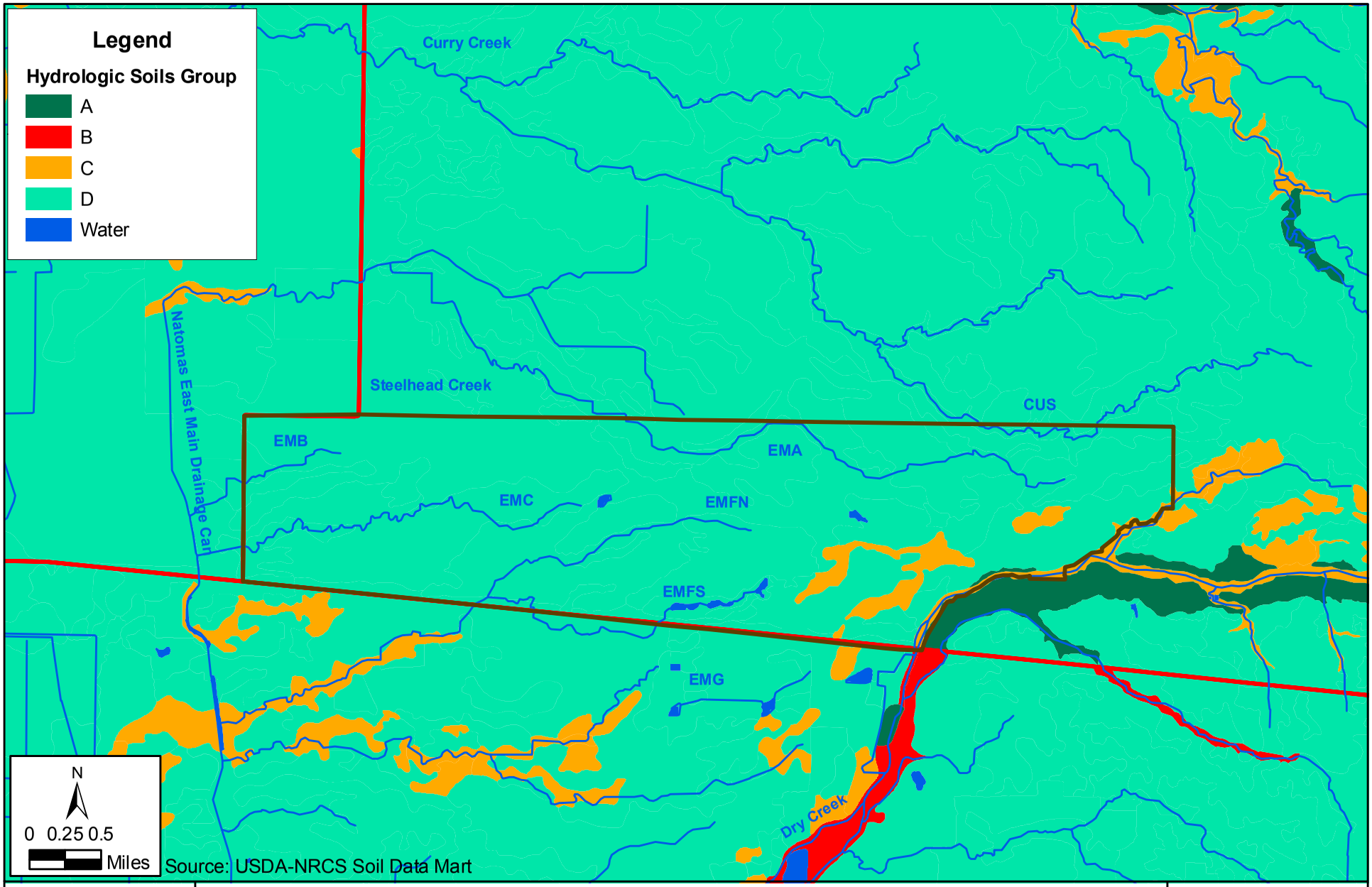


Placer Vineyards Master Project Drainage Study Review

General Project Location

December 2005

Figure 1



Placer Vineyards Master Project Drainage Study Review

Hydrologic Soils Group

December 2005

Figure 2

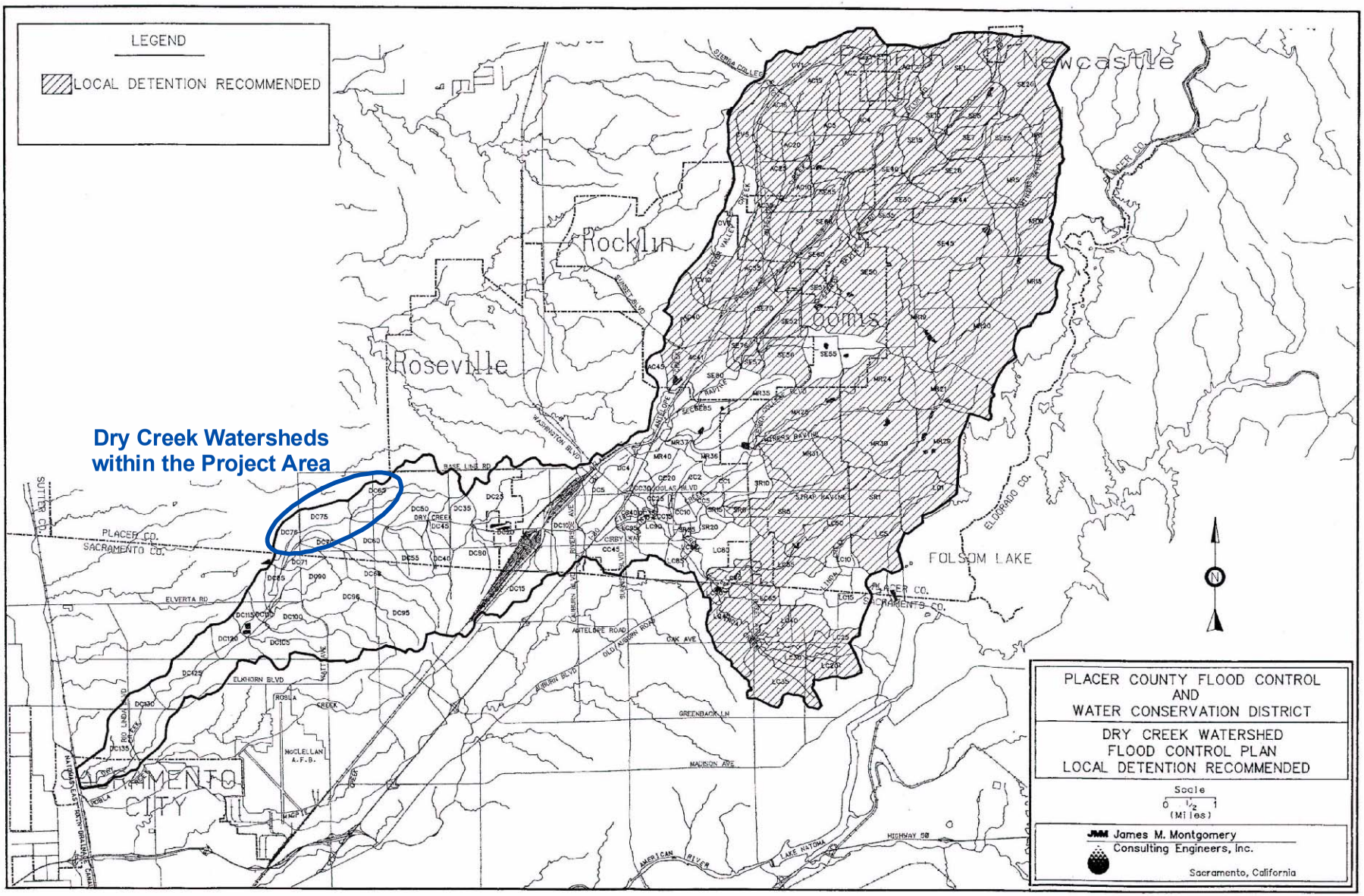


Figure Source: Dry Creek Watershed Flood Control Plan (Montgomery, 1992)

FIGURE 5-2

WRIME	Placer Vineyards Master Project Drainage Study Review **Areas of Dry Creek Watershed that Require Local Detention**	December 2005 Figure 3

LIST OF TABLES

1. List of reviewed material.
2. List of report editorial errors.
3. List of figures editorial changes.
4. List of tables editorial changes.
5. Differences of NRCS and Drainage Study soils maps.
6. List of pre-project watersheds requiring modification of the hydrologic soil parameters.
7. List of post-project watersheds requiring modification of the hydrologic soil parameters.
8. List of potential routing issues.
9. Comparison of pre- and post-project water levels at project boundaries.

Table 1 – List of Reviewed Material

No.	Description
1	Placer Vineyards Master Project Drainage Study, Dated August 23, 2005 (Hard copy including large size exhibits).
2	Placer Vineyards Master Project Drainage Study, Dated August 23, 2005 (electronic file in pdf format).
3	CD containing models input and output files and project photos.
4	Information provided by Civil Engineering Solution via email (AutoCAD files, model files, etc.).
5	Review comments of the Placer County Water Works Department.
6	Review comments of the Placer County Flood Control and Water Conservation District.

Table 2 – List of Editorial Corrections for the Report

Page	Section	Paragraph	Note
10	II.3	1	Reference to Tables I & III is wrong. These tables do not exist.
19		2	Reference to Table IIB is wrong. Change to IIB3.
26		3	"IIE1A" should read "Figure IIE1A"
351	Appendix J		Titles for many of the photos are cut. Provide a map showing the location of the photos.

Table 3 – List of Editorial Corrections for the Figures

Figure	Page	Note
I.1	5	No scale is provided for this map.
IIA2	9	No scale is provided for this map.
Sheet ATTN-1	Curry Creek	Detention location CUS16B should be CUS16D.
Sheet ATTN-1	EMA Watershed	Detention location A521RR should be AS21RR.
Sheet ATTN-1	EMFN Watershed	Detention location RN3BCR should be FN3BCR.
Sheet ATTN-1	EMC Watershed	Detention location MCRBR should be MC12BR.
Sheet ATTN-1	EMC Watershed	Detention location EMC12R is missing.
Sheet ATTN-1	EMFS Watershed	Detention location S7R is missing.
Sheet ATTN-1	EMG Watershed	No outlet is specified for EMGDET.
IIIA1	30	Misplaced figure. Move to Section III.
IIIA2	31	Misplaced figure. Move to Section III.
FP-1	390	Sheet 1 of 3 is missing from the pdf file.
Sheet FP-2 (2 of 3)		Wrong elevations are specified for EMFSS2 (3.01, 3.02, 3.03, 3.04)
Sheet ATTN-1		No scale is provided for this map.

Table 4 – List of Editorial Corrections for the Tables

Table	Page	Note
IIA4	15	Some of the headings and text are covered. The table should be reformatted. The flow rates are in cfs but the unit is not specified.
IIB3	19	Some of the headings and text are covered. The table should be reformatted. The flow rates are in cfs but the unit is not specified.
IIB4	20	Some of the headings and text are covered. The table should be reformatted. The flow rates are in cfs but the unit is not specified.
IIC1	22	Some of the headings and text are covered. The table should be reformatted. The flow rates are in cfs but the unit is not specified.
VII	23	Some of the headings and text are covered. The table should be reformatted. The flow rates are in cfs but the unit is not specified.
IID1	24	Text is missing from "type of facility" cell of detention location 19CCR.
IIIA1	33	Use larger font size for this table. Specify units for flow rates.
IIIA2	34	Use larger font size for this table. Specify units for flow rates. Delete the first forty rows. These rows are repeated from last page.
IIIA3	35	Use larger font size for this table. Specify units for flow rates.
IIIA4	36	Use larger font size for this table. Specify units for flow rates.
IIIB1	37	Correct the typing error in culvert description of watersheds EMAS16 and EMAS12A.
VB2	60	Specify the units for land use areas.

Table 5 – Differences of NRCS and Drainage Study soils maps

Soil Key	Soil Name	Drainage Study Hydrologic Soils Group	NRCS Hydrologic Soils Group	Locations	Recommendations
123	Boomer	C	D	EMA2	Model file uses type D, but should update the drainage study map
128	Boomer Variant	A	C	267 (West part of map, watershed probably named wrong on map)	Not in the project area, but should update the drainage study map
142	Cometa,Ramona	D	D/C	Throughout the entire project area	Soil type D is ok
157	Hedge	D	D/C	EMD3, EMD4	Soil type D is ok
174	Ramona	B	C	Throughout the EMGS watershed, EMFS10A, EMFS10B, EMAS20B, EMFN12K, EMFN12G. Curry Creek	Change from soil type B to soil type C
193	Xerofluvents, occasionally flooded	C	A	Dry Creek	Not in the project area, but should update the drainage study map
194	Xerofluvents, frequently flooded	D	C	Dry Creek. Curry Creek	Not in the project area, but should update the drainage study map.

Table 6 – List of pre-project watersheds requiring modification of the hydrologic soil parameters

Watersheds where model input files differ from NRCS soils map.	Watersheds where model input files are ok, but NRCS soils map differ from Drainage Study soils maps.
CUS3	EMAS20D
CUS4	EMAS29
CUS5	EMA3A
CUS6	EMD3
CUS6C	EMD4
CUS7	
CUS8	
CUS9	
CUS10	
CUS11A	
CUS11B	
CUS11C	
CUS12A	
CUS12B	
CUS13B	
CUS14	
CUS15	
CUS16A	
CUS17B	
CUS17C	
EMAS20B	
EMGS23	
EMGS24A	
EMGS24B	
EMGS25	
EMGS26	
EMGS27	
EMGS28A	
EMGS28B	
EMGS29	
EMGS30	
EMGS31	
EMGS32	
EMFS10A	
EMFS10B	
EMFN12G	
EMFN12K	

Table 7 - List of post-project watersheds requiring modification of the hydrologic soil parameters

Watersheds where model input files differ from NRCS soils map.	Watersheds where model input files are ok, but NRCS soils map differ from Drainage Study soils maps.
CUS3	EMA3A
CUS4	EMD3
CUS5	EMD4
CUS6	
CUS12A	
CUS15	
CUS17B	
CUS17C	
EMAS20G	
EMGS22	
EMGS24B	
EMFS8D	
68	
72	
73	
77	
80	
82	
83	
84	
85A	
86	

Table 8 – List of potential routing issues

Pre-Project					
Watershed	**Input File Page**	**Routing File Page**	**Type of Issue**	**Problem**	**Recommendation**
EMAS9 & EMAS 3	79	6	Error	EMAS9 is listed twice, EMAS3 is skipped	The 2nd EMAS9 should be EMAS3
EMGS24	109	20	Error	EMAS24 is listed twice, EMAS24 isn't in the watershed list, but EMAS 24A and 24B are	The 1st EMAS24 should be 24A. The 2nd EMAS24 should be 24B
Post-Project					
Watershed	**Input File Page**	**Routing File Page**	**Type of Issue**	**Problem**	**Recommendation**
EMAS30	118	4	Error	EMAS30 does not exist on the map or in the table	EMAS30 should be changed to EMAS6A
EMAS18	124	5	Routing	All of the upstream watersheds are routed into EMAS18	Routing should go to EMAS16 instead
EMAS3	126	6	Routing	All of the upstream watersheds are routed into EMAS3	Routing should go to EMAS12A or EMAS2 instead
EMFN4	130	10	Error	EMFN4 is skipped	The upstream watersheds should be routed into EMFN4 and then from there into EMFN3
EMD6	138	14	Error	EMD6 does not exist on the map or in the table	EMD6 should be changed to EMD6A and EMD6B
EMC12A	140	15	Routing	All of the upstream watersheds are routed into EMAS12A	Routing should go to EMC9 instead
EMC5D	143	17	Routing	All upstream watersheds are routed into EMC5D	Routing should go to EMC7 instead
EMC5A & EMC4E	144	17	Error	EMC5A is listed twice, EMC4E does not exist	Remove EMC4E and remove the 2nd listing of EMC5A (route it right into EMC4A)
EMC1U & EMC1L2	146	19	Error & Routing	EMC1L2 is listed twice, in the first listing EMC1U is routed to EMC1L2 the watersheds are not adjacent	Remove the first EMC1L2 and then route EMC1U to EMC1V to EMC1M to EMC1L1
EMC1T	146	19	Routing	EMC1T is routing south into the EMC* watershed, in the pre-project it is routed north and remains in the EMC1 watershed.	Routing should go to EMC1L1 instead. Note this may be related to the issues with EMC1L2 above
EMC1G	149	20	Routing	All upstream watersheds are routed into EMC1G	Routing should go to EMC1C instead with EMC1G and EMC1F connected upstream
EMA3F	151	21	Error	EMA3F does not exist	Remove EMA3F from the file

Table 9 – Comparison of pre- and post-project water levels at project boundaries

Station		10-year			100-year		
Number	Name	Pre	Post	Difference	Pre	Post	Difference
1.02	CUR-1	88.6	88.69	0.09	88.9	89.03	0.13
1.22	CUR-1	100.3	98.65	-1.65	101.3	101.79	0.49
12.03	EMD1	38.7	38.7	0	39	39.02	0.02
2.02	EMAS2	67.7	66.95	-0.75	66.4	68.07	1.67
5.01	EMF1	47.6	47.52	-0.08	48	47.93	-0.07
3.01	EMFS2	62.1	62.3	0.2	62.2	62.45	0.25
10.11	EMFS2	55.3	55.56	0.26	55.4	55.76	0.36
101.2	EMFS2	56.1	56.34	0.24	56.2	56.48	0.28
101.3	EMFS2	56.3	56.67	0.37	56.4	56.88	0.48
18.1	EMA3	37	36.92	-0.08	36.9	37.05	0.15
18	EMA3	35.9	35.77	-0.13	35.8	35.91	0.11
24.96	EMCN9	30.5	30.09	-0.41	30.6	30.09	-0.51
15.01	EMCS2	30.7	30.61	-0.09	31	30.79	-0.21
	EMG	No water levels listed at project boundary					
	Dry Creek	No water levels listed at project boundary					

Water Resources & Information Management Engineering, Inc.

DRAFT MEMORANDUM – Addendum I

To:	Kim Hudson, Gene Smith Quad Knopf	**CC:**	Ali Taghavi, Matt Zidar Wrime
From:	Reza Namvar	**Date**	December 22, 2005
Subject:	**Peer Review of the Placer Vineyards Master Project Drainage Study** Placer Vineyards – Steelhead Creek – Assessment of Potential Peak Flood Impacts (November 2005)		
Project Reference:	186.T01.00		

INTRODUCTION

Objective

This memorandum is Addendum I to the draft memorandum published on December 14, 2005, on Peer Review of the Placer Vineyards Master Project Drainage Study. The purpose of this Addendum is to document the work performed in reviewing the Placer Vineyards – Steelhead Creek – Assessment of Potential Peak Flood Impacts (November, 2005) prepared by Civil Engineering Solutions, Inc. (CS). This review is focused on the technical adequacy of CS assessment of the potential impacts of the Placer Vineyards project to the NEMDC system.

Basis of Peer Review

This memorandum presents the findings of our review, which was primarily based on the following information:

1. Review of the impact memos, maps, tables, calculations, model input and output files, and model results downloaded from Civil Solutions ftp site.
2. Review of additional information on NEMDC analysis provided by CS via email.
3. Murray, Burns and Kienlen Consulting Civil Engineers (MBK) report on hydraulic analysis of NEMDC stormwater pumping station.
4. Meeting with Tom Plummer of CS on December 9, 2005.

REVIEW RESULTS

This section presents a brief description of the project, project impacts, the proposed mitigation, and summary of review results. To facilitate the response to the review, an action list is provided in this section.

Project Description

The proposed Placer Vineyards development drains to Steelhead Creek (Natomas East Main Drainage Canal, NEMDC) in the central and western areas. In order to reduce peak flood stages in the Steelhead Creek north of Dry Creek, a pump station with gated bypass channel is constructed. The pumping station consists of three 333-cfs pumps and is designed to run only two at a time with the third pump as backup. The pumps are turned on at water surface elevations of 28 and 29 feet. During the periods of high water in the American River and Dry Creek, the Steelhead Creek will be isolated from the American River and Dry Creek, the pumps will provide positive outflow from the Steelhead Creek. CS has assessed the potential impacts of the Placer Vineyards project to the NEMDC system.

Assessment Method

MBK has developed UNET models of the NEMDC system. Civil Solutions converted the UNET models of the NEMDC system to HEC-RAS models and generated the NEMDC Base HEC-RAS models. The Placer Vineyards hydrographs were added to the Base models to generate the Placer HEC-RAS pre-project and mitigated post-project models. The impact of the Placer Vineyards project on NEMDC system was obtained by comparison of these two models. A 150-cfs pumping capacity was added to the Placer mitigated post-project model and the results were compared to Placer pre-project model to obtain the impact of the proposed 150-cfs pumping capacity.

Impacts

The major impacts of the proposed detention mitigation at the Placer Vineyards project on the NEMDC system include:

- Decreased maximum water surface elevations in the upper reaches (upstream of station 12.623) by as much as 0.19 feet, and
- Increased maximum water surface elevations in the lower reaches (downstream of station 12.623) by as much as 0.19 feet.

Mitigation Methods

Mitigation of impacts of the Placer Vineyard project is provided by addition of 150 cfs of pumping capacity to NEMDC pumping station. The 150 cfs pumping capacity was added to pump 2 with the operating criteria of PUMP ON at 29 and PUMP OFF at 27 feet.

Comparison of the water surface elevations from the HEC-RAS models indicate that the suggested mitigation method of 150 cfs additional pumping will result in lower water levels in the pump sump areas by as much as 0.35 feet.

Review Results/Opinions

Based on our review of the analysis of the project impacts and the proposed mitigation measures, the proposed mitigation method of adding 150 cfs of pumping capacity to NEMDC

pumping station is technically adequate and generates lower maximum water elevations in the pump sump areas. However, due to the issues raised in the main review memorandum and the proposed revision of the Placer Vineyards study, the Placer HEC-RAS models for pre-project and post-project mitigated plus 150 cfs pumping conditions should be revised, so that the report reflects adequate and correct technical analysis. Therefore, the resulting changes to the maximum water surface elevations should be identified and reported in the next revision of the report. We recommend that the revised models be reviewed for technical adequacy.

Action List

The Placer Vineyards assessment of potential impacts on NEMDC system should be revised based on the following actions:

1. Revise the Placer HEC-RAS models of the pre-project and post-project mitigated plus 150 cfs of pumping conditions. The revised mitigated model should have lower water levels at the pump sump areas.
2. Determine any changes in the additional pumping capacity for NEMDC pumping station. The changes should be reported in the next revision of the report.
3. Modify the report by adding the missing page, figure, and table numbers.
4. Review the revised models to ensure technical adequacy.

REFERENCES

1. Assessment of potential peak flood impacts – Steelhead Creek, Draft, November 2005. Civil Engineering Solutions.
2. Hydraulic analysis of Natomas East Main Drainage Canal (NEMDC) stormwater pumping station, 1995. Prepared for Sacramento Area Flood Control Agency (SAFCA). Murray, Burns, and Kienlen (MBK) Consulting Civil Engineers.