PUBLIC REVIEW DRAFT

AVIANO ADULT COMMUNITY PROJECT ENVIRONMENTAL IMPACT REPORT

STATE CLEARINGHOUSE #2006072027

LSA

November 2008

NOTICE OF AVAILABILITY

CITY OF ANTIOCH
AVIANO ADULT COMMUNITY PROJECT
DRAFT ENVIRONMENTAL IMPACT REPORT

State Clearinghouse #2006072027

NOTICE IS HEREBY GIVEN that the City of Antioch, as Lead Agency, has completed a Draft Environmental Impact Report (Draft EIR) for the Aviano Adult Community Project.

PROJECT LOCATION: The approximately 189-acre project site is located in southeast Antioch, east of Deer Valley Road. The project site is bordered by existing single-family residential uses and a neighborhood park to the north; the Antioch Unified School District (AUSD) Dozier Libbey Medical High School (Medical High School), Kaiser Hospital medical facilities, and undeveloped land planned for future residential, mixed use, and commercial development to the west; undeveloped land planned for future business park uses to the east; and undeveloped grazing land and the Contra Costa County Flood Control and Water Conservation District detention basin to the south (planned for a future Sports Complex).

PROJECT DESCRIPTION: The proposed project is an adult residential development that comprises up to 535 adult-single-family units on approximately 93 acres, a 4.8-acre recreational facility, approximately 24 acres of parks and landscaped areas, a segment of the Sand Creek regional trail, a 4.7-acre creek buffer area, 32 acres of open space and associated parking, roadway, and utility improvements. Some of the roadway and utility improvements would occur off-site. The proposed project would also construct roadway and utility improvements that would serve the AUSD Medical High School adjacent to the southwest corner of the site.

HAZARDOUS WASTE SITES: The proposed project is not located on any hazardous waste sites lists enumerated under Section 65965.5 of the Government Code.

SIGNIFICANT ANTICIPATED ENVIRONMENTAL EFFECTS: The Draft EIR provides an evaluation of the potential environmental impacts of the proposed project and recommends mitigation measures to reduce impacts to a less-than-significant level. With the implementation of the mitigation measures proposed, no significant impacts would result through implementation of the proposed project. However, the proposed project, when combined with cumulative projects in the vicinity of the site, would result in a cumulatively considerable significant unavoidable impact resulting from the loss of burrowing owl habitat.

DOCUMENT AVAILABILITY: Copies of the DEIR are available for review Monday through Friday, between the hours of 8:00 a.m. and 5:00 p.m., at the City of Antioch, Community Development Department, Third and "H" Streets, Antioch, California except on specified holidays. The DEIR is also available online at: www.ci.antioch.ca.us and at the Contra Costa County Public Library, at 501 W. 18th Street, Antioch, California.

PUBLIC REVIEW TIMELINE: The 45-day public review period for the DEIR begins **November 26, 2008 and ends January 9, 2009**. The City must receive all written comments within this time period. Written comments may be submitted to the attention of Tina Wehrmeister, Deputy Director, City of Antioch Community Development Department at the following:

City of Antioch
P.O. Box 5007
Antioch, California 94531

Email: cwehrmeister@ci.antioch.ca.us
Fax: 925-779-7034

PUBLIC HEARING: The Planning Commission is scheduled to receive public comments on the DEIR on **January 7, 2009 at 7:30 p.m.** at the City of Antioch Council Chambers, located at Third and "H" Streets, Antioch, California.

QUESTIONS: If you have any questions about this project, please contact Tina Wehrmeister, Deputy Director, City of Antioch Community Development Department at 925-779-7035.

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AVIANO ADULT COMMUNITY PROJECT ENVIRONMENTAL IMPACT REPORT

STATE CLEARINGHOUSE #2006072027

Submitted to:

City of Antioch
P.O. Box 5007
Antioch, CA 94531-5007

Prepared by:

LSA Associates, Inc.
2215 Fifth Street
Berkeley, CA 94710
510.540.7331

LSA

November 2008

TABLE OF CONTENTS

I. INTRODUCTION 1
- A. PURPOSE OF THE EIR 1
- B. PROPOSED PROJECT 1
- C. EIR SCOPE 1
- D. REPORT ORGANIZATION 2

II. SUMMARY 3
- A. PROJECT UNDER REVIEW 3
- B. SUMMARY OF IMPACTS AND MITIGATION MEASURES 3
- C. SUMMARY TABLE 4

III. PROJECT DESCRIPTION 47
- A. PROJECT SITE 47
- B. PROJECT OBJECTIVES 52
- C. PROPOSED PROJECT 53
- D. DISCRETIONARY ACTIONS 65
- E. USES OF THIS EIR 66

IV. SETTING, IMPACTS AND MITIGATION MEASURES 69
- A. LAND USE AND PLANNING POLICY 71
- B. TRANSPORTATION AND CIRCULATION 93
- C. AIR QUALITY 135
- D. NOISE 153
- E. CULTURAL AND PALEONTOLOGICAL RESOURCES 167
- F. GEOLOGY, SOILS AND SEISMICITY 179
- G. HYDROLOGY AND STORM DRAINAGE 195
- H. PUBLIC HEALTH AND SAFETY 209
- I. BIOLOGICAL RESOURCES 219
- J. PUBLIC SERVICES 283
- K. UTILITIES AND INFRASTRUCTURE 293
- L. VISUAL RESOURCES 303
- M. AGRICULTURE AND MINERAL RESOURCES 319
- N. GLOBAL CLIMATE CHANGE 327

V. ALTERNATIVES 349
- A. ALTERNATIVES TO THE PROJECT 350
- B. ALTERNATIVES THAT WERE CONSIDERED BUT REJECTED 362
- C. ENVIRONMENTALLY SUPERIOR ALTERNATIVE 363

VI. CEQA-REQUIRED ASSESSMENT CONCLUSIONS 365
- A. GROWTH-INDUCING IMPACTS 365
- B. SIGNIFICANT IRREVERSIBLE CHANGES 365
- C. CUMULATIVE IMPACTS 366
- D. EFFECTS FOUND NOT TO BE SIGNIFICANT 371

E. SIGNIFICANT UNAVOIDABLE ENVIRONMENTAL IMPACTS 371

VII. REPORT PREPARATION 373
A. REPORT PREPARATION 373
B. REFERENCES 374
C. COMMUNICATIONS 384

APPENDICES ***(Included on the inside back cover on a compact disc)***

APPENDIX A NOTICE OF PREPARATION (NOP) AND COMMENT LETTERS
APPENDIX B DEVELOPMENT AGREEMENT
APPENDIX C TRANSPORTATION AND CIRCULATION IMPACT STUDY
APPENDIX D AIR QUALITY DATA
APPENDIX E NOISE DATA
APPENDIX F CALIFORNIA DEPARTMENT OF PARKS AND RECREATION CONTINUATION SHEET FOR CA-CCO-6 82H
APPENDIX G GEOLOGIC/GEOTECHNICAL FEASIBILITY INVESTIGATION
APPENDIX H STORMWATER CONTROL PLAN
APPENDIX I ENVIRONMENTAL INVESTIGATION REPORT
APPENDIX J FINAL BIOLOGICAL ASSESSMENT
APPENDIX K RESOURCE MANAGEMENT PLAN
APPENDIX L WATER SUPPLY ASSESSMENT

FIGURES

Figure III-1: Project Vicinity and Regional Location Map 48
Figure III-2: Aerial Photograph 49
Figure III-3: Project Impact Areas 55
Figure III-4: Conceptual Land Use Plan 56
Figure III-5: Conceptual Elevations 57
Figure III-6: Conceptual Landscape Plan 59
Figure III-7: Sand Creek Trail 61
Figure III-8: Conceptual Utility Plan 63

Figure IV.A-1: Aerial View of the Project Site and Land Use Photo Location Map 73
Figure IV.A-2: Sand Creek Focus Area Map 77

Figure IV.B-1: Study Intersections 94
Figure IV.B-2: Existing Lane Geometry and Traffic Control 100
Figure IV.B-3: Existing Peak Hour Turning Movement Volumes 101
Figure IV.B-4: Near-Term (2011) Lane Geometry and Traffic Control 102
Figure IV.B-5: Approved Development Generated Traffic Volumes 109
Figure IV.B-6: Near Term (2011) Traffic Volumes Without the Project 110
Figure IV.B-7: Cumulative (2025) Lane Geometry and Traffic Control 112
Figure IV.B-8: Cumulative (2025) Traffic Volumes Without the Project 115
Figure IV.B-9: Proposed Project Near-Term (2011) Trip Distribution 119
Figure IV.B-10: Proposed Project Cumulative (2025) Trip Distribution 120
Figure IV.B-11: Proposed Project Near-Term (2011) Traffic Volumes 122
Figure IV.B-12: Proposed Project Cumulative (2025) Traffic Volumes 123
Figure IV.B-13: Near-Term (2011) Plus Proposed Project Traffic Volumes 124
Figure IV.B-14: Cumulative (2025) Plus Proposed Project Traffic Volumes 126

Figure IV.F-1: Regional Faults 182

Figure IV.I-1: Biotic Habitats 223
Figure IV.I-2: Preliminary Wetland Delineation for Ginochio/Nunn Property 227
Figure IV.I-3: Special-Status Species 243
Figure IV.I-4: San Joaquin Kit Fox 245

Figure IV.L-1: Photo and Visual Simulations Viewpoint Location Map 305
Figure IV.L-2: Visual Simulations – A 311
Figure IV.L-3: Visual Simulations – B 312
Figure IV.L-4: Visual Simulations – C 313
Figure IV.L-5: Visual Simulations – D 314

Figure IV.M-1: Important Farmland 321

Figure V-1: Reduced Density Alternative 357

TABLES

Table II-1: Summary of Impacts and Mitigation Measures 6

Table III-1: Proposed Land Uses 53
Table III-2: Required Permits and Approvals 67

Table IV.A-1: Relationship of Project to Relevant City of Antioch General Plan Goals, Objectives, and Policies 84

Table IV.B-1: Intersection Level of Service Definitions 96
Table IV.B-2: Existing Condition Intersection Levels of Service 103
Table IV.B-3: Approved and Pending Developments Included in Analysis 106
Table IV.B-4: Near-Term Level of Service Conditions without the Project 108
Table IV.B-5: Cumulative Level of Service Conditions without the Project 114
Table IV.B-6: Proposed Project Trip Generation 118
Table IV.B-7: Near-Term (2011) Level of Service Conditions With the Project 121
Table IV.B-8: Cumulative (2025) Level of Service Conditions With the Project 127
Table IV.B-9: Delay Index 130

Table IV.C-1: Federal and State Ambient Air Quality Standards 136
Table IV.C-2: Health Effects of Air Pollutants 138
Table IV.C-3: San Francisco Bay Area Attainment Status 140
Table IV.C-4: Ambient Air Quality at the Pittsburg Air Monitoring Station 142
Table IV.C-5: CO Concentrations for Near-Term 2011 No Project and Near-Term 2011 Plus Project Conditions 147
Table IV.C-6: CO Concentrations for Cumulative 2025 No Project and Cumulative 2025 Plus Project Conditions 148
Table IV.C-7: Project Regional Emissions in Pounds Per Day 150

Table IV.D-1: Definitions of Acoustical Terms 154
Table IV.D-2: Typical A-Weighted Sound Levels 154
Table IV.D-3: Existing (2008) Baseline Traffic Noise Levels 156
Table IV.D-4: Summary of EPA Protective Noise Levels 157
Table IV.D-5: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn} 157
Table IV.D-6: Typical Construction Equipment Maximum Noise Levels 161
Table IV.D-7: Near-Term (2011) Traffic Noise Levels without the Project 163
Table IV.D-8: Near-Term (2011) Traffic Noise Levels with the Project 163
Table IV.D-9: Cumulative (2025) Traffic Noise Levels without the Project 164
Table IV.D-10: Cumulative (2025) Traffic Noise Levels with the Project 164
Table IV.D-11: Predicted Traffic Noise Levels at the First Row of Outdoor Activity Areas with Varying Barrier Heights 165

Table IV.F-1: Modified Mercalli Scale 185

Table IV.I-1: Special-Status Plant Species Potentially Occurring On or In the Vicinity of the Project Site 233

Table IV.I-2: Special-Status Animal Species Potentially Occurring On or In the Vicinity of the Project Site 237
Table IV.I-3: Acreages of Permanent Project Impacts and Mitigations for Special-status Grassland and Vernal Pool Species. 265
Table IV.I-4: Acreages of Permanent Project Impacts and Mitigations for California Red-legged Frog. 272
Table IV.I-5: Summary of Acreages of Project Impacts to Waters of the U.S. and State 280

Table IV.K-1: Projected Water Supply and Demand with Project (Acre-Feet/Year) 300

Table IV.N-1: Global Warming Potentials 329
Table IV.N-2: Long-Term Project Operational Emissions of GHGs 341
Table IV.N-3: Project Compliance with Greenhouse Gas Emission Reduction Strategies 345

Table V-1: Alternative Buildout Scenarios 350
Table V-2: No Project Alternative Buildout 351
Table V-3: Project Regional Emissions in Pounds Per Day 353

I. INTRODUCTION

A. PURPOSE OF THE EIR

In compliance with the California Environmental Quality Act (CEQA), this report describes the environmental consequences of the Aviano Adult Community Project (project) proposed for the development of approximately 189 acres in southeast Antioch. This Environmental Impact Report (EIR) is designed to inform City of Antioch decision-makers, responsible agencies and the general public of the proposed project and the potential physical consequences of project approval. This EIR also examines alternatives to the proposed project and recommends mitigation measures to reduce or avoid potentially significant physical impacts. The City of Antioch is the Lead Agency for environmental review of the proposed project. This EIR will be used by the City of Antioch and the public in their review of the proposed project and associated approvals described in Chapter III.

B. PROPOSED PROJECT

The project considered in this EIR is a proposed active adult residential development for an approximately 189-acre site located in southeast Antioch, east of Deer Valley Road. Proposed development includes up to 535 adult-single-family units on approximately 93 acres, a 4.8-acre recreation facility, approximately 24 acres of parks and landscaped areas, a segment of the Sand Creek regional trail, a 4.7-acre creek buffer area, approximately 32 acres of open space, and associated parking, roadway, and utility improvements. Some of the roadway and utility improvements would occur off-site, on a total of approximately 25 acres. The project would also construct roadway and utility improvements that would serve the adjacent Antioch Unified School District (AUSD) Dozier Libbey Medical High School (Medical High School).

C. EIR SCOPE

The City of Antioch circulated a Notice of Preparation (NOP) notifying responsible agencies and interested parties that an EIR would be prepared for the project and indicating the environmental topics anticipated to be addressed in this EIR. The NOP was published on July 10, 2006. The NOP was mailed to public agencies, organizations, and individuals likely to be interested in the potential impacts of the project. Comments on the NOP were received by the City and considered during preparation of the EIR. A total of nine comment letters regarding the NOP were received. A copy of the NOP and the comment letters received are included in Appendix A of this EIR.

The following environmental topics are addressed as separate sections in this EIR:

A. Land Use and Planning Policy
B. Transportation and Circulation
C. Air Quality
D. Noise

E. Cultural and Paleontological Resources
F. Geology, Soils and Seismicity
G. Hydrology and Storm Drainage
H. Public Health and Safety
I. Biological Resources
J. Public Services
K. Utilities and Infrastructure
L. Visual Resources
M. Agriculture and Mineral Resources
N. Global Climate Change

D. REPORT ORGANIZATION

This EIR is organized into the following chapters:

- *Chapter I – Introduction:* Discusses the overall EIR purpose, provides a summary of the proposed project and the environmental impact report scope, and summarizes the organization of the EIR.
- *Chapter II – Summary:* Provides a summary of the proposed project and the impacts that would result from implementation of the proposed project, and describes mitigation measures recommended to reduce or avoid significant impacts. A discussion of alternatives to the proposed project is also provided.
- *Chapter III – Project Description:* Provides a description of the project site, project objectives, required approval process, and details of the project itself.
- *Chapter IV – Setting, Impacts and Mitigation Measures:* Describes the following for each environmental technical topic: existing conditions (setting); potential environmental impacts and their level of significance; and measures to mitigate identified impacts. Potential adverse impacts are identified by levels of significance, as follows: less-than-significant impact (LTS), significant impact (S), and significant and unavoidable impact (SU). The significance of each impact (after mitigation) is categorized before and after implementation of any recommended mitigation measure(s).
- *Chapter V – Alternatives:* Provides an evaluation of one alternative to the proposed project in addition to the CEQA-required No Project alternative.
- *Chapter VI – CEQA Required Assessment Conclusions:* Provides additional specifically-required analyses of the proposed project's growth-inducing effects, significant irreversible changes, cumulative impacts, and effects found not to be significant.
- *Chapter VII – Report Preparation:* Identifies preparers of the EIR, references used and persons and organizations contacted.

II. SUMMARY

A. PROJECT UNDER REVIEW

This EIR has been prepared to evaluate the environmental impacts of the proposed Aviano Adult Community Project in the City of Antioch. The project sponsor (Pulte Homes) proposes to develop up to 535 age-restricted single-family homes on 93 acres of the 189-acre project site. The remainder of the site would include a 4.8-acre recreational facility, approximately 24 acres of parks and landscaped areas, a segment of the Sand Creek regional trail, a 4.7-acre creek buffer area, approximately 32 acres of open space and associated parking, roadway, and utility improvements. Some of the roadway and utility improvements would occur off-site, on a total of approximately 25 acres. A more detailed description of the proposed project is provided in Chapter III, Project Description.

B. SUMMARY OF IMPACTS AND MITIGATION MEASURES

This summary provides an overview of the analysis contained in Chapter IV, Setting, Impacts and Mitigation Measures. CEQA requires a summary to include discussion of: (1) potential areas of controversy; (2) significant impacts; (3) cumulative impacts; (4) significant irreversible and unavoidable impacts; and (5) alternatives to the proposed project.

1. Potential Areas of Controversy

Letters received as comments on the Notice of Preparation (NOP) raised a number of topics that the commenters wanted addressed in the EIR, including: availability of public transit service; traffic congestion on local roadways and routes of regional significance; hydrology and water quality concerns associated with the capacity of the existing and proposed storm drainage system and proximity of Sand Creek; presence of special-status species; increased emergency response times for fire and police services; hazards associated with existing natural gas pipelines; and pedestrian and vehicular safety with respect to active rail lines.

2. Significant Impacts

Under CEQA, a significant impact on the environment is defined as, "…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."[1] Development of the proposed project has the potential to result in adverse environmental impacts in several environmental areas. Impacts in the following areas would be significant without the implementation of mitigation measures, but would be reduced to a less-than-significant level if the mitigation measures recommended in this EIR are implemented:

- transportation and circulation
- air quality

[1] Public Resources Code 15382; Public Resources Code 21068.

- noise
- cultural and paleontological resources
- geology, soils and seismicity
- hydrology and storm drainage
- public health and safety
- biological resources
- visual resources
- agricultural resources
- global climate change

3. Significant Unavoidable Impacts

As discussed in Chapters IV and VI of this EIR, all significant impacts associated with the proposed project could be mitigated to less-than-significant levels with implementation of the recommended mitigation measures. The proposed project itself would not result in any significant unavoidable impacts. However, in conjunction with other foreseeable projects, the proposed project would result in a cumulatively considerable significant unavoidable impact, related to habitat for burrowing owls.

4. Alternatives to the Project

The following alternatives to the proposed project are considered in this EIR:

- The **No Project alternative** assumes the proposed project would not be built, but that another project would be built in accordance with the existing General Plan land use designations for the project site.
- The **Reduced Density alternative** assumes the number of units in the proposed project would be reduced to avoid wetland habitat areas north of Sand Creek.

The Reduced Density alternative is identified as the environmentally superior alternative. Each of the alternatives is discussed in detail in Chapter V, Alternatives of this EIR.

5. Cumulative Impacts

With mitigation of the recommended measures discussed in Section IV.I, Biological Resources, the proposed project would result in a significant unavoidable cumulative impact on burrowing owl habitat in the vicinity of the site due to 1) recent development (i.e., development occurring in the past five years on vacant parcels in the southern portion of the City and in the Sand Creek Specific Plan Area) and 2) foreseeable future planned development in these areas. All other cumulative impacts would be less-than-significant.

C. SUMMARY TABLE

Information in Table II-1, Summary of Impacts and Mitigation Measures, has been organized to correspond with environmental issues discussed in Chapter IV. The table is arranged in four columns:

(1) impacts; (2) level of significance prior to mitigation; (3) mitigation measures; and (4) level of significance after mitigation. Levels of significance are categorized as follows: SU = Significant and Unavoidable; S = Significant; and LTS = Less Than Significant. A series of mitigation measures is noted where more than one mitigation measure is required to achieve a less-than-significant impact, and alternative mitigation measures are identified when available. For a complete description of potential impacts and recommended mitigation measures, please refer to the specific discussions in Chapter IV.

Table II-1: Summary of Impacts and Mitigation Measures

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
A. Land Use and Planning Policy			
There are no significant land use and planning policy impacts.			
B. Transportation and Circulation			
TRANS-1: The Hillcrest Avenue/Lone Tree Way intersection would operate below an acceptable level of service in 2025 independent of the proposed project. The addition of project traffic in the Cumulative (2025) Plus Project condition would exacerbate the unacceptable operation of this intersection.	S	TRANS-1: As a condition of project of approval, the project sponsor shall contribute its fair share to modify the intersection to add a second westbound left turn lane. The project traffic represents one percent of the total intersection volume. Costs associated with this modification may involve securing right-of-way. Modifying the intersection would improve level of service to an acceptable threshold and reduce the impact to less than significant.	LTS
TRANS-2: The SB SR-4 Bypass/Lone Tree Way intersection would operate below an acceptable level of service in 2025 regardless of the proposed project. The addition of project traffic in the 2025 plus project condition would further exacerbate the poor operation of this intersection.	S	TRANS-2: As a condition of project of approval, the project sponsor shall contribute its fair share to restripe the left-shared-through lane to an all-shared lane. The project traffic is one tenth of one percent of the total intersection volume. Costs associated with this modification may involve securing right-of-way. The proposed improvement is independent of any future plans to widen the SR-4 Bypass. Modifying the intersection would improve level of service to an acceptable threshold and reduce the impact to less than significant.	LTS
TRANS-3: The Hillcrest Avenue/Lone Tree Way intersection would have a northbound left turn queue that would spill out of the turn pocket in the Near-Term regardless of the proposed project. The addition of the project traffic would increase the queue by less than three vehicles.	S	TRANS-3: As a condition of project approval, the project sponsor shall contribute its fair share to restripe one northbound through lane to a through-shared-left turn lane. The project traffic is three percent of the total intersection volume. The intersection currently operates with split phasing in the north-south direction; therefore, no signal modifications would be necessary.	LTS
TRANS-4: The Hillcrest Avenue/Lone Tree Way intersection would have westbound left and northbound left turn queues that would spill out of the turn pockets in 2025 regardless of the proposed project. The addition of project traffic would increase the westbound left turn queue by less than two vehicles and the northbound left turn queue by less than three vehicles.	S	TRANS-4: Implement Mitigation Measures TRANS-1 and TRANS-3.	LTS
TRANS–5: At locations where the greenway path crosses the proposed project's internal streets there is increased potential for collisions due to drivers not anticipating pedestrians and bicyclists crossing at those locations.	S	TRANS–5: Lighted crosswalks and flashing traffic signs are recommended to increase driver awareness of the crossing, slow traffic and thereby increase safety. The proposed project should be responsible for all of the mitigation costs associated with this measure. Adding the raised crosswalks and signage would reduce the impact to a less-than-significant level.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
TRANS–6: At locations where the greenway path abuts some cul-de-sacs and internal loop roads, residents are not able to directly access the greenway path and must take a circuitous route. This is inconsistent with general plan policies.	S	TRANS–6: Direct access from the cul-de-sacs and loop streets should be provided to the path in harmony with the general plan policy to remove barriers for safe and convenient movement of pedestrians. The proposed project should be responsible for all of the mitigation costs associated with this measure. Adding additional access points to the greenway reduces the impact to a less-than-significant level.	LTS
C. Air Quality			
AIR-1: Construction period activities during future development of the project site could generate significant dust, exhaust, and organic emissions.	S	AIR-1: Consistent with guidance from the BAAQMD, the following controls shall be implemented at all construction sites for the project to control dust production and fugitive dust. • Water all active construction areas at least twice daily and more often during windy periods; active areas adjacent to existing sensitive land uses shall be kept damp at all times, or shall be treated with non-toxic stabilizers to control dust; • Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard; • Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites; • Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites; • Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets; • Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more); • Enclose, cover, water twice daily or apply (non-toxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.); • Limit traffic speeds on unpaved roads to 15 mph; • Install sandbags or other erosion control measures to prevent silt runoff to public roadways;	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
AIR-1 *Continued*		• Replant vegetation in disturbed areas as quickly as possible; • On-site idling of construction equipment shall be minimized as much as feasible (no more than 5 minutes maximum); • All construction equipment shall be properly tuned and fitted with manufacturer's standard level exhaust controls; • Contractors shall consider using alternative powered construction equipment (i.e., hybrid, compressed natural gas, biodiesel, electric) when feasible; • Contractors shall use add-on control devices such as diesel oxidation catalysts or particulate filters; and • All contractors shall use equipment that meets California Air Resources Board's (ARB) most recent certification standard for off-road heavy duty diesel engines.	
D. Noise			
NOISE-1: Construction period activities could create significant short-term noise impacts on existing residential properties and on buildings that would become occupied within the project site before completion of the entire project.	S	NOISE-1a: The construction contractor shall limit all noise producing construction related activities, including haul truck deliveries or warming up and idling of heavy construction equipment, to the hours of 8:00 a.m. to 5:00 p.m. on weekdays. On Saturdays, noise producing construction activities shall be limited to 9:00 a.m. to 5:00 p.m., irrespective of the distance from occupied dwellings. No construction shall be allowed on Sundays and public holidays. All weekend noise producing construction activity is subject to approval by the City Engineer.	LTS
		NOISE-1b: During all project site excavation and on-site grading, the construction contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.	
		NOISE-1c: The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.	
		NOISE-1d: The construction contractor shall locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
NOISE-1 *Continued*		NOISE-1e: The construction contractor shall use temporary noise attenuation fences at least 6 feet in height to protect all sensitive receptors along the northern property line that are not currently protected by a sound wall of at least 6 feet in height.	
NOISE-2: Local traffic would generate long-term exterior noise exceeding normally acceptable levels on the project site and could expose site uses to unacceptable noise levels.	S	NOISE-2a: A sound wall barrier at least 8-feet-high (measured above the finished roadway elevation) shall be constructed along the project property line adjacent to Hillcrest Avenue to reduce traffic noise impacts to a less-than-significant level. The sound wall should be of solid construction without gaps (including at the bottom), and have a minimum surface weight of 4 pounds per square foot.	LTS
		NOISE-2b: A sound wall barrier at least 8-feet-high (measured above the finished roadway elevation) shall be constructed along the project property line adjacent to Sand Creek Road to reduce traffic noise impacts to a less-than-significant level. The sound wall should be of solid construction without gaps (including at the bottom), and have a minimum surface weight of 4 pounds per square foot.	
E. Cultural and Paleontological Resources			
CULT-1: Site preparation, grading, and construction activities could adversely impact subsurface historic resources at site CA-CCO-682H.	S	CULT-1: If feasible, the site shall be avoided. If avoidance is not feasible, an Archaeological Research Design and Testing Plan (ARDTP) shall be developed. Once the ARDTP is reviewed and approved by the City of Antioch, and testing is completed, a report shall be prepared detailing the methods and results, and the site shall be evaluated using the California Register of Historic Resources eligibility criteria. The report shall be submitted to the project applicant, the City of Antioch, and the Northwest Information Center (NWIC). If the site appears to be ineligible for the California Register, project construction activity within the area of the site may begin. If the site is found to be potentially eligible, a Cultural Resources Treatment Plan (CRTP) shall be developed to mitigate project effects. Once the program is approved by the City, and the work completed, project construction activities within the site area can begin. A Cultural Resources Treatment Report (CRTR) shall be prepared and submitted to the project applicant and the City for review and comment. Final copies of the CRTR shall be submitted to the project applicant, the City of Antioch, and the NWIC.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
CULT-2: Site preparation, grading, and construction activities could adversely impact previously undiscovered archeological resources.	S	CULT-2: If deposits of prehistoric or historic archeological materials are encountered during project activities, all work within 25 feet of the discovery shall be redirected and a qualified archeologist shall be contacted to assess the deposit finds and make recommendations. While deposits of prehistoric or historic archeological materials should be avoided by project activities, if the deposits cannot be avoided, they shall be evaluated for their California Register eligibility. If the deposits are not eligible for the California Register, avoidance is not necessary. If the deposits are eligible for the California Register, they shall be avoided. If avoidance is not feasible, project impacts shall be mitigated in accordance with the recommendations of the evaluating archaeologist and CEQA Guidelines §15126.4 (b)(3)(C), which requires implementation of a data recovery plan and avoidance of human remains. Upon completion of the archaeologist's assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the discovered archaeological materials. The report shall be submitted to the project applicant, the City of Antioch, and the Northwest Information Center (NWIC). Once the report is reviewed and approved by the City, and any appropriate resource recovery completed, project construction activity within the area of the find may resume.	LTS
CULT-3: Ground disturbing activities associated with site preparation, grading, and construction activities could result in adverse impacts to previously undiscovered paleontological resources.	S	CULT-3: If paleontological resources are encountered during site preparation or grading activities, all work within 25 feet of the discovery shall be redirected until a qualified paleontologist has assessed the discoveries and made recommendations. If the paleontological resources are found to be significant, adverse effects to such resources shall be avoided by project activities. If project activities cannot avoid the resources, the adverse effects shall be mitigated. Mitigation shall include data recovery and analysis, preparation of a final report, and the formal transmission or delivery of any fossil material recovered to a paleontological repository, such as the University of California Museum of Paleontology (UCMP). Upon completion of recovery activities, a final report documenting methods and findings of the mitigation shall be prepared and submitted to the project applicant, the City of Antioch, and a suitable paleontological repository. Once the final report is reviewed and approved by the City, project construction activity within the area of the find may resume.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
CULT-4: Ground disturbing activities associated with site preparation, grading, and construction activities could disturb human remains, including those interred outside of formal cemeteries.	S	CULT-4: If human remains are encountered, work within 25 feet of the discovery shall be redirected and the Contra Costa County Coroner notified immediately. At the same time, an archaeologist shall be contacted to assess the situation and consult with the appropriate agencies. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations of the MLD. The report shall be submitted to the project applicant, the City of Antioch, and the Northwest Information Center. Once the report is reviewed and approved by the City, and any appropriate treatment completed, project construction activity within the area of the find may resume.	LTS
F. Geology, Soils and Seismicity			
GEO-1: Seismically-induced ground shaking at the project site could result in injuries, fatalities, and property damage.	S	GEO-1: Project design and construction shall be in conformance with, or exceed, current best standards for earthquake resistant construction in accordance with the California Building Code, applicable local codes, and in accordance with the generally accepted standards of geotechnical practice for seismic design in Northern California. In addition, project design for on- and off-site project elements shall follow the recommendations of a site-specific design-level geotechnical investigation report to be prepared by a Certified Engineering Geologist or Geotechnical Engineer. The City Engineer shall approve all final design and engineering plans.	LTS
GEO-2: Differential settlement at the project site could result in damage to project buildings and other improvements.	S	GEO-2: A site-specific design-level geotechnical investigation report for on- and off-site project elements shall be prepared by a licensed professional and submitted to the City Engineer for review and approval. The report shall include specific recommendations for mitigating potential settlement associated with native soil/fill boundaries and areas of different fill thickness, if any. The report shall specifically address treatment of test pit areas and trenches to ensure that differential settlement will not occur in those areas.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
GEO-3: Damage to structures or property could result from expansive or corrosive soils.	S	GEO-3: A site-specific design-level geotechnical investigation report for both on- and off-site project elements, prepared by a licensed professional, shall be prepared. The report shall include recommendations for foundations and improvements, including sidewalks, paved paths, parking lots, and subsurface utilities, considering expansive soil conditions. Measures shall be incorporated into the report to ensure that potential damage due to shrink/ swell potential of soils is minimized. Corrective measures, as recommended by a licensed professional, may include removal and replacement of problematic soils with engineered and compacted fill, proper drainage design, or design and construction of improvements to withstand the forces exerted by expected shrink/ swell cycles. The report shall be submitted to the City Engineer for review and approval. In addition, the design-level geotechnical study shall include an evaluation of the potential for corrosive soils. If the study results indicate corrosive soil conditions, appropriate measures to mitigate these conditions shall be incorporated into the design of project improvements that may come into contact with site soils. Wherever corrosive soils are found in sufficient concentrations, recommendations shall be made to protect iron, steel, metal, and concrete from long-term deterioration caused by contact with corrosive onsite soils. In general, these recommendations are expected to include, but not be limited to, the following provisions: • Protect buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron (including all buried metallic pressure piping) against corrosion from soil. • Protect buried metal and cement structures in contact with earth surfaces from chloride ion concentrations. • Use sulfate-resistant concrete mix for all concrete in contact with the ground. • Consult a corrosion expert during the project's detailed design phase to design the most effective corrosion protection. All design criteria and specifications set forth in the site-specific design-level geotechnical investigation report shall be implemented to reduce impacts associated with problematic soils to a less-than-significant level.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
GEO-4: The presence of improperly abandoned oil or gas wells at the project site could result in instability of surface soils.	S	GEO-4: Research and verification of closure records, as well as physical verification of well closure and capping shall be completed during preparation of the site-specific design-level geotechnical investigation report for on- and off-site project elements. Any improperly abandoned wells within the project boundaries shall be brought into compliance with the requirements of California Department of Conservation and City of Antioch. The report shall be submitted to the City Engineer for review and approval.	LTS
GEO-5: Personal injury could result during construction due to inadequately shored walls in trenches and excavations.	S	GEO-5: The applicant shall ensure that the requirements for worker health and safety as specified by Cal/OSHA are implemented. In particular, due to the caving proclivity of the soil types of the project site, shoring requirements of the California standards for workers dealing with and work in excavations as specified in the California Code of Regulations, Title 8, Section 1540 et. al., *Excavations*, shall be observed for all on- and off-site operations. This article applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.	LTS
G. Hydrology and Storm Drainage			
HYD-1: Increased runoff volume resulting from creation of new impervious surfaces could cause hydromodification impacts.	S	HYD-1: As a condition of approval of the final grading and drainage plans for the project, and prior to issuance of a grading permit the applicant shall demonstrate through detailed hydraulic analysis that implementation of the proposed drainage plans for all on-site and off-site improvements will not create potential hydromodification impacts downstream by implementing the following: 1) A qualified licensed engineering firm retained by the applicant shall develop final design-level drainage and C.3 compliant stormwater management plans for the proposed project including all on-site and off-site improvements. The project drainage plan shall include a design that, when implemented, would ensure that post-project runoff does not exceed estimated pre-project rates and/or durations, where the increased stormwater discharge rates and/or durations will result in increased potential for erosion.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
HYD-1 *Continued*		2) Include drainage components that are designed in compliance with City of Antioch standards. The qualified licensed engineering firm preparing drainage plans shall consider the proximity of the proposed detention basins to Sand Creek and shall implement adequate design measures so as to not result in bank instability in Sand Creek. The grading and drainage plans shall be reviewed for compliance with these requirements by the City of Antioch. 3) Neither the City of Antioch nor any other government agency shall be responsible for maintenance of C.3 compliance facilities. The project must include a self-perpetuating drainage system maintenance program (to be managed by a homeowners association or similar entity) that includes annual inspections and necessary maintenance of detention basins, sedimentation basins, drainage ditches, and drainage inlets. Any accumulation of sediment or other debris shall be promptly removed and damage to the drainage system repaired in a timely manner. 4) Storm Water Control Plans shall be in conformance with the engineering guidance and specifications provided by the Contra Costa County Flood Control and Water Conservation District.	
HYD-2: Increased runoff resulting from creation of new impervious surfaces could potentially exacerbate downstream flooding problems.	S	HYD-2: As a condition of approval of the final grading and drainage plans for the project, and prior to issuance of a grading permit the applicant shall demonstrate through detailed hydraulic analysis that implementation of the proposed drainage plans will not impact flooding conditions or create potential flooding impacts downstream, by implementing the following: 1) The qualified licensed engineering firm retained by the applicant shall analyze the potential for the project including all on-site and off-site improvements to contribute to downstream flooding impacts at the project limits, as well as downstream of the site, to the junction of Sand Creek and Marsh Creek. The project drainage plan shall include a design that, when implemented, would not increase peak flows above existing flows, or exacerbate downstream flooding.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
HYD-2 *Continued*		2) Storm Water Control Plans, including underlying hydrology and hydraulic analysis, shall be submitted to the CCCFCD for review to ensure that the design is in conformance with CCCFCD engineering guidance and specifications and that the proposed design is compatible with the future plans for the USCB. The applicant shall work closely with the City of Antioch and the CCCFCD to ensure that the proposed uses within the on-site open space immediately downstream of the USCB dam structure are compatible with the dam inundation zone, emergency release route, and primary spillway alignment of the proposed USCB facility.	
HYD-3: Construction activities and post-construction site uses could result in degradation of water quality in the San Joaquin River by reducing the quality of stormwater runoff.	S	HYD-3a: As a condition of approval of the final grading plans, the applicant shall prepare a Storm Water Pollution Prevention Plan (SWPPP) designed to reduce potential impacts to surface water quality through the construction period of the project including all on- and off-site improvements. The SWPPP shall be submitted for approval to the City of Antioch prior to issuance of a grading permit. The SWPPP must be maintained on-site and made available to City inspectors and/or San Francisco Bay or Central Valley Water Board staff upon request. The SWPPP shall include specific and detailed BMPs designed to mitigate construction-related pollutants. At a minimum, BMPs shall include practices to minimize the contact of construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, adhesives) with stormwater. The SWPPP shall specify properly designed centralized storage areas that keep these materials out of the rain. An important component of the stormwater quality protection effort is the knowledge of the site supervisors and workers. To educate on-site personnel and maintain awareness of the importance of stormwater quality protection, site supervisors shall conduct regular tailgate meetings to discuss pollution prevention. The frequency of the meetings and required personnel attendance list shall be specified in the SWPPP. The SWPPP shall specify a monitoring program to be implemented by the construction site supervisor, which must include both dry and wet weather inspections. In addition, in accordance with State Water Resources	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
HYD-3 *Continued*		Control Board Resolution No. 2001-046, monitoring would be required during the construction period for pollutants that may be present in the runoff that are "not visually detectable in runoff." Water Board and/or City personnel, who may make unannounced site inspections, are empowered to levy considerable fines if it is determined that the SWPPP has not been properly implemented. BMPs designed to reduce erosion of exposed soil may include, but are not limited to: soil stabilization controls, watering for dust control, perimeter silt fences, placement of fiber rolls, and sediment basins. The potential for erosion is generally increased if grading is performed during the rainy season as disturbed soil can be exposed to rainfall and storm runoff. If grading must be conducted during the rainy season, the primary BMPs selected shall focus on erosion control; that is, keeping sediment on the site. End-of-pipe sediment control measures (e.g., basins and traps) shall be used only as secondary measures. Entry and egress from the construction site shall be carefully controlled to minimize off-site tracking of sediment. Vehicle and equipment wash-down facilities shall be designed to be accessible and functional during both dry and wet conditions.	
		HYD-3b: The design-level stormwater control plan shall demonstrate through detailed hydraulic analysis that implementation of the proposed drainage plan would result in treatment of the appropriate percentage of the runoff from the project including all on- and off-site improvements (in compliance with the County NPDES permit). The amount of runoff that is typically required to be treated is about 85 percent of the total average annual runoff from the site (depending on whether the volume-based or flow-based approach is used). The qualified professionals preparing the design-level stormwater control plan shall include as many of the BMPs identified in the preliminary stormwater plan as feasible and consider additional measures designed to mitigate potential water quality degradation of runoff from all portions of the completed development. The project's design-level stormwater control plan must meet the requirements of the Water Board and City of Antioch per the terms of the NPDES permit. City staff shall review and approve the SWPPP and design-level stormwater control plan prior to approval of the grading plan.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
HYD-4: Water supply well(s) at the project, if not properly managed or decommissioned, could be damaged during construction, potentially resulting in impacts to groundwater quality.	S	HYD-4: Any existing water supply wells that may be discovered during site preparation shall either be: 1) Properly abandoned in compliance with the California Department of Water Resources, California Well Standards; or 2) Inspected by a qualified professional to determine whether the well is properly sealed at the surface to prevent infiltration of water-borne contaminants into the well casing or surrounding gravel pack. The California Well Standards require an annular surface seal of at least 20 feet for water supply wells. If any of the wells are found not to comply with this requirement, the applicant shall retain a qualified well driller to install the required seal.	LTS
H. Public Health and Safety			
HAZ-1: Development of the project site and off-site areas could expose construction workers and future residents to hazardous materials from historic oil and gas exploration.	S	HAZ-1: Prior to the issuance of grading or construction permits for the project site and off-site impact areas, a Construction Risk Management Plan (CRMP) should be prepared to address potential hazardous material issues during construction of the project. The CRMP shall include provisions to protect construction workers and the nearby public from health risks from pipeline hazards and potential contaminated soils associated with oil and natural gas production in the project vicinity. The CRMP shall incorporate Best Practices defined by the Common Ground Alliance to ensure construction worker safety and prevent accidental releases from oil and natural gas pipelines. The CRMP shall also require site inspections during initial grading activities at the site; provide procedures to be undertaken in the event that previously unreported petroleum contamination or subsurface hazards are discovered during construction; incorporate construction safety measures for excavation and other construction activities; establish detailed procedures for the safe storage, stockpiling, use, and disposal of hazardous materials at the project site; provide emergency response procedures; and designate personnel responsible for implementation of the CRMP. Any areas of contamination that may be discovered during project development shall be immediately reported to CCHS and investigated and remediated under the oversight of CCHS or other appropriate agency in accordance with existing regulatory programs. The CRMP shall be submitted to the City of Antioch for review and approval.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
HAZ-2: Development of the proposed project could expose future open space recreational users to hazardous materials and corrosives that may be present in Sand Creek.	S	HAZ-2: Prior to the issuance of a certificate of occupancy at the site, a qualified environmental professional shall conduct a surface water quality investigation at the portion of Sand Creek within the project site. At least one surface water sample shall be collected from Sand Creek during three different quarters of the year to evaluate water quality at the start of, during, and at the end of the rainy season. The samples shall be analyzed for pH and California Title 22 heavy metals, and the laboratory results shall be compared to established residential health risk standards (RWQCB Environmental Screening Levels). Water quality sampling results shall be provided to the Mining Section of the Central Valley RWQCB, which is responsible for implementation of water quality regulations related to mining wastes, to aid their investigation and remediation of the source of the acid mine drainage. The surface water quality investigation shall also be submitted to the City of Antioch for review and approval. If acidic conditions are identified (pH lower than 6.5) and/or concentrations of metals in excess of residential water quality standards, warning signs shall be posted on both banks of Sand Creek warning open space users to avoid contact with Creek water.	LTS
HAZ-3: Oil and natural gas pipelines may create safety hazards for construction workers during development of the project.	S	HAZ-3: Preparation and implementation of the CRMP in Mitigation Measure HAZ-1, which requires compliance with best management practices for construction safety in pipelines, would reduce this potential impact to a less than significant level.	LTS
HAZ-4: Improper use, storage, or disposal of hazardous materials during construction activities could result in releases affecting construction workers, the public, and the environment.	S	HAZ-4: Preparation and implementation of the CRMP in Mitigation Measure HAZ-1 as well as the required SWPPP for construction (see Mitigation Measure HYD-2a) would reduce the potential impacts of hazardous materials releases during construction to a less-than-significant level. No additional mitigation is required.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
I. Biological Resources			
BIO-1: Grading and construction of the proposed project would result in a loss of habitat for special-status grassland and vernal pool species including the vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, burrowing owl, and San Joaquin kit fox.	S	BIO-1a: The project sponsor shall compensate for the permanent loss of 154 acres of suitable habitat for listed grassland and vernal pool species (vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamanders, and San Joaquin kit fox) at a ratio of 1:3 (e.g, for each acreage impacted, a minimum of 3 acres of suitable habitat will be preserved). This would result in a mitigation requirement of 462 acres of suitable habitat for listed grassland species. Mitigation for impacts to listed species habitat may be accomplished 1) through on and/or off-site preservation as described below or 2) through the purchase of habitat credits equivalent to preservation of habitat at a 1:3 ratio (loss:preserved) at an approved mitigation bank that includes the City of Antioch in its service area. Alternatively, the project sponsor may negotiate and pay development fees to the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECC HCP/NCCP) Implementing Entity consistent with the applicable fee schedule for projects covered under the ECC HCP/NCCP (see Mitigation Measure BIO-1d). To compensate for the permanent loss of habitat for grassland and vernal pool animals, the project sponsor shall be required to preserve and/or create suitable habitat on-site and/or off-site within eastern Contra Costa County. Habitat to be preserved on-site would partially compensate for impacts to San Joaquin kit fox and burrowing owl in the on-site preserve as described below. The remainder of the mitigation would be accomplished at off-site mitigation areas. Habitat to be preserved off-site must be grassland habitat possessing the following characteristics: 1) the site shall be located within the northern range of the San Joaquin kit fox in Contra Costa County and shall be contiguous with other suitable kit fox habitat, 2) the site shall provide suitable foraging and denning habitat for kit foxes; 3) the site shall encompass seasonal wetlands/vernal pools that	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		support vernal pool fairy shrimp and/or vernal pool tadpole shrimp; 4) the site shall provide breeding and upland habitat for California tiger salamanders; 5) the site shall provide upland and migration habitat for California red-legged frogs, and 6) the site shall have supported breeding burrowing owls in the last 3 years. The basis for this required mitigation is as follows. While it is acknowledged that the project site is outside the area covered by the HCP/NCCP, and the HCP/NCCP does not set forth specific ratios for preservation or creation of habitat, it does set a goal of the acquisition and preservation of 13,900 acres of grassland habitat. This is to compensate for projected impacts to between 3,920 and 5,578 acres of such habitat in the plan area. Using these impacted and preserved acreage values roughly translates to a loss:preservation ratio between 1:2.5 to 1:3.5 for grassland species such as California tiger salamander and San Joaquin kit fox. Participants in the HCP/NCCP divide the responsibility for land acquisition and preservation to meet the HCP/NCCP goals between new development at 52 percent and existing development (i.e., the public) at 48 percent. Since there is no cost sharing for projects not covered by HCP/NCCP, the entire responsibility to mitigate the impacts in a manner consistent with the regional HCP/NCCP would fall to new development (i.e., the project sponsor). Consistent with the derived ratio above, the 1:3 (loss:preservation) ratio is the standard used by the USFWS and CDFG to determine appropriate compensation for impacts to listed grassland species' habitat (e.g., California tiger salamander, San Joaquin kit fox) for other projects in these species' ranges including those in eastern Contra Costa and Solano counties. Given that both the derived ratio from the regional HCP/NCCP and the resource agencies' typical requirements are similar, the 1:3 (loss:preservation) ratio is justified for this project. For mitigation purposes, the minimum loss:preservation ratio is 1:3, unless the applicable resource agencies determine a lower ratio to be acceptable.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		Upland habitat mitigation for both San Joaquin kit fox and California tiger salamander may be accomplished on the same acreage provided that 1) the mitigation site is determined to be suitable for both of these species by a qualified biologist in consultation with USFWS and CDFG and 2) the management plan includes measures for conservation of both species and enhancement of habitat for both species. The additional acreage purchased by the project sponsor to mitigate habitat impacts for California tiger salamander must be grassland habitat that supports ground squirrels and either has known breeding habitat on-site or is within migration range of, and has preserved connectivity to, known breeding habitat for this species. The known breeding habitat must be located on a site that is preserved and managed for California tiger salamanders and other native wildlife and plants (i.e., regional or state park, mitigation or conservation bank, or other area preserved in a conservation easement). Additional acreage purchased by the project sponsor to mitigate for impacts for San Joaquin kit fox must be within the USFWS mapped range of the species, must have connectivity to areas where kit fox are known to occur, and provide suitable foraging and denning habitat. The project sponsor must either establish a conservation easement on the additional mitigation lands to preserve them in perpetuity as wildlife habitat or donate the additional mitigation lands acres to a qualified conservation organization. The project sponsor must also establish an endowment fund to provide for the long-term management, maintenance, and monitoring of the mitigation site.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		Requirements for each preservation/creation (on-site and off-site) are detailed below. ***On-site Preservation.*** The project sponsor shall preserve 35.9 acres as an Open Space Preserve at the south end of the project site. Approximately 4.7 acres of the preserved area are located north of the Sand Creek channel and would serve to buffer the Sand Creek riparian corridor from the development north of the creek. The on-site preserved area excludes 2.5 acres that have been set-aside for a potential future road extending from Sand Creek Road southwest through the Preserve, as well as another 1.0 acre which has been granted as an easement to PG&E for grading and landscaping associated with a new substation located at the eastern boundary of the preserve. On-site habitat preservation within the Preserve would provide habitat for San Joaquin kit fox and burrowing owl. The population of round-leaved filaree is located within the on-site preserve. The on-site preserve also would provide habitat for common wildlife and plant species that occur in the grasslands of the region. The Preserve would include a permanently protected riparian buffer along the north side of Sand Creek on the project site averaging 100 feet from the top-of-bank. The development plan for the project site shall include the transfer of the preserve averaging 100 feet from top-of-bank. The development plan for the project site shall include the transfer of the preserve into a dedicated parcel. A deed restriction shall be recorded over the parcel, ensuring that its ecological values would be maintained in perpetuity. An endowment fund shall be established by the project sponsor and held and administered by an appropriate public agency such as CDFG, to provide for the long-term maintenance, monitoring, and management of the on-site preserve including the plantings established in the Riparian Enhancement Plan (described in Mitigation Measure BIO-2b). As required by the City's General Plan, the site would be managed pursuant to a Resource Management Plan (a draft version of which is provided herein as Appendix K).	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		***Off-site Preservation.*** The project sponsor has purchased a 205.6-acre property known as the Ralph Property in eastern Contra Costa County as partial mitigation for impacts associated with the development of the project site. Approximately 166.6 acres would be used as off-site mitigation for biological impacts resulting from the proposed project. The Ralph property is located approximately two miles south of the Byron Airport, just outside the town of Byron, California, and is composed of two parcels: APN 001-031-018-3 (147.02 acres), and APN 001-031-019-1 (58.53 acres). Per an agreement with CDFG in 2006, 39 acres of the 205.6-acre Ralph property have already been designated as mitigation for impacts that occurred to burrowing owls at another of the project sponsor's project sites in Oakley. As mitigation compensation for the proposed project, the project sponsor shall donate the remaining 166.6 acres of the Ralph property to a qualified conservation organization to mitigate impacts to waters of the U.S. and State, and for habitat loss for the vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, western burrowing owl, and San Joaquin kit fox. The project sponsor shall establish an endowment fund to provide for the long-term maintenance and monitoring of the site. As required by the City's General Plan, the site shall be managed pursuant to a Resource Management Plan (Appendix K). The 166.6 acres of the Ralph property that would be preserved as compensation for impacts to special-status grassland and vernal pool species is comprised of predominantly non-native grassland habitat (estimated at 136.6 acres), with the remaining acreage (estimated at 30 acres) supporting a mosaic of vernal pool, seasonal wetland channel, and seasonal alkali wetland habitats. The Ralph site is within USFWS Critical Habitat for vernal pool crustaceans and within the mapped range of San Joaquin kit fox. The site also supports known populations of four species of vernal pool crustaceans including the vernal pool fairy shrimp; breeding and upland habitat for the California tiger salamander; and breeding and overwintering habitat for burrowing owls. Additionally, occurrences of California red-legged frog have been documented upstream of the site in a seasonal wetland channel that enters the site in the southwest corner.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		Adding to the resource value of the site, the Ralph property is located just outside the 2,000-foot protection zone established around the Byron Airport and therefore would remain part of a much larger preservation complex with regional importance as identified in the ECC HCP/NCCP. The HCP/NCCP indicates that there are already areas adjacent to the Ralph property that are preserved in perpetuity and whose resources will be managed for the benefit of native wildlife and plants (816 acres within the airport boundaries and 121 acres in a private mitigation bank). The Ralph property is immediately outside the indicated preserved areas and thus has regional significance as a property that can be added to existing preserved areas. Based on information provided by M&A, information contained in the HCP/NCCP, and on a reconnaissance-level site visit to the Ralph property by LOA staff in April 2007, the Ralph mitigation site appears to provide higher habitat value for special-status animals that occur on the site or its vicinity than the project site itself. Acreages of impacts and mitigations for the loss of habitat for individual special-status grassland and vernal pool species impacted by the project are provided in Table IV.I-3 and discussed in further detail in the text that follows. *Vernal Pool Crustaceans*. The Ralph property occurs within vernal pool fairy shrimp critical habitat and, although no formal wetland delineation has been conducted on the site, it is roughly estimated that the site contains at least 9.0 acres of vernal pool habitat. In 2006, M&A conducted wet season protocol-level surveys for federally-listed vernal pool crustaceans on the Ralph site. The site was found to support one listed fairy shrimp species – vernal pool fairy shrimp (*Branchinecta lynchi*), and three non-listed species – Lindahl's fairy shrimp (*Branchinecta lindahli*), Midvalley fairy shrimp (*Branchinecta mesovallensis*), and alkali fairy shrimp (*Branchinecta mackini*). Vernal pool tadpole shrimp were not found to be present on the mitigation site.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		The proposed project would result in a loss of 0.32 acres of potential vernal pool crustacean habitat occurring on the project site, and would result in temporary impacts to another approximately 0.10 acres of such habitat occurring on the Ginochio/Nunn site. This loss would be compensated by the preservation of an estimated 9.0 acres of occupied vernal pool crustacean habitat on the Ralph property, resulting in a loss: preservation ratio greater than 1:20 and well in excess of the 1:3 mitigation ratio generally required by the USFWS. Additionally, the project sponsor shall create another 0.91 acres of seasonal wetland habitats that shall be suitable for vernal pool fairy shrimp and vernal pool tadpole shrimp. The created wetlands shall be inoculated with salvaged soils from the seasonal wetlands on the project site, resulting in a greater than 1:2 loss:creation ratio. The salvaging of topsoil from the seasonal wetlands is described in Mitigation Measure BIO-3. *California Tiger Salamander.* The Ralph site is known to support breeding habitat for California tiger salamanders. On April 7, 2005, M&A staff observed numerous California tiger salamander larvae in one of the larger alkali wetlands located in the south central portion of the site confirming the presence of this species on the site. The extent of this known breeding habitat on the site is estimated at approximately 6.0 acres, however, another large, approximately 4.0-acre wetland occurring in the northeastern portion of the site also supports proper hydrology for salamander breeding. Additionally, a CNDDB record from 1994 reports California tiger salamanders breeding in a stock pond located approximately 1,500 feet east of the Ralph site. As such, all 146.6 acres of the Ralph site are considered to be salamander breeding and upland habitat. Additionally, the Ralph site is surrounded by open rangeland, over 900 acres of which has already been preserved and is being managed for sensitive resources according to the HCP/NCCP, that likely provides an additional significant amount of upland habitat for salamanders breeding on the Ralph site.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		The project would result in a loss of 0.32 acres of seasonal wetland/vernal pool habitat, and 0.86 acres of manmade detention channel (totaling 1.18 acres) which provides low quality breeding habitat for salamanders as a result of the surrounding land uses (development, crop production); the shallow nature, small size and observed hydrologic regime of the seasonal wetlands; and the hydrologic regime and likely presence of predatory non-native bullfrogs in the detention channel. Additionally, the project would result in the loss of 149.6 acres of potential upland habitat on-site for this species and the loss of another 4.4 acres of potential upland habitat for the species due to off-site impacts on the Royal Formosa/Chen parcel and the Ginochio/Nunn parcel. The loss of 1.18 acres of low quality potential tiger salamander breeding habitat on-site along with the loss of another 154 acres of upland habitat would be partially off-set by the preservation of 146.6 acres of combined breeding and upland habitat on the Ralph property, of which approximately 10 acres is wetland habitat that is either known to support breeding salamanders, or that has the proper hydrology to provide such habitat. Although 35.9 acres of grassland habitat would be preserved on-site, this preserved acreage has not been considered in the mitigation of habitat impacts for this species. This area has been excluded because of the unlikely future preservation of off-site migration corridors to the Preserve area from known salamander breeding habitat in the site's vicinity, as well as the uncertainty that such off-site breeding habitat would be preserved in perpetuity. The combination of breeding habitat in proximity to suitable upland habitat is most important for the ongoing viability of the tiger salamander populations. Breeding habitat on the Ralph property supports not just upland habitat on the site, but also many more acres of upland habitat on open rangeland surrounding the site. According to the HCP/NCCP, over 900 acres of such habitat is already preserved in the immediate vicinity of the Ralph property. However, given that the loss:preservation ratio for salamander habitat on the Ralph property alone is below the minimum by the resource agencies, or as derived from the HCP/NCCP, acreage on the Ralph property alone does not adequately mitigate this impact, and additional mitigation is required (see BIO-1b).	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		*Burrowing Owl.* As many as three pairs of burrowing owls have been observed to be present on the project site; however, formal surveys for this species have not been conducted and, potentially, more individuals or pairs could be present. The project would result in the loss of 149.6 acres of known breeding and/or foraging habitat for this species on-site, as well as another 4.4 acres of potential breeding and/or foraging habitat off-site on the Royal Formosa/Chen and Ginochio/Nunn properties. Typically, CDFG has required that 6.5 acres of habitat be preserved to compensate for each pair of owls, or each individual owl. Mitigation for the three pairs known to occur on the site based on this ratio would be 19.5 acres of preserved habitat. Approximately 35.9 acres of grassland habitat would be preserved on-site, and another approximately 166.6 acres of combined breeding and foraging habitat would be preserved off-site on the Ralph property which is known to support breeding burrowing owls, totaling 202.5 acres, or more than 10 times the habitat preservation that would typically be required by CDFG for impacts to the three pairs of owls known to occur on the project site. Considered another way, preservation of approximately 202.5 acres of suitable foraging and nesting habitat would be adequate mitigation for up to 31 pairs of owls. M&A has confirmed the presence of at least three pairs of burrowing owls on the Ralph property over a two-year period. M&A staff has observed these owls on an on-going basis beginning in the fall of 2005 and continuing through the 2006 breeding season. Most recently these owls were observed in the non-breeding season in January 2007. This indicates that a burrowing owl population is firmly established on the Ralph property, and that they use the site both as breeding and wintering habitat. The entire Ralph site would be considered breeding and foraging habitat for this species.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		*San Joaquin Kit Fox*. The site provides marginal habitat for this species because of surrounding land uses (i.e., residential, agricultural and commercial), and its location along the very northern edge of the USFWS mapped range for kit fox. These factors make it unlikely that the project would directly impact this species. However, as the project sponsor has opted at this time not to conduct protocol-level studies to demonstrate that kit foxes do not occur on the site, presence is presumed. The project, therefore, would result in a loss of 154 acres of suitable foraging and denning habitat for kit foxes: 149.6 acres of grassland habitat on-site and another 4.4 acres of habitat off-site which is considered suitable kit fox habitat. Although protocol-level studies for San Joaquin kit fox have not been conducted on the Ralph site, the site occurs well within the USFWS mapped range of this species, and the USFWS considers the site to be kit fox habitat based on M&A's informal consultation with USFWS in February 2006. Additionally, there have been eleven occurrences of kit fox documented in the vicinity of Byron in the period from 1987 to 2002, within 1 and 6 miles north and northwest of the Ralph site, with the latest of these sightings in 2002. Approximately 166.6 acres of grasslands and seasonal wetlands that provide habitat for this species would be preserved off-site on the Ralph property, and additionally, another 35.9 acres of grassland habitat would be preserved on-site, totaling 202.5 acres. Preservation of the on-site and off-site mitigation lands would result in a 1:1.3 (loss:preservation) ratio. This ratio is below the minimum ratio of 1:3 (loss:preservation) required to mitigate this impact to a standards used by the USFWS, CDFG, and the ratio derived from the regional HCP/NCCP. Therefore, the preserved acreage on-site and off-site on the Ralph property would not adequately mitigate this impact, and additional mitigation is required (see BIO-1b).	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		*Resource Management Plan (RMP).* Pursuant to the City of Antioch's General Plan, Resource Management Section 10.3.2e and Section 10.4.2d, a Resource Management Plan (RMP) has been developed for the management of natural resources to be preserved both on-site within the open space and riparian buffer areas, and for the off-site mitigation lands (Ralph mitigation site and other lands that may be purchased by the project sponsor as mitigation pursuant to Mitigation Measure BIO-1b) (see Appendix K). The project sponsor must be required to implement and adhere to all recommendations contained in the RMP.	
		BIO-1b: In order to achieve the 1:3 (loss:preservation) ratio for impacts to listed species grassland habitat on the project site (462 acres), the project sponsor shall purchase 315.4 acres of additional land that is suitable habitat for California tiger salamander. Additional mitigation lands must meet the criteria as described in Mitigation Measure BIO-1a. Of this additional 315.4 acres, at least 259.4 acres must also provide suitable foraging and denning habitat for San Joaquin kit fox as described in Mitigation Measure BIO-1a. Alternatively, the sponsor may choose to purchase an equivalent amount of preservation credits in an accredited mitigation bank within eastern Contra Costa County that includes the City of Antioch in its service area. This would result in a total of 462.00 acres of on-site and/or off-site habitat being preserved for these two species and a 1:3 (loss:preservation) ratio. Mitigation for both kit fox and California tiger salamander may be accomplished on the same acreage provided that 1) the mitigation site is determined to be suitable for both of these species by a qualified biologist in consultation with USFWS and CDFG and 2) the management and monitoring plan includes measures for conservation of both species and enhancement of habitat for both species.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		The additional acreage purchased by the project sponsor to mitigate habitat impacts for California tiger salamander must be grassland habitat that supports ground squirrels and either has known breeding habitat on-site or is within migration range of, and has preserved connectivity to, known breeding habitat for this species. The known breeding habitat must be located on a site that is preserved and managed for California tiger salamanders and other native wildlife and plants (i.e., regional or state park, mitigation or conservation bank, or other area preserved in a conservation easement). Additional acreage purchased by the project sponsor to mitigate for impacts for San Joaquin kit fox must be within the USFWS mapped range of the species, must have connectivity to areas where kit fox are known to occur, and provide suitable foraging and denning habitat. The project sponsor must either establish a conservation easement on the additional mitigation lands to preserve them in perpetuity as wildlife habitat or donate the additional mitigation lands acres to a qualified conservation organization. The project sponsor must also establish an endowment fund to provide for the long-term management, maintenance, and monitoring of the mitigation site.	
		BIO-1c: The installation of the sewer pipeline along the eastern boundary of the Ginochio/Nunn property may result in temporary impacts to seasonal wetlands that provide habitat for special-status vernal pool crustaceans, estimated at less than 0.10 acres. To the maximum extent possible, wetlands on the Ginochio/Nunn property shall be avoided during pipeline installation. A qualified biologist shall stake a minimum buffer of 25 feet along the edge of all wetlands adjacent to the pipeline corridor prior to ground disturbance and pipeline excavation activities. Exclusionary fencing shall be erected along the edge of the buffer to ensure wetlands are protected from construction related impacts. A biological monitor shall inspect the exclusionary fencing on a twice-weekly basis during the pipeline installation phase to ensure it remains in place and that no intrusion into the avoided wetlands occurs. Soil contours within the pipeline corridor shall be restored to pre-project conditions following installation of the pipeline.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-1 *Continued*		If wetlands on the Ginochio/Nunn property cannot be avoided during pipeline installation, then prior to any grading and excavation activities related to the installation, the topsoil of all wetland areas to be impacted shall be salvaged and stockpiled, and the configuration of the impacted wetlands shall be mapped so that they can be recontoured to pre-project conditions after the completion of the pipeline installation. Once pipeline installation is completed, the wetlands shall be re-contoured on the site and salvaged topsoils shall be re-deposited in the wetlands.	
		BIO-1d: As an alternative to purchasing land or purchasing habitat credits at a mitigation bank, the project sponsor may negotiate to pay development fees to the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECC HCP/NCCP) Implementing Entity. This individual project buy-in to the HCP/NCCP would provide mitigation fees for the purpose of implementing the ECC HCP/NCCP. Based on the 2008 fee schedule, assuming 154 acres of permanent disturbance and impacts to 0.42 acres of seasonal wetlands, the project would incur development fees and wetland fees of approximately $3,797,000.00. However, as the project site falls outside the area covered by the HCP, the project sponsor would need to negotiate a fee which is mutually agreeable to the Implementing Entity, USFWS, and CDFG. If the project sponsor chooses to pursue this mitigation option, the project sponsor shall provide the City with evidence that the project has been accepted for individual coverage under the ECC HCP/NCCP and evidence of payment of the applicable development and wetland mitigation fees prior to issuance of a grading permit.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-2: Grading and construction of the proposed project may result in a loss of dispersal habitat for the California red-legged frog.	S	BIO-2a: To compensate for the loss of 0.86 acres of marginal dispersal habitat for the frog within the detention channel and approximately 0.03 acres of known frog dispersal habitat within the Sand Creek channel, approximately 1.0 acre of such habitat shall be preserved on-site within the Sand Creek riparian buffer area. Additionally, as part of the project sponsor's mitigation for the loss of jurisdictional waters of the U.S. and State on the project site, the project sponsor shall create 0.91 acres of seasonal pond habitat on the Ralph site within and/or adjacent to the seasonal wetland drainage on the site, which would be designed to provide suitable breeding habitat for red-legged frogs. The created pond habitat will be managed to support breeding habitat for red-legged frogs pursuant to the RMP (see Mitigation Measure BIO-1 and Appendix K). Management of the site must include such measures as draining ponds as necessary to control predators such as fish and bullfrogs. This created wetland habitat would provide an opportunity for the red-legged frog to become established on the mitigation site and in its immediate vicinity.	LTS
		BIO-2b: The project proponent shall provide the City with a map showing the extent of encroachment of project development, including the detention basins, landscaped areas, roads and trail, that occur within 100 feet of the dripline of riparian vegetation or the creek bank, whichever is greater, as well as the acreage of such encroachment. To compensate for such encroachment, the project proponent shall enhance riparian habitat on-site within the 4.7 acre riparian set-back area at a 1:1 (loss:enhancement) ratio. A Riparian Enhancement Plan shall be developed by a qualified Plant or Restoration Ecologist in consultation with the USFWS and CDFG. A copy of the Enhancement Plan shall be provided to the City. At a minimum, the Plan shall include: • A Planting Plan which provides the location of on-site Enhancement Areas within the 4.7 acre designated riparian buffer and the number, location, planting container size, and species of trees and shrubs to be utilized in the enhancement effort. • A Maintenance Plan which provides details on irrigation, weed abatement and other maintenance activities to be conducted in the Enhancement Area(s) during the monitoring period.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-2 *Continued*		• A Monitoring Plan which provides specific measurable performance and final success criteria, and the methods that will be used to monitor these criteria. Performance criteria shall be monitored on an annual basis for a minimum of five years. The Monitoring Plan shall also include specific remedial actions to be taken should annual monitoring indicate that the Enhancement Area is not meeting the annual performance criteria during each annual monitoring period, or doesn't meet the final success criteria at the end of the minimum 5-year monitoring period. One of the remedial actions will include an extension of the monitoring period until the final success criteria are met. Results of the annual monitoring effort and any remedial actions to be taken to rectify situations where the Enhancement is not meeting the annual performance criteria or final success criteria shall be provided to the City via an annual monitoring report.	
BIO-3: Grading and construction of the proposed project may result in harm or mortality to individual special-status animals including vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, California red-legged frog, western pond turtle, burrowing owl, American badger and San Joaquin kit fox.	S	BIO-3a: The project sponsor shall consult with the USFWS and CDFG regarding impacts to federal and State listed species from the proposed project. The project sponsor shall obtain the appropriate take authorization (Section 7 Biological Opinion and/or 2081 permit) from the USFWS and CDFG prior to initiation of construction activities. The project sponsor shall comply with all terms of the endangered species permits including any mitigation requirements and provide proof of compliance to the City prior to issuance of a grading permit. BIO-3b: Project grading shall only occur during the dry season (April 15 – October 30) and only after a qualified biologist has determined that all wetland areas of the site providing potential habitat for vernal pool crustaceans are dry, and individuals of these species, if present, would be in cyst form. Prior to filling these wetlands, the topsoil of all permanently impacted wetlands shall be salvaged and deposited in appropriate seasonal wetland habitats to be created on the Ralph mitigation property. Additionally, should pipeline installation on the Ginochio/Nunn parcel result in temporary impacts to wetlands on that site, prior to the installation, topsoils in areas of these wetlands to be impacted shall be salvaged and then redeposited in the wetlands of the site once pipeline installation is complete and these wetlands have been re-sculpted on the site pursuant to Mitigation Measure BIO-1c.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		BIO-3c: California tiger salamanders that are in burrows or soil cracks on the project site would be impacted by ground disturbing activities. California tiger salamanders may also become trapped in trenches excavated during project construction. In order to minimize and avoid mortality of California tiger salamanders on the site, as well as in the vicinity of off-site impacts occurring on the Royal Formosa/Chen and Ginochio/Nunn parcels, the following measures shall be implemented: • Prior to project-related ground disturbance activities occurring on-site or off-site, an employee training program for operators/contractors shall be conducted by a qualified biologist to explain the endangered species concerns at the project site and the measures being implemented to minimize and avoid mortality to the listed species. • All project-related grading activities shall be conducted during the summer months after all potential breeding sites on and in the vicinity of the project site have dried and when California tiger salamanders are not be breeding or migrating. • A qualified biologist shall be present at the locations of all on- and off-site project-related ground disturbance activities to monitor these activities and to salvage California tiger salamanders that may be unearthed during ground disturbing activities. Salvaged California tiger salamander may be turned over to CDFG personnel for relocation, or the relocation of the CTS may be handled by a 10(a)(1)(A) permitted biologist as approved and directed by the USFWS and CDFG. Terms of the salvage shall be established in consultation with USFWS and CDFG prior to initiation of construction activities. • The sponsor shall develop and implement a plan to prevent salamanders from moving onto the construction areas during grading or construction activities and to monitor the site during construction. The plan shall be approved by the City, USFWS, and CDFG prior to the initiation of construction activities. • Best Management Practices also shall be implemented to minimize the potential mortality, injury or other impacts to California tiger salamanders. Erosion control materials shall not include small-mesh plastic netting, which could result in entanglement within the material and death of California tiger salamanders. All trash items shall be removed from the project site to reduce the potential for attracting predators of California tiger salamanders, such as crows and ravens which could scavenge uncovered salamanders.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		BIO-3d: California red-legged frogs are known to be present on-site within Sand Creek and may also occur from time to time in the manmade detention channel. To avoid harm or mortality to California red-legged frogs to the greatest extent practicable, the following measures shall be implemented: • Any construction-related activity that occurs within either the manmade detention channel or the Sand Creek channel, or within 300 feet of the top of the bank of either of these features, including project-related activities occurring on the Royal Formosa/Chen and Ginochio/Nunn properties, shall only occur during the dry season (April 15 to October 30) when the frog would most likely have moved off-site to deeper pool habitats upstream of the site in Sand Creek. • No more than 48 hours prior to such construction-related activities described above, a qualified biologist shall survey Sand Creek and the detention channel, including at least 100 feet upstream and downstream of the construction site to determine if frogs are present and may be impacted by the activities. • Prior to any ground disturbance occurring within 300 feet of Sand Creek or the manmade detention channel, an employee training program for operators/contractors shall be conducted by a qualified biologist to explain the endangered species concerns at the project site. This education/training program must include a discussion of the general protection measures to be implemented to protect the frog and minimize take, and a delineation of the limits of the work area. • The project sponsor shall isolate the work area with suitable amphibian exclusion fencing that would block the movement of California red-legged frogs from entering the work area. This fence shall be installed prior to the time any site grading or other construction-related activities are implemented. The fence shall remain in place during site grading or other construction-related activities to prevent frogs from entering the project site work areas. Exclusion fencing shall consist of a 4-foot wall of ¼-inch mesh, galvanized wire (i.e., hardware cloth). Initially, staking would be installed along the route of the exclusion fencing in a 4-inch deep trench. Then, the bottom of the fence shall be firmly seated in the trench. The fencing above the ground shall be anchored to metal staking with wire. Finally, the top 10 inches or less shall be bent over in a semi-circle towards the outside of the fence to ensure that the fence cannot be climbed.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		• A qualified biologist possessing the proper authorizations from USFWS and CDFG shall be on-site during all construction and grading activities occurring within 300 feet of Sand Creek or the detention channel to conduct daily inspections of the fencing and to ensure that stranded frogs are relocated back to the stream channel. The biological monitor shall be responsible for ensuring that the frog fencing is not compromised, and shall notify both the on-site contractor and supervisor when fencing needs to be repaired. • All trash that might attract predators to the project site shall be properly contained and removed from the site and disposed of regularly. All construction debris and trash shall be removed from the site when construction activities are complete. All fueling and maintenance of equipment and vehicles, and staging areas shall be at least 75 feet from the top of the bank of Sand Creek or the detention channel. The construction personnel shall ensure that contamination of California red-legged frog habitat does not occur and shall have a plan to promptly address any accidental spills.	
		BIO-3e: Within 24 hours of ground disturbance occurring within the manmade detention channel or the Sand Creek channel on the project site, or within 50 feet of the top of the banks of either of these areas, a qualified biologist shall survey the work area for western pond turtles. If turtles are found within the work area, they shall be relocated to other suitable habitat at least 300 feet up- or down-stream from the work area by a qualified biologist with the appropriate approvals from CDFG shall conduct all the relocations.	
		BIO-3f: No burrowing owls or their nests shall be disturbed during the breeding season (February 1 through August 31). In the non-breeding season (September 1 to January 31), or at such time as all young owls have been determined by a qualified biologist to have fledged and be foraging independently, owls may be passively evicted from the project site's development area by a qualified biologist. Passive eviction methods shall be implemented pursuant to CDFG guidelines, and all eviction activities shall be coordinated with the CDFG prior to disturbance of active burrows. Once owls are evicted from the site, a qualified biologist shall develop a plan for management and on-going biological monitoring of the site to be implemented by the project sponsor to preclude owls from becoming re-established on the site.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		If construction or ground disturbance activities commence on the site prior to a passive eviction of owls, the CDFG shall be notified and a qualified biologist shall implement a routine monitoring program and establish a fenced exclusion zone around each occupied burrow in which no construction-related activity shall occur until the burrows are confirmed to be unoccupied. No disturbance shall occur within 160 feet (50 meters) of an occupied burrow during the non-breeding season (September 1 through January 31) and within 250 feet (75 meters) of an occupied burrow during the breeding season (February 1 through August 31).	
		BIO-3g: To avoid harm or mortality to American badgers, a qualified biologist shall survey the site for denning badgers on the project site, and in areas of off-site temporary or permanent project impacts. This survey may be conducted at the same time that surveys for denning kit foxes are conducted (see *Mitigation Measure BIO-3h* below). If potential badger dens are found, they shall be monitored by the biologist to determine their status. If an active badger den is identified during pre-construction surveys within or immediately adjacent to the construction envelope, a no disturbance buffer zone consisting of a 300-foot circumference around the den (or distance specified by the CDFG) shall be established. Because badgers are known to use multiple burrows in a breeding burrow complex, a biological monitor shall be present on-site during construction activities to ensure the buffer is adequate to avoid direct impact to individuals or den abandonment. The monitor shall remain on-site until it is determined that young are of an independent age and construction activities would not harm individual badgers.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		BIO-3h: Pre-construction surveys for kit fox dens shall be conducted no more than 30 days prior to any construction-related activities. A qualified biologist shall conduct pre-construction kit fox surveys on the project site, and in areas of off-site temporary or permanent project impacts. The primary objective is to identify kit fox habitat features (potential dens and refugia) on the project site and evaluate use by kit fox. If an active kit fox den is detected within (or immediately adjacent to) the area of work, the USFWS shall be contacted immediately to determine the best course of action. The project sponsor will implement all measures specified by the USFWS and CDFG in the Biological Opinion and 2081 permit. All potential dens shall be monitored prior to destruction according to the terms of the *Standardized Recommendations for Protection of the Kit Fox Prior to or During Ground Disturbance* (USFWS 1999). If no kit fox activity is detected during den monitoring and destruction then a written report shall be submitted to the USFWS within five days following completion of the surveys. The project sponsor shall follow the *Standardized Recommendations for Protection of the Kit Fox Prior to or During Ground Disturbance* developed by the U.S. Fish and Wildlife Service (1999). The recommendations include the following: • Preconstruction surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the San Joaquin kit fox. • All construction-related activities shall be preceded by a tail-gate session, the primary purpose of which is to describe the importance of implementing construction related activities that would minimize potential construction related impacts to kit foxes. • Project-related vehicles shall observe a 20-mph speed limit in all project areas, except on city or county roads; this is particularly important at night when kit foxes are most active. To the extent possible, night-time construction and traffic should be avoided. Off-road traffic outside of designated project areas should be prohibited.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		• To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of the project, all excavated, steep-walled holes or trenches more than 2-feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. In addition, these structures shall be thoroughly inspected by properly trained construction personnel each morning for kit fox or other species. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. • All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected by properly trained construction personnel for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in anyway. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity. • All food related trash items such as wrappers, cans, bottles, food scraps shall be disposed of in a closed container and removed at least once a week from a construction or project site and signs shall be placed at the construction site that prohibit feeding wildlife. • No firearms shall be allowed on the project site. • To prevent harassment, mortality of kit foxes or destruction of dens by dogs or cats, pets shall not be permitted on project sites. • Use of rodenticides and herbicides in project areas shall be restricted. • A representative shall be appointed by the project sponsor who would be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped individual (the representative's name and address shall be provided to the USFWS). • Upon completion of the project, all areas subject to temporary ground disturbance, including storage and staging areas, temporary roads, pipeline corridors, etc., shall be re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-3 *Continued*		• In the case of trapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape, or the USFWS should be contacted for advice. • Any contractor, employee(s), or agency personnel who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. • The Sacramento Field Office of the USFWS and CDFG shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal and any other pertinent information.	
BIO-4: Grading and construction of the proposed project may result in the destruction or abandonment of special-status bird nests including golden eagle, Swainson's hawk, white-tailed kite, northern harrier, loggerhead shrike, and tricolored blackbird.	S	BIO-4a: A qualified biologist shall conduct a pre-construction survey for nesting special-status raptors and loggerhead shrikes within 30 days prior to the commencement of tree trimming, site preparation, or construction related activities on the project site or at off-site project areas. The survey shall include all impacted areas within 250 feet of riparian vegetation along Sand Creek or within 250 feet of trees occurring in the area south of the creek, if this disturbance is to occur during the breeding season (February 1 to August 31). If nesting birds are detected, an appropriate fenced construction buffer shall be established around the nest. The actual size of the buffer shall be determined by the biologist in consultation with CDFG and would depend on the species, topography, and type of construction activity that would occur in the vicinity of the nest. The fenced construction buffers shall be monitored weekly by the biologist and shall remain in effect until the young have fledged the nest and are foraging independently or the nest is no longer active. No construction activity, staging, or parking shall be allowed with the buffer zones until the young have fledged from the nest and are foraging independently or the nest is no longer active. Preconstruction surveys shall be repeated at 30 day intervals until construction activities are initiated.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-4 *Continued*		BIO-4b: A qualified biologist shall conduct pre-construction surveys for nesting tricolored blackbirds within the manmade detention channel within 30 days prior to the commencement of any activities occurring within or within 100 feet of the detention channel or within the grasslands of the site, if this disturbance would occur during the passerine (songbird) breeding season, March 1 to August 31. If nesting tricolored blackbirds are detected, an appropriate fenced construction buffer shall be established around the nest. The actual size of the buffer shall be determined by the biologist in consultation with CDFG depending on the species, topography, and type of construction activity that would occur in the vicinity of the nest. The fenced construction buffers shall be monitored weekly by the biologist and shall remain in effect until the young have fledged the nest and are foraging independently or the nest is no longer active. Preconstruction surveys shall be repeated at 30-day intervals until construction activities are initiated.	
		BIO-4c: A qualified biologist shall conduct pre-construction surveys for nesting northern harriers, and nesting or roosting burrowing owls, 30 days prior to the commencement of ground disturbance activities in all grassland habitats occurring within 250 feet of such disturbance. If nesting birds are detected, an appropriate fenced construction buffer shall be established around the nest. The actual size of the buffer shall be determined by the biologist in consultation with CDFG and would depend on the species, topography, and type of construction activity that would occur in the vicinity of the nest. The fenced construction buffers shall be monitored weekly by the biologist and shall remain in effect until the young have fledged the nest and are foraging independently or the nest is no longer active. No construction activity, staging, or parking shall be allowed with the buffer zones until the young have fledged from the nest and are foraging independently or the nest is no longer active. Preconstruction surveys shall be repeated at 30 day intervals until construction activities are initiated. If roosting burrowing owls occur on the site outside the raptor breeding season (i.e. outside of the period from February 1 to August 31), the project proponent may proceed with a passive eviction as discussed in Mitigation Measure BIO-3f.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-4 *Continued*		BIO-4d: The project sponsor shall consult with the CDFG regarding impacts to Swainson's hawk from the proposed project. The project sponsor shall obtain the appropriate take authorization (2081 permit) from the CDFG prior to initiation of construction activities. The project sponsor shall comply with all terms of the endangered species permits including any mitigation requirements and provide proof of compliance to the City prior to issuance of a grading permit. Implementation of Mitigation Measures BIO-4a, 4b, 4c, and 4d would reduce impacts as a result of destruction or abandonment of special-status bird nests to a less-than-significant level.	
BIO-5: Grading and construction of the proposed project would result in fill being placed within jurisdictional waters of the U.S. and State.	S	BIO-5a: To mitigate for the loss of 0.17 acres of jurisdictional Waters of the U.S., 0.40 acres of jurisdictional Waters of the State, and approximately 0.03 acres of riparian areas under CDFG jurisdiction on the project site, the project sponsor shall preserve approximately 0.61 acres of jurisdictional tributary waters within the Sand Creek channel on-site, as well as preserve and create jurisdictional seasonal wetland habitat off-site on the 166.6-acre Ralph mitigation property. Although no formal delineation has been conducted on the Ralph property, it is estimated that the site supports approximately 30 acres of combined vernal pool, seasonal wetland channel, and seasonal alkali wetland habitats that would be preserved in perpetuity on the site. Additionally, the project sponsor shall create 0.91 acres of seasonal wetland habitat on the Ralph site to mitigate at a 1:2.8 (loss:creation) ratio the loss of 0.32 acres of seasonal wetland habitat on the project site.	LTS
		BIO-5b: Prior to issuing a grading permit, the project sponsor shall obtain the appropriate State and federal permits authorizing the fill of wetlands that are waters of the State and U.S. The project sponsor shall provide proof to the City of compliance with the terms and conditions of the permits, including all mitigation requirements, prior to issuance of the grading permit.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
BIO-6: Grading and construction activities associated with the project could harm or disturb other nesting birds or destroy their nests.	S	BIO-6: If grading or construction begins within the breeding season for passerines (songbirds) and other common bird species (March – August), a qualified biologist shall conduct surveys of the grassland, ruderal and riparian habitats on-site and in all off-site impact areas to identify any bird species that are nesting in these areas. These surveys shall be carried out no sooner than two weeks prior to the start of construction. Impacts to active nests shall be avoided by establishing a fenced exclusion zone around all active nests, within which construction-related activities shall be prohibited until nestling birds have been determined to have fledged and be foraging independently or the until the nest is no longer active. Preconstruction surveys shall be repeated at 30-day intervals until construction activities are initiated.	LTS
BIO-7: Grading and construction activities on the Aera Energy parcel associated with the installation of the sewer pipeline would result in a loss of trees covered by the City of Antioch's tree ordinance.	S	BIO-7: A formal tree survey shall be conducted by a qualified arborist or botanist to determine the sizes, locations and species of all trees that would be impacted by the pipeline installation. Trees covered under the tree ordinance that would be removed as a result of pipeline construction shall be replaced at a 3:1 mitigation to loss ratio for "mature trees" and at a 2:1 mitigation to loss ratio for "established trees" to offset the temporal loss of these mature trees on the site. All mitigation trees shall consist of native trees indigenous to the region. Trees planted as mitigation can be incorporated into the landscape plans and/or the Riparian Enhancement Plan for the project site.	LTS
J. Public Services			
There are no significant public services impacts.			
K. Utilities and Infrastructure			
There are no significant utilities and infrastructure impacts.			
L. Visual Resources			
VIS-1: The proposed project would create a new source of light and glare affecting day and nighttime views in the area.	S	VIS-1: Outdoor lighting shall be designed to minimize glare and spillover to surrounding properties. The proposed project shall incorporate non-mirrored glass to minimize daylight glare. Proposed lighting and building materials shall be reviewed and approved by the City as part of the Design Review process prior to issuance of building permits for the proposed project.	LTS

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
M. Agricultural and Mineral Resources			
AG-1: Construction of sewer extension associated with the proposed project would temporarily disturb approximately 10 acres of agriculturally productive farmland on the Ginochio-Nunn property, within the adjacent off-site impact area.	S	AG-1: Under the direction and approval of the City, the project sponsor shall consult with adjacent property owners regarding construction of the sewer line extension through adjacent agriculturally productive parcels. Upon completion of the sewer line extension, the project sponsor shall re-till disturbed areas to restore the field to previous conditions. This shall occur prior to issuance of a certificate of occupancy for the proposed project.	LTS
N. Global Climate Change			
GCC-1: Implementation of the project could result in greenhouse gas emission levels that would conflict with implementation of the greenhouse gas reduction goals under AB 32 or other State regulations.	S	GCC-1a: To the extent feasible and to the satisfaction of the City, the following measures shall be incorporated into the design and construction of the project: • Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled; • Reuse and/or recycle at least 50 percent (as calculated by weight or volume) of non-hazardous construction debris (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard); • Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site, unless use of such products are demonstrated to the satisfaction of the City to be infeasible.	LTS
		GCC-1b: To the extent feasible and to the satisfaction of the City, the following measures shall be incorporated into the design and construction of the project: ***Energy Efficiency Measures*** • Design all project buildings to exceed California Building Code's Title 24 energy standard, including, but not limited to any combination of the following:	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
GCC-1 *Continued*		o Increase insulation to exceed minimum code requirements so that heat transfer and thermal bridging is minimized; o Construct all units to achieve the Home Energy Rating System (HERS) certification to minimize energy consumption by constructing "tight" building envelopes and HVAC systems; o Install only EnergyStarTM or better rated space heating and cooling equipment, appliances or other applicable electrical equipment; o Install EnergyStarTM approved lighting and lighting control systems and use daylight as an integral part of lighting systems in buildings; and o Install only EnergyStarTM approved or better Low-E windows. • Provide a landscape and development plan for the project that takes advantage of shade, prevailing winds, and landscaping; • Install light colored "cool" roofs and pavements; • Install solar powered or light emitting diodes (LED) outdoor lighting systems. ***Water Conservation and Efficiency Measures*** • Devise a comprehensive water conservation strategy appropriate for the project and location. The strategy may include the following, plus other appropriate innovative measures: o Create water-efficient landscapes within the development (i.e., through the use of drought tolerant vegetation); o Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls; o Use reclaimed water for landscape irrigation within the project. Install the infrastructure to deliver and use reclaimed water; o Install water-efficient fixtures and appliances including low-flow faucets and shower heads and dual-flush toilets in all buildings; and o Restrict watering methods (e.g., prohibit systems that apply water to non-vegetated surfaces) and control runoff.	

Table II-1 *Continued*

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance With Mitigation
GCC-1 *Continued*		***Solid Waste Measures*** • Provide adequate recycling containers in all public areas of the project. ***Transportation and Motor Vehicle Measures*** • Provide transit facilities (e.g., bus bulbs/turnouts, benches, shelters); • Provide bicycle lanes and/or paths, incorporated into the proposed street systems and connected to a community-wide network; • Provide sidewalks and/or paths, connected to adjacent land uses, transit stops, and/or community-wide network; • Size parking capacity to not exceed the City's zoning requirements; and • To the extent feasible, provide infrastructure and support programs to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle service to mass transit.	

Source: LSA Associates, 2008.

III. PROJECT DESCRIPTION

This chapter describes the proposed Aviano Adult Community Project (proposed project), that is evaluated in this Environmental Impact Report (EIR). A description of the proposed project's location and objectives is followed by details of the project itself and a summary of required approvals and entitlements.

A. PROJECT SITE

This section describes the project site's location, surrounding land uses, and site characteristics.

1. Location

The approximately 189-acre project site is located in the largely undeveloped southeastern portion of the City of Antioch. The City of Antioch is located in East Contra Costa County and is bordered to the north by the San Joaquin River Delta; to the east by the City of Brentwood and the City of Oakley; to the west by the City of Pittsburg and unincorporated portions of the County; and to the south by unincorporated portions of the County, as shown in Figure III-1.

2. Surrounding Land Use

The project site is located in a mostly undeveloped area and is surrounded by a mixture of uses including existing single-family residential uses and a community park to the north; the Antioch Unified School District (AUSD) Dozier Libbey Medical High School (Medical High School), Kaiser Hospital medical facilities, and undeveloped land planned for future residential, mixed use, and commercial development to the west; undeveloped land planned for future business park uses to the east; and undeveloped grazing land and the Contra Costa County Flood Control and Water Conservation District (CCCFCD) detention basin to the south (planned for a future Sports Complex). Existing land uses in the vicinity of the project site are depicted in the aerial photo provided in Figure III-2, and are discussed in more detail in Chapter IV.A, Land Use and Planning Policy.

3. Site Characteristics

The project site consists of both on-site (referred to as the "project site") and off-site impact areas. These areas are described in detail below.

a. Project Site. The 189-acre project site is comprised of two parcels, collectively known as the "Williamson" property. The site is generally rectangular; however the western, southwestern, and southern borders curve inward and are irregularly shaped, as shown in Figure III-2. The site's northern terrain is generally flat and the existing topography falls from west to east at approximately 1 percent slope with elevations ranging from 171 to 200 feet above mean sea level. The unchannelized Sand Creek, a tributary of Marsh Creek, flows in a northeastern direction across the southern portion of the site. A north-south drainage channel flows along the eastern boundary of the project

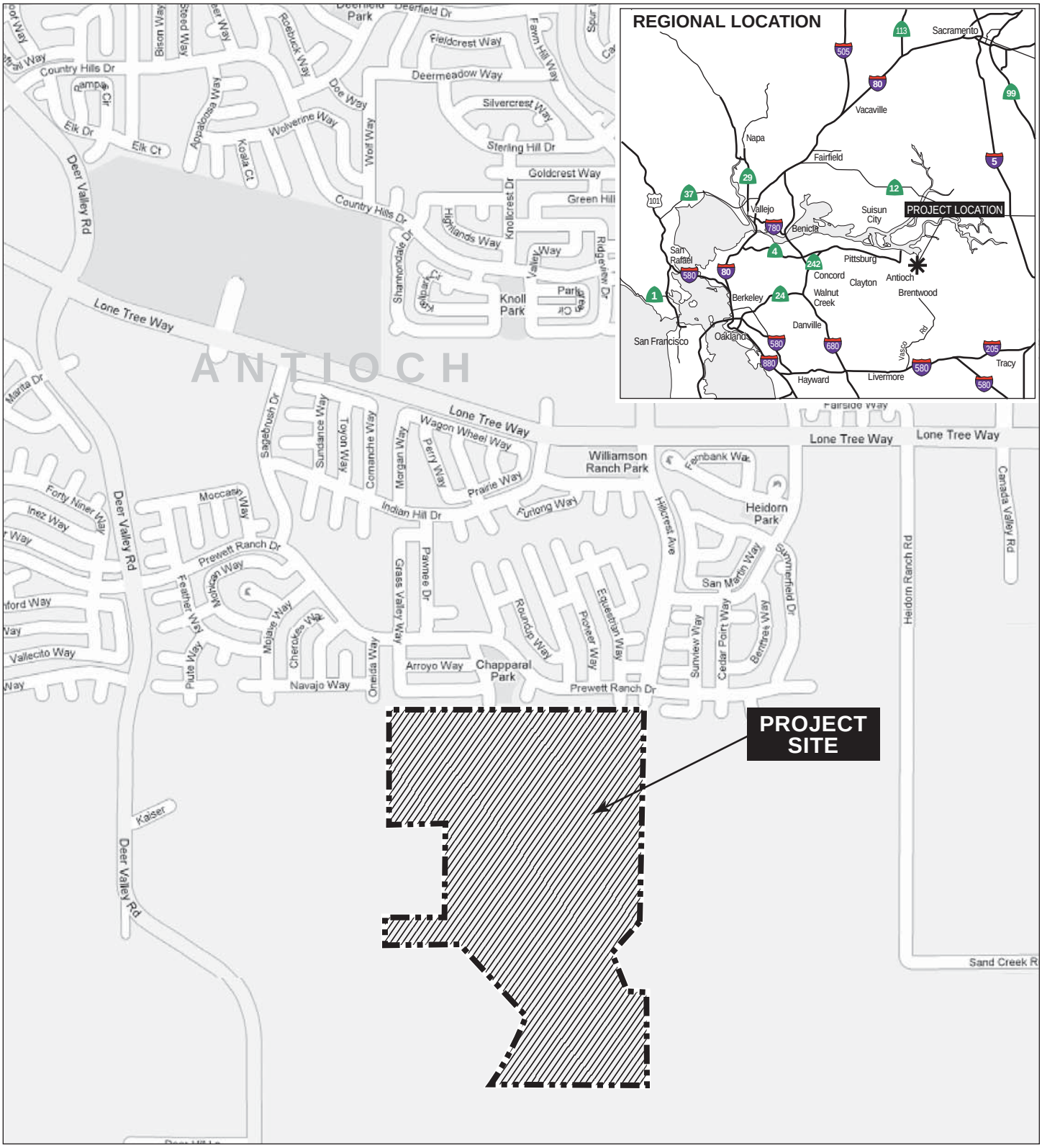

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FIGURE III-1

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PROJECT AREA

Aviano Adult Community Project EIR
Project Vicinity and
Regional Location Map

SOURCE: GOOGLE MAPS; LSA ASSOCIATES, INC., 2006

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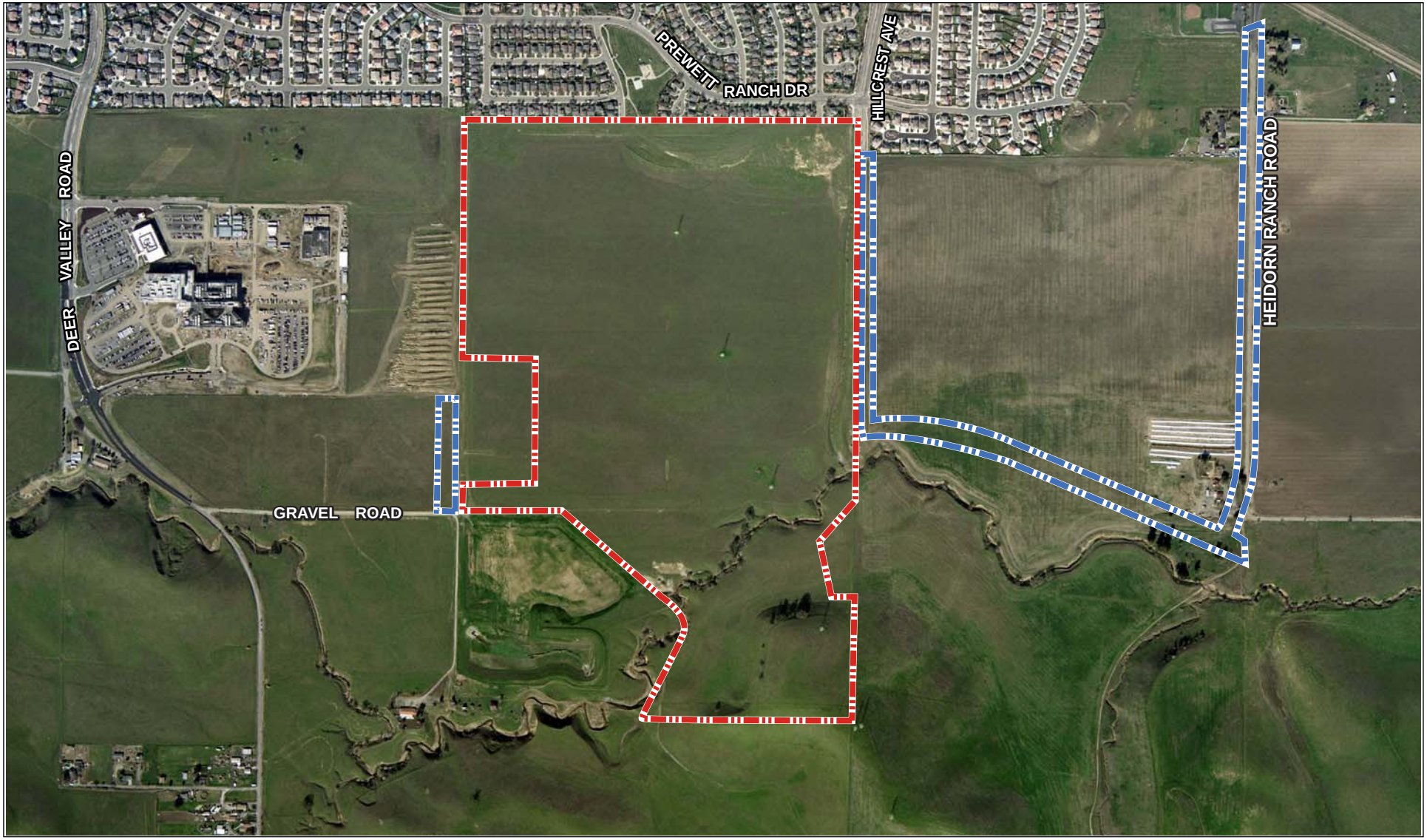

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FIGURE III-2

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PROJECT SITE

OFF-SITE IMPACT AREAS

Aviano Adult Community Project EIR
Aerial Photograph

SOURCE: Pulte Homes, 2008.

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Back of III-2

site, emptying into Sand Creek. A north facing hill slope is located in the southernmost portion of the site, south of Sand Creek. The hill slopes upwards to an elevation of about 328 feet above mean sea level at the southern property boundary. A 25-foot wide natural gas pipeline easement (owned by Calpine) runs across the western border of the project site. A 25-foot wide Shell Oil Company easement runs in an east-west direction across the site and the 10-inch pipeline (owned by Calpine) runs below ground and crosses Sand Creek in the southeast portion of the site. An approximately 200-foot wide Pacific Gas and Electric Company (PG&E) transmission line easement runs across the project site from the southeast corner to the northwest, to approximately the center of the northern property boundary. Four 230-kilovolt (kV) electrical transmission line towers are located within this easement on the project site. There is also an additional easement within the project's open space area granted to PG&E for grading and landscaping associated with construction of the PG&E substation. This easement is approximately 1 acre in size and lies partially within the 200-foot wide linear PG&E easement described above. The project site is primarily covered with non-native vegetation and is currently used for cattle grazing.

b. Off-Site Impact Areas. The proposed project would construct off-site improvements (i.e., roadways, utilities) that would affect a number of off-site corridors located on adjacent properties, totaling approximately 25 acres. These off-site areas are depicted in Figure III-2. Off-site areas include a portion (1.4 acres) of the Royal Formosa/Chen property located west of the project site and portions of the Ginochio/Nunn (21.1 acres) and Aera Energy (2.2 acres) properties east of the project site. These adjacent properties are primarily flat and consist of grazing and agricultural lands. The Aera Energy property is developed with a number of buildings and several mature trees.

4. Land Use Designations

The project site is located within the Sand Creek Focus Area (formerly Future Urban Area #1, or FUA#1) as shown in the City of Antioch General Plan Land Use Map. The Sand Creek Focus Area encompasses approximately 2,712 acres in the southern portion of Antioch. Development in this area is intended to function as a large-scale planned community providing housing and employment opportunities within this region of the City.

The General Plan designates the majority of the northern portion of the project site as Low Density Residential, which allows 4 dwelling units per gross developable acre. Smaller portions of the site, south of where Sand Creek Road would bisect the site if extended westward, are designated Multiple Family Residential, which allows up to 20 dwelling units per acre and Public/Quasi Public, which allows a maximum floor area ratio (FAR) of 50 percent. The southernmost portion of the site is designated Hillside Estate, Executive Residential or Open Space, which allows one to two dwelling units per acre. The adjacent Royal Formosa/Chen property is designated Commercial/Open Space and the adjacent Ginochio/Nunn property is designated Business Park in the General Plan.

The project site and adjacent off-site areas are zoned (S) Study District on the Antioch Zoning Map, which is intended as an interim designation until all necessary detailed land use studies are completed for a given area. Chapter IV.A, Land Use and Planning Policy, provides additional discussion of existing site uses, applicable land use regulations, and consistency of the proposed project with adopted planning policies.

5. Development Agreement

The project site is subject to a Development Agreement executed by the City of Antioch and the project sponsor on October 25, 2005, and amended on September 13, 2007[1] and included as Appendix B of this report. On October 9, 2007 the City Council determined that the environmental impacts associated with the Development Agreement were studied in the General Plan Update EIR[2] and that no subsequent or supplemental environmental review would be required.

Entering into a Development Agreement is voluntary and the terms of such agreements result from negotiations between the City and the developer. A Development Agreement allows a developer who needs additional discretionary approvals to complete a long-term development project as approved per the land use regulations in effect at the time, regardless of any intervening changes in local regulations. The Development Agreement is a binding contract between the City and the developer and provides the sponsor with a vested right to have the land use regulations in effect when the Development Agreement became effective apply to the future development of its property. However, development of the project site is subject to future discretionary actions and the City may adopt new or modified rules, regulations, and official policies (i.e., building regulations) after the effective date of the Development Agreement and may review and process subsequent City actions required for the proposed project under future rules and regulations in effect at the time of project approval.

Per the Development Agreement, as part of the proposed project, the sponsor has agreed to facilitate the development of the AUSD Medical High School by providing temporary and permanent infrastructure improvements to serve the school. Such infrastructure would include both an access road along the westerly edge of the school site as well as those portions of Sand Creek Road along the southerly edge of the school site. In addition to the infrastructure requirements for the planned school, the Development Agreement also requires that the southern portion of the project site remain as open space and that the sponsor fund the cost of a regional trail connecting the proposed residential community with the Sand Creek Road corridor. All of these improvements are evaluated as part of the proposed project considered in this EIR. The Development Agreement also allows concurrent processing of a Master Plan, Residential Development Allocation request, and a Final Development Plan/Tentative Map for the proposed project.

B. PROJECT OBJECTIVES

The proposed project would develop an active adult residential community, consisting of up to 535 adult single-family units. As stated by the project sponsor, the objectives of the proposed project are as follows:

- To maximize the opportunity for development of housing for a regionally under-supplied market segment, allowing active adults to appropriately size their homes to suit their life-stage needs.
- To increase the City of Antioch's available housing stock to address regional needs while creating minimal new burdens on existing roadways and circulation systems and school facilities.

[1] First Amendment and Restated Development Agreement No. 2007-0337114-0. Effective December 13, 2007.

[2] Antioch, City of, 2007. *General Plan Update Environmental Impact Report, Second Addendum*. May.

- To construct temporary and permanent infrastructure and utilities to the new medically-focused Dozier Libbey Medical High School.
- To provide for various infrastructure improvements that would benefit the community, including public roadway improvements to serve the new Dozier Libbey Medical High School as well as other portions of the Sand Creek Focus Area, utilities within those roadways, and drainage facilities to appropriately collect and convey storm water runoff to new detention basins.
- To create, preserve, and maintain open space and critical biological habitat on- and off-site so as to responsibly address the environmental sensitivity of the site.
- To expand existing public park facilities, including extending such facilities into the new community, thus providing expanded recreational opportunities for both existing and new residents.
- To extend public pedestrian trails through the site with connections between existing residential communities, new open space amenities including preserved areas of Sand Creek, and planned City facilities, including the Sports Complex.
- To contribute to the economic and social viability of the region by adding residents who tend to shop locally, maintain high volunteerism, and travel less frequently during peak traffic hours.
- To create an economically viable project that provides a fair share contribution of infrastructure to the community through payment of fees, and/or land based financing, and/or construction of required capital improvements, while providing a well-designed community of the type and style desired by current and future active adult citizens of Antioch and the greater Bay Area.

C. PROPOSED PROJECT

This EIR considers the environmental effects of the residential project proposed by Pulte Home Corporation (project sponsor). This section provides a description of the proposed project based on information submitted by the project sponsor in February 2007, May 2008, and September 2008. The proposed project is an adult residential development that comprises up to 535 adult-single-family units on approximately 93 acres, a 4.8-acre recreational facility, approximately 24 acres of parks and landscaped areas, a segment of the Sand Creek regional trail, a 4.7-acre creek buffer area, approximately 32 acres of open space (excludes the potential future roadway access easement) and associated parking, roadway, and utility improvements. Some of the roadway and utility improvements would occur off-site, as depicted in Figure III-3. Proposed on-site and off- site land uses and associated acreages are listed in Table III-1. The proposed project would also construct roadway and utility improvements that would serve the AUSD Medical High School adjacent to the

Table III-1: Proposed Land Uses

Land Use	Acreage
On-Site Uses	
Residential Area	92.9
Parks and Landscaping	24.1
Streets	20.6
Recreation Facility	4.8
Water Quality Basins	7.2
Open Space[a, b]	32.2
Sand Creek Buffer[b]	4.7
Access Roads/Easements	2.5
Subtotal	*189.0*
Off-Site Development[a]	
AUSD Medical High School Access Road	1.4
Northbound Hillcrest Road Extension	3.0
Sewer Infrastructure	20.3
Subtotal	*24.7*
Total	***213.7***

[a] Includes acreage for temporary construction easements
[b] Excludes acreage for future roadway easement
Source: Carlson, Barbee & Gibson, 2008. Project Plans dated June 3, 2008.

southwest corner of the site. Figure III-4 depicts the conceptual site plan for the proposed project. The following provides a summary of the project's primary components.

1. Residential Concept

The proposed project would develop an active adult community which would provide residents age 55 and older with the opportunity to appropriately size their homes to their current needs, while allowing for a more active and socially connected lifestyle. The proposed project includes development of up to 535 adult single-family residential units on approximately 93 acres in the northern portion of the project site. The average density of residential development would be approximately 2.8 units per gross acre. Six different product models would be constructed, ranging from approximately 1,555 to 2,240 square feet in size on lots ranging from approximately 5,000 to 6,000 square feet. All homes would be single-level with a two-car attached garage. No development is proposed on the southern portion of the site, south of Sand Creek. Figure III-5 shows representative building elevations. An 8-foot tall sound wall is proposed to separate the residential neighborhood from the adjacent AUSD Medical High School to the west and a 6-foot tall sound wall is proposed along Hillcrest Avenue.

The Covenants, Conditions, and Restrictions (CC&R's), for the proposed project would ensure that age restrictions are imposed for proposed residents, consistent with the Fair Housing laws and the Housing for Older Persons Act. In addition, the Development Agreement[3] for the proposed project specifically states that the proposed project would be developed as an active senior community.

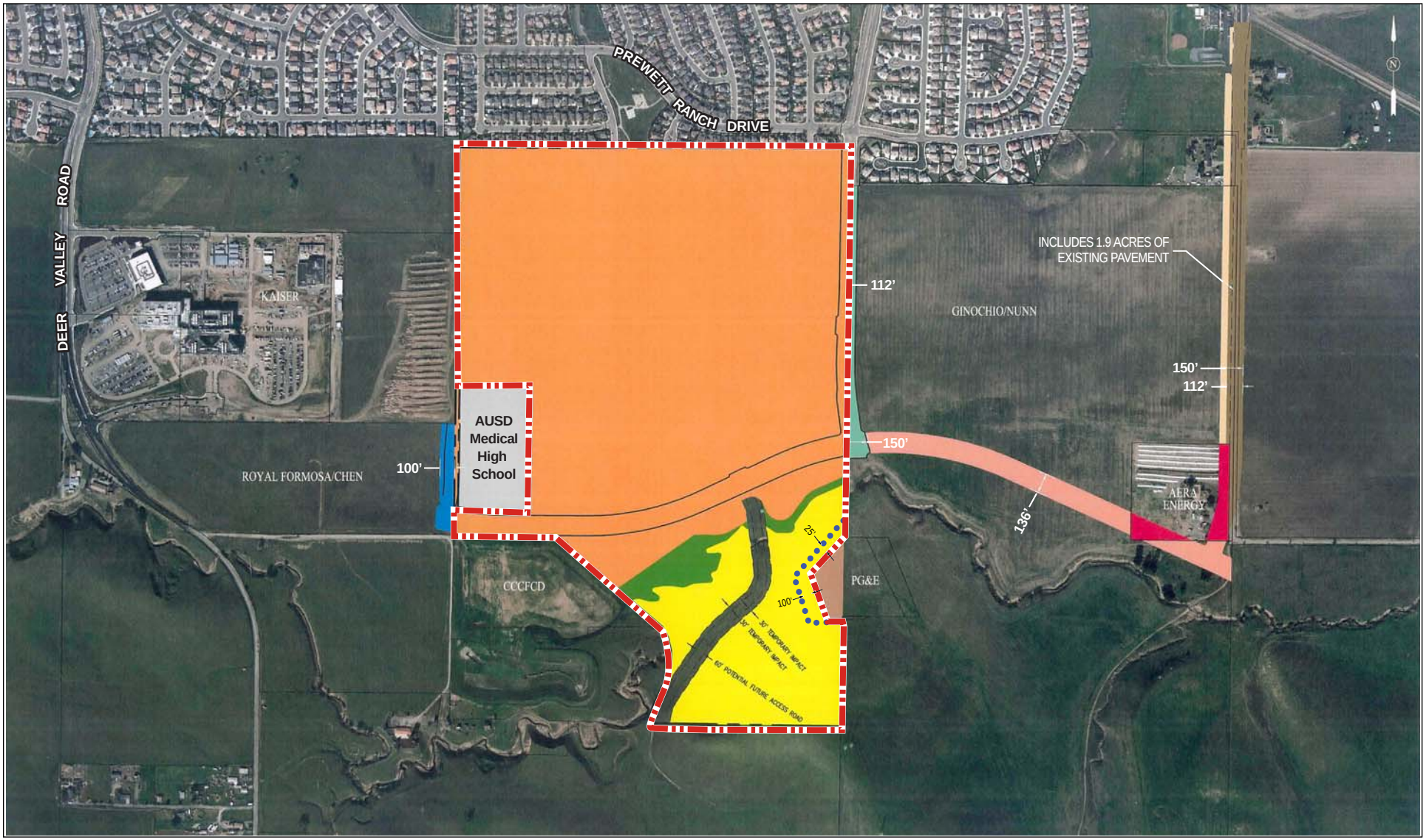
2. Recreation, Landscaping and Open Space

The proposed project includes the development of recreational, park, and landscaped areas within the residential area. South of the residential area, the project site would remain as undeveloped open space with habitat preservation and buffer areas. Recreation, park, and landscaped areas are depicted in Figure III-6. The open space and buffer areas are depicted on Figures III-3 and III-4. Approximately 20 percent of the project site would be set aside for these uses, as described in detail below.

a. Recreational Facility. An approximately 18,600 square foot recreational facility would be located on approximately 4.8 acres of the site and the grounds would include tennis courts, a fitness pool, fitness center, lounge, pool and spa, lifelong learning center, billiards area, outdoor entertaining areas, and meeting and multi-purpose rooms. These facilities would be available to residents and their guests and open to the public on a fee basis.

b. Parks. The proposed project would provide approximately 12 acres of public parks and public pathways. The existing neighborhood park north of the project site would be expanded onto the project site. This approximately 2.5-acre park would contain lawn areas and public benches. The PG&E easement that bisects the site would act as a linear greenway linking this park with the open space area (described below) and the planned Sports Complex to the south. A 0.72 acre park would be located west of this greenway and would be connected by a landscaped pathway.

[3] First Amendment and Restated Development Agreement No. 2007-0337114-0. Effective December 13, 2007.



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NOT TO SCALE

PROJECT SITE

ON-SITE

- DEVELOPABLE ACREAGE (ONSITE) – 149.6 AC
- SAND CREEK BUFFER – 4.7 AC
- OPEN SPACE – 29.7 AC
- 60' ACCESS ROAD – 2.5 AC
- TEMPORARY IMPACT – 2.5 AC
- PG & E EASEMENT

OFF-SITE

- HIGH SCHOOL ACCESS ROAD - 1.4 AC
- OFFSITE SAND CREEK ROAD (EAST) – 7.6 AC *
- OFFSITE HEIDORN RANCH ROAD – 8.2 AC *^
- TEMPORARY CONSTRUCTION EASEMENT – 2.3 AC *
- AERA ENERGY – 2.2 AC *
- OFFSITE HILLCREST AVENUE – 3.0 AC

* THESE AREAS ARE IDENTIFIED FOR THE INSTALLATION OF A SEWER EXTENSION. PROJECT RELATED IMPACTS TO THESE AREAS ARE TEMPORARY.

^ THIS IS THE GROSS ACREAGE. DEVELOPABLE ACREAGE DOES NOT INCLUDE EXISTING PAVED AREAS INDICATED ON MAP.

FIGURE III-3

Aviano Adult Community Project EIR

Project Impact Areas

SOURCE: Pulte Homes, 2008.

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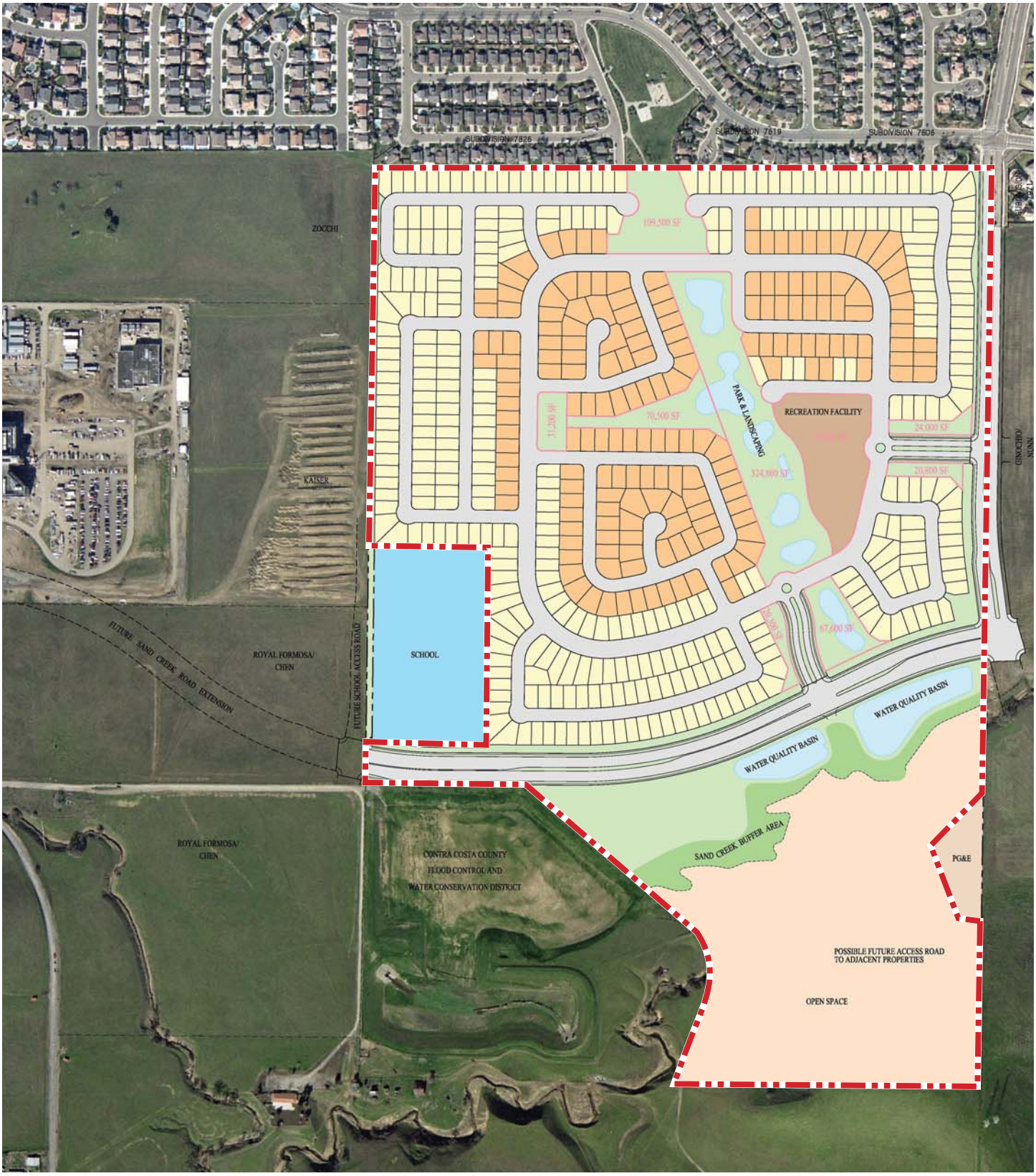

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FIGURE III-4

PROJECT SITE

352	50' x 100' LOTS (66%)
182	60' x 100' LOTS (34%)
534	TOTAL UNITS

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Aviano Adult Community Project EIR
Conceptual Land Use Plan

SOURCE: PULTE HOMES, APRIL 9, 2008.

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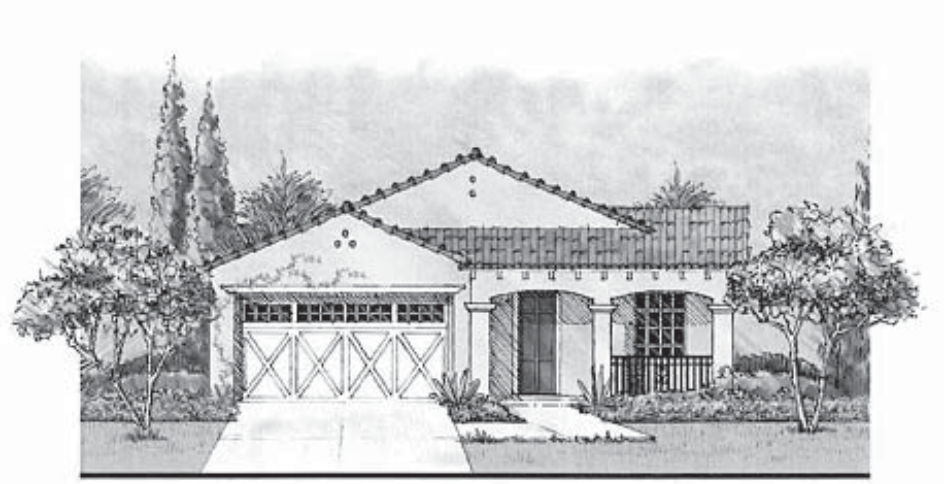
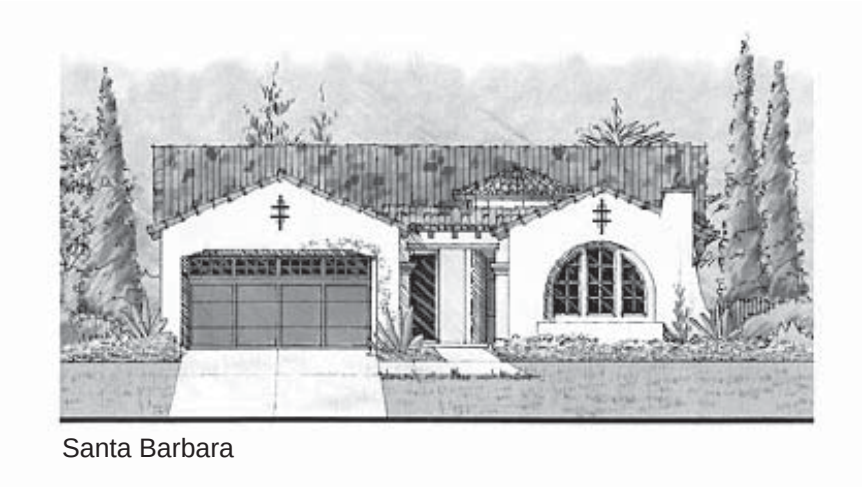


Monterey



Santa Barbara

Spanish

LSA

FIGURE III-5

Aviano Adult Community Project EIR

Conceptual Elevations

NOT TO SCALE

SOURCE: PULTE HOMES, 2006

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c. Sand Creek Regional Trail. The project applicant would construct a segment of the Sand Creek regional trail within the project site. The trail would connect the linear greenway within the PG&E easement to the north to the planned Sports Complex to the south. The Sand Creek trail would be developed along the northern edge of the proposed Sand Creek buffer area (described below) and would originate at the eastern side of the planned Sports Complex at the dam/road/bank to be developed by CCCFCD, as shown in Figure III-7. The trail would extend approximately 1,650 feet east to the future intersection of Sand Creek Road and Hillcrest Avenue. An access path would also be provided at the intersection of Sand Creek Road and the pathway system located within the PG&E easement to the north. Both the main trail and access trail would be approximately 12 feet wide and would be constructed of either asphalt or concrete at an excavation depth of approximately 8 to 10 inches. A wire mesh fence would be installed along the southern trail boundary, adjacent to the creek buffer. Small staging areas with two metal benches would be located at each of the three access points. Removable posts or barriers may also be located in these areas to prevent vehicular access while allowing pedestrian and bicycle access. Native trees would be planted along the path alignment; no plantings are proposed within the creek buffer zone.

d. Landscaping. Landscaping would be provided throughout the project site, on a total of about 11 acres, and would conform to the requirements and provisions of Article 10, Section 9-5.1001 of the Antioch Zoning Code. Project landscaping would consist of street trees, shrubs, groundcover, and open lawn areas. Both entrances to the project site would be landscaped as would the project side of Sand Creek Road and Hillcrest Avenue, including roadway medians. Common landscaping and parks throughout the project site would be maintained by a Home Owners Association (HOA). Individual residences would also be landscaped with trees, shrubs, and lawns and would be maintained by the individual occupants.

e. Open Space. Approximately 37 acres south of Sand Creek Road would be retained as undeveloped open space, as depicted on Figures III-3 and III-4. Within the open space area, 4.7 acres would serve as a buffer area along the Sand Creek corridor, including a variable setback buffer from each side of the creek top of bank. In the vicinity of the westerly detention basin, the setback is 5 feet at its narrowest point; however this area is on a spur of the creek and not on the creek's main channel. Generally, in the vicinity of the western detention basin, the buffer would be 50 feet from top of bank. The maximum width of the creek setback would be 200 feet. Approximately 32 acres of the site, south of the Sand Creek buffer area, would remain undeveloped and would be dedicated as permanent open space. An approximately 60 foot wide, 2.5-acre easement would be granted through the creek buffer and open space areas to allow for a possible future access road to properties which may be developed to the south. If the roadway is constructed, approximately 2.5 acres (an additional 60 feet in width) of the open space area would be temporarily disturbed to allow for roadway construction. The Sand Creek regional trail segment to be constructed as part of the proposed project would also be developed within the open space area; however, the trail would not intrude into the Sand Creek buffer area. In addition, a 1-acre PG&E easement is located within the open space area; landscaping will be located within this easement, to buffer the adjacent PG&E substation from the undeveloped open space area.

The proposed project may also include the purchase and preservation (in fee or through conservation easement) of off-site habitat to mitigate for the potential loss of special-status species habitat on the project site, if necessary. The project applicant has purchased a 205-acre site (the "Ralph" property) near the Byron Airport in east Contra Costa County for this purpose. This property contains vernal

LSA

FIGURE III-6

Aviano Adult Community Project EIR

Conceptual Landscape Plan

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SOURCE: Pulte Homes, 2008.

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Back of III-6

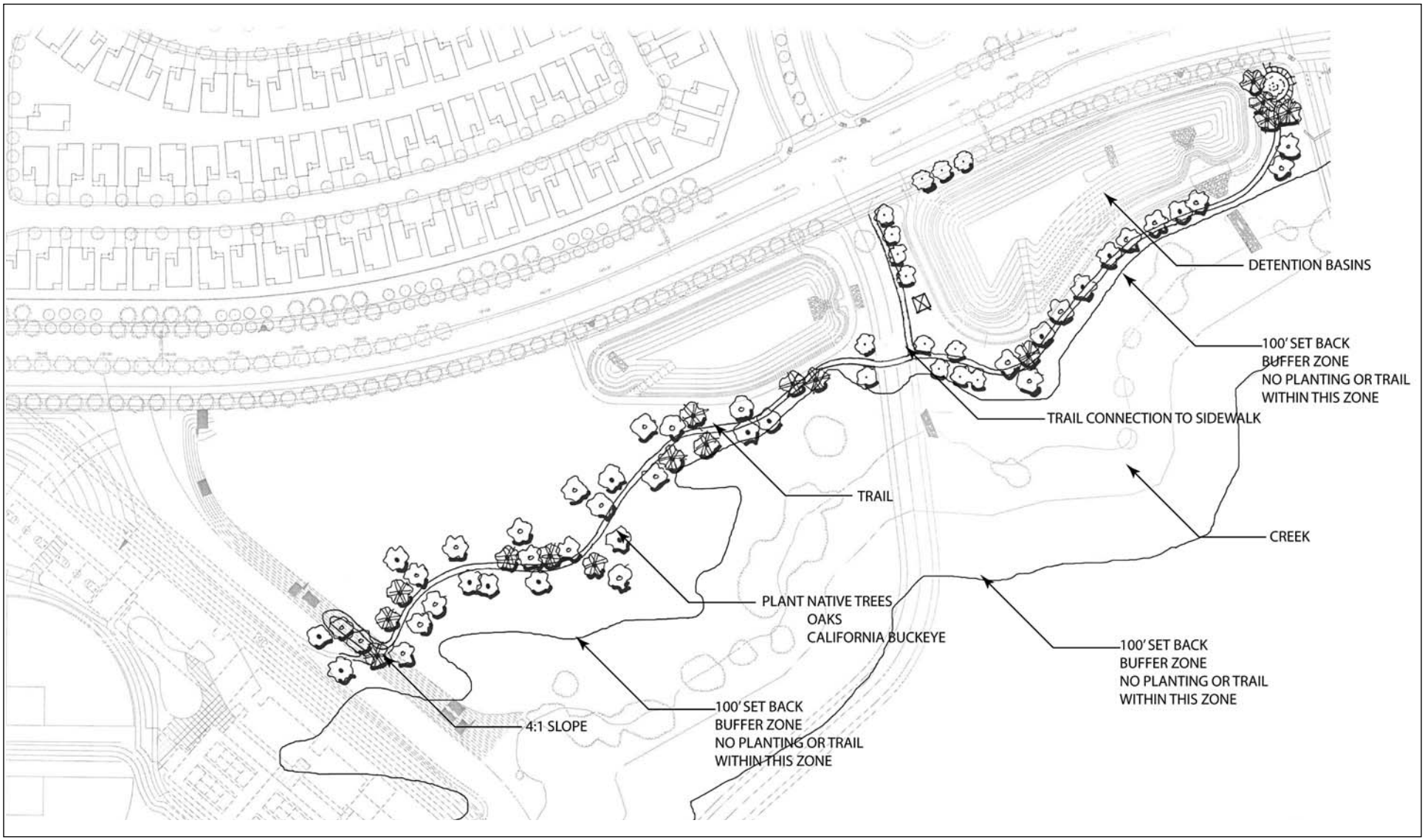

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FIGURE III-7

Aviano Adult Community Project EIR

Sand Creek Trail

N

NOT TO SCALE

SOURCE: GATES AND ASSOCIATES, 2008

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pool habitats and supports special-status species, which are known to occur on the project site. Other off-site lands are also currently being reviewed for potential acquisition as off-site habitat. (These issues are described and analyzed in Chapter IV.I, Biological Resources.)

3. Circulation, Parking and Streetscape

Vehicular ingress and egress to the project site would be provided by a newly constructed 1,650-foot extension of Hillcrest Avenue along the eastern boundary of the project site and construction of approximately 2,850 lineal feet of the proposed Sand Creek Road from the Hillcrest Avenue extension to the western property line. The Hillcrest extension would include southbound pavement to be used for two-way traffic until construction of separate northbound lanes is warranted, a landscaped median, and landscaping on the road's western boundary. Sand Creek Road would include a total of four lanes including eastbound and westbound lanes, a landscaped median, and landscaping on the north and south sides of the roadway. Pedestrian access to the site would be provided by sidewalks located on both sides of Hillcrest Avenue and Sand Creek Road.

Internal vehicular circulation would be provided by a circular street pattern connecting to internal two-way streets and cul-de-sacs within the residential area. Most streets would have sidewalks or separated walking paths. Each residential unit would have a two-car garage, with additional curbside street parking. Separate parking would also be provided for the recreational facilities.

Off-site circulation improvements depicted on Figure III-3, include the development of a permanent roadway with access to the AUSD Medical High School and Kaiser Hospital medical facilities (approximately 1.4 acres) on the eastern side of the Royal Formosa/Chen property. East of and immediately adjacent to the project site on the Ginochio/Nunn property, approximately 3 acres would eventually be developed as the northbound Hillcrest Avenue extension from Sand Creek Road.

4. Utilities and Infrastructure

As the project site is currently undeveloped, public utilities, including potable water, sanitary sewer, improved stormwater drainage, power, and telecommunications services are not currently provided on the site. The following describes how the project proposes to improve the site to provide these standard services. Proposed water, sewer, and storm drainage infrastructure locations and connections are depicted in Figure III-8.

a. Water Service. Potable water would be distributed to the project site and the AUSD Medical High School by an existing 16-inch trunk line beneath Hillcrest Avenue. This line would continue within the Hillcrest Avenue road extension and create a loop through the proposed greenway to connect with the trunk line at Candlewood Way.

b. Sanitary Sewer. The proposed project would extend the existing 24-inch sanitary sewer pipe located at Heidorn Ranch Road, northeast of the project site. This pipe would be extended south along the future alignment of Heidorn Ranch Road and west along the future alignment of Sand Creek Road. This new sanitary sewer line would serve both the project site as well as the planned AUSD Medical High School. Development of this sewer line through the adjacent properties to the east of the project site would require temporary construction easements, and would total approximately 20.3 acres of disturbed area, including 1.9 acres of existing pavement on Heidorn Ranch Road.

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FIGURE III-8

Aviano Adult Community Project EIR

Conceptual Utility Plan

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WATER

STORM DRAIN

SANITARY SEWER

PROJECT SITE

SOURCE: Pulte Homes, 2008.

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Back of III-8

c. Storm Water. The project site naturally drains to the east and storm water is conveyed by Sand Creek. Two existing 84-inch storm drain pipes run south along the western boundary of the project site and outfall into an existing CCCFCD detention basin just south of the site (the location of the planned Sports Complex). The AUSD Medical High School is served by these existing improvements. The project site west of the PG&E easement and north of the school site, as well as most the area of the PG&E easement, would drain to storm water detention/water quality basins located throughout the proposed greenway. The 28 acres nearest Sand Creek Road between the AUSD Medical High School and PG&E easement would drain to the basin just south of Sand Creek Road. The project site east of the PG&E easement along with 84 acres of off-site area north of the project would drain to a second detention/water quality basin south of Sand Creek Road. These basins would then drain via engineered outlets to Sand Creek. The basins would provide mitigation for detention water quality, and hydromodification.

The CCCFCD is constructing a regional detention basin immediately south of the project site as well as a second detention basin downstream at Sand Creek.[4] Construction of the Upper Basin is anticipated to begin in Summer 2010; there is no current timeline for construction of the Lower Basin. However, once these two permanent basins are constructed, peak flows from the project site would drain to them.

d. Power and Communications. Electricity to the project site would be provided by PG&E. AT&T provides telephone and DSL service and Comcast provides cable television and internet services Citywide. Dry utilities, electrical, gas, and technology lines would be extended from those existing beneath Hillcrest Avenue and would be looped back to Candlewood Way. There is an existing overhead power line extending south from Hillcrest Avenue that would be relocated underground with the extension of Hillcrest Avenue.

5. Project Construction

Project grading would be balanced on-site. Construction of the proposed project would be conducted in four phases. The first phase of the project would commence in 2010 and the final phase of construction is expected to be completed by 2012.

Off-site improvements would include the extension of infrastructure to the project site, including the under-grounding of utility lines at Hillcrest Avenue and the extension of water, sanitary sewer, and storm drainage pipes, as discussed above.

D. DISCRETIONARY ACTIONS

The proposed project would require a series of discretionary actions as described below.

1. Master Development Plan/Planned Development Rezone

The project would require the approval of a Master Development Plan and Planned Development Rezone. The Master Development Plan and PD District would list the development standards

[4] Contra Costa County Flood Control District, 1992. Draft Subsequent Environmental Impact Report for Marsh Creek Watershed Regional Drainage Facilities and Sand Creek Improvements. January.

applicable to the project site, including setbacks, lot sizes, building heights etc.

2. Residential Development Allocations

The project would require City review of an application for residential development allocations (RDA's) pursuant to Article 40 of the City of Antioch's Municipal Code. Age restricted-senior housing units account for 0.5 allocation.

3. Vesting Tentative Map

Vesting Tentative Map approval is required to authorize subdivision of the project site into multiple parcels to accommodate up to 535 adult single-family residential units as well as recreational, parks, and open space parcels.

4. Use Permit

A Use Permit is required to further clarify the details of each phase of the proposed project and to ensure that each component complies with established provisions of the proposed PD district.

5. Design Review

Design Review is required to authorize the proposed building architecture, landscaping, and site design of the residential community and to ensure consistency with the City of Antioch's General Plan and Zoning Ordinance design policies and criteria.

E. USES OF THIS EIR

A number of permits and approvals, including the discretionary actions listed above, may be required before development of the proposed Aviano Adult Community project could proceed. As lead agency for the proposed project, the City of Antioch would be responsible for the majority of approvals required for development. Other agencies also may have some authority related to the project and its approvals. A list of the permits and approvals that may be required by the City and other agencies is provided in Table III-2. Many of these agencies would use this EIR when deliberating over required permits and approvals.

Table III-2: Required Permits and Approvals

Lead Agency	Permit/Approval
City of Antioch	• Environmental Review • Master Development Plan/Rezone • Residential Development Allocations • Vesting Tentative Map/Final Development Plan • Use Permit • Design Review • Grading and building permits • Approval of water line connection, water hookups and review of water needs • Connection to City sewer system • SB 610 Water Supply Assessment • SB 221 Water Supply Verification
Responsible Agencies	
U.S. Army Corps of Engineers	• Section 404 Permit (Nationwide Permit) for the construction of outfalls
U.S. Fish and Wildlife Service	• Biological Opinion for listed species and critical habitat
San Francisco Bay Regional Water Quality Control Board (RWQCB)	• National Pollutant Discharge Elimination System (NPDES) permit for storm water discharge • Section 401 water quality certification
California Department of Fish and Game	• Section 1602 streambed alteration agreement
Contra Costa County Flood Control and Water Conservation District	• Flood Control Encroachment Permit • Rights-of-Way granted.
Delta Diablo Sanitation District	• Discharge of sanitary sewage into system.
Other Agencies	
AT&T	• Approval of communication line improvements and connection permits.
Pacific Gas & Electric (PG&E)	• Approval of natural gas improvements and connection permits.

Source: LSA Associates, Inc., 2008.

A. LAND USE AND PLANNING POLICY

This section describes existing land uses on the project site as well as the surrounding area, defines the existing regulatory context, evaluates the project's consistency with applicable planning policies, identifies potential land use impacts, and recommends mitigation measures, where appropriate. While this section contains a discussion of the consistency of the proposed project with relevant land use policies, according to CEQA policy conflicts do not, in and of themselves, constitute a significant environmental impact. Policy conflicts are considered to be environmental impacts only when they would result in direct *physical* impacts. Any such associated physical impacts are discussed in this EIR under specific topical sections, such as noise, air quality, and transportation and circulation.

1. Setting

The following section describes the existing land uses and regulatory context of the project site and its vicinity.

a. Existing Land Use. Land uses at and adjacent to the project site are generally identified in the aerial photo provided in Figure IV.A-1. Photographs of the site and surrounding area are provided throughout this section as Photos IV.A-1 through IV.A-5. These photos correspond to the viewpoint locations (1 through 5) noted on Figure IV.A-1.

Photo IV.A-1: Sand Creek

(1) Project Site. As described in Chapter III, Project Description, the approximately 189-acre project site is generally flat and is primarily covered in non-native grassy vegetation. There are no existing buildings on the site. The unchannelized Sand Creek, a tributary of Marsh Creek, flows in a northeastern direction across the southern portion of the site, and is shown in Photo IV.A-1. Several trees are scattered along the banks of the creek. South of Sand Creek, the topography slopes upward into a north-facing hill. Photo IV.A-2 depicts the southern hillside portion of the site. Several trees are scattered along the hillside and 230-kV transmission line towers (discussed in more detail below) on and beyond the site are also visible. A drainage channel flows along the site's eastern border and drains to Sand Creek. The site is enclosed by barbed-wire fencing and is currently used for seasonal cattle grazing.

Photo IV.A-2: Southern hillside portion of the project site

A 25-foot wide natural gas pipeline easement (owned by Calpine) runs across the western border of the site. A 25-foot Shell Oil Company easement runs in an east-west direction across the site and a 10-inch in diameter buried natural gas pipeline (owned by Calpine) runs below ground and crosses Sand Creek in the southeast portion of the site. Several plugged and abandoned oil and gas exploration wells and their standpipes are also located throughout the project site. A 200-foot wide PG&E transmission line easement runs from the southeast corner of the site to approximately the center of the northern property boundary. Four 230-kV electrical transmission line towers are located within this easement on the project site. Photo IV.A-3 looks northeast across the project site from the site's western boundary. The PG&E transmission line is visible on the site as are residential uses north of the site. A portion of the northeast corner of the site is currently covered with imported soils and construction debris from off-site uses.

Photo IV.A-3: Northeast across project site

(2) Off-Site Impact Areas. As described in Chapter III, Project Description, off-site development of sewer infrastructure and roadways associated with the proposed project would affect a number of off-site corridors located on adjacent properties, totaling approximately 25 acres. The existing land uses for each these off-site properties are discussed below.

Royal Formosa/Chen Property. The approximately 73-acre Royal Formosa/Chen property is located immediately west of and adjacent to the project site, as depicted on Figure IV.A-1. This parcel consists of undeveloped land currently utilized for grazing. Approximately 1.4 acres of this property would be affected by the proposed project.

Ginochio/Nunn Property. The approximately 289-acre Ginochio/Nunn property is located immediately east of and adjacent to the project site, as depicted in Figure IV.A-1. This parcel consists of undeveloped land currently used for agriculture. Most recently, the site has been dryland farmed in barley. Approximately 21.1 acres of this property would be affected by the proposed project.

Aera Energy Property. The approximately 10.2-acre Aera Energy (formerly Shell) property is located east of the project site along Heidorn Ranch Road. This property is developed with a number of buildings and mature trees. Facilities on this property are used for pressurizing and pumping natural gas and underground pipelines. Approximately 2.2 acres of this property would be affected by the proposed project.

(3) Surrounding Area. The project site is located in developing area of the City and is surrounded by a mixture of uses. Land uses within the vicinity of the proposed project are described below.

Land Uses to the North. The project site is bordered to the north by single-family residential developments and Chaparral Park, a public park. As shown in Photo IV.A-4, this park is developed with open lawn areas, play structures, and public pathways. A PG&E easement, which transects the site, continues northwesterly through the park and surrounding neighborhoods to Prewett Family

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FIGURE IV.A-1

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PROJECT SITE

OFF-SITE IMPACT AREAS

6 PHOTO LOCATIONS

Aviano Adult Community Project EIR

Aerial View of Project Site and Land Use Photo Location Map

SOURCE: Pulte Homes, 2008.

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Back of Color Figure IV.A-1

Park, located on the north side of Lone Tree Way. Lone Tree Way, a major arterial roadway, generally runs parallel to the project site approximately 1/2 mile to the north, where it intersects with Hillcrest Avenue northeast of the site. Diablo Vista Elementary School and Deer Valley High School are located approximately 1/4 and 1/2 mile, respectively, northwest of the project site, south of Lone Tree Way. Farther north of Lone Tree Way, land uses consist of low to medium density residential developments, parks, and open space. The San Joaquin River is located approximately 4 miles north of the site.

Photo IV.A-4: Chaparral Park, north of the project site

Land Uses to the East. The project site is bordered to the east by agricultural land (shown in Photo IV.A-5) planned for future business park uses. The planned alignment of Heidorn Ranch Road runs in a north-south direction approximately 1/4 mile to the east of the project site. East of the future Heidorn Ranch Road alignment are scattered rural residential and agricultural land uses located in the City of Brentwood. Approximately 1/2 mile east of the project site, the SR-4 bypass runs in a north-south direction, between Lone Tree Way and Balfour Road. The connection between Lone Tree Way and SR-4 to the north is currently under construction. Sand Creek also continues northeast from the project site where it flows to Marsh Creek, approximately 2.5 miles from the project site.

Photo IV.A-5: Agricultural uses, east of the project site

Land Uses to the South. The project site is bordered to the south by open space within the City's Planning Area. These open space areas are planned for residential and continued open space. Further to the south the Ginochio property is designated by the General Plan for mixed use and planned community/resort uses. Roddy Ranch Golf Course is located southwest of the project site, west of Deer Valley Road. Balfour Road and Deer Creek (a tributary of Marsh Creek) lie 1.5 miles south of the project. South of Balfour Road land uses continue to consist of open space within unincorporated Contra Costa County.

Land Uses to the West. Photo IV.A-6 looks west from the project site's western boundary towards the recently constructed Kaiser Hospital. The undeveloped land north of the Kaiser Hospital facility and immediately west of the project site is proposed for single-family residential uses. West of the Kaiser Hospital facility is Deer Valley Road, a major north-south arterial, which connects to SR-4 to the north. West of Deer Valley Road, land uses consist largely of open space; Mt. Diablo and the surrounding foothills can be seen in the distance. The southwest corner of the project site is bordered by the AUSD Medical High School, which provides a medically-focused curriculum for students interested in entering the medical field. South of this facility is the Contra Costa County Flood Control and Water Conservation Districts (CCCFCD) Upper Sand Creek detention basin. This

48-acre basin is planned for future use as a City-operated seasonal Sports Complex. Southwest of the project site, a gravel road leads to an AUSD teacher-training facility. A horse corral and barn are also located near this facility.

Photo IV.A-6: Kaiser Hospital Medical Facilities, under construction, west of the project site

b. Regulatory Context. Several planning and regulatory documents guide land use and development on the project site. These documents include the City of Antioch General Plan and Title 9, Chapter 5 of the Antioch Municipal Code (Zoning Code), which also includes the Residential Development Allocation (RDA) Program. Brief descriptions of each of these documents are provided below.

(1) Antioch General Plan.[1] The Antioch General Plan, adopted on November 24, 2003, provides the City's vision for long-range development and growth-management. The General Plan provides this policy direction through nine chapters: Growth Management; Land Use; Community Image and Design; Economic Development; Circulation; Public Services and Facilities; Housing; Resource Management; and Environmental Hazards. General Plan direction is provided in each chapter through a series of goals, objectives, and policies, each organized by broad issues of importance to the community. Implementation programs describe the specific actions the City will take to fulfill the vision of the General Plan are also provided.

The General Plan Land Use Map applies a land use designation to all publicly and privately owned parcels within the City's planning area. Ten areas within the General Plan Planning Area are identified as focus areas. Specific policy direction is provided for each focus area, including appropriate land use types and development intensity, based upon analysis of the particular opportunities and constraints affecting each area. It should be noted that General Plan designations are not parcel specific, but provide a guide for development in a given area. The project site is located within the Sand Creek Focus Area on the General Plan Land Use Map. The Sand Creek Focus Area is shown in Figure IV.A-2, and is discussed below, as provided in the General Plan.

Sand Creek Focus Area. The Sand Creek Focus Area encompasses approximately 2,712 acres and is bounded by existing residential neighborhoods to the north, Black Diamond Mines Regional Preserve to the west, the newly incorporated Roddy Ranch property and unincorporated open space to the south, and the City of Brentwood to the east. The Sand Creek Focus Area is intended to function as a large-scale planned community, providing needed employment and housing opportunities in the southern portion of the City. The General Plan anticipates a maximum build out within the Sand Creek Focus Area of 3,537 single-family residential units, 500 multi-family residential units, 1,240,000 square feet of commercial/office uses, and 2,600,000 square feet of business park uses. The General Plan also provides policy direction for long-range development within this focus area; specific policies applicable to the proposed project are described in detail under the impact analysis below.

[1] Antioch, City of, 2003. *City of Antioch General Plan*. November 24.

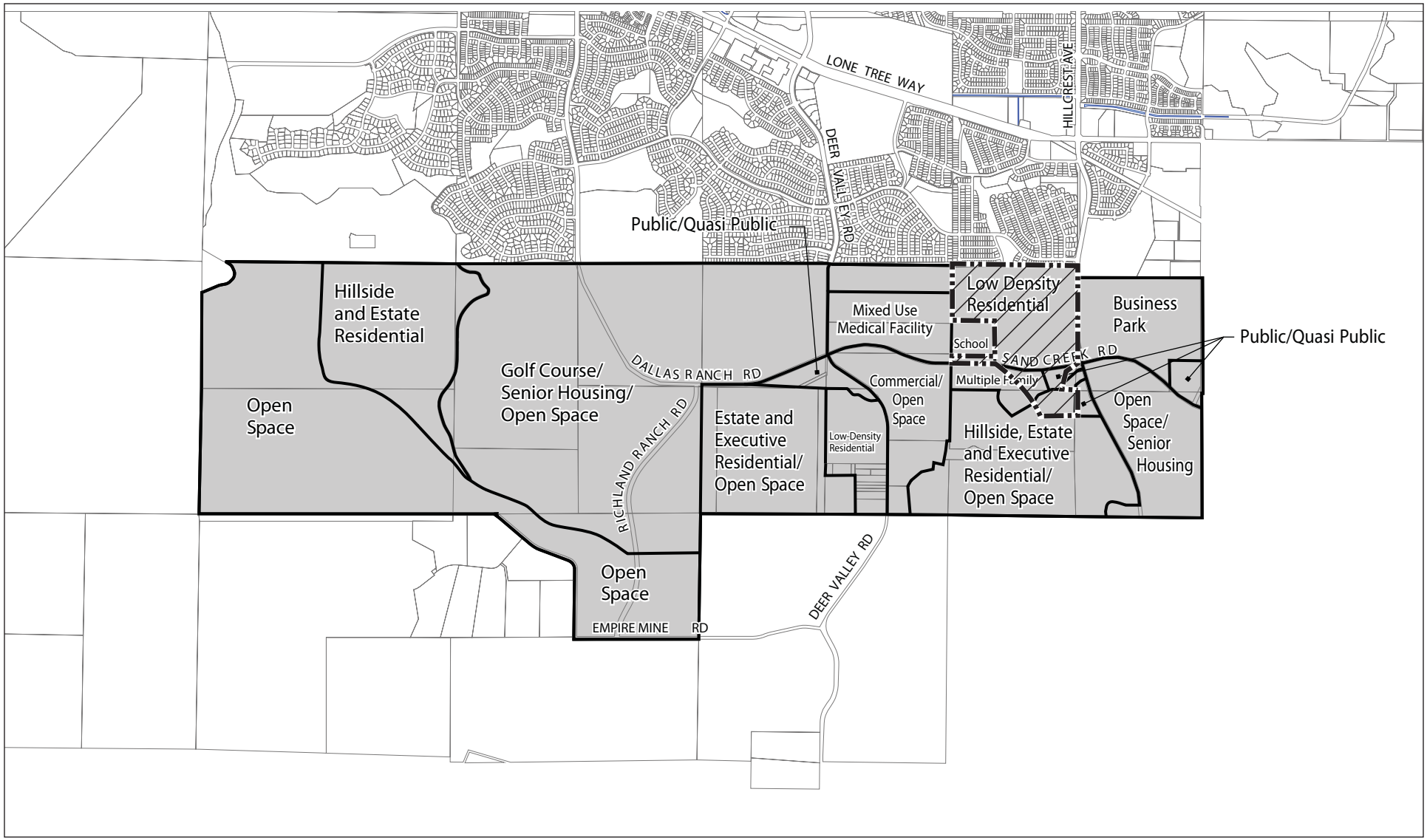

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FIGURE IV.A-2

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PROJECT SITE

Aviano Adult Community Project EIR
Sand Creek Focus Area Map

SOURCE: DES ARCHITECTS ENGINEERS, AUGUST 2005

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The northern 137 acres of the project site is designated Low Density Residential within the Sand Creek Focus Area Map. Development under this designation is generally characterized by single-family homes in traditional subdivisions. The Low Density Residential designation allows a maximum of 4 dwelling units per gross developable acre (du/acre) on lots ranging from 7,000 to 10,000 square feet. Therefore, approximately 548 single-family homes are permitted within this area of the site. The southwest 10-acre portion of the project site, south of Sand Creek, is designated Multiple Family Residential on the Sand Creek Focus Area Map. Development under this designation is generally characterized by attached townhomes or flats with required common open space and recreation facilities for use by residents. The maximum allowable density under this designation is 20 dwelling units per gross developable acre, which would allow approximately 200 units on this area of the site. The southeastern 6-acre portion of the project site, south of Sand Creek, is designated Public/Quasi Public, which is intended to identify locations for new public and institutional uses to serve the future development of the focus area. The maximum Floor Area Ratio (FAR) for development in these areas is 50 percent of the site. The southernmost 36-acre portion of the site is designated Hillside Estate, Executive Residential or Open Space, which allows one to two dwelling units per acre. At an average density of 1.5 units per acre, this area of the site could be developed with approximately 54 homes. In total the project site could be developed with up to 802 residential units under the existing land use designations provided for the site on the Sand Creek Focus Area Map. The adjacent Royal Formosa/Chen property is designated Commercial/Open Space and the adjacent Ginochio/Nunn property is designated Business Park in the General Plan.

In addition, the General Plan identifies the Sand Creek Focus Area as suitable for age-restricted senior housing as a means of expanding the range of housing choices within the City. Such housing may be developed within any of the residential areas within the Sand Creek Focus Area and may consist of Single-Family Detached, Small Lot Single-Family Detached, or Multi-Family Attached housing.

General Plan Policies. General Plan land use policies applicable to the proposed project are provided in Table IV.A-2, located at the end of this section. The table provides a detailed evaluation of the proposed project's consistency with these policies.

(2) Antioch Zoning Code.[2] The Antioch Zoning Code provides land use, development, and environmental protection regulations to protect and promote the public health, safety, and general welfare of residents and businesses in the City. The Zoning Code implements the policies of the General Plan by classifying and regulating the uses of land and placement of buildings and improvements within the City, consistent with the General Plan. Each zoning district specifies standards for new development, such as minimum lot sizes, maximum densities, setbacks, height, and parking requirements. The Zoning Map also depicts allowable uses for each district, which may either be permitted by right or permitted with a use permit (or minor use permit). Zoning regulations applicable to the project site are discussed below.

Study District. The project site is currently zoned (S) Study District on the Antioch Zoning Map. The S District is intended as an interim designation which is utilized until all necessary detailed land use studies are completed for a given area. This district is most appropriately applied to properties at the time that they are prezoned prior to annexation by the City.

[2] Antioch, City of, 1994. Municipal Code, Title 9, Chapter 5: Zoning Code.

Planned Development District. The proposed project would rezone the project site to the Planned Development (PD) zoning district. The intent of the PD district is to enable and encourage flexibility in the design and development of land so as to promote its most appropriate use; to allow diversification in the relationship of various uses, structures, and space; to facilitate the adequate and economical provision of streets and utilities; to preserve the natural and scenic qualities of open space; to offer recreational opportunities convenient to residents; to enhance the appearance of neighborhoods through the preservation of natural green spaces; and to counteract the effects of urban congestion and monotony. Each residential PD district is required to include specific development standards for that district, including minimum lot sizes, setbacks, and open space requirements, architectural and landscaping guidelines, and maximum building heights and lot coverage. The PD district is also required to encourage non-auto oriented circulation within the development through the strategic provision of pedestrian and bicycle facilities. Once approved as part of the final development plan, all standards, densities, and other requirements are to remain tied to the plan and to the property designated by the district, unless formally amended by the City Council.

(3) Residential Development Allocation Program.[3] The Residential Development Allocation (RDA) Program, adopted by the City Council May 14, 2002, requires that development allocations be obtained in connection with development entitlements including the issuance of building permits. The objective of the RDA Program is to provide for a reasonable rate of residential growth that ensures the ability of the City to provide housing opportunities for all economic segments of the community, as required by State Housing Element law, and to facilitate the ability of public services and facilities provided by the City and outside agencies to expand at a commensurate rate. The issuance of development allocations is limited to a maximum annual average of 600, and may not exceed 3,000 development allocations within a 5-year period. Age-restricted (55 or over) market-rate senior housing is counted as 0.5 unit allocation. In order to prevent the predominance of any one housing type, during any 5-year period, not more than 200 of the 600 average annual allocations (400 actual units) may be granted to age-restricted senior housing. However, in 2005 Antioch voters passed Measure K, an initiative intended to control growth and relieve traffic congestion within the City. Measure K prohibited the City Council from approving any new allocations in 2006 and 2007. This measure also reduces the number of allocations from 3,000 to 2,000 within the 5-year period through 2010.

(4) Development Agreement. As described in Chapter III, Project Description, the project site is subject to a Development Agreement executed by the City of Antioch and the project sponsor on October 25, 2005, and amended on September 13, 2007.[4] Per the Development Agreement, as part of the proposed project, the sponsor has agreed to facilitate the development of the AUSD Medical High School by providing temporary and permanent infrastructure improvements to serve the school. Such infrastructure would include both an access road along the westerly edge of the AUSD Medical High School site as well as those portions of Sand Creek Road along the southerly edge of the AUSD Medical High School site. In addition to the infrastructure requirements for the planned school, the Development Agreement also requires that the southern portion of the project site remain as open space and that the sponsor fund the cost of a regional trail connecting the proposed residential community with the Sand Creek Road corridor. All of these improvements are evaluated as part of the proposed project considered in this EIR.

[3] Antioch, City of, 2005. Municipal Code, Title 9, Chapter 5, Article 40, §9-5.4007, amended through April 12.

[4] First Amendment and Restated Development Agreement No. 2007-0337114-0. Effective December 13, 2007.

2. Land Use Impacts and Mitigation Measures

The following section presents a discussion of the impacts related to land use that could result from implementation of the proposed project. The section begins with the criteria of significance, which establish the thresholds to determine if an impact is significant. The latter part of this section presents the land use impacts from the proposed project and the recommended mitigation measures, if required. Impacts are delineated into separate categories based on their significance according to the criteria listed below: less-than-significant impacts, which do not require mitigation, and significant impacts, which do require mitigation.

As previously discussed, inconsistencies between a project and applicable land use policies do not constitute significant environmental impacts in and of themselves. However, a policy inconsistency is considered to be a significant adverse environmental impact when it is related to a policy adopted for the purpose of avoiding or mitigating an environmental effect and it is anticipated that the inconsistency would result in a significant adverse *physical* impact. The proposed project's consistency with regional policies related to physical environmental topics (e.g., air quality, transportation, and noise) is fully analyzed and discussed in those topical sections of this EIR.

a. Criteria of Significance. Development of the proposed project would have a significant land use impact if it would:

- Disrupt or divide the physical arrangement of an established community;
- Introduce new land uses that would conflict with established uses; or
- Fundamentally conflict with any applicable land-use plan, policy, or regulation of an agency with jurisdiction over a project, including, but not limited to, a general plan, specific plan, or zoning ordinance, adopted for the purpose of avoiding or mitigating an environmental effect.

b. Less-than-Significant Land Use Impacts. Less-than-significant land use impacts of the proposed project are discussed below.

(1) Divide an Established Community. The physical division of an established community typically refers to the construction of a physical feature (such as interstate highway or railroad tracks) or removal of a means of access (such as a local road or bridge) that would impair mobility within an existing community, or between a community and outlying areas. For instance, the construction of an interstate highway through an existing community may constrain travel from one side of the community to another; similarly, such construction may also impair travel to areas outside of the community.

The proposed project would result in the development of residential uses on the undeveloped, vacant project site. These residential uses would not create a physical barrier to travel around the project site. The proposed project would extend Hillcrest Avenue south to connect with a segment of Sand Creek Road, also to be developed as part of the proposed project. Sand Creek Road would eventually provide connections to Heidorn Ranch Road to the east, and Deer Valley Road to the west. In addition to providing access to the project site, project roadways would provide access to the planned Sports Complex and AUSD Medical High School, which currently are only partially accessible by a gravel road extending east from Deer Valley Road. These roadways would also create greater access from the east to the Kaiser Medical Facility. In addition, an easement would be granted to the City

through the open space area for a future access roadway to provide access from Sand Creek Road to future developments south of the project site.

The project's proposed parks and greenways would serve to physically connect the neighborhood to the north with open space areas south of the site. The existing neighborhood park north of the project site would be expanded south onto the project site and the PG&E easement that bisects the site would act as a linear greenway linking the park to the proposed Sand Creek trail and open space areas within the southern portion of the project site. These proposed uses would provide a continuous pedestrian link from the neighborhood to the north to the planned Sports Complex to the south. As such, the proposed project would not disrupt or divide the physical arrangement of an established community, but would increase pedestrian and vehicular access throughout the site and vicinity.

(2) Compatibility with Surrounding Land Uses. The proposed project would introduce residential uses onto the currently undeveloped project site. The southern portion of the site, south of the proposed segment of Sand Creek Road, would be used for detention basins, passive recreational use as part of the Sand Creek trail, and as a creek buffer and wildlife habitat area, all of which provide a transition from the more intensive uses to the north to the undeveloped open space areas south of Sand Creek. Residential uses developed as part of the proposed project would be compatible with the existing residential neighborhoods located north of the project site, and planned single-family residential uses to the northwest. Residential uses at the eastern portion of the site would be separated from existing agricultural lands (planned for future business park uses) by the proposed extension of Hillcrest Avenue, sidewalks on both sides of the roadway, and the associated median and roadway landscaping (an approximate total of 80 feet). In addition, the residential boundary would be separated from the roadway by an 8-foot tall soundwall, as required by Mitigation Measure NOI-2a and -2b. (See Section IV.D, Noise).

On the west the project would be bordered by the Kaiser Medical Facility and the AUSD Medical High School. An 8-foot tall soundwall is proposed along the western boundary of the project, which would provide an adequate buffer from potentially incompatible land uses adjacent to the western boundary of the site.

Both permanent and temporary impacts to adjacent agricultural and grazing land would occur with development of the associated off-site sewer infrastructure and access roadways. As previously discussed, the proposed project would develop sewer infrastructure to serve the proposed project east from the site to Heidorn Ranch Road. This sewer line would be constructed along the future alignment of Sand Creek Road (to be constructed by others) and impacts to this area would be temporary. The future widening of Hillcrest Avenue, widening of Heidorn Ranch Road, and construction of the AUSD Medical High School access road would all occur within agriculturally productive and grazing land adjacent to the project site. However, the proposed roadways would generally be consistent with the development pattern envisioned by the General Plan and would not result in an inherent conflict with existing land uses. Please refer to Section IV.M, Agricultural and Mineral Resources, for a detailed discussion of potential impacts to agricultural land uses.

In addition, indirect impacts from the introduction of residential uses on the project site could lead to conflicts with adjacent open space by increasing the number of non-native predators, such as domestic dogs and cats. However, existing residential development in the vicinity already provides a source of domestic animals that may enter nearby open space and the proposed project's incremental

increase in such effects would not constitute a significant impact. Therefore, the proposed project would generally be compatible with existing and planned land uses within the vicinity and would have a less-than-significant impact on land use compatibility.

(3) Conflict with Applicable Land Use Plans. Three sets of applicable land use regulations are addressed below: General Plan; Zoning; and Residential Development Allocation Program.

Antioch General Plan. Potential conflicts with specific General Plan goals, objectives and policies are discussed below and evaluated in detail in Table IV.A-1, at the end of this section. The proposed project would be generally consistent with General Plan land use-related goals, objectives, and policies that envision development on the site. It should be noted that the General Plan contains many policies, which may in some cases address different goals, and thus some policies may compete with each other. The Planning Commission and City Council, in deciding whether to approve the proposed project, must decide whether, on balance, the project is consistent (i.e., in general harmony) with the General Plan.

Although the site itself is not designated for senior housing on the Sand Creek Focus Area map, General Plan Policy 4.4.6.7.p specifies that the entirety of the Sand Creek Focus Area is suitable for age-restricted senior housing. Such housing may be developed within any of the residential areas within the Sand Creek Focus Area and may consist of Single-Family Detached, Small Lot Single-Family Detached, or Multi-Family Attached housing. Development of the project site with age-restricted housing would be consistent with the General Plan vision for development in this area of the City.

The Low Density Residential designation for the 137-acre northern portion of the project site permits a maximum of 4 dwelling units per gross developable acre (du/acre) on lots ranging from 7,000 to 10,000 square feet. The southwest 10 acres of the project site, south of Sand Creek, is designated Multiple Family Residential which allows 20 du/gross acre and the southernmost 36 acres of the site is designated Hillside Estate, Executive Residential or Open Space, which allows 1 to 2 du/acre. The southeastern 6-acre portion of the project site, south of Sand Creek, is designated Public/Quasi Public, which would remain as open space. In total, approximately 802 residential units could be built on the project site under the existing land use designations, at a development density of 4.2 du/acre. Development of approximately 93 acres of the 189-acre project site with up to 535 single-family residential units, at an average density of approximately 2.8 du/acre, would be generally consistent with the development intensity envisioned for the project site.

Antioch Zoning Code. The proposed project would rezone the site from the S district to the PD zoning district. The rezone to the PD district would set the development standards for the project site, including the maximum density and number of units, minimum lot size, landscape and open space requirements, architectural guidelines, maximum building heights, and lot coverage. Although specific development standards have not yet been developed for the proposed project, it is anticipated that all standards, densities, and other requirements would conform to the intent of the PD zoning district, which allows flexibility for development standards.

Residential Development Allocation Program. The project sponsor would initially apply for approximately 268 residential development allocations in connection with project entitlements and residential building permits. Given the project would be phased over two years, the issuance of

subsequent residential development allocations would also be phased over this time period. The proposed project would not exceed the 5-year average of residential development allocations for age-restricted senior housing, even with the reduced number of allocations available through 2010 under Measure K.

c. Significant Land Use Impacts. Development of the proposed project would not result in any significant land use impacts.

Table IV.A-1: Relationship of Project to Relevant City of Antioch General Plan Goals, Objectives, and Policies

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
CHAPTER 4: LAND USE		
Goal LU-4.2.1:	Maintain a pattern of land uses that minimizes conflicts between various land uses, and promotes rational utilization of presently undeveloped and underdeveloped open land, and supports the achievement of Antioch's vision for its future.	The proposed project would be surrounded by a variety of existing uses and would not be incompatible with these uses. Appropriate buffers and/or soundwalls would be located between potentially conflicting uses. The General Plan designates the undeveloped project site for a mix of urban uses (Low Density Residential; Multi-Family Residential; Hillside Estate, Executive Residential or Open Space; and Public/Quasi-Public). While not entirely consistent with the General Plan vision for a mix of urban uses on the site, the project is consistent with General Plan policy 4.4.6.7.p which encourages senior housing in any residential area within the Sand Creek Focus Area.
Community Structure Objective LU-4.3.1:	Provide adequate land for present and future urban and economic development needs, while retaining a compact, rather than scattered development pattern.	The proposed project would continue the residential development pattern that exists north of the site.
Residential Land Use Objective LU-4.4.2:	Provide a wide range of residential opportunities and dwelling unit types to meet the present and future needs of all socioeconomic groups.	The proposed project would provide age-restricted senior housing in the southern portion of the City, increasing the range of residential opportunities for City residents.
Residential Land Use Policy LU-4.4.2.2a:	Within lands designated for residential use, permit the following non-residential uses: Public elementary schools; parks, botanical gardens, and passive open space areas; and playgrounds and playing fields and active open space areas.	The proposed project includes a park, recreational facilities, a segment of the Sand Creek regional trail, and open space uses on the site.
Residential Land Use Policy LU-4.4.2.2c:	Encourage larger neighborhood units to provide choices for residents as to the size and type of dwelling unit and lot, neighborhood design, density of development, community amenities, and form of ownership.	The proposed project would develop a community of up to 535 adult single-family residential units for residents 55 and older. Six different product models would be constructed, ranging from approximately 1,555 to 2,240 square feet in size on lots ranging from approximately 5,000 to 6,000 square feet. Three different architectural styles would be available. The proposed project would also include development of a recreational facility, as well as parks, trails and open space areas, which would all provide a variety of recreational opportunities within the community.

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
Residential Land Use Policy LU-4.4.2.2d:	Design new residential development with identifiable neighborhood units, with neighborhood shopping facilities, parks and recreational facilities, and schools provided as an integral component of neighborhood design. • *Streets*. Street design should route through traffic around, rather than through new neighborhoods. Neighborhood streets should be quiet, safe, and amenable to bicycle and pedestrian use. Within new subdivisions, single-family residences should be fronted on short local streets, which should, in turn, feed onto local collectors, and then onto master planned roadways. • *Schools, Parks, and Recreation Areas*. Elementary schools, as well as parks and recreational areas should be contained as near the center of the neighborhood they are in, as is feasible. • *Connections*. Individual neighborhoods should be provided with pathways and open spaces connecting residences to school and recreational facilities, thereby facilitating pedestrian and bicycle access. • *Neighborhood Character*. Residential neighborhoods should be designed to maintain a distinct character through the use of neighborhood signage, streetscapes, architectural styles and variations, natural topographic variations, and landscape buffers.	The proposed development would clearly identify the residential neighborhood and separate the project from surrounding residential development through the following: • *Streets.* Through traffic would be routed around the proposed residential development, along Hillcrest Drive, and eventually the extension of Sand Creek Road. Residential access would be provided by both of these main roadways. The internal circular street pattern would connect to internal two-way streets and culs-de sac within the residential area. Internal streets would also have sidewalks or separated walking paths. • *Parks and Recreation Areas*. Proposed parks, green space, play areas, and recreational facilities would be located at the center of the residential development. • *Connections.* The proposed project would extend the existing Chaparral Park, located north of the site, south onto the project site. This greenway would include pedestrian pathways connecting project residents to the recreation amenities provided throughout the site. These pathways would also provide project residents with pedestrian and bicycle access to the residential neighborhoods to the north. The Sand Creek trail segment would also provide project residents and the neighborhoods to the north with pedestrian and bicycle access to the planned Sports Complex to the south. • *Neighborhood Character.* Entrances to the proposed residential development would be clearly marked by cascading entry/signwall features and enhanced paving at project access points. Landscaping would be provided within and around the project site and project streetscapes would define the character of the residential neighborhood. Building and streetscape design would provide variation from the residential character of existing neighborhoods to the north.
Residential Land Use Policy LU-4.4.2.2e:	Provide recognizable variations in front and side yard setbacks within single-family residential neighborhoods.	Project residences would range from 1,555 to 2,240 square feet in size on lots ranging from approximately 5,000 to 6,000 square feet. Lot coverage would range from 30 to 40 percent, providing variations in front and side yard setbacks.

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
Sand Creek Focus Area Policy LU-4.4.6.7a:	Prior to or concurrent with approvals of any development applications other than major employment-generating uses (including, but not limited to a medical facility on the Kaiser property), a specific plan or alternative planning process as determined by the City Council, shall be prepared and approved for the Sand Creek Focus Area. Such specific plan or alternative planning process shall identify and provide for project-related land uses, financing of required public services and facilities, open space preservation, community design, recreational amenities, and community improvements within the area proposed for development.	The Specific Plan planning process for the Sand Creek Focus Area has been suspended. The City has adopted an alternative planning process for development in this area. In lieu of a Specific Plan, the City and the project sponsor have entered into a Development Agreement. The Development Agreement specifies the type of development permitted on the project site, and details the public services and facilities finance requirements for the proposed project. Specifically, the Development Agreement requires that the project sponsor provide temporary and permanent roadways and utility infrastructure improvements for the AUSD Medical High School as well as construction of the alignment of Sand Creek Road.
Sand Creek Focus Area Policy LU-4.4.6.7k:	A maximum of 4,000 dwelling units may be constructed within the Sand Creek Focus Area. Appropriate density bonuses may be granted for development of age-restricted housing for seniors; however, such density bonuses may not exceed the total maximum of 4,000 dwelling units for the Sand Creek Focus Area.	The proposed project would develop up to 535 single-family residential units within the Sand Creek Focus Area, which remains largely undeveloped. The proposed density of 2.8 du/acre would not exceed the maximum dwelling unit allowance for the Sand Creek Area. No density bonus is required.
Sand Creek Focus Area Policy LU-4.4.6.7p:	Age-restricted senior housing should be developed within the Focus Area as a means of expanding the range of housing choice within Antioch, while reducing the Focus Area's overall traffic and school impacts. Such senior housing may consist of Single Family Detached, Small Lot Single Family Detached, of Multi-Family Attached Housing, and may be developed in any of the residential areas of the Sand Creek Focus Area. Within areas identified specifically for senior housing, limited areas of non-senior housing may be permitted where environmental or topographic constraints would limit development densities to a range more compatible with estate housing than with senior housing.	The proposed project would develop up to 535 single-family detached units of age-restricted senior housing within the Sand Creek Focus Area.
Sand Creek Focus Area Policy LU-4.4.6.7q:	Areas identified as Public/Quasi Public and School are intended to identify locations for new public and institutional uses to serve the future development of the Sand Creek Focus Area. Development within these areas is to be consistent with the provisions of the Public/Institutional land use category described in Section 4.4.1.4 of the Land Use Element.	The Public/Quasi Public portion of the project site would be developed with detention basins serving the proposed project. A portion of this area would also be part of the open space area on the site. These uses would be compatible with the intent of the Public/Quasi Public land use designation as the basins will protect public safety and the open space area will provide passive public recreational opportunities.
Sand Creek Focus Area Policy LU-4.4.6.7r:	Sand Creek, ridgelines, hilltops, stands of oak trees, and significant landforms shall be preserved in their natural condition. Overall, a minimum of 25 percent of the Sand Creek Focus Area shall be preserved in open space, exclusive of lands developed for golf course use.	Sand Creek would be protected by a buffer area averaging approximately 100 feet on both sides of the creek bank. The proposed project would also preserve approximately 20 percent (32 acres) of the site as open space.

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
Sand Creek Focus Area Policy LU-4.4.6.7s:	Adequate buffer areas adjacent to the top of banks along Sand Creek to protect sensitive plant and amphibian habitats and water quality shall be provided. Adequate buffer areas shall also be provided along the edge of existing areas of permanently preserved open space adjacent to the Sand Creek Focus Area, including but not limited to the Black Diamond Mines Regional Park. Buffers established adjacent to existing open space areas shall be of an adequate width to minimize light/glare, noise, fire safety, public safety, habitat, public access impacts avoid significant biological resource impacts within the existing open space areas, consistent with the provisions of Section 10.5, Open Space Transitions and Buffers Policies of the General Plan.	The proposed project would provide an average 100-foot buffer area on both sides of Sand Creek. The open space area at the southern portion of the site would be located south of the Sand Creek buffer area. The Sand Creek buffer and open space areas would be separated from the residential development and the Sand Creek Road extension to the north by landscaping along the roadway.
Sand Creek Focus Area Policy LU-4.4.6.7t:	Because of the sensitivity of the habitat areas within the Sand Creek Focus Area, and to provide for mitigation of biological resources impacts on lands in natural open space, as well as for the long-term management of natural open space, a Resource Management Plan based on the Framework Resource Management Plan shall be prepared and approved prior to development of the Sand Creek Focus Area.	The proposed project includes the preparation of a site-specific Resource Management Plan to supplement the existing Resource Management Plan for the Sand Creek Focus Area. This RMP provides specific recommendations for the project site and is included as Appendix K of this report. A site-specific Resource Management Plan has also been prepared for the Ralph property and would be implemented for that site.
Sand Creek Focus Area Policy LU-4.4.6.7w:	To mitigate the impacts of habitat that will be lost to future development within the Focus Area, an appropriate amount of habitat shall be preserved on- or off-site per the compensatory provisions of the Framework Resource Management Plan prepared for the Sand Creek Focus Area.	The proposed project would include the purchase and preservation (in fee and/or through conservation easement) of off-site habitat to mitigate for the potential loss of special-status species habitat on the project site, if necessary.
Sand Creek Focus Area Policy LU-4.4.6.7bb:	Mass grading within the steeper portions or the Focus Area (generally exceeding 25 percent slopes) is to be avoided.	The southern hillside portion of the project site would remain undeveloped open space and would not be graded.
Sand Creek Focus Area Policy LU-4.4.6.7dd:	Project entry, streetscape, and landscape design elements are to be designed to create and maintain a strong identification of the Sand Creek Focus Area as an identifiable "community" distinct from Southeast Antioch.	Entrances to the proposed residential development would be clearly marked by cascading entry/signwall features and enhanced paving at project access points. Landscaping would be provided within and around the project site and project streetscapes would define the character of the residential neighborhood.
Sand Creek Focus Area Policy LU-4.4.6.7hh:	Development of an appropriate level of pedestrian and bicycle circulation throughout the community is to be provided, including pathways connecting the residential neighborhoods, as well as non-residential and recreational components of the community. Sand Creek Focus Area development should also provide recreational trail systems for jogging and bicycling, including areas for hiking and mountain biking. Trails along Sand Creek and Horse Valley Creek shall be designed so as to avoid impacting sensitive plant and amphibian habitats, as well as water quality.	Proposed sidewalks along project roadways and public pathways located throughout park and greenway areas would facilitate pedestrian access and circulation throughout the project site. Public pathways would connect the project site to the existing Chaparral Park and residential neighborhoods to the north. The proposed Sand Creek trail segment would also connect the residential neighbor-hood to the planned Sports Complex south of Sand Creek. The proposed segment of Sand Creek Road would be separated from Sand Creek by an average 100- foot-wide buffer area, in addition to roadway landscaping.

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
CHAPTER 5: COMMUNITY IMAGE AND DESIGN		
Community Design Policy CD-5.4.2s	Where needed, undertake active programs to minimize or prohibit through traffic from using neighborhood collectors and local streets. Visual deterrents to through traffic will be emphasized, using physical deterrents only as a last resort.	The proposed project would encourage through traffic to use Hillcrest Avenue or Sand Creek Road. Project access points would only provide access to the residential development.
Community Entries and Gateways Policy CD-5.4.3c:	Provide gateways to specific districts/communities within Antioch through streetscape improvements, entry monumentation, and special landscape design at the following locations. • Primary entries into the Sand Creek Specific Plan Focus Area.	The extension of Hillcrest Avenue would serve as one of the primary entries into the Sand Creek Focus Area from the north. Once fully constructed, Sand Creek Road, a segment of which would be constructed by the proposed project, would serve as a primary access point into the Focus Area from both the east and west. Project entry points along the Hillcrest Avenue extension and Sand Creek Road would include enhanced paving and landscaping such as low pilasters containing potted plants, and a combined cascading entry/signwall feature on either side of the project entry.
Community Entries and Gateways Policy CD-5.4.3d:	Provide enhanced project entries into single family residential neighborhoods and multi-family, commercial, office, and business park developments.	Project access points located along Hillcrest Avenue and Sand Creek Road would consist of entry driveways for vehicular and pedestrian access into the community. These driveways would include enhanced paving and landscaping including low pilasters containing potted plants, and a combined cascading entry/signwall feature on either side of the project entry. Landscaping on either side of the roadway and along the median would include groundcover, accent trees, and shrubs.
Residential Development Policy CD-5.4.7a:	Design new residential development in identifiable neighborhood units, with neighborhood shopping facilities, parks and recreational facilities, and schools provided as an integral component of neighborhood design. [Detailed specific design standards have been omitted from this cell of the table]	Please see response to *Residential Land Use Policy LU-4.4.2.2d.*
Residential Development Policy CD-5.4.7b:	Provide recognizable variations in front and side yard setbacks within single-family residential neighborhoods.	Please see response to *Residential Land Use Policy LU-4.4.2.2e.*
Residential Development Policy CD-5.4.7a:	Design new residential development in identifiable neighborhood units, with neighborhood shopping facilities, parks and recreational facilities, and schools provided as an integral component of neighborhood design. *Streets*. Street design should route through traffic around, rather than through new neighborhoods. Neighborhood streets should be quiet, safe, and amenable to bicycle and pedestrian use. Within new subdivisions, single-family residences should be fronted on short local streets (generally with 50 or fewer dwelling units along them), which should, in turn, feed onto local collectors (two-lane streets without dwelling units fronting on them), and then onto the master planned roadways illustrated in the Circulation Element.	Please see response to *Residential Land Use Policy LU-4.4.2.2d.*

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
Development Transitions and Buffering Policy 5.4.12a:	Minimize the number and extent of locations where non-residential land use designations abut residential land use designations. Where such land use relationships cannot be avoided, strive to use roadways to separate the residential and non-residential uses.	The proposed residential development would be located east of and adjacent to the Kaiser Medical Facility and the AUSD Medical High School. Although roadways are not planned to separate these uses, an 8-foot soundwall is proposed between these uses. Construction of the soundwall, along with implementation of mitigation measures recommended in Section IV.D, Noise would limit land use conflicts between these uses.
Development Transitions and Buffering Policy 5.4.12b	Ensure that the design of new development proposed along a boundary between residential and non-residential uses provides sufficient protection and buffering for the residential use, while maintaining the development feasibility of the non-residential use. The burden to provide buffers and transitions to achieve compatibility should generally be on the second use to be developed. Where there is bare ground to start from, both uses should participate in providing buffers along the boundary between them.	Please see response to *Development Transitions and Buffering Policy 5.4.12a.* The proposed project would provide an adequate buffer between residential uses and adjacent hospital and school uses. In addition, the existing Kaiser Medical Facility includes soundwalls around noise generating uses, such as the generator facility.
Development Transitions and Buffering Policy 5.4.12c	Provide appropriate buffering to separate residential and non-residential uses, using one or more of the following techniques as appropriate. • Increase setbacks along roadways and common property lines between residential/non-residential uses. • Provide a heavily landscaped screen along the roadway or common property line separating residential and non-residential use. • Design the residential area with cul-de-sacs running perpendicular to and ending at the non-residential use, facilitating greater separation of residential and non-residential structures than would be possible if residential streets ran parallel to the boundary of the non-residential use.	Please also see response to *Development Transitions and Buffering Policy 5.4.12a.* Common property boundaries between residential and non-residential land uses would be buffered by walls and landscaping.
CHAPTER 10: RESOURCE MANAGEMENT ELEMENT		
Goal 10.2	Conserve and enhance the unique natural beauty of Antioch's physical setting, and control the expansion of urban development by protecting open space where it is important to preserve natural environmental processes and areas of cultural and historical value.	The northern section of the project site would be developed with residential uses, consistent with the City's General Plan designation for the site. The proposed project would provide approximately 37 total acres of natural open space habitat south of Sand Creek Road. Of the 37 acres, 4.7 acres of habitat would be preserved along the Sand Creek corridor, including an average 100-foot setback buffer area from each side of the creek top of bank. The remaining 32 acres of the site, south of the Sand Creek buffer area, would remain undeveloped and would be dedicated as permanent open space.
Open Space Policy 10.3.1.d	Where significant natural features are present (e.g., ridgelines, natural creeks and other significant habitat areas, rock outcrops, and other significant or unusual landscape features), require new development to incorporate natural	Please see response to *Open Space Goal RM-10.2*. Management and maintenance of the open space area would be arranged by the project sponsor and may be conducted by a qualified agency or

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
Open Space Policy 10.3.1.d Continued	opens space areas into project design. Require dedication to a public agency or dedication of a conservation easement, preparation of maintenance plans, and provision of appropriate long-term management and maintenance of such open space areas.	non-profit organization consistent with the terms of the Resource Management Plan prepared for the proposed project and any permit requirements of the appropriate federal and State agencies.
Open Space Policy 10.3.1.f	Encourage public access to creek corridors through the establishment of trails adjacent to riparian resources, while maintaining adequate buffers between creeks and trails to protect sensitive habitats, special-status species and water quality to the maximum extent feasible.	A public trail system would pass through the proposed residential neighborhood and extend along Sand Creek, connecting the existing trail north of the site to the planned Sports Complex to the south. Buffer areas would be located on either side of Sand Creek and public access along the creek corridor would be provided by the proposed Sand Creek trail segment.
Open Space Policy 10.3.1.g	Where feasible, incorporate, preserve and protect significant existing natural features as part of the design of new development projects rather than removing them. Where preservation of natural features is not feasible, introduce natural elements into project design. Impacts to significant natural features that cannot be preserved or reintroduced into the project design on-site shall be mitigated off-site.	The proposed project would preserve and protect the Sand Creek corridor.
Biological Resources Objective 10.4.1	Preserve natural streams and habitats supporting rare and endangered species of plants and animals.	The proposed project would preserve and protect the Sand Creek corridor. Impacts to special-status species habitats are analyzed in detail in Section IV.I, Biological Resources and would be mitigated to a less-than-significant level.
Biological Resources Policy 10.4.2.c	Require appropriate setbacks adjacent to natural streams to provide adequate buffer areas ensuring the protection of biological resources, including sensitive natural habitat, special-status species habitats and water quality protection.	Within the dedicated open space area, 4.7 acres of habitat would be preserved along the Sand Creek corridor, including an average 100-foot setback buffer area from each side of the creek top of bank.
Biological Resources Policy 10.4.2.d	Through the project approval and environmental review processes, require new development projects to protect sensitive habitat areas, including, but not limited to, oak woodlands, riparian woodland, vernal pools, and native grasslands. Ensure the preservation in place of habitat areas found to be occupied by state and federally protected species.	The proposed project would eliminate on-site sensitive species habitat. However the proposed project would also include preservation of sensitive species habitat off-site. Habitat would also be preserved within the open space area in the southern portion of the site.
Biological Resources Policy 10.4.2.i	Design drainage within urban areas so as to avoid creating perennial flows within intermittent streams to prevent fish and bullfrogs from becoming established within a currently intermittent stream.	Implementation of the mitigation measures recommended in Section IV.G, Hydrology and Storm Drainage would ensure that drainage does not create perennial flows to Sand Creek.
Open Space Transitions and Buffers Objective 10.5.1	Minimize the impacts of development located adjacent to natural areas, preserved open space, and protected environmental resources.	The proposed residences to the north would be separated from the open space areas to the south by the extension of Sand Creek Road and a proposed buffer area along Sand Creek. A wire mesh fence would be located along the southern boundary of the proposed Sand Creek trail segment in order to limit access within the creek buffer.

Table IV.A-1 *Continued*

General Plan Citation	Goal, Objective, or Policy Language	Project's Relationship to Policy
Open Space Transitions and Buffers Policy 10.5.2.b	Ensure that the design of development proposed along a boundary with open space or protected resources provides sufficient protection and buffering for protected resources. The provision of buffers and transitions to achieve compatibility shall occur as part of the proposed development.	The proposed project would create open space and buffer areas south of the site.

Source: City of Antioch, 2003. *City of Antioch General Plan*, November 24; LSA Associates, Inc., 2008.

B. TRANSPORTATION AND CIRCULATION

The following section provides an overview of the regional and local transportation and circulation systems in and around the project site. The section then evaluates potential impacts related to transportation that could result from implementation of the proposed project. Mitigation measures are recommended, as appropriate. Traffic model runs are included in Appendix C of this report.

1. Setting

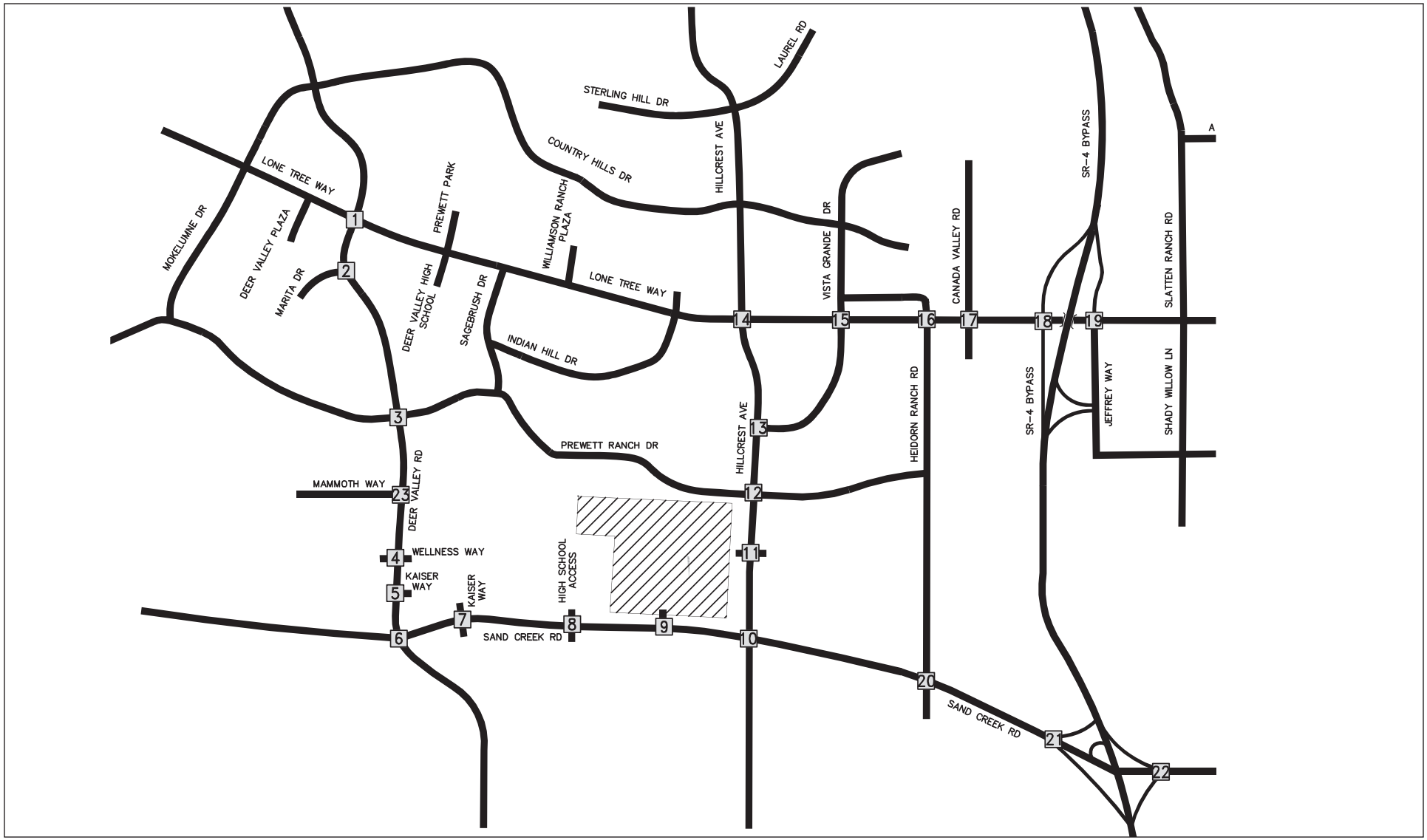
The following discussion describes: the scope of the study; methodologies employed in the analysis; existing, near-term and cumulative volumes with and without the project; service levels at study intersections; and the regulatory framework within which this traffic analysis has been conducted.

a. Scope of Study. This study was conducted according to the requirements of the City of Antioch. The basis of analysis is peak hour level of service calculations for key intersections in the vicinity of the project. The hours identified for analysis are the peak hours between 7:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m. for each of the facilities. Throughout this section, these peak hours are identified as the AM and PM peak hours, respectively.

The 23 study intersections in the project study area are listed below and shown on Figure IV.B-1. The study intersections were chosen in consultation with City staff, and are consistent with Contra Costa Transportation Authority technical procedures.

Study Intersections (all are/will be signalized unless noted by an *)

- Deer Valley Road/Lone Tree Way
- Deer Valley Road/Marita Drive
- Deer Valley Road/Prewett Ranch Drive
- Deer Valley Road/Wellness Way
- Deer Valley Road/Kaiser Way
- Deer Valley Road/Sand Creek Road
- Kaiser Hospital Entrance/Sand Creek Road
- High School Access Road/Sand Creek Road
- Project South Access/Sand Creek Road
- Hillcrest Avenue/Sand Creek Road
- Hillcrest Avenue/Project East Access
- Hillcrest Avenue/Prewett Ranch Drive*
- Hillcrest Avenue/Vista Grande Drive
- Hillcrest Avenue/Lone Tree Way
- Vista Grande Drive/Lone Tree Way
- Heidorn Ranch Road/Lone Tree Way



LSA

FIGURE IV.B-1

LEGEND

PROJECT SITE

STUDY AREA INTERSECTIONS

N

NOT TO SCALE

Aviano Adult Community Project EIR

Study Intersections

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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- Canada Valley Road/Lone Tree Way
- Southbound SR-4 Bypass/Lone Tree Way
- Northbound SR-4 Bypass (Jeffrey Way)/Lone Tree Way
- Heidorn Ranch Road/Sand Creek Road
- SR-4 Bypass/Sand Creek Road
- SR-4 Bypass SB Ramps/Sand Creek Road – (future)
- SR-4 Bypass NB Ramps/Sand Creek Road (future)
- Deer Valley Road/Mammoth Way

The following scenarios were evaluated for this study:

- **Existing Condition.** Existing Conditions were established using counts collected in May and October.[1] At that time, local schools were in session and conditions are assumed to be representative of typical weekday conditions.
- **Near-Term Condition (2011).** This time period was selected as it corresponds to the expected buildout date of the proposed project. Traffic analysis for this scenario consists of existing volumes plus approved/pending or under construction projects anticipated by 2011. A list of all projects whose traffic could have an effect on study intersections over the next four years was developed by the City of Antioch. Ultimately, 49 projects located in Antioch, Brentwood and Oakley were identified for inclusion in the Near-Term Condition traffic analysis.
- **Near-Term Condition Plus Project (2011).** The Near-Term Condition Plus Project scenario was developed by adding project-related traffic to the Near-Term Condition scenario.
- **Cumulative (2025).** Year 2025 corresponds to the Antioch General Plan buildout horizon year. Traffic volumes were developed using the Year 2025 modeling forecasts prepared for the General Plan. This data included turning movement volumes for roadways in the study area. Analysis of year 2025 traffic is based on modeling forecast data and roadway improvements anticipated to be completed by the year 2025.
- **Cumulative Plus Project (2025).** Year 2025 Cumulative Plus Project traffic forecasts were developed by adding project-related traffic volumes to the 2025 Cumulative scenario.

b. Study Methods. This section describes the methods used to evaluate the traffic conditions for each scenario described above. It includes descriptions of the data requirements, analysis methodologies, and applicable level of service standards.

(1) Data Requirements. Existing lane configurations, traffic control devices, signal phasing, turn pocket lengths and intersection turning movement counts at the study intersections were obtained during field visits conducted in May and October 2006.

(2) Level of Service Standards (LOS). Consistent with the requirements of Antioch, Brentwood, and Contra Costa Transportation Authority (CCTA), traffic analysis to determine level of

[1] Kimley-Horn and Associates, Inc., 2006.

service was completed using the CCTALOS module within TRAFFIX software at signalized intersections and the Highway Capacity Manual (HCM) module within TRAFFIX at unsignalized intersections. The CCTALOS module in TRAFFIX is a CCTA-approved alternative to the stand-alone CCTALOS software. Traffic service objectives (delay index) and vehicle queuing at signalized intersections was determined using SYNCHRO software, which is based on the methodology of the *Highway Capacity Manual*. The CCTALOS module within TRAFFIX software is based on the Intersection Capacity Utilization (ICU) methodology and reports the volume to capacity ratio (v/c).

To measure and describe the operational status of a local roadway network or intersection, transportation engineers and planners commonly use a grading system called level of service (LOS). The LOS scale describes traffic flow with six ratings, ranging from LOS A (indicating free-flow traffic conditions with little or no delay) to LOS F (representing over-saturated conditions where traffic flows exceed design capacity, resulting in long delays). The relationship of delay, v/c, and level of service is summarized in Table IV.B-1.

Table IV.B-1: Intersection Level of Service Definitions

Level of Service	Description	Signalized Intersection volume to capacity Ratio v/c	Unsignalized Average Control Delay Per Vehicle (seconds)
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	<0.6	<10
B	Stable traffic. Traffic flows smoothly with few delays.	0.61 – 0.70	>10 – 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	0.71 – 0.80	>15 – 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	0.81 – 0.90	>25 – 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	0.91 – 1.00	>35 – 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	>1.00	>50

Sources: Contra Costa Transportation Authority Technical Procedures 1997 and Transportation Research Board, *Highway Capacity Manual 2000*, National Research Council, 2000.

c. Existing Transportation Network. The project site location and study area roadway network is shown on Figure IV.B-1. The following section describes the transportation system in the project study area including roadway, transit, pedestrian, and bicycle networks.

(1) Regional Roadways. The project study area is served by one regional roadway, as described below.

State Route 4 (SR-4). This major freeway is located about 2.5 miles to the north of the site. Access to the site from SR-4 is provided by the Lone Tree Way interchange. A regional-serving bypass to SR-4 is planned between Vasco Road in Brentwood and the existing SR-4 in Antioch. The project site is located less than 1/2 mile west of the bypass. The bypass is partially constructed and currently there is a two-lane expressway between Lone Tree Way and Balfour Road. Construction is completed on a four-lane freeway between Lone Tree Way and SR-4 to the north. Ultimately this section will be widened to six lanes. At-grade intersections would be replaced with a freeway interchange at and Sand Creek Road, as well as at other locations outside of the study area.

An interchange currently exists at Lone Tree Way, but will be modified with the future widening. The project site would have direct access off of Sand Creek Road.

(2) Local Roadways. A description of local roadways that serve the project study area is provided below. Figure IV.B-1 depicts their location.

- **Lone Tree Way**. This arterial roadway links Antioch with the City of Brentwood. Through the project study area, Lone Tree Way is a four- to six-lane divided roadway with a landscaped median, left turn bays, wide shoulders, and restricted parking. Shoulders are designated as Class II bike lanes. The speed limit on Lone Tree Way is posted at 45 mph in the study area. Lone Tree Way is designated as a Route of Regional Significance (by CCTA, a distinction that is discussed in greater detail below). Deer Valley High School is located on Lone Tree Way east of Deer Valley Road. Traffic from the high school represents a large portion of traffic during the AM peak period.
- **Deer Valley Road**. This four-lane arterial with turn lanes is located west of the project site. Near Kaiser Hospital and south of Sand Creek Road, Deer Valley Road is currently a two-lane roadway. The speed limit on Deer Valley Road is 45 mph. Shoulders are designated as Class II bike lanes. Deer Valley Road is designated as a Route of Regional Significance.
- **Hillcrest Avenue**. This is a four-lane divided roadway with a landscaped median, left turn bays, wide shoulders, and restricted parking. It is located directly adjacent to the eastern boundary of the project site. Shoulders are designated as Class II bike lanes. The speed limit on Hillcrest Avenue is posted at 45 mph in the study area. As part of the proposed project, Hillcrest Avenue would be extended to the south to connect with Sand Creek Road. It is planned to be extended farther to the south in the future. Hillcrest Avenue is designated as a Route of Regional Significance.
- **Sand Creek Road.** This is a planned six-lane arterial with turn lanes at major intersections. It will be located south of Lone Tree Way, will run in an east-west direction, and will bisect the southern portion of the project site. The roadway is designated as a Route of Regional Significance. In the 2011 Near-Term Condition, Sand Creek Road would be extended from the SR-4 Bypass to Heidorn Ranch Road as well as from Hillcrest Avenue Hillcrest Avenue west to the western edge of the AUSD Medical High School. In the 2025 Cumulative Condition, Sand Creek Road would connect from Dallas Ranch Road in Antioch to Sand Creek Road in Brentwood. The posted speed limit on Sand Creek Road would be 45 mph.
- **Heidorn Ranch Road.** This is a four-lane arterial with turn lanes located east of the site. The speed limit on Heidorn Ranch Road is 25 mph. The roadway serves residential and commercial uses and is planned to be extended to the south to connect with Sand Creek Road.
- **Prewett Ranch Drive**. This is a two-lane collector street with turn lanes at major intersections. The posted speed limit on Prewett Ranch Drive is 35 mph near Deer Valley Road and 25 mph near Hillcrest Avenue. There are Class II bike lanes present east of Deer Valley Road. Diablo Vista Elementary School is located on Prewett Ranch Drive east of Deer Valley Road. Traffic from the elementary school represents a large part of traffic during the AM peak period.
- **Canada Valley Road.** This is a two-lane collector roadway with turn lanes serving residential areas north of Lone Tree Way. The speed limit is 25 mph. South of Lone Tree Way the street changes name and serves the Arcadia Shopping Center.

- **Mammoth Way** is a two-lane collector roadway with turn lanes providing access to and from Deer Valley Road from the residential neighborhoods west of Deer Valley Road.
- **Vista Grande Drive.** This is a two-lane street with turn lanes at major intersections. The speed limit on Vista Grande is 25 mph. There are Class II bike lanes present on the roadway.
- **Jeffery Way.** This is a two-lane street with a speed limit of 25 mph. Jeffrey Way is connected to the northbound ramps for the SR-4 Bypass that was completed in 2007. Existing conditions were analyzed in 2006 before the bypass was completed.
- **Wellness Way**. This is a two-lane street with turn lanes providing access to Kaiser Hospital and medical offices from Deer Valley Road.
- **Marita Drive.** This is a two-lane residential street with Class II bike lanes. The posted speed limit is 25 mph.
- **High School Access Road.** The High School Access Road (HSAR) would be built as part of the proposed project and would extend along the western edge of the AUSD Medical High School and extend from Sand Creek Road to the northern boundary of the AUSD Medical High School property. The road would serve the AUSD Medical High School. A temporary road has been constructed from the eastern terminus of Sand Creek Road (near Deer Valley Road) east to intersect the HSAR. It will temporarily provide access to the school until Sand Creek Road is constructed from Hillcrest Avenue west to the HSAR by the project sponsor. Once this segment of Sand Creek Road is built, the temporary access road on Sand Creek Road east from Deer Valley Road will be closed.

(3) Transit Service. Areas near the project site are served by transit Routes 380, 383, 384, 385, 388, and 392 of the Tri-Delta Transit System. The closest stop to the project site is on Route 388, which stops at the Kaiser Hospital medical facilities just west of the proposed project. Currently, however, there are no pedestrian connections between this transit stop and the project. The routes and areas served are described below.

- **Route 380.** Travels along Lone Tree Way and on Canada Valley Road.
- **Route 383.** Travels along Lone Tree Way and Deer Valley Road north of Lone Tree Way.
- **Route 384.** Travels along Deer Valley Road.
- **Route 385.** Travels along Hillcrest Avenue and on Lone Tree Way east of Hillcrest Avenue.
- **Route 388.** Travels along Dallas Ranch Road to Prewett Ranch Road and then south on Deer Valley Road to the Kaiser Hospital medical facilities.
- **Route 392.** Travels along Lone Tree Way and on Hillcrest Avenue.

(4) Bicycle and Pedestrian Facilities. An inventory of pedestrian facilities at the project study intersections indicates that there are continuous sidewalk facilities at all existing project study intersections. Sidewalk facilities would be included on the Hillcrest Avenue extension south to Sand Creek and on the Sand Creek extension from Deer Valley Road to the SR-4 Bypass/Sand Creek Road interchange. In the vicinity of the project site, Class II bicycle facilities (i.e. striped bike lanes) are present on Canada Valley Road, Deer Valley Road, Prewett Ranch Drive, Marita Drive, and Hillcrest Avenue. Sand Creek Road and Heidorn Ranch Road are proposed to be Class II bicycle facilities in the future. The Mokelumne Trail (a Class I facility – i.e. completely separate from traffic travel lanes)

runs parallel to Lone Tree Way. No other street segments at study intersections were observed to have bikeway facilities.

d. Existing Condition Lane Geometry and Traffic Volumes. The existing lane configurations, traffic control devices, signal phasing, and turn pocket lengths at the study intersections were obtained during field visits conducted in October 2006. The existing lane geometry and traffic control at the study intersections are illustrated in Figure IV.B-2.

All project study intersections were analyzed under existing weekday AM and weekday PM peak hour traffic conditions. Weekday traffic counts were collected in May and October 2006, as well as May 2007. Peak weekday conditions occur from 7:00 a.m. to 9:00 p.m. and from 4:00 p.m. to 6:00 p.m. Intersection operations were evaluated for the one hour during each of these periods for which the highest traffic volumes were measured. Existing peak-hour traffic volumes and turning movement counts at the study intersections are shown on Figure IV.B-3.

Results of the existing conditions analysis are presented in Table IV.B-2, along with the applicable jurisdictional standard for acceptable levels of service. Additional detail of the analysis is provided in Appendix C. Results of the analysis indicate that all of the study area intersections currently operate at acceptable levels of service based on established significance criteria.

e. Existing Condition Traffic Signal Warrant Analysis. Traffic signals may be justified when traffic operations fall below acceptable thresholds and when one or more signal warrants are satisfied. Existing traffic volumes at unsignalized study intersections were compared against the peak hour warrant in the *Manual of Uniform Traffic Control Devices* published by the US Department of Transportation and which is the standard used by Antioch (and Caltrans). Traffic Signal Warrant #3 – Peak Hour Volume Warrant is satisfied when traffic volumes on the major and minor approaches to an intersection exceed thresholds for one hour of the day. This warrant is generally the first warrant (of many possible ones) to be satisfied. The warrant applies to traffic conditions during a one hour peak that are sufficiently high such that minor street traffic experiences excessive delay in entering and crossing the street.

Results of the analysis showed that one intersection, Hillcrest Avenue/Prewett Ranch Drive, does not currently satisfy Traffic Signal Warrant #3.

Other warrants for minimum vehicle volumes, interruption of continuous traffic, and traffic progression were not evaluated because they generally require higher traffic volumes to be satisfied. Copies of the analysis summaries for Warrant #3 are included in Appendix C.

f. Near-Term Condition Planned Roadway Improvements. According to the City of Antioch, the following roadway and intersection improvements are anticipated by 2011. Intersection numbers refer to Figure IV.B-4. This figure illustrates the roadway geometry and traffic control for the Near-Term Condition Planned Improvements, independent of the proposed project. The timing of these improvements coincides with the expected completion year of the proposed project.

- Extension of Hillcrest Avenue south from Prewett Ranch Road to Sand Creek Road.
- Completion of the Sand Creek Road/SR-4 Bypass Interchange.
- Intersection #1 - Deer Valley Road/Lone Tree Way – On Deer Valley Road a second southbound left turn lane will be added and an exclusive northbound right turn lane will be added and the existing through-shared-right lane will be restriped to a through lane.

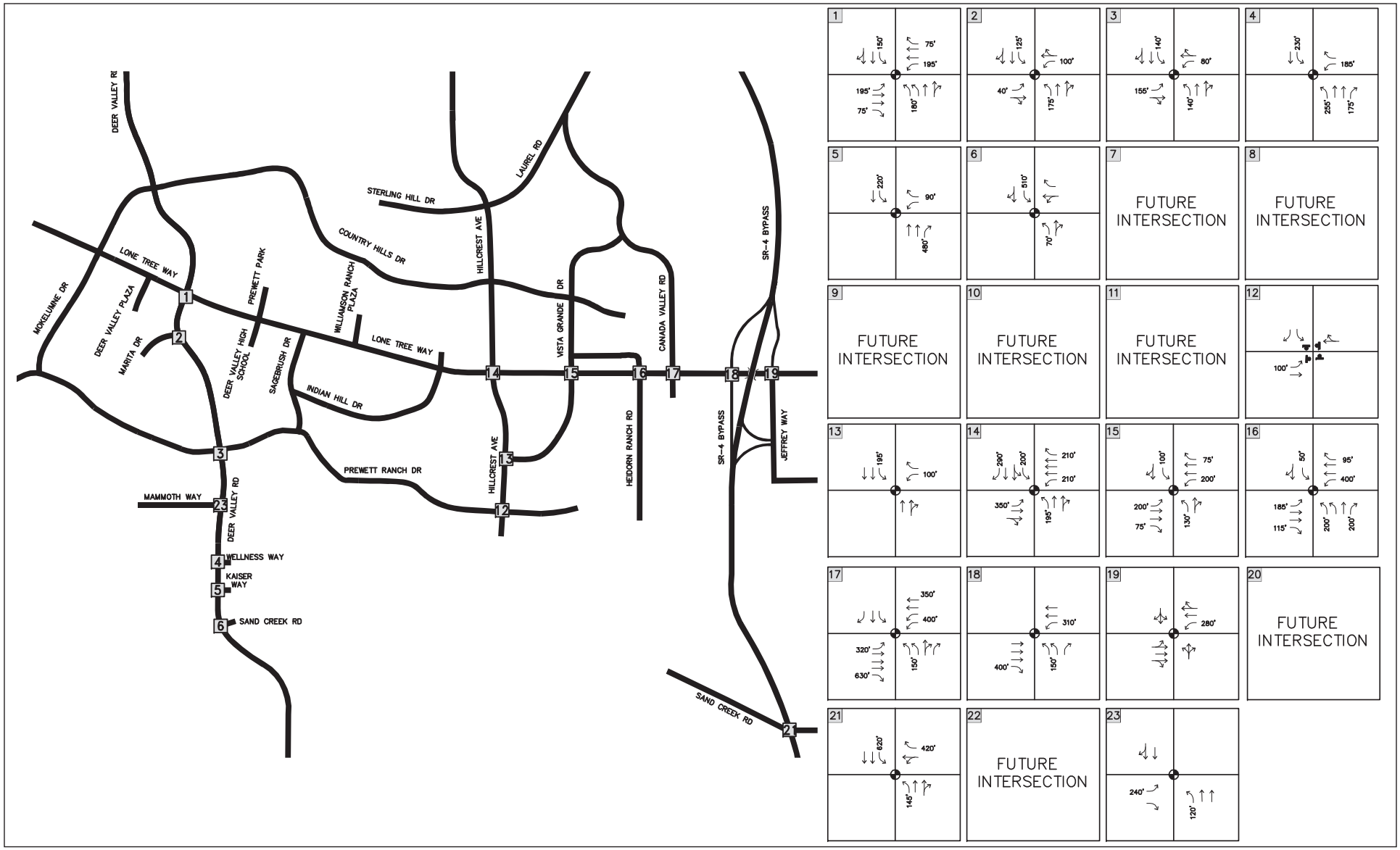

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FIGURE IV.B-2

NOT TO SCALE

LEGEND

- STUDY AREA INTERSECTIONS
- TRAFFIC SIGNAL
- STOP SIGN
- XX' STORAGE LENGTH

Aviano Adult Community Project EIR

Existing Lane Geometry and Traffic Control

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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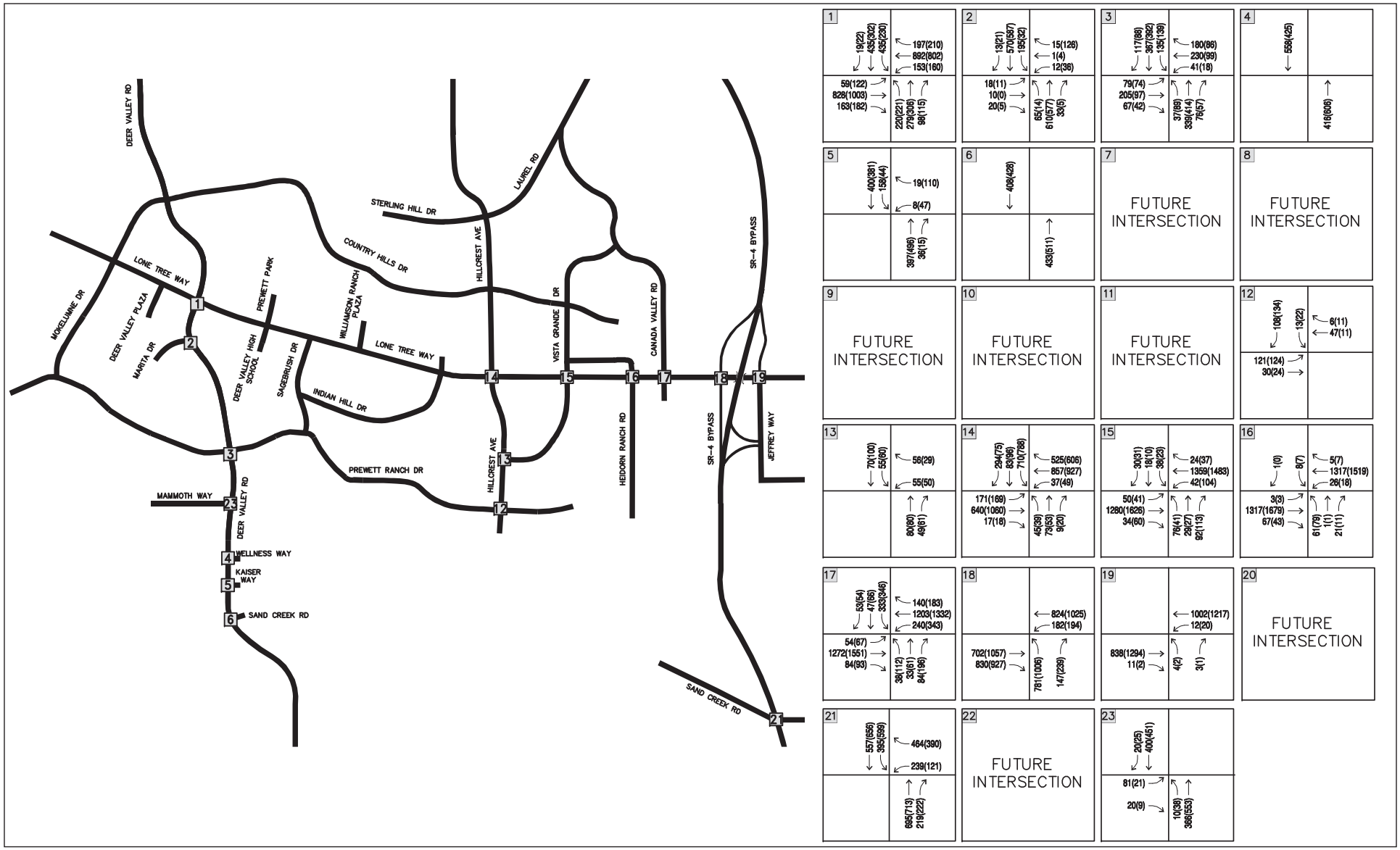

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FIGURE IV.B-3

Aviano Adult Community Project EIR

Existing Peak Hour Turning Movement Volumes

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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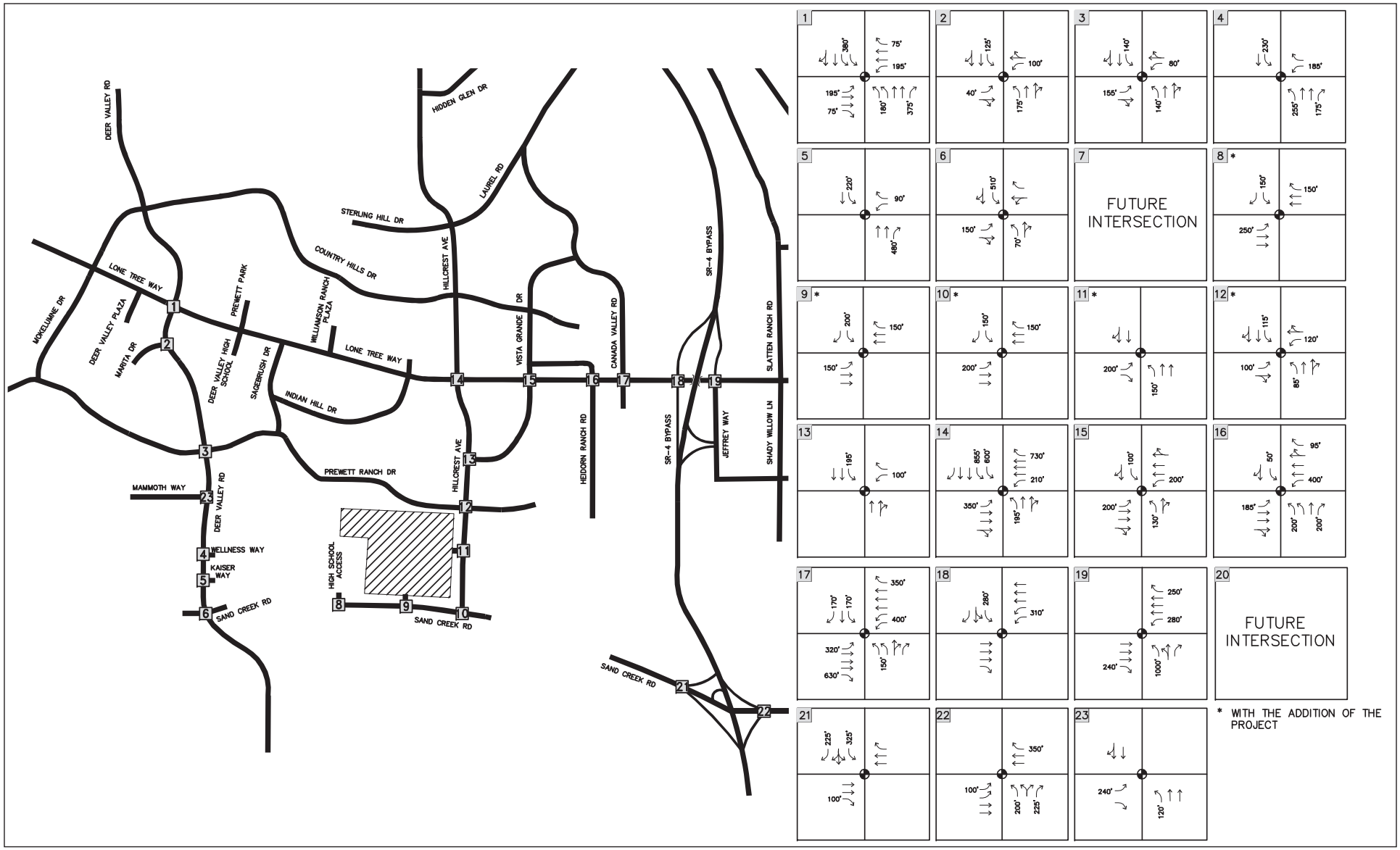

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FIGURE IV.B-4

Aviano Adult Community Project EIR

Near-Term (2011) Lane Geometry and Traffic Control

LEGEND

- STUDY AREA INTERSECTIONS
- TRAFFIC SIGNAL
- STOP SIGN
- XX' STORAGE LENGTH

NOT TO SCALE

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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Table IV.B-2: Existing Condition Intersection Levels of Service

	Intersection	Criteria	AM Peak		PM Peak	
			LOS	V/C or Delay	LOS	V/C or Delay
1	Lone Tree Way / Deer Valley Road	D	B	0.68	B	0.67
2	Deer Valley Road / Marita Drive	D	A	0.33	A	0.27
3	Deer Valley Road / Prewett Ranch Drive	D	A	0.48	A	0.37
4	Deer Valley Road / Wellness Way	D	A	0.34	A	0.26
5	Deer Valley Road / Kaiser Hospital	D	A	0.25	A	0.27
6	Deer Valley Road / Sand Creek Road	D	A	0.25	A	0.30
7	Kaiser Hospital / Sand Creek Road	D	-	-	-	-
8	High School Access / Sand Creek Road	D	-	-	-	-
9	Project South Access / Sand Creek Road	D	-	-	-	-
10	Hillcrest Avenue / Sand Creek Road	D	-	-	-	-
11	Hillcrest Avenue / Project East Access	D	-	-	-	-
12	Hillcrest Avenue / Prewett Ranch Road	D	A	8.7	A	9.0
13	Hillcrest Avenue / Vista Grande Drive	D	A	0.11	A	0.11
14	Hillcrest Avenue / Lone Tree Way	D	A	0.54	B	0.64
15	Vista Grande Drive / Lone Tree Way	D	A	0.52	B	0.63
16	Heidorn Ranch Road / Lone Tree Way	D	A	0.44	A	0.55
17	Canada Valley Road / Lone Tree Way	D	B	0.62	B	0.69
18	SR-4 Bypass SB Ramps / Lone Tree Way	D	B	0.61	B	0.68
19	SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	D	A	0.30	A	0.36
20	Heidorn Ranch Road / Sand Creek Road	D	-	-	-	-
21	SR-4 Bypass / Sand Creek Road	D	B	0.63	B	0.69
22	SR-4 Bypass NB Ramps / Sand Creek Road	D	-	-	-	-
23	Deer Valley Road / Mammoth Way	D	A	0.18	A	0.18

Source: Kimley-Horn and Associates, Inc., 2008.

- Intersection #8 - High School Access Road/Sand Creek Road – Installation of a new traffic signal and turn lanes.
- Intersection #9 - Project South Access/Sand Creek Road – Installation of a new traffic signal and, with the proposed project, extension of Sand Creek Road east to Hillcrest with two lanes in each direction and turn lanes.
- Intersection #10 - Hillcrest Avenue/Sand Creek Road – Installation of a new traffic signal and turn lanes.
- Intersection #11 - Hillcrest Avenue/Project East Access – Installation of a new traffic signal and, with the proposed project, extension of Hillcrest Avenue south with two lanes in each direction and turn lanes.
- Intersection #12 - Hillcrest Avenue/Prewett Ranch Road – Activation of the signal out of flash operation, and into actuated timing.
- Intersection #14 - Lone Tree Way/Hillcrest Avenue – the following improvements are funded and currently in the design phase:

  - A second new southbound left-turn lane to eastbound Lone Tree Way for 855 feet;
  - Lengthening the existing southbound left-turn bay on Lone Tree Way to 600 feet;
  - Changing the southbound left-shared-through lane on Lone Tree Way to a through lane; and
  - Lengthening the westbound right-turn lane on Lone Tree Way to northbound Hillcrest Avenue to 730 feet.
- Intersection #18 - Lone Tree Way/ SR-4 SB Bypass Off-Ramp – With the completion of the north segment of the Bypass, the following changes would take place to the intersection. These improvements have been completed but the existing conditions analysis was conducted before the Bypass was completed.
  - An additional westbound Lone Tree Way left-turn lane to southbound SR-4 Bypass for 310 feet would be constructed as well as an additional westbound through lane; and
  - In the southbound direction on the SR-4 Bypass off-ramp there would be a 280 foot left-turn lane, a left-shared-through lane, and a right-turn lane.
- Intersection #19 - Lone Tree Way/ SR-4 NB Bypass Ramps (Jeffrey Way) – With the completion of the north segment of the Bypass, the following changes would take place to the intersection. These improvements have been completed but the existing conditions analysis was conducted before the Bypass was completed.
  - Northbound vehicles exiting the SR-4 Bypass would exit onto Jeffrey Way making the northbound lane configuration on Jeffrey Way a 1,000 foot left-turn lane, a through-shared-left lane, and a right turn lane;
  - In the westbound direction on Lone Tree Way the shared through-right lane that currently exists would be a through lane and a third through lane and westbound right-turn lane to northbound SR-4 Bypass for 250 feet would be constructed; and
  - In the eastbound direction on Lone Tree Way the left-shared-through lane would be a through lane, the through-shared-right lane would be a through lane, and an eastbound right-turn lane to southbound Jeffrey Way for 240 feet would be constructed.
- Intersection #21 - SR-4 Bypass SB Ramps/Sand Creek Road – With the completion of this intersection, the following improvements would be in place:
  - Eastbound Sand Creek Road would be two through lanes and a 100 foot right-turn lane to the southbound SR-4 Bypass;
  - Southbound SR-4 Bypass would be an exclusive 325 foot left-turn lane for eastbound Sand Creek Road, a shared left-through-right lane, and an exclusive 225 foot right-turn lane for westbound Sand Creek Road; and
  - Westbound Sand Creek Road would be two through lanes.
- Intersection #22 - SR-4 Bypass NB Ramps/Sand Creek Road – With the completion of this intersection, the following improvements would be in place:
  - Eastbound Sand Creek Road would be two 100 foot left-turn lanes to the northbound SR-4 Bypass and two through lanes;

- Northbound SR-4 Bypass would be an exclusive 200 foot left-turn lane for westbound Sand Creek Road, a shared left-right lane, and an exclusive 225 foot right-turn lane for eastbound Sand Creek Road; and
- Westbound Sand Creek Road would be two through lanes and a 350 foot right-turn lane to the northbound SR-4 Bypass.

The City has restriped Lone Tree Way to three lanes in each direction from Hillcrest Avenue to the east Antioch City limits in concurrence with the opening of the SR-4 Bypass to the north but the restriping was not complete when the existing conditions analysis was conducted.

With the completion of the north leg of the SR-4 Bypass, some existing traffic volumes on local streets are expected to shift to the SR-4 Bypass; however, the exact volume is uncertain in the 2011 Near-Term Condition because the analysis was completed before the Bypass was completed. 2025 Cumulative travel forecast information from the Contra Costa Transportation Authority (CCTA) indicates that hundreds of peak hour vehicles that are included in the 2025 Cumulative analysis would be diverted to the Bypass. In the Near-Term Condition, the number of diverted vehicles is expected to be less but a forecast (with the SR-4 Bypass in place and operational) was not available from CCTA to confirm specific volumes. Although the exact numbers are unknown, the effect would be to reduce current background traffic levels in the study area, principally on Hillcrest Avenue and on Lone Tree Way between Hillcrest Avenue and the SR-4 Bypass.

Although a diversion is expected in connection with the Bypass, existing traffic was not manually reallocated in the Near-Term Condition analysis. Instead, existing traffic volumes were left unchanged to represent a more conservative analysis at the study intersections (i.e., one that would ensure that potential impacts are not underestimated). Thus, actual levels of service and vehicle queuing in this traffic study are expected to be better than reported.

g. Near-Term Condition Traffic Volumes. As previously described, the Near-Term Condition includes the Existing Condition plus the 49 approved, under construction or pending projects. It also assumes implementation of the Near-Term Roadway Improvements discussed in the preceding section. Table IV.B-3 provides a description of the size and status of each approved, under construction or pending project.

An estimate of trips generated by the 49 approved and pending projects was derived from information provided by the cities of Antioch and Brentwood. To the extent data was available, trip generation, trip distribution, and traffic assignments to the roadway network was obtained directly from city-provided information. In some instances, no traffic data were available, particularly for smaller projects; therefore, Kimley-Horn calculated trip generation using the Institute of Transportation Engineers' publication *Trip Generation, 7th Edition* coupled with engineering judgment in assigning traffic at the study intersections. Figure IV.B-5 shows approved and pending development traffic at the study intersections.

Existing traffic volumes were combined with vehicle trips expected to be generated by the approved and pending projects to identify Near-Term Condition (2011) traffic volumes (i.e., existing plus approved/pending project traffic). Figure IV.B-6 illustrates Near-Term Condition traffic volumes anticipated to exist independent of the proposed project. Table IV.B-4 indicates that for the Near-Term Condition all study intersections were found to operate at acceptable level of service thresholds based on established significance criteria, independent of the proposed project.

Table IV.B-3: Approved and Pending Developments Included in Analysis

Project Name	Location[a]	Size[b]	Status
Laurel Ranch	N & S of Laurel Rd, W of SR-4 Bypass (A)	217 DU	In process
Renaissance at Bluerock & Bluerock Center	Lone Tree & Golf Course Rd (A)	86 DU 246.6 KSF Office	Under Construction
Davidon Homes	Vista Grande, E of Canada Valley Rd (A)	538 DU	In process
Deer Valley Business Park	Deer Valley Rd & Country Hills (A)	82.0 KSF Office 92.982 KSF Retail 57.993 KSF Community College	Under Construction Community College occupied
Hidden Glen	Off Hillcrest, N of Lone Tree (A)	363 DU	Under construction
Kaiser Hospital	Deer Valley Rd, S of Lone Tree (A)	427.4 KSF Hospital 173 KSF Med Office	Under construction
Lone Tree Landing Retail Center	N of Lone Tree, E of Hillcrest (A)	81.963 KSF Retail	Under Construction
Lowe's Home Improvement	NE Corner Lone Tree & Canada Valley Rd (A)	170.7 KSF	Completed
Meadow Creek Crossing	Heidorn Ranch Rd, S of Lone Tree (A)	49 DU	Under construction
Nelson Ranch Homes	S of SR-4 (A)	354 DU	Approved
Sand Creek Ranch	N of Country Hills, W of Canada Valley Rd (A)	490 DU	Under construction
Mercy Housing	N side of Sand Creek, E of Streets of Brentwood (B)	96 DU	Under construction
Williamson Ranch Plaza Phases III & IV	NS of Lone Tree, W of Indian Hill (A)	12 KSF Office 6 KSF Restaurant	Under construction (Restaurant complete)
Wal-Mart Expansion	N of Lone Tree, W of Hillcrest (A)	73.506 KSF	Approved
Venture Commerce Center	Lone Tree Way/Vista Grande (A)	92.155 KSF Office	Completed
Amber Park	S of Lone Tree, E of Empire (B)	118 DU	Under construction
Arcadia Shopping Center	Lone Tree, E of Heidorn Ranch Rd (B)	534 KSF Shop Ctr 25 KSF Office	Under construction
Shady Willow Plaza	S of Lone Tree, E of Shady Willow (B)	29.6 KSF Retail	Approved
Tri-City Plaza	SE of Lone Tree and Fairview (B)	50.647 KSF Retail	Under construction
Visions at Brentwood	SE of Lone Tree and Windy Springs (B)	42 DU	Under construction
Winco Shopping Center	N of Lone Tree, E of Empire (B)	14 KSF Retail	Under construction
Brentwood Station	S of Lone Tree, E of Jeffrey (B)	5.725 KSF Co-Brand 11.2 KSF Restaurant 65 KSF Fitness Ctr 14.4 KSF Retail	Under construction
Brighton Station	E of SR-4, N of Sand Creek (B)	169 DU	Under construction

Table IV.B-3 *Continued*

Project Name	Location[a]	Size[b]	Status
Streets of Brentwood	E of SR-4, S of Sand Creek (B)	446.1 KSF	In process
Mancini's Sleep World	S of Lone Tree, E of Shady Willow (B)	14.618 KSF	Approved
Empire Crossings	S of Lone Tree, W of Empire (B)	23.6 KSF Retail	Approved
Best Buy	N of Lone Tree, E of Empire (B)	60.1 KSF	Under construction
Alexandra Homes	N side of Sand Creek, W of Fairview (B)	37 DU	Approved
LT Towne Plaza	N of Lone Tree, E of Windy Springs (B)	118.229 KSF Retail	Approved
Carmel Estates	E of Minnesota, N of Randy Way (B)	106 DU	Approved
Terreno Homes	N of Sand Creek, E of Railroad tracks (B)	244 DU	Under construction
Oncology Center	Dallas Ranch Rd S of Lone Tree (A)	40 KSF medical office (2 - 20KSF bldgs)	Approved
Medical Office Bldg	Hillcrest Ave, S of Deer Valley (A)	4 story medical office bldg (36 KSF)	Under construction
Commons at Dallas Ranch (senior care facility)	4751 Dallas Ranch Rd (A)	76.741 KSF residential care facility 25 apartments	Completed
County Square Market (Asian food)	Larkspur off of Hillcrest (A)	30.860 KSF	Approved
Antioch Surgical Center	Hillcrest Ave, S of Deer Valley (A)	55 KSF outpatient surgery 52 KSF medical office bldg	In process (application not complete)
Hillcrest Professional Center	Hillcrest Ave, S of Deer Valley (A)	31.26 KSF Office/Condo	Completed
Non-Senior Homes	Deer Valley Rd, S of Lone Tree (A)	300 DU	Application not filed - but moving forward
Balfour Retail Center	N of Balfour, W of W Country Club Dr (B)	23.150 KSF Retail	Under construction
Bridle Gate	W of SR-4, S of Sand Creek (B)	166 DU	Approved
Blackhawk-Nunn-Cox Property	W of SR-4, N of Balfour (B)	66 DU	Under construction
Meridian Professional Office	W of SR-4, N of Balfour (B)	32.036 KSF Office	Under construction
Balfour Retail	E of John Muir Pkwy, N of Balfour (B)	26.7 KSF Retail	In process
Vic Stewarts	S of Balfour, E of John Muir Pkwy (B)	31.457 KSF Restaurant	In process
Kindercare	S of Balfour, W of John Muir Pkwy (B)	9.3 KSF	Approved
Senior Apartments - Cox Property	W of SR-4, N of Balfour (B)	120 DU	Under construction
Capital and Counties	N/O JC Penney between Slaten Ranch Road and Empire Avenue (A)	319.84 KSF Retail	Development Anticipated (Long-Term)

Table IV.B-3 *Continued*

Project Name	Location[a]	Size[b]	Status
Office	On Slaten Ranch Road S/O Laurel Road (A)	1428.5 KSF	Development Anticipated (Long-Term)
Deer Valley Estates	East of Deer Valley Road, N/O Kaiser Hospital (A)	136 DU	In process
eBART	Neroly Rd (A & O)	1000 parking spaces	Development Anticipated (Long-Term)
JC Penney	Slaten Ranch Road N/O Lone Tree Way (A)	128.325 KSF	In process
AUSD Medical High School	Sand Creek Road W/O Aviano Development (A)	800 students	Approved

[a] (A) = Antioch; (B) = Brentwood; (O) = Oakley.
[b] DU = dwelling units, KSF = thousand square feet.
Source: Kimley-Horn and Associates, Inc., 2008.

Table IV.B-4: Near-Term Level of Service Conditions without the Project

	Existing				2011 Near-Term Condition			
	AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay
Lone Tree Way / Deer Valley Road	B	0.68	B	0.67	D	0.80	C	0.77
Deer Valley Road / Marita Drive	A	0.33	A	0.27	A	0.40	A	0.34
Deer Valley Road / Prewett Ranch Drive	A	0.48	A	0.37	B	0.60	A	0.47
Deer Valley Road / Wellness Way	A	0.34	A	0.26	B	0.48	A	0.34
Deer Valley Road / Kaiser Hospital	A	0.25	A	0.27	A	0.35	A	0.35
Deer Valley Road / Sand Creek Road	A	0.25	A	0.30	A	0.34	A	0.37
Kaiser Hospital / Sand Creek Road	-	-	-	-	A	0.02	A	0.02
High School Access / Sand Creek Road	-	-	-	-	A	0.26	A	0.05
Project South Access / Sand Creek Road	-	-	-	-	A	0.12	A	0.02
Hillcrest Avenue / Sand Creek Road	-	-	-	-	A	0.26	A	0.05
Hillcrest Avenue / Project East Access	-	-	-	-	A	0.13	A	0.03
Hillcrest Avenue / Prewett Ranch Road	A	8.7	A	9.0	A	0.27	A	0.18
Hillcrest Avenue / Vista Grande Drive	A	0.11	A	0.11	A	0.19	A	0.15
Hillcrest Avenue / Lone Tree Way	A	0.54	B	0.64	B	0.65	C	0.73
Vista Grande Drive / Lone Tree Way	A	0.52	B	0.63	A	0.47	B	0.61
Heidorn Ranch Road / Lone Tree Way	A	0.44	A	0.55	A	0.37	A	0.50
Canada Valley Road / Lone Tree Way	B	0.62	B	0.69	B	0.69	D	0.84
SR-4 Bypass SB Ramps / Lone Tree Way	B	0.61	B	0.68	A	0.41	A	0.55
SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	A	0.30	A	0.36	A	0.54	B	0.69
Heidorn Ranch Road / Sand Creek Road	-	-	-	-	-	-	-	-
SR-4 Bypass SB Ramps / Sand Creek Road *	B	0.63	B	0.69	A	0.16	A	0.24
SR-4 Bypass NB Ramps / Sand Creek Road	-	-	-	-	A	0.39	A	0.36
Deer Valley Road / Mammoth Way	A	0.18	A	0.18	A	0.24	A	0.24

Notes: * Intersection modified from existing condition; LOS mid-D (v/c 0.85) is maximum acceptable level of service
Source: Kimley-Horn and Associates, Inc., 2008.

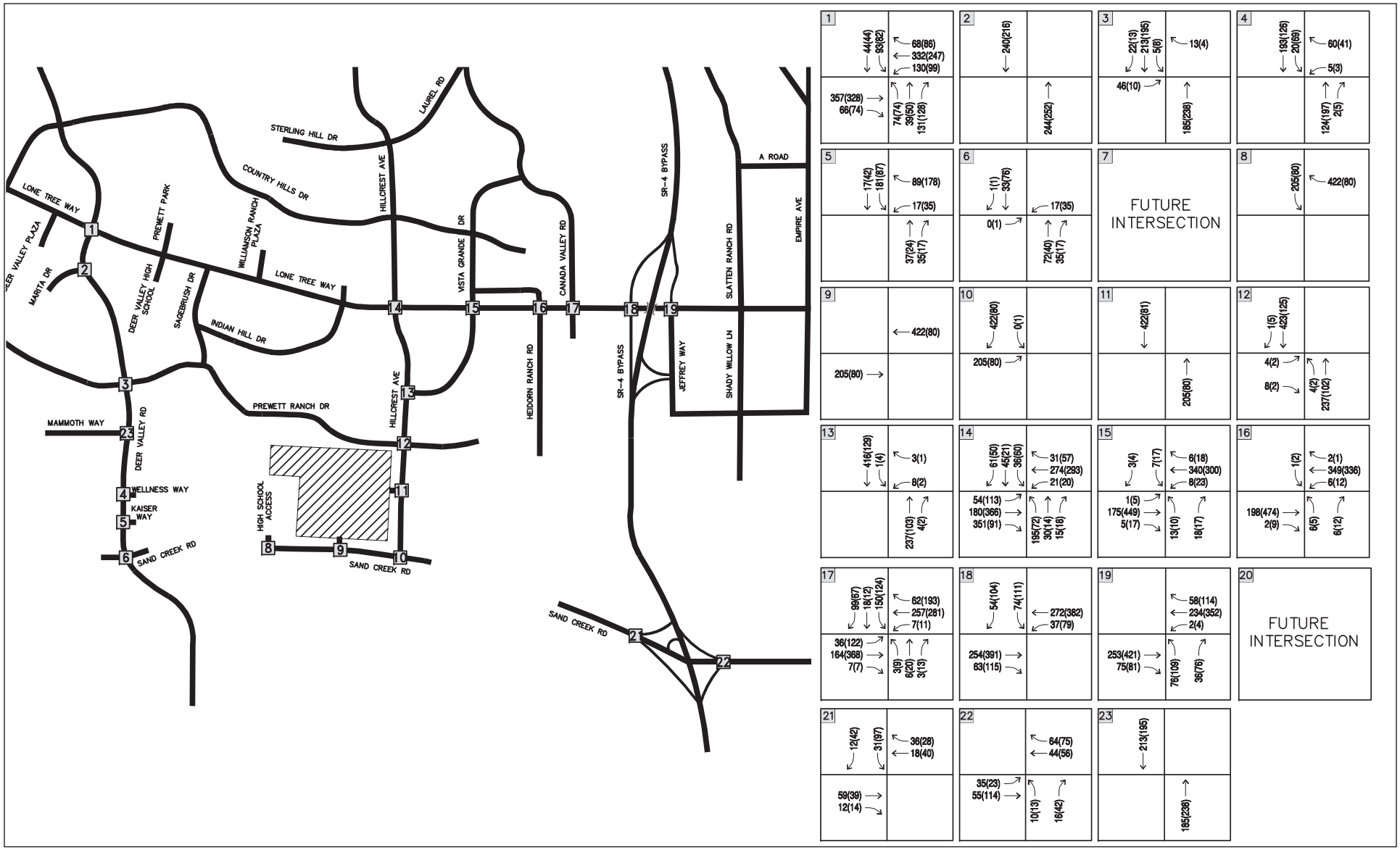

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FIGURE IV.B-5

N

NOT TO SCALE

LEGEND

X	STUDY AREA INTERSECTIONS
XX (XX)	AM (PM) VOLUMES

Aviano Adult Community Project EIR

Approved Development Generated Traffic Volumes

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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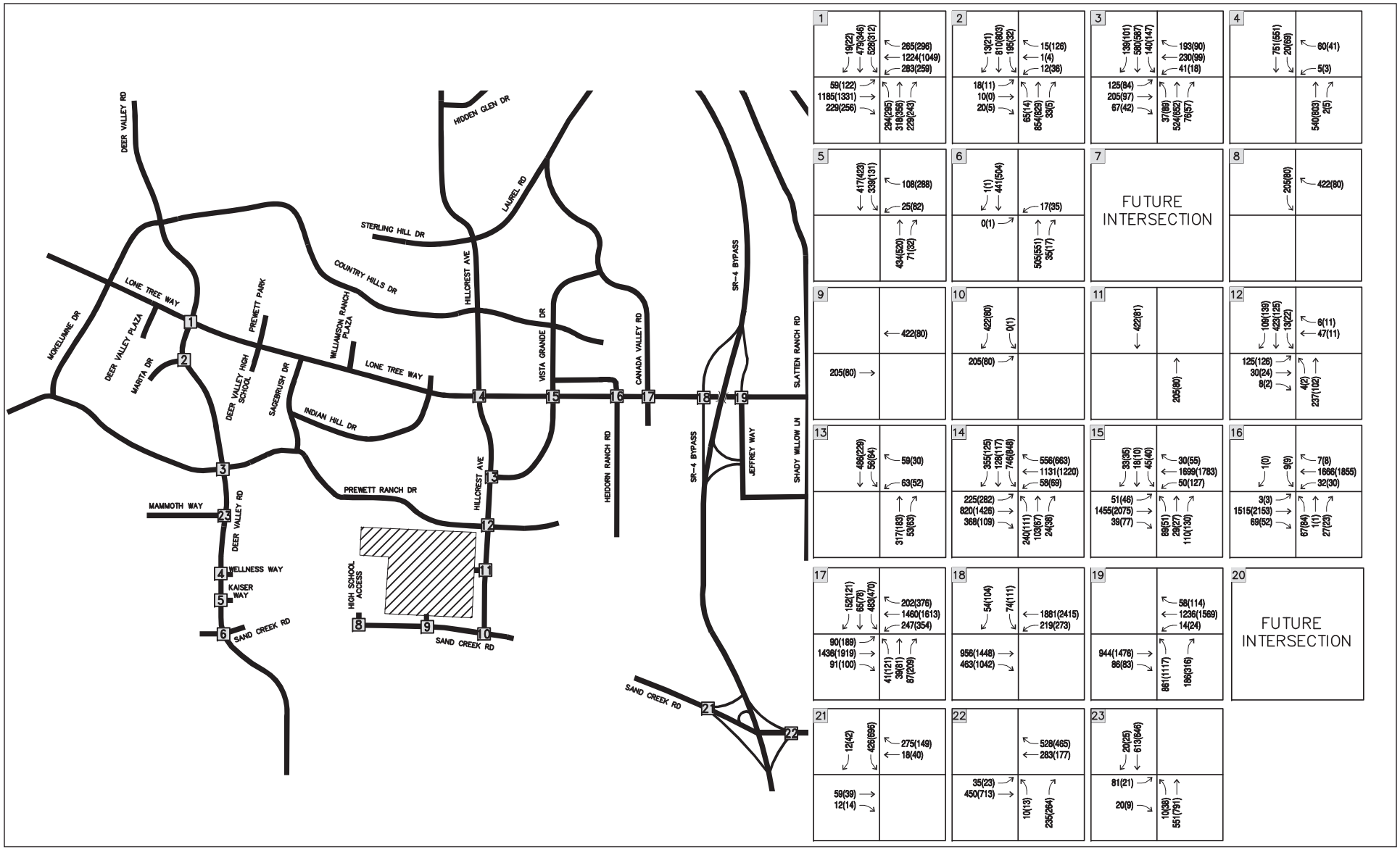

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FIGURE IV.B-6

N

NOT TO SCALE

LEGEND

X STUDY AREA INTERSECTIONS

XX (XX) AM (PM) VOLUMES

Aviano Adult Community Project EIR

Near-Term (2011) Traffic Volumes Without the Project

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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In the near-term, there is a temporary access road south of Kaiser Hospital extending from the eastern terminus of Sand Creek Road (near Deer Valley Road) to the High School Access Road (HSAR). This road will be used for access to the AUSD Medical High School and for emergency access until Sand Creek Road is constructed from Hillcrest Avenue west to the AUSD Medical High School. It should be noted that for the purpose of analyzing the effect of the project on the study intersections, in the near-term without project the AUSD Medical High School was assumed to gain access to the HSAR via Sand Creek Road, Hillcrest Avenue and Lone Tree Way. The AUSD Medical High School traffic can be accommodated in the near-term via the temporary access road until Sand Creek Road is built by the project sponsor. After construction of Sand Creek Road from Hillcrest west to the AUSD Medical High School, the traffic volumes will be higher at the intersection of Lone Tree Way/Deer Valley Road and lower at Lone Tree Way/Hillcrest Avenue.

h. Near-Term Condition Vehicle Queuing. As congestion increases it is common for traffic at signals and stop signs to form lines of stopped (or queued) vehicles. Queue lengths for this traffic analysis were determined for each turn pocket of each study intersection and measure the distance that vehicles will backup in each direction approaching an intersection. The 95th percentile queue is calculated by using 95th percentile traffic to account for fluctuations in traffic and represents a condition where 95 percent of the time during the peak period, traffic volumes and related queuing will be at, or less, than determined by the analysis. Average queuing is generally less. Ninety-fifth percentile queuing was checked under the various development conditions and in consideration of planned intersection and signal timing improvements. A typical vehicle length of 25 feet is used in the queuing analysis. A summary of the queuing results is included in Appendix C. The results indicate dedicated turn lanes where queuing may exceed their storage limits. The results of the queuing analysis, which identify dedicated turn lanes where queuing may exceed their storage limit, are discussed in this traffic section under impacts and mitigations. It should be noted that some variations in intersection queuing between scenarios are a result of planned intersection and signal timing improvements.

i. Cumulative (2025) Planned Roadway Improvements. Based on information from the City of Antioch, the following roadway and intersection improvements are anticipated by 2025. Intersection numbers correspond to Figure IV.B-7. This figure illustrates the roadway geometry and traffic control for the Cumulative 2025 scenario, independent of the proposed project.

- Sand Creek Road would be extended east from Hillcrest Avenue to the SR-4 Bypass Interchange, and extended west of Deer Valley Road to the stubout on the western edge of the AUSD Medical High School, and then extended east of Hillcrest Avenue to Dallas Ranch Road.
- Heidorn Ranch Road would be extended south to Sand Creek Road.
- Intersection #4 - Deer Valley Road/Wellness Way will be widened to two lanes in the southbound direction with two southbound left turn lanes and a new west leg will be added and striped with a left and a through-shared right in the eastbound direction.
- Intersection #5 - Deer Valley Road/Kaiser Way – Widening the southbound approach to two through lanes.
- Intersection #6 - Deer Valley Road/Sand Creek Road – Widening all approaches for an additional through lane.

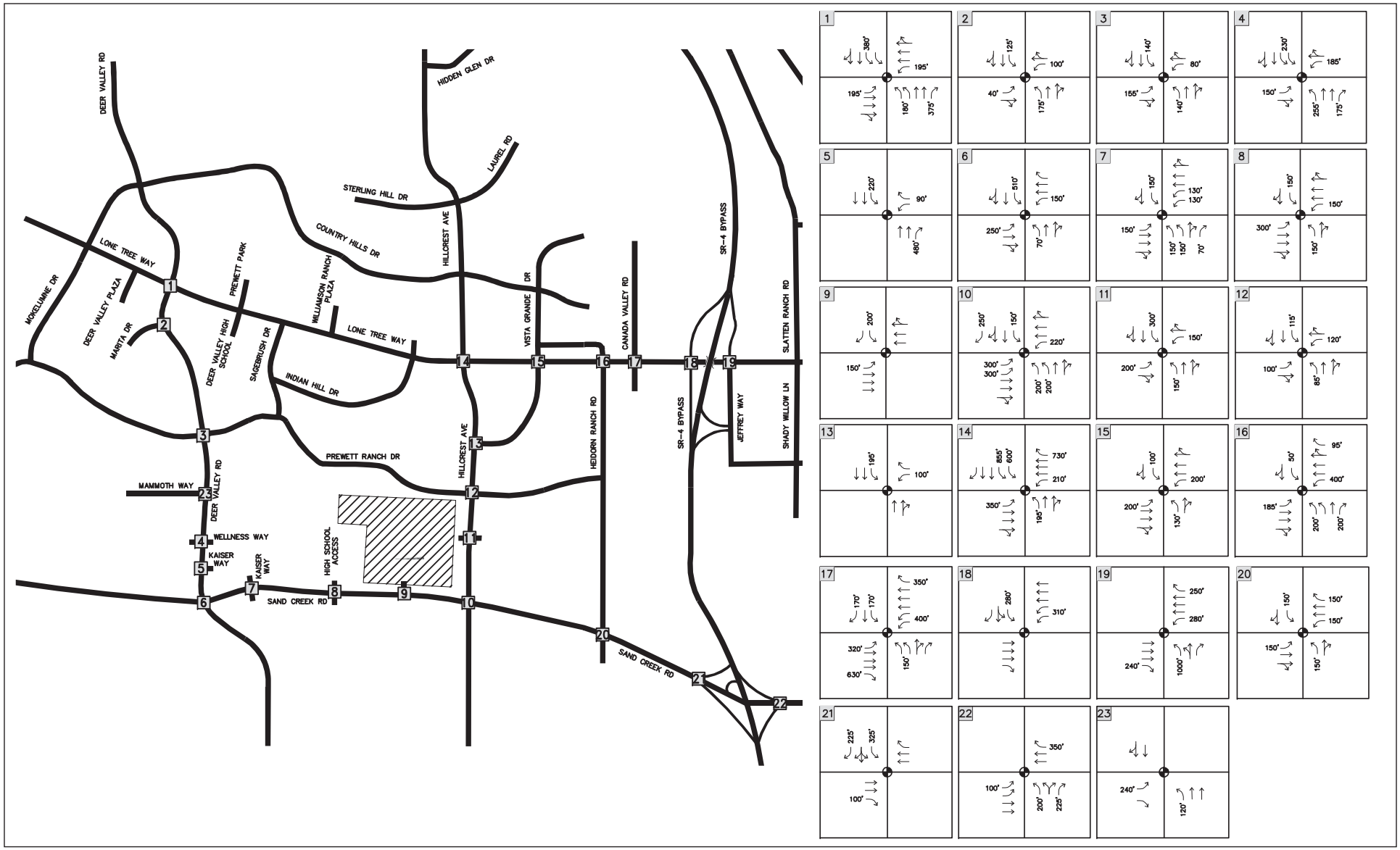

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FIGURE IV.B-7

N

NOT TO SCALE

LEGEND

- X STUDY AREA INTERSECTIONS
- TRAFFIC SIGNAL
- STOP SIGN
- XX' STORAGE LENGTH

Aviano Adult Community Project EIR

Cumulative(2025) Lane Geometry and Traffic Control

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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- Intersection #7 – Kaiser Way/Sand Creek Road – Install a new traffic signal and extend Sand Creek Road east with three lanes in each direction with turn lanes. The intersection will have four approaches.
- Intersection #8 - Sand Creek Road/High School Access – Reconfiguration of intersection to add a south leg.
- Intersection #10 - Hillcrest Avenue/Sand Creek Road – Reconfiguration of intersection to add a south leg, a second eastbound left turn lane, and an exclusive southbound right turn lane.
- Intersection #11 - Hillcrest Avenue/Project East Access – Reconfiguration of intersection to add an east leg.
- Intersection #20 - Heidorn Ranch Road/Sand Creek Road - Installation of a new traffic signal with turn lanes

The City also plans to restripe Lone Tree Way from James Donlon to Hillcrest Avenue as well as Sand Creek Road to three lanes in each direction in the 2025 Cumulative Condition. The roadway would be wide enough for three lanes in each direction in the 2011 Near-Term Condition, but would only be striped for two lanes with right turn bays.

In addition to these 2025 planned improvements, other system expansion and roadway extension projects are planned outside of the project study area and, for each improvement, are assumed to be in place either by the year 2011 or 2025. These projects are included in the City's travel forecast model and result in some shifts in traffic from existing corridors and intersections evaluated in this traffic study.

j. Cumulative (2025) Traffic Volumes. Additional development projects are expected to be completed by the year 2025 and would contribute to a long-term increase in background traffic independent of the proposed project. These projects include growth that will occur within the City's urban growth limit including residential, industrial, business park, and commercial, as well as growth outside of Antioch. This anticipated growth comprises the long-term cumulative traffic forecast. The long-term forecast for this study is based on the year 2025 modeling prepared for the buildout of the Antioch General Plan. The EIR authors received from the City the 2025 forecast data and turning movement volumes for roadways in the study area.

An estimate of trips generated by the three anticipated long-term development projects (listed in Table IV.B-3) was derived from information provided by the cities of Antioch and Brentwood. No traffic data were available, therefore, Kimley-Horn calculated trip generation using the Institute of Transportation Engineers' publication *Trip Generation, 7th Edition* coupled with engineering judgment in assigning traffic at the study intersections. Figure IV.B-8 shows the cumulative (2025) intersection traffic volumes without the project, which are comprised of the long-term cumulative traffic forecast and the three cumulative projects.

Table IV.B-5 presents the results of the analysis of cumulative (2025) traffic volumes without the proposed project. Additional detail is provided in Appendix C. As indicated in the table (and shown in bold typeface), the following intersections would fail to meet acceptable level of service thresholds in 2025 independent of the proposed project:

Table IV.B-5: Cumulative Level of Service Conditions without the Project

	Existing				Cumulative			
	AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**
Lone Tree Way / Deer Valley Road	B	0.68	B	0.67	C	0.78	B	0.68
Deer Valley Road / Marita Drive	A	0.33	A	0.27	A	0.40	A	0.34
Deer Valley Road / Prewett Ranch Drive	A	0.48	A	0.37	B	0.65	B	0.62
Deer Valley Road / Wellness Way	A	0.34	A	0.26	A	0.51	B	0.62
Deer Valley Road / Kaiser Hospital	A	0.25	A	0.27	A	0.46	A	0.48
Deer Valley Road / Sand Creek Road	A	0.25	A	0.30	B	0.67	B	0.66
Kaiser Hospital / Sand Creek Road	-	-	-	-	A	0.32	A	0.43
High School Access / Sand Creek Road	-	-	-	-	A	0.59	A	0.48
Project South Access / Sand Creek Road	-	-	-	-	A	0.16	A	0.19
Hillcrest Avenue / Sand Creek Road	-	-	-	-	A	0.41	A	0.59
Hillcrest Avenue / Project East Access	-	-	-	-	A	0.50	A	0.46
Hillcrest Avenue / Prewett Ranch Road	A	8.7	A	9.0	A	0.47	A	0.59
Hillcrest Avenue / Vista Grande Drive	A	0.11	A	0.11	A	0.45	A	0.45
Hillcrest Avenue / Lone Tree Way	A	0.54	B	0.64	**F**	**1.08**	**F**	**1.19**
Vista Grande Drive / Lone Tree Way	A	0.52	B	0.63	A	0.55	B	0.69
Heidorn Ranch Road / Lone Tree Way	A	0.44	A	0.55	C	0.78	**E**	**0.92**
Canada Valley Road / Lone Tree Way	B	0.62	B	0.69	**F**	**1.06**	**F**	**1.19**
SR-4 Bypass SB Ramps / Lone Tree Way	B	0.61	B	0.68	C	0.75	**E**	**0.93**
SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	A	0.30	A	0.36	**E**	**0.92**	**F**	**1.07**
Heidorn Ranch Road / Sand Creek Road	-	-	-	-	A	0.30	A	0.30
SR-4 Bypass SB Ramps / Sand Creek Road *	B	0.63	B	0.69	B	0.68	**D**	**0.86**
SR-4 Bypass NB Ramps / Sand Creek Road	-	-	-	-	A	0.48	A	0.58
Deer Valley Road / Mammoth Way	A	0.18	A	0.18	A	0.35	A	0.35

Notes: * Intersection modified from existing condition
LOS mid-D (v/c 0.85) is maximum acceptable level of service
Bold indicates unacceptable level of service.
Source: Kimley-Horn and Associates, Inc., 2008.

- Intersection #14 - Hillcrest Avenue/Lone Tree Way;
- Intersection #16 - Heidorn Ranch Road/Lone Tree Way;
- Intersection #17 - Canada Valley Road/Lone Tree Way;
- Intersection #18 - SR-4 Bypass SB Ramps/Lone Tree Way;
- Intersection #19 - SR-4 Bypass NB Ramps (Jeffrey Way)/Lone Tree Way; and
- Intersection #21 - SR-4 Bypass SB Ramps/Sand Creek Road.

All of these unacceptable levels of service are related to long-term traffic levels in excess of intersection capacity and would occur independent of the proposed project. It should be noted that between the Near-Term Condition and the Cumulative scenario at the intersection of Deer Valley

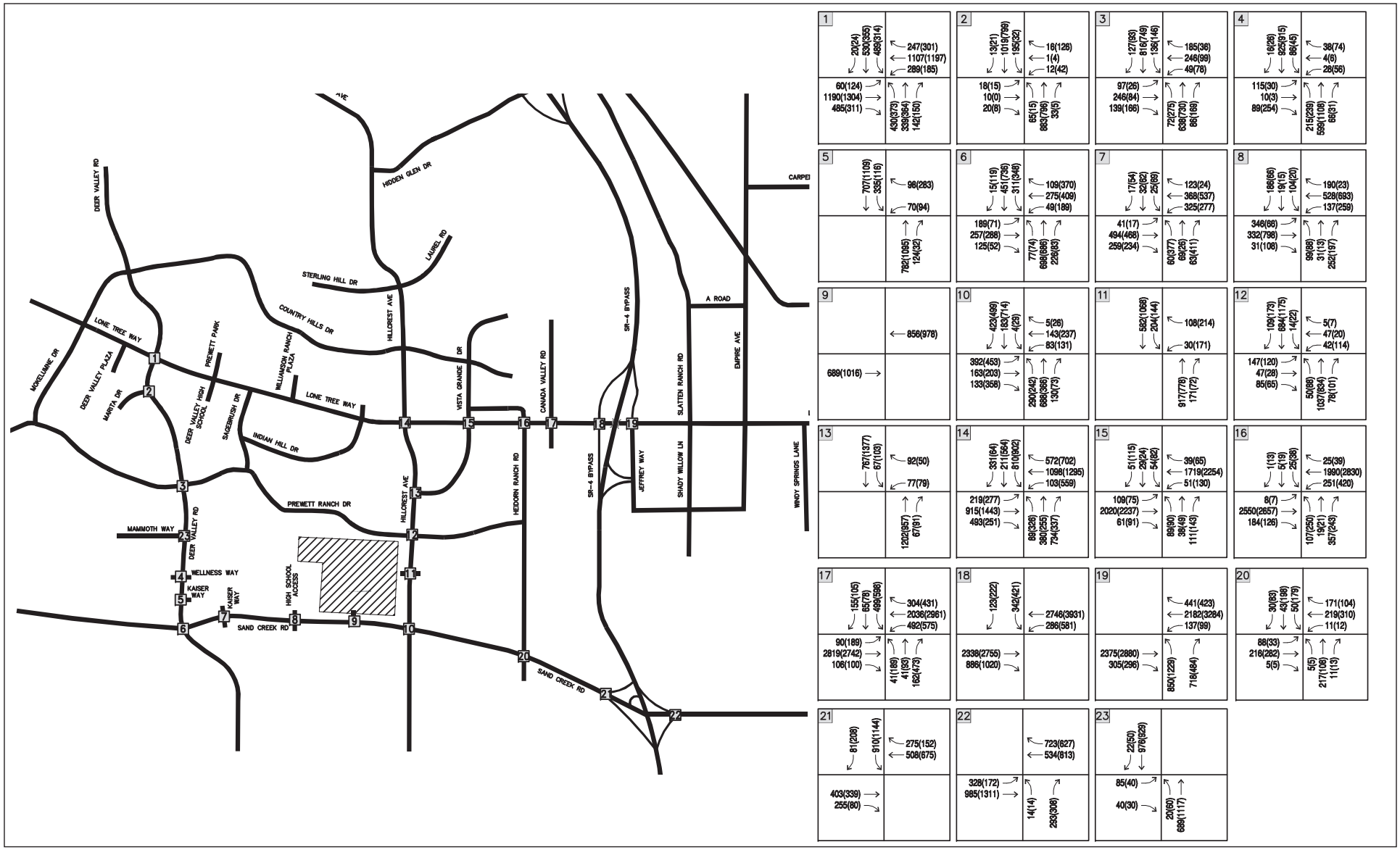

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FIGURE IV.B-8

N

NOT TO SCALE

LEGEND

X	STUDY AREA INTERSECTIONS
XX (XX)	AM (PM) VOLUMES

Aviano Adult Community Project EIR

Cumulative (2025) Traffic Volumes Without the Project

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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Road/Lone Tree Way, the level of service would worsen during the AM peak and improve during the PM peak with the completion of the restriping to three lanes on Lone Tree Way. The critical movements during the AM and PM peaks in the eastbound direction are the right turn and the through movement, respectively. When the exclusive right turn is restriped to a through-shared-right, the level of service would improve during the PM peak where the through movement is critical and would become worse during the AM peak where the right turn is critical.

k. Regulatory Considerations. Transportation and Circulation planning in Antioch is regulated by two key agencies: the City of Antioch through its General Plan and the Contra Costa Transportation Agency (CCTA) through its standards and procedures.

(1) City of Antioch. The Antioch General Plan states that, where feasible, signalized intersections along designated arterial roadways should strive to maintain a "High D" level of service (v/c – 0.85-0.89) within regional commercial areas and at intersections within 1,000 feet of a freeway interchange.

The goals and policies of the Antioch General Plan are to provide a transportation system that improves traffic flow, is safe for all modes of transportation, and promotes alternative forms of transportation. Specific policies are referenced later in this section. In general, the proposed project is in compliance with the General Plan policies.

(2) Contra Costa Transportation Authority (CCTA). Measure C established a sales tax to be used to fund transportation improvements in Contra Costa County. The measure includes a growth management program and requires the CCTA to develop a comprehensive transportation plan and update it every other year. To receive a share of the sales tax generated by Measure C, local jurisdictions must adhere to the level of service (LOS) standards that Measure C applies to specified local streets and roads. The standards are applied to streets and roads for which the jurisdictions are responsible. Each jurisdiction must take appropriate action to ensure that the LOS standards are met. These streets and roads are referred to as routes of regional significance. Designated regional routes include all the freeways and state highways, and the most significant arterials, in Contra Costa County.

CCTA has designated several roadways in the project study area as routes of regional significance: Lone Tree Way, Deer Valley Road, Sand Creek Road, and State Route 4 Bypass.

As such, intersections along the routes require analysis utilizing Growth Management Program procedures outlined in CCTA Technical Procedures, September 17, 1997. The CCTA Technical Procedures require the use of CCTALOS software to determine intersection operation levels based on the Intersection Capacity Utilization (ICU) methodology. The methodology describes the operation of an intersection in terms of Level of Service (LOS) based on corresponding volume to capacity (v/c) ratio.

CCTA has established LOS D (i.e., v/c up to 0.85) as the acceptable level of traffic operation at intersections on routes of regional significance. For the study area, this includes intersections along Lone Tree Way, Deer Valley Road, Sand Creek Road and the SR-4 Bypass. Intersections evaluated under CCTA requirements include signalized intersections that are expected to be affected by 50 or more project trips in a given (AM or PM) peak period.

In addition, the CCTA and its subsequent Regional Transportation Planning Committees also set various standards in order to measure effectiveness on specific roadways, called Traffic Service Objectives (TSOs). In the study area, the delay index on routes of regional significance should be less than 2.0 during the AM peak and PM peak period. This number represents the ratio of congested travel time versus uncongested travel time along a designated corridor.

For streets not designated as regionally significant, local standards apply. Unsignalized intersections are not specifically covered in the CCTA or Antioch General Plan requirements. However, consistent with the intent of the Antioch General Plan, this report considered a "High D" level of service (LOS) to be an acceptable level of operation at unsignalized intersections. Unsignalized intersections were evaluated using *Highway Capacity Manual* methodology, which bases LOS on average delay per vehicle.

2. Impacts and Mitigation Measures

This section identifies project impacts and appropriate mitigation measures where feasible. The significance criteria are presented below followed by a presentation and discussion of the project's less-than-significant and significant traffic and circulation impacts.

a. Criteria of Significance. The project would have a significant impact on transportation and circulation if any of the following conditions occurs:

- A route of regional significance (Lone Tree Way, Deer Valley Road, Sand Creek Road, and State Route 4 Bypass.) degrades to below LOS Mid-D (i.e., v/c of 0.85) due to the addition of project traffic.
- A route of regional significance (Lone Tree Way, Deer Valley Road, Sand Creek Road, and State Route 4 Bypass) exceeds the 2.0 delay index during either the AM or PM peak period.
- Hillcrest Avenue (south of Lone Tree Way) degrades to below LOS Low-D (i.e., v/c of 0.80 to 0.84) due to the addition of project traffic.
- A substantial increase in traffic-related hazards due to a design feature or incompatible land uses
- Results in inadequate emergency access.
- Conflicts with adopted policies supporting public transportation and other alternate transportation systems (i.e., bike and pedestrian trails).
- The vehicle queue increases by one or more vehicles (a vehicle being 25 feet long) and the vehicle queue exceeds the turn pocket length.

b. Proposed Project Trip Generation, Distribution and Assignment. Traffic projections for the proposed project were estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In the first step, the amount of traffic added to the surrounding roadway system by the proposed project is estimated. In the second step, the general directions of approach and departure are estimated. In the third step, the trips are assigned to specific street segments and intersection turning movements.

(1) Trip Generation. Trip generation for development projects is typically calculated based on rates contained in the Institute of Transportation Engineers' publication, *Trip Generation 7th Edition* (*Trip Generation)* unless more detailed local data are available. *Trip Generation* is a standard

reference used by jurisdictions throughout the country for the estimation of trip generation potential of proposed developments. A trip is defined in *Trip Generation* as a single or one-directional vehicle movement with either the origin or destination at the project site. In other words, a trip can be either "to" or "from" the site.

For purposes of determining the worst-case impacts of traffic on the surrounding street network, the trips generated by a proposed development are typically estimated between the hours of 6:00-8:00 a.m. and 4:00-6:00 p.m. While the project itself may generate more traffic during some other time of the day, the peak of "adjacent street traffic" represents the time period when the uses generally contribute to the highest level of congestion and potential for mitigation, with the p.m. peak commonly being the greatest congestion period. For this reason, this evaluation focused on the weekday a.m. and p.m. peaks.

The proposed project is most appropriately classified as Senior Adult Housing-Detached (ITE Land Use 251). In estimating trip generation for the proposed project, data from ITE *Trip Generation* was reviewed and supplemented with actual trip generation data from three active adult residential developments in northern California constructed by Pulte Homes.[2] The results of that analysis indicated that one of the developments generated trips at a rate lower than the published rate (ITE LU 251) and the other two developments generated more trips than the published rate. At the direction of City staff, it was conservatively assumed that the proposed project would generate as many trips as the Pulte development with the highest trip generation rate.

Trip generation was calculated based on the previous discussion and is listed in Table IV.B-6. Additional trip generation calculations are contained in Appendix C.

Table IV.B-6: Proposed Project Trip Generation

Land Use	Trip Rate					
	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Senior Adult Housing – Detached	0.11	0.18	0.29	0.21	0.13	0.34
	Trips					
	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Senior Adult Housing – Detached (535 DU)	59	96	155	113	69	182
Net New Vehicle Trips	59	96	155	113	69	182

Source: Kimley-Horn and Associates, Inc., 2008.

(2) Trip Distribution. Project trip distribution was based on three sources of information: (a) information provided by City staff from the City's General Plan buildout traffic model; (b) existing traffic patterns; and (c) field observations. Figure IV.B-9 and Figure IV.B-10 show the proposed traffic distribution assumed for the project traffic analysis for the Near-Term (2011) and Cumulative (2025) scenarios.

(3) Trip Assignment. New trips generated by the project were assigned to the roadway system based on the directions of approach and departure described above. According to the project site plan provided by the project sponsor, the proposed development would have two access points from

[2] Fehr & Peers Associates, Inc., *Active Adult Residential Developments Trip Generation Study*.

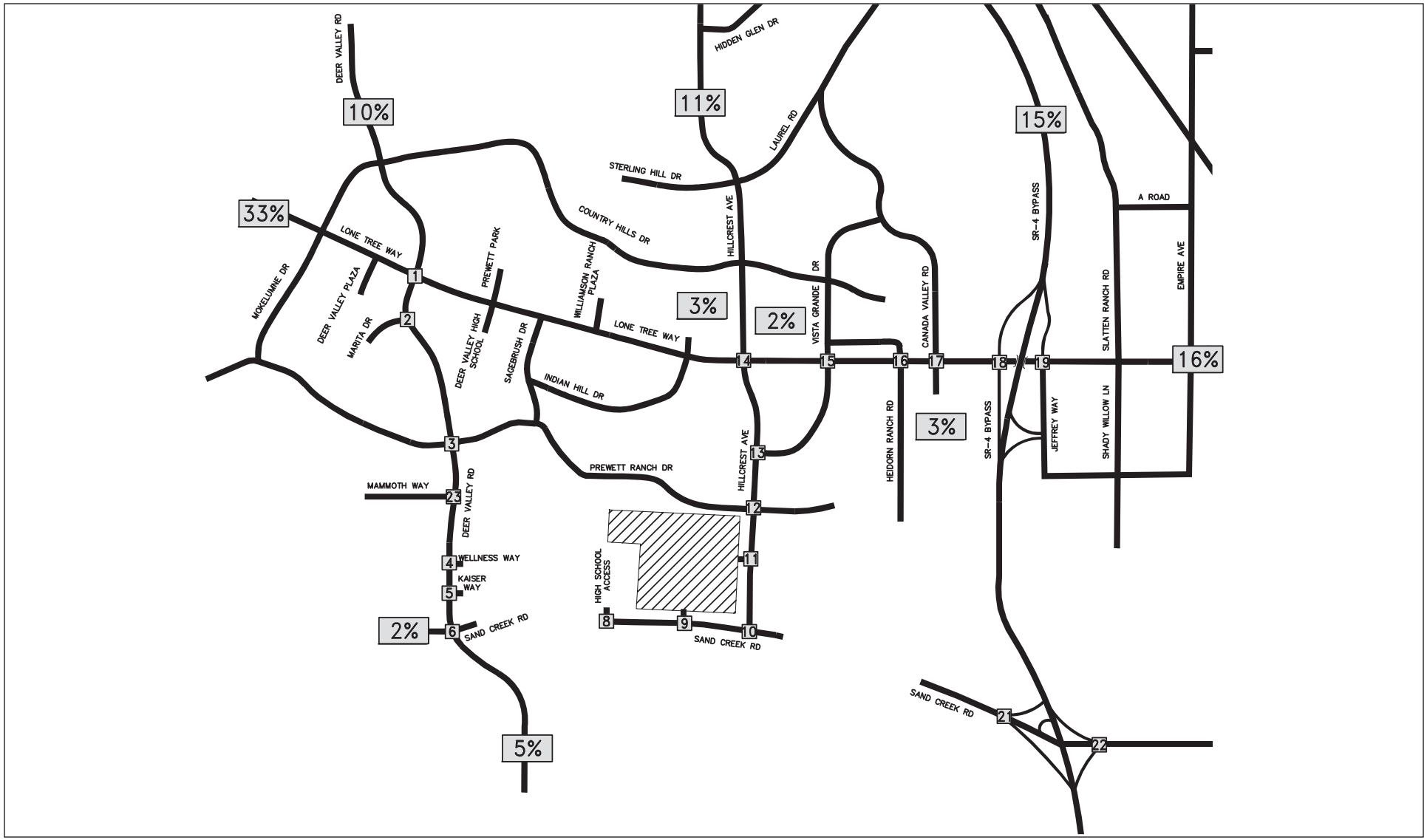

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FIGURE IV.B-9

LEGEND

X STUDY AREA INTERSECTIONS

PROJECT SITE

X% PROJECT TRIP DISTRIBUTION

N

NOT TO SCALE

Aviano Adult Community Project EIR

Proposed Project Near-Term (2011)
Trip Distribution

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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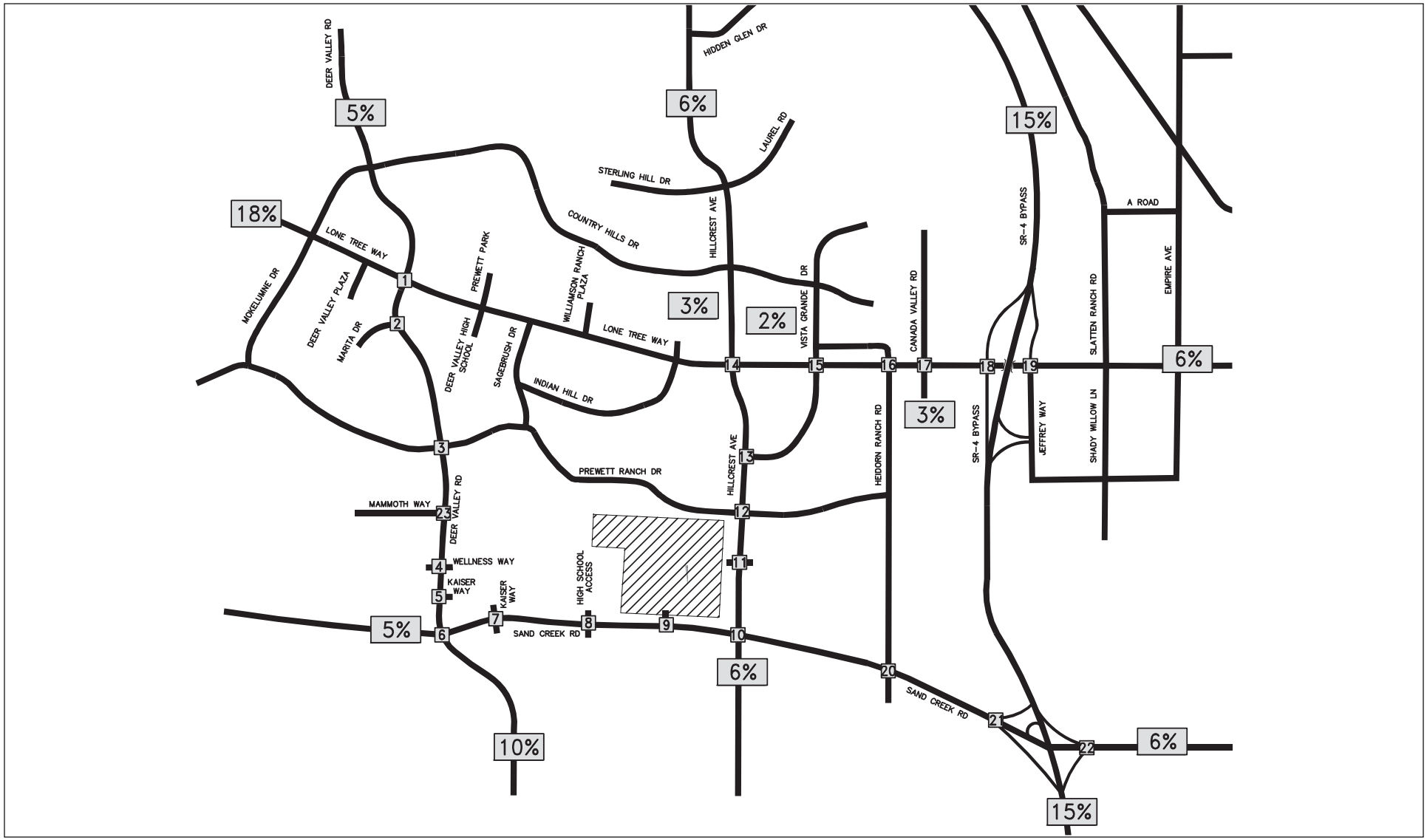

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FIGURE IV.B-10

LEGEND

X STUDY AREA INTERSECTIONS

PROJECT SITE

X% PROJECT TRIP DISTRIBUTION

N

NOT TO SCALE

Aviano Adult Community Project EIR

Proposed Project Cumulative (2025)

Trip Distribution

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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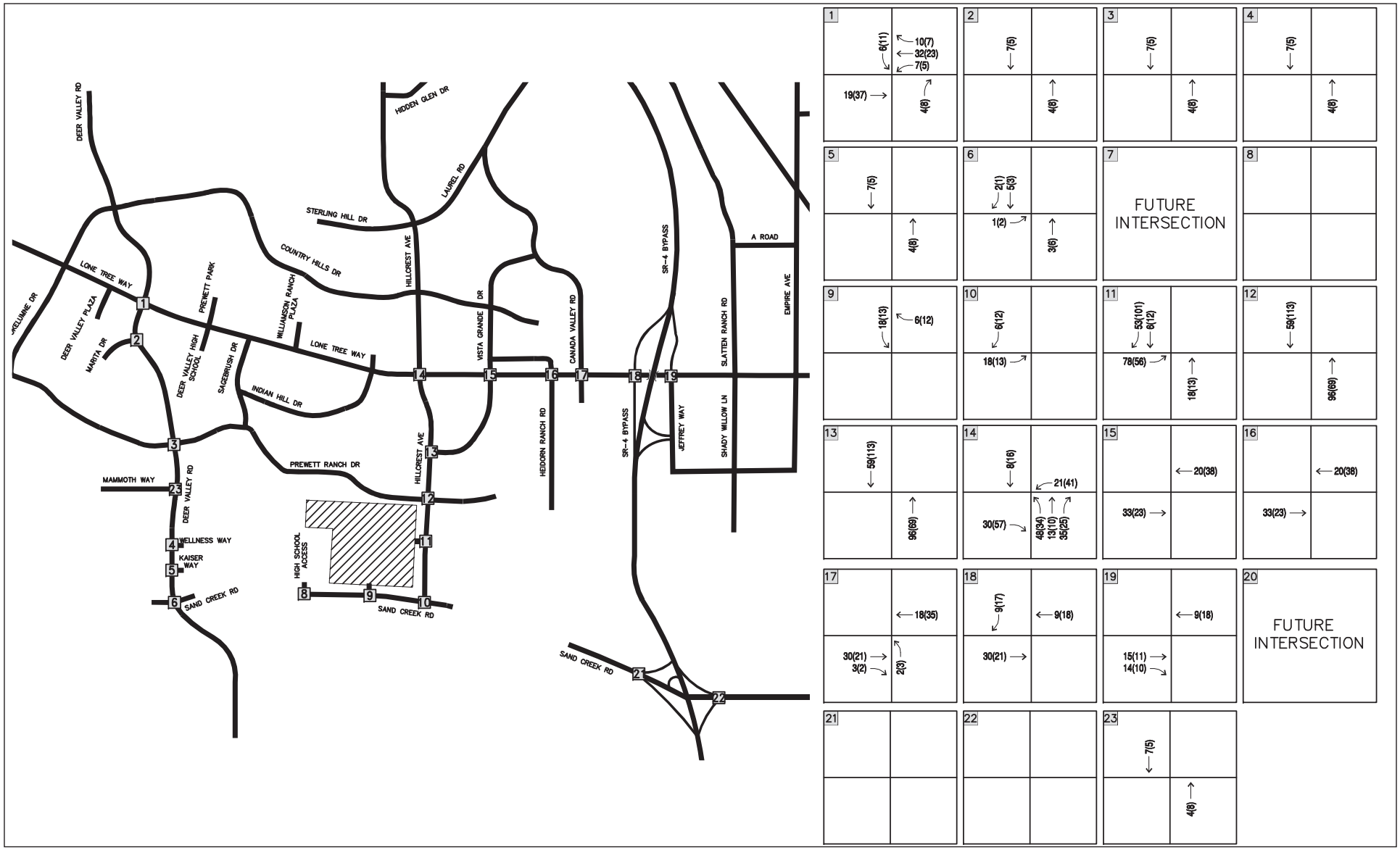
external roadways: (a) on the east side at Hillcrest Avenue, south of Prewett Ranch Drive, approximately halfway between Prewett Ranch Drive and the future Sand Creek Road/Hillcrest intersection; and (b) on the south side of the development, approximately one third of the way between Hillcrest Avenue and the High School Access intersection. Based on the assumed trip distribution, new vehicle trips generated by the proposed project were assigned to the street network as shown in Figures IV.B-11 and IV.B-12.

c. Near-Term Condition (2011) Plus Project Intersection Level of Service Impacts and Mitigation Measures. Near-Term Condition traffic volumes were combined with expected net new vehicle trips generated by the proposed project, as shown in Figure IV.B-13. This analysis assumes the lane configurations and traffic control measures expected to be in place by Year 2011. The results of the analysis are presented in Table IV.B-7 with additional detail provided in Appendix C.

Table IV.B-7: Near-Term (2011) Level of Service Conditions With the Project

	Near-Term				Near-Term Plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**
Lone Tree Way / Deer Valley Road	D	0.80	C	0.77	D	0.82	**D**	**0.79**
Deer Valley Road / Marita Drive	A	0.40	A	0.34	A	0.40	A	0.35
Deer Valley Road / Prewett Ranch Drive	B	0.60	A	0.47	B	0.60	A	0.47
Deer Valley Road / Wellness Way	B	0.48	A	0.34	B	0.48	A	0.34
Deer Valley Road / Kaiser Hospital	A	0.35	A	0.35	A	0.35	A	0.36
Deer Valley Road / Sand Creek Road	A	0.34	A	0.37	A	0.34	A	0.37
Kaiser Hospital / Sand Creek Road	A	0.02	A	0.02	A	0.02	A	0.02
High School Access / Sand Creek Road	A	0.26	A	0.05	A	0.26	A	0.05
Project South Access / Sand Creek Road	A	0.12	A	0.02	A	0.13	A	0.03
Hillcrest Avenue / Sand Creek Road	A	0.26	A	0.05	A	0.26	A	0.06
Hillcrest Avenue / Project East Access	A	0.13	A	0.03	A	0.19	A	0.10
SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	A	0.27	A	0.18	A	0.29	A	0.21
Hillcrest Avenue / Vista Grande Drive	A	0.19	A	0.15	A	0.21	A	0.17
Hillcrest Avenue / Lone Tree Way	B	0.65	C	0.73	B	0.67	C	0.74
Vista Grande Drive / Lone Tree Way	A	0.47	B	0.61	A	0.48	A	0.61
Heidorn Ranch Road / Lone Tree Way	A	0.37	A	0.50	A	0.37	A	0.50
Canada Valley Road / Lone Tree Way	B	0.69	D	0.84	B	0.70	D	0.84
SR-4 Bypass SB Ramps / Lone Tree Way	A	0.41	A	0.55	A	0.42	A	0.57
SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	A	0.54	B	0.69	A	0.54	B	0.69
Heidorn Ranch Road / Sand Creek Road	-	-	-	-	-	-	-	-
SR-4 Bypass SB Ramps / Sand Creek Road *	A	0.16	A	0.24	A	0.16	A	0.24
SR-4 Bypass NB Ramps / Sand Creek Road	A	0.39	A	0.36	A	0.39	A	0.36
Deer Valley Road / Mammoth Way	A	0.24	A	0.24	A	0.24	A	0.24

Notes:* Intersection modified from existing condition.
LOS mid-D (v/c 0.85) is maximum acceptable level of service.
Bold indicates unacceptable level of service.
Source: Kimley-Horn and Associates, Inc., 2008.



LSA

FIGURE IV.B-11

NOT TO SCALE

LEGEND

X	STUDY AREA INTERSECTIONS
XX (XX)	AM (PM) VOLUMES

Aviano Adult Community Project EIR

Proposed Project Near-Term (2011)
Traffic Volumes

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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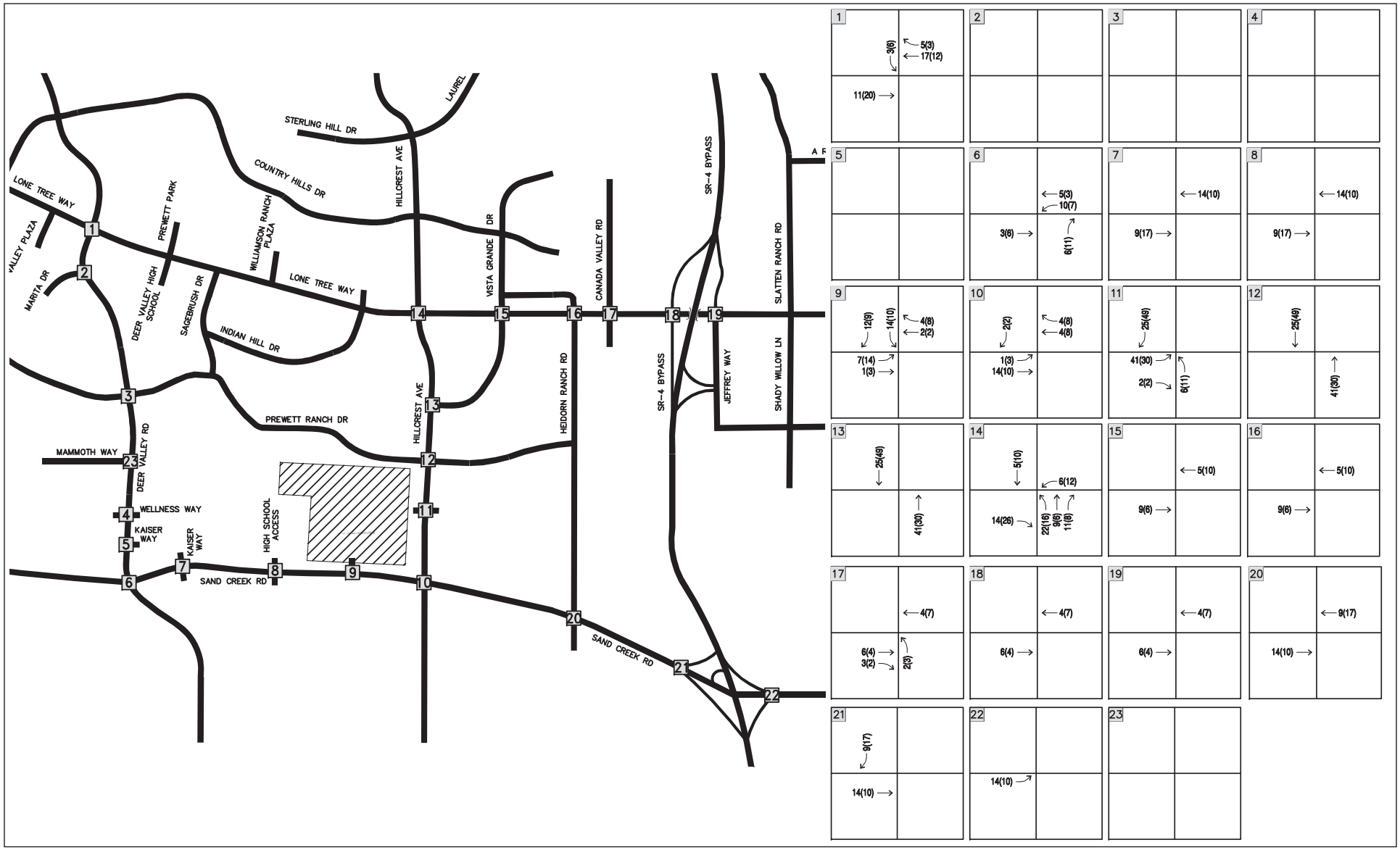

LSA

FIGURE IV.B-12

N

NOT TO SCALE

LEGEND

X	STUDY AREA INTERSECTIONS
XX (XX)	AM (PM) VOLUMES

Aviano Adult Community Project EIR

Proposed Project Cumulative(2025)
Traffic Volumes

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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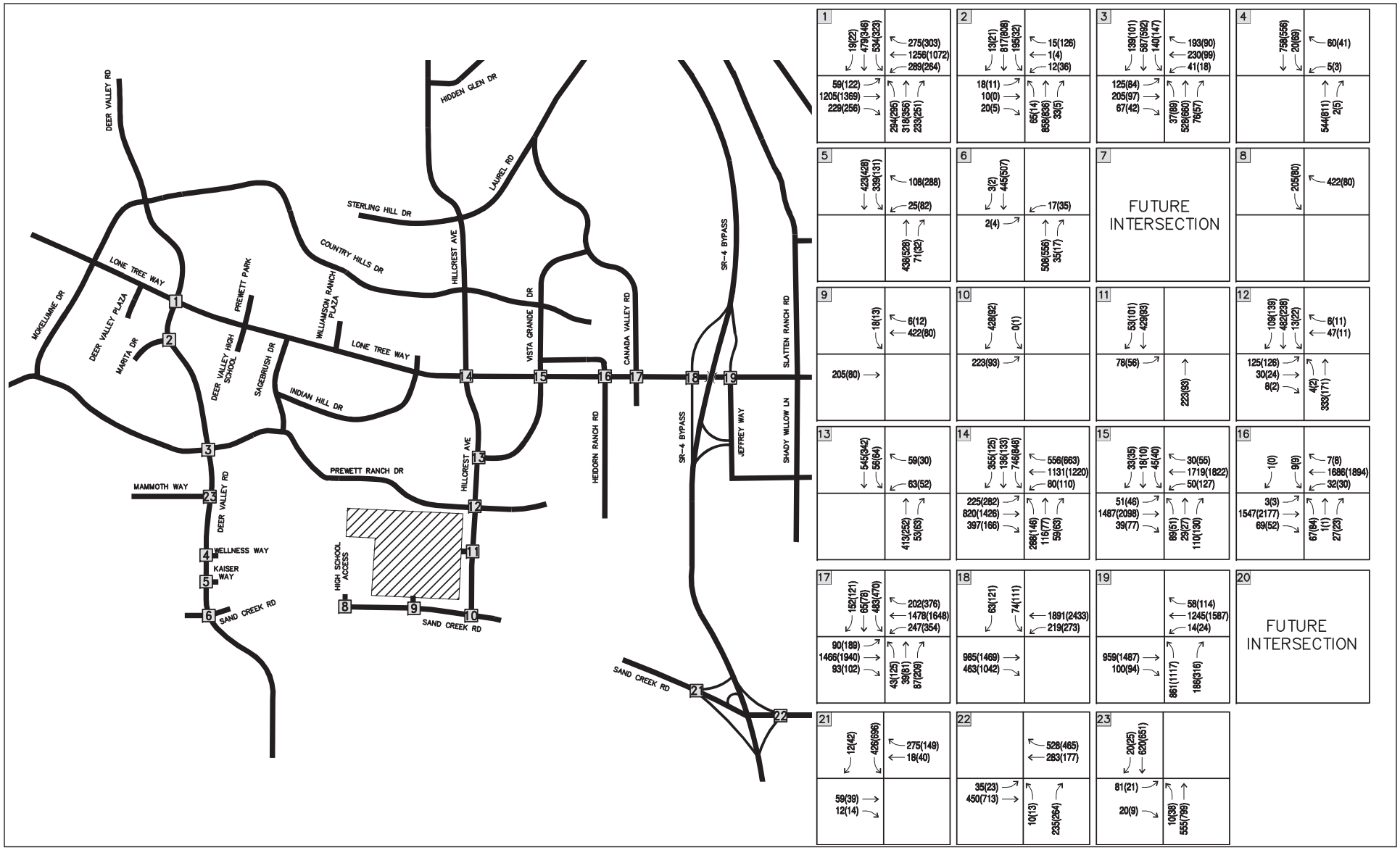

LSA

FIGURE IV.B-13

N

NOT TO SCALE

LEGEND

[X] STUDY AREA INTERSECTIONS

XX (XX) AM (PM) VOLUMES

Aviano Adult Community Project EIR

Near-Term (2011) Plus Proposed Project Traffic Volumes

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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(1) Less-than-Significant Impacts. All of the study intersections would operate at acceptable levels of service in the Near-Term Condition Plus Project scenario (see Table IV.B-7). As shown in the table, the project would generally have a small incremental effect on v/c ratio but would not change the level of service at any intersection. The analysis also found that all of the project traffic could be accommodated at the Lone Tree Way/Hillcrest Avenue intersection before Sand Creek is extended west from the Magnet School to Deer Valley Road. The project would, therefore, have a less-than-significant effect on all of the study intersections in the Near Term (2011) condition.

(2) Significant Impacts. No significant impacts would occur with the proposed project under the Near Term (2011) condition.

d. Cumulative (2025) Plus Project Intersection Level of Service Impacts and Mitigation Measures. Potential impacts related to intersection levels of service during the 2025 Cumulative Plus Project scenario are described below. To analyze this condition, net new project trips were added to the cumulative forecast. Figure IV.B-14 illustrates turning movement volumes at the study intersections under this development condition. Results of the analysis are presented in Table IV.B-8 with additional detail provided in Appendix C.

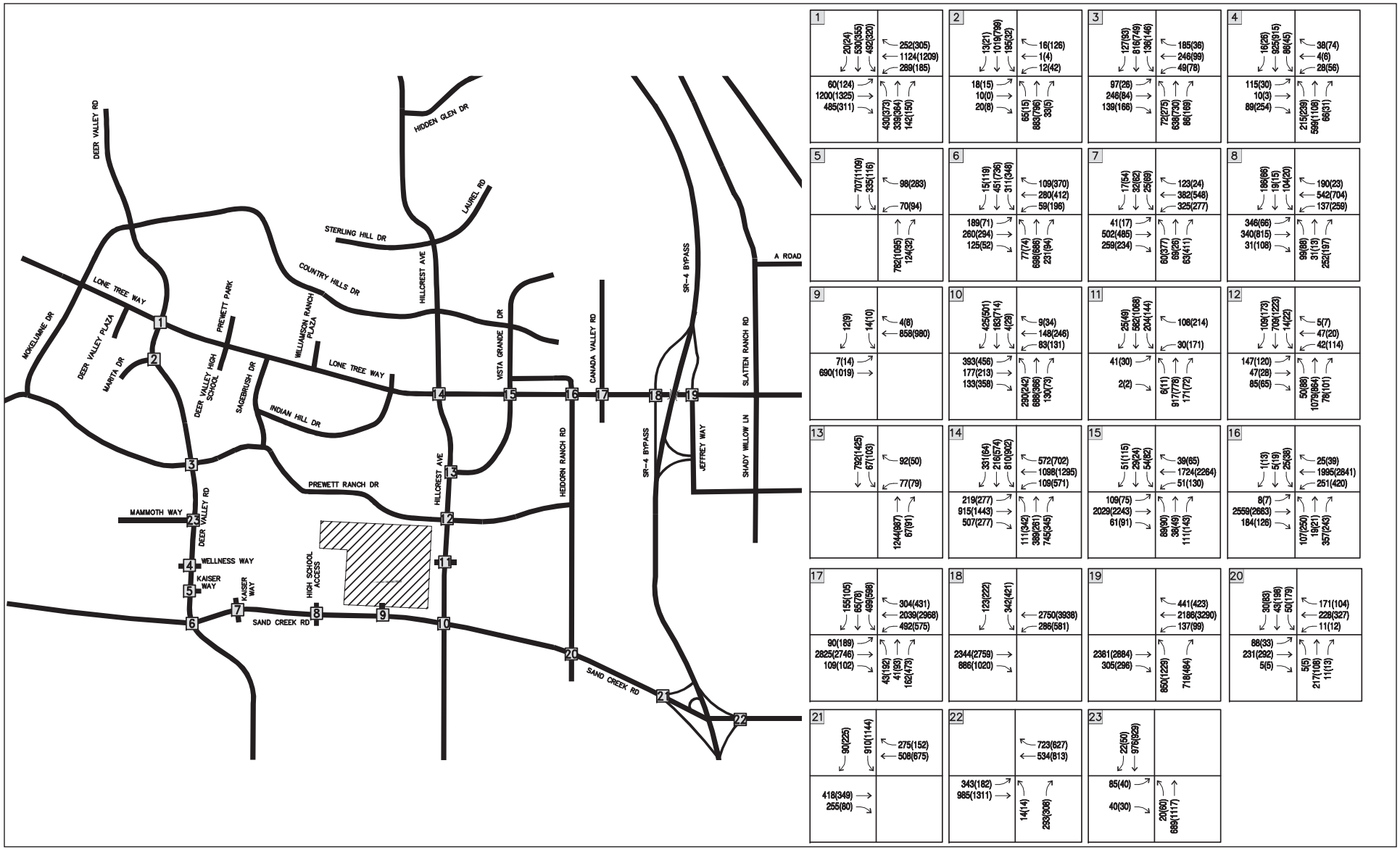
(1) Less-than-Significant Impacts. In the 2025 Cumulative Plus Project condition, six of the study intersections would already operate at an unacceptable level of service without the project. With the exception of two of those six intersections, described below, the project would not significantly alter the v/c ratios. Project-related traffic contributions to the four unaffected intersections and all other study intersections operating at acceptable levels would be less than significant.

(2) Significant Impacts. As shown in Table IV.B-8, the following six intersections would operate at an unsatisfactory level of service in the Cumulative condition without the project. Intersection numbers refer to Figure IV.B-14.

- Intersection #14 – Hillcrest Avenue/Lone Tree Way
- Intersection #16 – Heidorn Ranch Road/Lone Tree Way
- Intersection #17 – Canada Valley Road/Lone Tree Way
- Intersection #18 – SR-4 Bypass SB Ramps/Lone Tree Way
- Intersection #19 – SR-4 Bypass NB Ramps (Jeffrey Way)/Lone Tree Way
- Intersection #21 – SR-4 Bypass SB Ramps/Sand Creek Road

As discussed above, the addition of project traffic to the Cumulative condition would not significantly alter the v/c ratio at four of the six intersections that already would operate at an unacceptable level of service. The project would, however, generate trips to a degree that they would constitute a significant cumulative impact at the following two intersections:

- Intersection #14 – Hillcrest Avenue/Lone Tree Way
- Intersection #18 – SR-4 Bypass SB Ramps/Lone Tree Way



LSA

FIGURE IV.B-14

N

NOT TO SCALE

LEGEND

[X] STUDY AREA INTERSECTIONS

XX (XX) AM (PM) VOLUMES

Aviano Adult Community Project EIR

Cumulative (2025) Plus Proposed Project Traffic Volumes

SOURCE: KIMLEY-HORN AND ASSOCIATES, INC., 2008

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Table IV.B-8: Cumulative (2025) Level of Service Conditions With the Project

	Cumulative				Cumulative Plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**	**LOS**	**V/C or Delay**
Lone Tree Way / Deer Valley Road	C	0.78	B	0.68	C	0.78	B	0.68
Deer Valley Road / Marita Drive	A	0.40	A	0.34	A	0.40	A	0.34
Deer Valley Road / Prewett Ranch Drive	B	0.65	B	0.62	B	0.65	B	0.62
Deer Valley Road / Wellness Way	A	0.51	B	0.62	A	0.51	B	0.62
Deer Valley Road / Kaiser Hospital	A	0.46	A	0.48	A	0.46	A	0.48
Deer Valley Road / Sand Creek Road	B	0.67	B	0.66	B	0.67	B	0.67
Kaiser Hospital / Sand Creek Road	A	0.32	A	0.43	A	0.32	A	0.43
High School Access / Sand Creek Road	A	0.59	A	0.48	A	0.59	A	0.48
Project South Access / Sand Creek Road	A	0.16	A	0.19	A	0.18	A	0.21
Hillcrest Avenue / Sand Creek Road	A	0.41	A	0.59	C	0.41	A	0.59
Hillcrest Avenue / Project East Access	A	0.50	A	0.46	A	0.54	A	0.49
SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	A	0.47	A	0.59	A	0.48	B	0.60
Hillcrest Avenue / Vista Grande Drive	A	0.45	A	0.45	A	0.47	A	0.46
Hillcrest Avenue / Lone Tree Way	**F**	**1.08**	**F**	**1.19**	**F**	**1.10**	**F**	**1.20**
Vista Grande Drive / Lone Tree Way	A	0.55	B	0.69	A	0.55	B	0.69
Heidorn Ranch Road / Lone Tree Way	C	0.78	**E**	**0.92**	C	0.79	**E**	**0.92**
Canada Valley Road / Lone Tree Way	**F**	**1.06**	**F**	**1.19**	**F**	**1.06**	**F**	**1.19**
SR-4 Bypass SB Ramps / Lone Tree Way	C	0.75	**E**	**0.93**	C	0.75	**E**	**0.94**
SR-4 Bypass NB Ramps (Jeffrey Way) / Lone Tree Way	**E**	**0.92**	**F**	**1.07**	**E**	**0.92**	**F**	**1.07**
Heidorn Ranch Road / Sand Creek Road	A	0.30	A	0.30	A	0.30	A	0.30
SR-4 Bypass SB Ramps / Sand Creek Road *	B	0.68	**D**	**0.86**	B	0.68	**D**	**0.86**
SR-4 Bypass NB Ramps / Sand Creek Road	A	0.48	A	0.58	A	0.48	A	0.58
Deer Valley Road / Mammoth Way	A	0.35	A	0.35	A	0.35	A	0.35

Notes: * Intersection modified from existing condition.
LOS mid-D (v/c 0.85) is maximum acceptable level of service.
Bold indicates unacceptable level of service.
Source: Kimley-Horn and Associates, Inc., 2008.

The Cumulative 2025 analysis assumes that Sand Creek Road would be striped as six lanes with left turn lanes. Based on level of service results, it appears that Sand Creek Road would operate acceptably in the year 2025 as a four-lane road. A supplemental analysis of Sand Creek Road in the year 2030 is included at the end of the traffic report contained in Appendix C.

<u>Impact TRANS-1</u>: The Hillcrest Avenue/Lone Tree Way intersection would operate below an acceptable level of service in 2025 independent of the proposed project. The addition of project traffic in the Cumulative (2025) Plus Project condition would exacerbate the unacceptable operation of this intersection. (S)

<u>Mitigation Measure TRANS-1:</u> As a condition of project of approval, the project sponsor shall contribute its fair share to modify the intersection to add a second westbound left turn lane. The

project traffic is one percent of the total intersection volume. Costs associated with this modification may involve securing right-of-way. Modifying the intersection would improve level of service to an acceptable threshold and reduce the impact to less than significant. (LTS)

Impact TRANS-2: The SB SR-4 Bypass/Lone Tree Way intersection would operate below an acceptable level of service in 2025 regardless of the proposed project. The addition of project traffic in the 2025 plus project condition would further exacerbate the poor operation of this intersection. (S)

Mitigation Measure TRANS-2: As a condition of project of approval, the project sponsor shall contribute its fair share to restripe the left-shared-through lane to an all-shared lane. The project traffic represents one tenth of one percent of the total intersection volume. Costs associated with this modification may involve securing right-of-way. The proposed improvement is independent of any future plans to widen the SR-4 Bypass. Modifying the intersection would improve level of service to an acceptable threshold and reduce the impact to less than significant. (LTS)

Tables illustrating the improvements related to the proposed mitigations are included in Appendix C.

e. Vehicle Queuing Impacts and Mitigation Measures. At most locations affected by the proposed project the increase in vehicle queuing is less than one vehicle. However, as seen in the summary in Appendix C, some turn bays are exceeded under Near-Term and Cumulative projected traffic volumes associated without and with the proposed project.

The queuing deficiencies at the intersections are mainly due to the approved projects to be developed near the intersections, although the proposed project would add to the length of the queue. The proposed project would increase the queue at the following intersection by one or more vehicles as listed below:

- Hillcrest Avenue/Lone Tree Way – WB left turn: <2 vehicles
  WB right turn: <2 vehicles
  NB left turn: <3 vehicles

Vehicle queues that extend one or more vehicles out of the turn pockets can interfere with through traffic movements and create a potential increase in rear-end collisions. Therefore, the project was considered to create a significant impact at the locations where this condition was determined to occur.

(1) Less-than-Significant Impacts. With the exception of one intersection, the project would not cause a significant increase in the queuing length at the remainder of the study intersections under the Near-Term and Cumulative conditions.

(2) Significant Impacts. Under both the Near-Term (2011) and Cumulative scenarios, the addition of project traffic would result in an increase of the queue length by one or more vehicles at one study intersection - Hillcrest Avenue/Lone Tree Way. Based on the significance criteria established for this traffic analysis, the increase in queue length would constitute a significant impact. Implementation of the proposed mitigation measures would reduce the impacts to a less-than-significant level.

Impact TRANS-3: The Hillcrest Avenue/Lone Tree Way intersection would have a northbound left turn queue that would spill out of the turn pocket in the Near-Term regardless of the proposed project. The addition of the project traffic would increase the queue by less than three vehicles. (S)

> Mitigation Measure TRANS-3: As a condition of project approval, the project sponsor shall contribute its fair share to restripe one northbound through lane to a through-shared-left turn lane. The project traffic is three percent of the total intersection volume. The intersection currently operates with split phasing in the north-south direction; therefore, no signal modifications would be necessary. (LTS)

Impact TRANS-4: The Hillcrest Avenue/Lone Tree Way intersection would have westbound left and northbound left turn queues that would spill out of the turn pockets in 2025 regardless of the proposed project. The addition of project traffic would increase the westbound left turn queue by less than two vehicles and the northbound left turn queue by less than three vehicles. (S)

> Mitigation Measure TRANS-4: Implement Mitigation Measures TRANS-1 and TRANS-3. (LTS)

Tables illustrating the improvement related to Mitigation Measure TRANS-1 are included in Appendix C.

f. Delay Index. The delay index (DI) is defined as the ratio between the peak congested travel time and the uncongested travel time along a roadway segment. The Synchro model developed for this traffic study was used to determine the DI during all five study scenarios. Travel times were determined under peak congestion and also under uncongested conditions. Based on CCTA established criteria, Deer Valley Road, Lone Tree Way, and Sand Creek Road are designated as routes of regional significance (in the study area) and are to have a DI of less than 2.0.

Based on the analysis using the Synchro model, Lone Tree Way and Deer Valley operate at a DI of less than 2.0 in the Existing and Near-Term Conditions, both with and without the project. In the 2025 Cumulative Condition the DI is 2.5 on Lone Tree Way in the eastbound direction during the PM peak hour, both with and without the project. Deer Valley Road operates at a DI of 2.1 in the southbound direction during the AM and PM peak hours both with and without the project. Sand Creek Road from Deer Valley west to the High School Access Road and west from Heidorn Road to Hillcrest Avenue won't be completed until the Cumulative Condition but would operate at a DI of less than 2.0. Table IV.B-9 summarizes the results of the DI analysis.

(1) Less-than-Significant Impacts. The project also would not alter the DI for any of the routes of regional significance under any of the scenarios. Lone Tree Way would operate above the established service standard for DI (2.0) in the 2025 Cumulative Condition independent of the proposed project. The addition of the proposed project would not alter this DI. The proposed project would have a less-than-significant impact on DI on the designated routes of significance within the study area.

Table IV.B-9: Delay Index

Scenario	Time Period		Lone Tree Way		Deer Valley Road		Sand Creek Road	
			EB	WB	NB	SB	EB	WB
Uncongested Travel Time (sec)	AM Peak		312.1	301.6	201.6	109.7	313.6	372.0
	PM Peak		314.1	323.8	189.8	105.3	347.1	373.8
Existing	AM Peak	CTT (sec)	262.6	306.1	237.0	186.8	INCOMPLETE ROADWAY	
		DI	0.8	1.0	1.2	1.7		
	PM Peak	CTT (sec)	303.6	297.2	229.1	187.3		
		DI	1.0	0.9	1.2	1.8		
2011 Near-Term	AM Peak	CTT (sec)	263.0	395.2	241.4	196.9	INCOMPLETE ROADWAY	
		DI	0.8	1.3	1.2	1.8		
	PM Peak	CTT (sec)	283.1	360.6	235.0	188.5		
		DI	0.9	1.1	1.2	1.8		
Near-Term + Project	AM Peak	CTT (sec)	264.5	405.3	244.9	212.6	INCOMPLETE ROADWAY	
		DI	0.8	1.3	1.2	1.9		
	PM Peak	CTT (sec)	286.2	365.8	235.1	188.7		
		DI	0.9	1.1	1.2	1.8		
Cumulative	AM Peak	CTT (sec)	526.6	349.5	247.3	231.1	320.3	376.8
		DI	1.7	1.2	1.2	**2.1**	1.0	1.0
	PM Peak	CTT (sec)	789.8	616.6	237.4	217.4	368.6	389.1
		DI	**2.5**	1.9	1.3	**2.1**	1.1	1.0
Cumulative + Project	AM Peak	CTT (sec)	530.4	413.1	247.4	231.5	320.2	375
		DI	1.7	1.4	1.2	**2.1**	1.0	1.0
	PM Peak	CTT (sec)	800.5	621.7	236.4	216.6	368.7	389.4
		DI	**2.5**	1.9	1.2	**2.1**	1.1	1.0

Notes: CTT = Congested Travel Time
Acceptable Delay Index (DI) is 2.0
Bold indicates unacceptable level of service.
Source: Kimley-Horn and Associates, Inc., 2008

(2) Significant Impacts. The proposed project would not result in any significant impacts associated with increased delay.

g. Construction Traffic Impacts and Mitigation Measures. The day-to-day construction operations for the construction of the proposed project would include traffic impacts related to construction employees, site grading, construction material importation, and more. However, because construction activities generate significantly less traffic than the project would and because construction-related trips would occur partly outside of the peak hours, they would not create additional impacts beyond than those already identified.

h. Alternative Transportation Modes Impacts and Mitigations. Potential impacts associated with transit, pedestrian, and bicycle modes of travel are discussed in this section.

(1) Transit Operations. The City of Antioch General Plan has several policies established to help maximize the amount of transit usage that occurs within the City. As they would pertain to this project, the relevant policies include:

- Preserve options for future transit use when designing roadway and highway improvements.

- Include Tri-Delta Transit in the review of new development projects and require new developments to provide transit improvements in proportion to traffic demands created by the project. Transit improvements may include direct and paved access to transit stops, provision of bus turnout areas and bus shelters, and roadway geometric designs to accommodate bus traffic.

Routes 384 and 388 on the Tri Delta Transit System would be the closest routes available to persons traveling to and from the project neighborhood. The closest bus stop to the project is located at Kaiser Hospital. According to the 2000 U.S. Census[3], only 4.3 percent of Antioch residents use transit to travel to work. This typically represents the highest level of transit ridership during the day. If it were conservatively assumed that 5 percent of the proposed project residents would use transit during the peak hours of the day, approximately 8 passengers in the weekday AM peak and 9 in the weekday PM peak would make use of these buses.

Data was not readily available for peak hour ridership levels on the Tri Delta Transit System, but during the morning and evening periods, the two routes operate every 30 to 60 minutes and observations indicate that sufficient capacity exists on the buses to accommodate the potential additional transit demand. Furthermore, dispersion of project-generated riders to the various bus routes would result in a minimal effect on transit capacity.

Although there are currently no transit stops or service adjacent to the project site, it is anticipated that there will be in the future. The project should provide bus turn outs on Hillcrest Avenue at the Project East Access intersection and on Sand Creek Road at the South Project Access intersection. The bus turn outs should be located on the far side of each intersection. A bus turn out should also be provided on Sand Creek Road at the High School Access intersection. The addition of these bus stops would place most residents of the proposed development within ¼ mile walking distance of public transit. The project sponsor should work with Tri-Delta Transit to coordinate the installation of the bus turnouts and amenities.

Based on the foregoing discussion, adequate capacity on existing transit routes would exist to accommodate the small number of project residents projected to use the local transit service in Antioch. The project complies with applicable General Plan policies related to transit in general with the exception of providing direct paved access to transit stops, which would be eliminated with installation of the bus turnouts on Hillcrest Avenue and Sand Creek Road. The project would have a less-than-significant effect on transit operations.

(2) Bicycle and Pedestrian Operations. The City of Antioch General Plan has several bicycle and pedestrian circulation policies that would pertain to the proposed project:

- Design new residential neighborhoods to provide safe pedestrian and bicycle access to schools, parks and neighborhood commercial facilities.
- Design intersections for the safe passage of pedestrians and bicycles through the intersection.
- Provide street lighting that is attractive, functional, and appropriate to the character and scale of the neighborhood or area, and that contributes to vehicular, pedestrian, and bicycle safety.
- Maintain roadway designs that maintain mobility and accessibility for bicyclists and pedestrians.

[3] US Census Bureau, 2000. Employment – Journey to Work.

- Integrate multi-use paths into creek corridors, railroad rights-of-way, utility corridors, and park facilities.
- Provide, as appropriate, bicycle lanes (Class II) or parallel bicycle/pedestrian paths (Class I) along all arterial streets and high volume collector streets, as well as along major access routes to schools and parks.
- Maximize visibility and access for pedestrians, and encourage the removal of barriers for safe and convenient movement of pedestrians.
- Ensure that the site design of new developments provides for pedestrian access to existing and future transit routes and transit centers.
- Pave walks and pedestrian pathways with a hard, all-weather surface that is easy to walk on. Walks and curbs should accommodate pedestrians with disabilities. Walks within open space areas should have specially paved surfaces that blend with the surrounding environment.
- In general, design walks to provide a direct route for short to medium distance pedestrian trips, and to facilitate the movement of large numbers of pedestrians. Meandering sidewalks are appropriate in areas where the natural topography or low-density land uses lend themselves to informal landscapes.

As stated previously there are presently several Class II bike lanes in the vicinity of the project site on the following roadways: Canada Valley Road, Deer Valley Road, Prewett Ranch Drive, Marita Drive, and Hillcrest Avenue. Sand Creek Road and Heidorn Ranch Road are proposed to be Class II bicycle facilities in the future. The Mokelumne Trail (a Class I facility – i.e. completely separate from traffic travel lanes) runs parallel to Lone Tree Way.

An inventory of pedestrian facilities at the project study intersections indicates that there are continuous sidewalk facilities at all existing project study intersections and that sidewalk facilities will be included when Hillcrest is extended south to Sand Creek and Sand Creek Road is extended from Deer Valley Road to the SR-4 Bypass/Sand Creek Road interchange. Sidewalks would be included on all streets within the project. In addition, the project would construct a segment of the Sand Creek regional trail along the Sand Creek buffer area, south of Sand Creek Road. This 12-foot wide paved pathway would provide pedestrian and bike access from the proposed residential neighborhood to the planned Sports Complex south of the site.

Residents from the proposed project would be able to use the continuous sidewalk facilities in the neighborhood and along study area roadways. This would allow them to conveniently walk to nearby destinations or access transit services. Pedestrian crosswalks are present on approaches at signalized intersections near the project site.

(1) Less-than-Significant Impacts. Based on the foregoing discussion, the site is well connected to multiple existing bicycle and pedestrian facilities and no capacity deficiencies are anticipated for either of these systems within the project vicinity. The project complies with applicable General Plan policies related to bicycle and pedestrian access. The project would have a less-than-significant effect on bicycle and pedestrian operations.

(2) Significant Impacts. The proposed project would not result in any significant impacts associated with bicycle and pedestrian operations.

i. Project Access and Internal Site Circulation. On site circulation was evaluated at the project's two driveways and within the project site. All site driveways would provide single lane ingress and egress, with left turn lanes out from the site.

Vehicular access to the project site is proposed from Hillcrest Avenue and Sand Creek Road. No other accesses were noted on the site plan even though Equestrian Way and Candlewood Way (located immediately north of the site) are stubbed out off-site, apparently to preserve the potential for future connections to the south. Generally, this lack of vehicular connection to an adjacent neighborhood is not advised. Limited connectivity between residential areas promotes increased driving and congestion on nearby collector and arterial streets. However, because of the close proximity of the AUSD Medical High School, it was observed that if the connections were provided, a large volume of high school traffic would likely cut through the proposed development. Therefore, the lack of street connections to the north may be preferred, in order to avoid conflicts with the high school traffic.

Vehicular circulation within the project is considered adequate but unfamiliar drivers may find the curvilinear layout and multiple cul-de-sacs difficult to navigate. On the other hand, the curvilinear layout does help to reduce potential speeding within the development.

Vehicle queuing at the project exits is not likely to exceed eight vehicles, which is roughly equivalent to 200 feet. Therefore, throat depths at the two vehicular access locations internal to the site are expected to be sufficient for the traffic generated by the project. As part of the project, signalized intersections with turn lanes would be provided at both project entrances (at Hillcrest and Sand Creek).

Sight distances and emergency access were evaluated to identify potential deficiencies such as possible sight obstructions, poor intersection alignments, lack of secondary access, long cul-de-sacs, and turn radii. Based on the review the site design appears adequate and no modifications to the proposed project entryways are proposed. Project roadways and intersections will be expected to conform to city design standards.

The City of Antioch Code of Ordinances states that for single family detached residential housing the requirement is two spaces per unit in a garage, plus one on-street space. Per the project description, two parking spaces per unit plus curbside parking will be provided, fulfilling the requirement.

ITE Parking Generation, 3rd Edition is a standard reference used by jurisdictions throughout the country and is based on actual parking demand studies at numerous locations in areas of various populations. Parking Generation states that the average peak period parking demand for single family detached housing is 1.83 vehicles per dwelling unit. The 85th percentile peak period demand is 2.14 vehicles per dwelling unit. The number of parking spaces being supplied by the proposed project is also in accordance with *Parking Generation* guidelines as well.

Bicycle and pedestrian access would occur at the Hillcrest Avenue and Sand Creek Road project entryways. Internal project bicycle circulation would occur principally along the residential streets where traffic volumes and speeds are expected to be sufficiently low to permit cyclists and motorists to share the roadways. Pedestrian circulation would principally occur on sidewalks along the neighborhood streets. Secondary bicycle and pedestrian circulation is anticipated to occur along the greenway (i.e., PG&E easement) that runs north/south through the development and along the

proposed 12-foot wide Sand Creek trail segment. Therefore, a minimum 12-foot wide shared bicycle/pedestrian path should be constructed along the greenway to serve residents as well as students and recreationalists. At locations where the path crosses the proposed project's internal streets there is the increased potential for collisions due to drivers not anticipating bicycles crossing at those locations. This represents a substantial increase in traffic-related hazards due to a design feature. At locations where the path abuts some cul-de-sacs and internal loop roads, residents are not able to directly access the greenway path and must take a circuitous route to reach the path. This conflicts with adopted policies supporting other alternate transportation systems (i.e., bike and pedestrian trails).

(1) Less-than-Significant Impacts. The site is generally well connected to multiple existing bicycle and pedestrian facilities and no capacity deficiencies are anticipated for either of these systems within the project vicinity. With respect to access and on-site circulation, the project triggers two significance criteria that require mitigations to enhance bicycle and pedestrian safety and connectivity internal to the site.

(2) Significant Impacts. Significant internal circulation impacts are described below.

<u>Impact TRANS–5:</u> At locations where the greenway path crosses the proposed project's internal streets there is increased potential for collisions due to drivers not anticipating pedestrians and bicyclists crossing at those locations. (S)

<u>Mitigation Measure TRANS–5:</u> Lighted crosswalks and flashing traffic signs are recommended to increase driver awareness of the crossing, slow traffic and thereby increase safety. The proposed project should be responsible for all of the mitigation costs associated with this measure. Adding the raised crosswalks and signage would reduce the impact to a less-than-significant level. (LTS)

<u>Impact TRANS–6:</u> At locations where the greenway path abuts some cul-de-sacs and internal loop roads, residents are not able to directly access the greenway path and must take a circuitous route. This is inconsistent with general plan policies. (S)

<u>Mitigation Measure TRANS–6:</u> Direct access from the cul-de-sacs and loop streets should be provided to the path in harmony with the general plan policy to remove barriers for safe and convenient movement of pedestrians. The proposed project should be responsible for all of the mitigation costs associated with this measure. Adding additional access points to the greenway reduces the impact to a less-than-significant level. (LTS)

C. AIR QUALITY

This section has been prepared using methodologies and assumptions recommended by the Bay Area Air Quality Management District (BAAQMD) and the *CEQA Guidelines*. In keeping with these guidelines, this chapter describes existing air quality, impacts of future traffic on local carbon monoxide levels and impacts of project emissions that have regional effects. Mitigation measures to reduce or eliminate potentially significant air quality impacts are identified, where appropriate.

1. Setting

The following discussion provides an overview of existing air quality conditions in the region and the Antioch area. Ambient standards and the regulatory framework relating to air quality are described below as well as climate, air quality conditions, and typical air pollutant types and sources.

a. Air Quality Standards, Regulatory Framework and Attainment Status. Air quality standards, the regulatory framework, and State and federal attainment status are discussed below.

(1) Air Quality Standards. Both the State and federal governments have established health-based Ambient Air Quality Standards for six air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter (PM). In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety.

Federal standards include both primary and secondary standards. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.[1]

Additionally, the State of California has established a set of episode criteria for CO, O_3, NO_2, SO_2, and PM_{10}. These episode criteria refer to episode levels, ranging from Stage One to Stage Three, representing periods of short-term exposure to air pollutants that actually threaten public health. Health effects are progressively more severe as pollutant levels increase from Stage One to Stage Three.

In addition to criteria pollutants, toxic air contaminants (TACs) are another group of pollutants of concern. There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust.[2]

California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) for the criteria air pollutants are listed in Table IV.C-1. Health effects of these criteria pollutants are described in Table IV.C-2.

[1] U.S. Environmental Protection Agency, 2007. Website: www.epa.gov/air/criteria.html. January.

[2] Bay Area Air Quality Management District, 1999. *BAAQMD CEQA Guidelines.* December.

Table IV.C-1: Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[a]		Federal Standards[b]		
		Concentration[c]	Method[d]	Primary[b,e]	Secondary[c,f]	Method[g]
Ozone (O_3)	1-Hour	0.09 ppm (180 μg/m^3)	Ultraviolet Photometry	No federal standard	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 μg/m^3)		0.075 ppm (147 μg/m^3)		
Respirable Particulate Matter (PM_{10})	24-Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m^3		–		
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	No Separate State Standard		35 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m^3	Gravimetric or Beta Attenuation	15 μg/m^3		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.03 ppm (57 μg/m^3)	Gas Phase Chemiluminescence	0.053 ppm (100 μg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1-Hour	0.18 ppm (339 μg/m^3)		–		
Lead (Pb)	30-day average	1.5 μg/m^3	Atomic Absorption	–	–	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 μg/m^3	Same as Primary Standard	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	Ultraviolet Fluorescence	0.030 ppm (80 μg/m^3)	–	Spectrophoto-metry (Pararosaniline Method)
	24-Hour	0.04 ppm (105 μg/m^3)		0.14 ppm (365 μg/m^3)	–	
	3-Hour	–		–	0.5 ppm (1300 μg/m^3)	
	1-Hour	0.25 ppm (655 μg/m^3)		–	–	
Visibility-Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer - visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**		
Sulfates	24-Hour	25 μg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 μg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[h]	24-Hour	0.01 ppm (26 μg/m^3)	Gas Chromatography			

Source: ARB, 2008.
Table notes on next page.

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter—PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
Contact U.S. EPA for further clarification and current federal policies.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[g] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[h] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

(2) Regulatory Framework. The BAAQMD is the local agency primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development), as well as monitoring ambient pollutant concentrations. The District's jurisdiction encompasses seven counties—Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara and Napa—and portions of Solano and Sonoma counties. The California Air Resources Board (ARB) and the U.S. Environmental Protection Agency (EPA) regulate direct emissions from motor vehicles.

Federal Clean Air Act. The 1970 Federal Clean Air Act authorized the establishment of national health-based air quality standards and also set deadlines for their attainment. The Federal Clean Air Act Amendments of 1990 changed deadlines for attaining national standards as well as the remedial actions required of areas of the nation that exceed the standards. Under the Clean Air Act, State and local agencies in areas that exceed the national standards are required to develop State Implementation Plans to demonstrate how they will achieve the national standards by specified dates.

The Clean Air Act requires that projects receiving federal funds demonstrate conformity to the approved State Implementation Plan and local air quality attainment plan for the region. The project does not anticipate receiving federal funds.

California Clean Air Act. In 1988, the California Clean Air Act required that all air districts in the State endeavor to achieve and maintain California Ambient Air Quality Standards for carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) by the earliest practical date. The California Clean Air Act provides districts with authority to regulate indirect sources and

Table IV.C-2: Health Effects of Air Pollutants

Pollutant	Health Effects	Examples of Sources
Suspended Particulate Matter ($PM_{2.5}$ and PM_{10})	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.
Ozone (O_3)	• Breathing difficulties • Lung damage	• Formed by chemical reactions of air pollutants in the presence of sunlight; common sources are motor vehicles, industries, and consumer products
Carbon Monoxide (CO)	• Chest pain in heart patients • Headaches, nausea • Reduced mental alertness • Death at very high levels	• Any source that burns fuel such as cars, trucks, construction and farming equipment, and residential heaters and stoves
Lead (Pb)	• Organ damage • Neurological and reproductive disorders • High blood pressure	• Metals processing • Fuel combustion • Waste disposal
Nitrogen Dioxide (NO_2)	• Lung damage	• See carbon monoxide sources
Toxic Air Contaminants	• Cancer • Chronic eye, lung, or skin irritation • Neurological and reproductive disorders	• Cars and trucks, especially diesels • Industrial sources such as chrome platers • Neighborhood businesses such as dry cleaners and service stations • Building materials and products

Source: ARB and EPA, 2005.

mandates that air quality districts focus particular attention on reducing emissions from transportation and area-wide emission sources. Each non-attainment district is required to adopt a plan to achieve a 5 percent annual reduction, averaged over consecutive 3-year periods, in district-wide emissions of each nonattainment pollutant or its precursors. A Clean Air Plan (CAP) shows how a district would reduce emissions to achieve air quality standards. Generally, the State standards for these pollutants are more stringent than the national standards.

The most recent BAAQMD plan for attaining California Ambient Air Quality Standards, the Bay Area 2005 Ozone Strategy, was adopted by the District's Board of Directors on January 4, 2006. The 2005 Ozone Strategy demonstrates how the San Francisco Bay Area will achieve compliance with the State 1-hour air quality standard for ozone and how the region will reduce transport of ozone and ozone precursors to neighboring air basins. The Ozone Strategy also includes stationary source control measures, mobile source control measures and transportation control measures.

City of Antioch. The City of Antioch has established air quality objectives and policies in the Resource Management section of the City's General Plan. The following air quality policies relate to the proposed project.

- *10.6.1 Air Quality Objective.* Minimize air pollutant emissions within the Antioch Planning Area so as to assist in achieving State and federal air quality standards.

- *Air Quality Policy 10.6.2a*: Construction Emissions: Require development projects to minimize the generation of particulate emissions during construction through implementation of the dust abatement actions outlined in the CEQA Handbook of the Bay Area Air Quality Management District.
- *Air Quality Policy 10.6.2b*: Mobile Emissions. Require developers of large residential and non-residential projects to participate in programs and to take measures to improve traffic flow and/or reduce vehicle trips resulting in decreased vehicular emissions.
- *Air Quality Policy 10.6.2.g*: Stationary Source Emissions. Require new wood burning stoves and fireplaces to comply with EPA and BAAQMD approved standards.

(3) Attainment Status. The California Air Resources Board (ARB) is required to designate areas of the State as attainment, nonattainment or unclassified for all State standards. An "attainment" designation for an area signifies that pollutant concentrations did not violate the standard for a pollutant in that area. A "nonattainment" designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria. An "unclassified" designation signifies that data does not support either an attainment or nonattainment status. The California Clean Air Act divides districts into moderate, serious, and severe air pollution categories, with increasingly stringent control requirements mandated for each category.

The U.S. EPA designates areas for O_3, CO, and NO_2 as either "does not meet the primary standards," or "cannot be classified," or "better than national standards." For SO_2, areas are designated as "does not meet the primary standards," "does not meet the secondary standards," "cannot be classified" or "better than national standards." In 1991, new nonattainment designations were assigned to areas that had previously been classified as Group I, II, or III for PM_{10} based on the likelihood that they would violate national PM_{10} standards. All other areas are designated "unclassified."

Table IV.C-3 provides a summary of the attainment status for the San Francisco Bay Area with respect to national and State ambient air quality standards.

b. Existing Climate and Air Quality. Regional air quality designations, local climate and air quality in the Bay Area Air Basin, and air pollution climatology are described in this section.

(1) Regional Air Quality. The project area is in the City of Antioch, which is located in the San Francisco Bay Area Air Basin, a large, shallow air basin ringed by hills which taper into a number of sheltered valleys around the perimeter. Two primary atmospheric outlets exist. One is through the strait known as the Golden Gate, which is a direct outlet to the ocean. The second extends to the northeast, along the west delta region of the Sacramento and San Joaquin Rivers.

Air quality conditions in the San Francisco Bay Area have improved significantly since the BAAQMD was created in 1955. Ambient concentrations of air pollutants and the number of days the region exceeds air quality standards have fallen dramatically. Public health benefits, improved visibility, and reduced damage to plants and materials are among the benefits of cleaner air.

Table IV.C-3: San Francisco Bay Area Attainment Status

Pollutant	Averaging Time	California Standards [a]		National Standards [b]	
		Concentration	Attainment Status	Concentration[3]	Attainment Status
Ozone (O_3)	8-Hour	0.07 ppm (137 μg/m^3)	Nonattainment [h]	0.075 ppm	Nonattainment [d]
	1-Hour	0.09 ppm (180 μg/m^3)	Nonattainment	Not Applicable	Not Applicable [e]
Carbon Monoxide (CO)	8-Hour	9 ppm (10 mg/m^3)	Attainment	9 ppm (10 mg/m^3)	Attainment [f]
	1-Hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	Attainment
Nitrogen Dioxide (NO_2)	Annual Mean	0.030 ppm (56 mg/m^3)	Attainment	0.053 ppm (100 μg/m^3)	Attainment
	1-Hour	0.18 ppm (339 μg/m^3)	Attainment	Not Applicable	Not Applicable
Suspended Particulate Matter (PM_{10})	Annual Mean	20 μg/m^3	Nonattainment [g]		
	24-Hour	50 μg/m^3	Nonattainment	150 μg/m^3	Unclassified
Suspended Particulate Matter ($PM_{2.5}$)	Annual Mean	12 μg/m^3	Nonattainment [g]	15 μg/m^3	Attainment
	24-Hour	Not Applicable	Not Applicable	35 μg/m^3 [i]	Unclassified
Sulfur Dioxide (SO_2)	Annual Mean	Not Applicable	Not Applicable	0.03 ppm (80 μg/m^3)	Attainment
	24-Hour	0.04 ppm (105 μg/m^3)	Attainment	0.14 ppm (365 μg/m^3)	Attainment
	1-Hour	0.25 ppm (655 μg/m^3)	Attainment	Not Applicable	Not Applicable

Notes: Lead (Pb) is not listed in the above table because it has been in attainment since the 1980s.
ppm = parts per million
mg/m^3 = milligrams per cubic meter
μg/m^3 = micrograms per cubic meter

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM_{10}, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that ARB determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.

[b] National standards other than for ozone, particulates and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.075 ppm (75 ppb) or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 g/m3. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentiles is less than 35 μg/m3. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM_{10} is met if the 3-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the 3-year average of annual averages spatially-averaged across officially designed clusters of sites falls below the standard.

[c] National air quality standards are set by US EPA at levels determined to be protective of public health with an adequate margin of safety.

[d] In June 2004, the Bay Area was designated as a marginal nonattainment area of the national 8- hour ozone standard. US EPA lowered the national 8-hour ozone standard from 0.80 to 0.075 ppm (i.e.. 75 ppb) effective May 27, 2008. EPA will issue final designations based upon the new 0.075 ppm ozone standard by March 2010.

(Table notes continued on next page.)

[e] The national 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.
[f] In April 1998, the Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard.
[g] In June 2002, CARB established new annual standards for $PM_{2.5}$ and PM_{10}.
[h] The 8-hour CA ozone standard was approved by the Air Resources Board on April 28, 2005 and became effective on May 17, 2006.
[i] U.S EPA lowered the 24-hour $PM_{2.5}$ standard from 65 μg/m3 to 35 μg/m3 in 2006. EPA is required to designate the attainment status of BAAQMD for the new standard by December 2009.

Source: Bay Area Air Quality Management District, 2008. Bay Area Attainment Status.

(2) Local Climate and Air Quality. Air quality is a function of both local climate and local sources of air pollution. Air quality is the balance of the natural dispersal capacity of the atmosphere and emissions of air pollutants from human uses of the environment.

The City of Antioch lies in the Carquinez Strait climatological subregion of the Bay Area Air Basin. The Carquinez Strait is the only sea-level gap in the central and northern California coastal mountains, which results in relatively strong and persistent winds. Winds are generally greatest during spring and summer and lowest in fall and winter. A strong daily variation in wind occurs in spring and summer, with peak winds occurring in the late afternoon hours and winds gradually decreasing at night. During fall and winter, winds are generally more variable both in speed and direction as the area is influenced by storms from the Pacific Ocean.

The occurrence of episodes of high atmospheric stability, known as inversion conditions, severely limits the ability of the atmosphere to disperse pollutants vertically. Inversions are experienced during all seasons in the Bay Area, but are particularly prevalent in the summer months when they are present about 90 percent of the time in both morning and afternoon.

Topography also affects air quality. Antioch is located between the expansive Sacramento and San Joaquin Valleys to the east and the San Francisco Bay to the west, and the large summertime temperature differences between these two areas result in a strong flow of generally westerly winds that dilute and transport air pollutants.

The amount of a given air pollutant in the atmosphere is determined by the amount of pollutant released and the atmosphere's ability to transport and/or dilute that pollutant. The major determinants of transport and dilution are wind, atmospheric stability, terrain and, for photochemical pollutants, sunshine. Antioch has a relatively low natural atmospheric potential for pollution given the persistent and strong winds typical of the area. These winds dilute pollutants and influence air quality in the Sacramento and San Joaquin valleys. Antioch's location downwind of the greater Bay Area, however, also means that pollutants from other areas are transported to Antioch.

Exceedances of air quality standards occur primarily during meteorological conditions conducive to high pollution levels, such as cold, windless winter nights or hot, sunny summer afternoons. The major pollutants of concern in the San Francisco Bay Area (ozone, carbon monoxide, and particulate matter) are monitored at a number of locations. The closest monitoring station is located in Pittsburg. However, the closest monitoring station that records $PM_{2.5}$ measurements is located in Concord.

Pollutant monitoring results for the years 2005 to 2007 (see Table IV.C-4) at the Pittsburg ambient air quality monitoring station indicate that air quality in the project area has generally been good. Although PM_{10} California standards were violated in each year, as indicated in

Table IV.C-4: Ambient Air Quality at the Pittsburg Air Monitoring Station

Pollutant	Standard	2005	2006	2007
Carbon Monoxide (CO)				
Maximum 1 hr concentration (ppm)		3.3	3.3	2.8
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8 hr concentration (ppm)		1.7	1.9	1.5
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1 hr concentration (ppm)		0.094	0.105	0.100
Number of days exceeded:	State: > 0.09 ppm	0	3	1
Maximum 8 hr concentration (ppm)		0.078	0.093	0.074
Number of days exceeded:	State: > 0.07 ppm	ND	ND	ND
	Federal: > 0.08 ppm	0	1	0
Coarse Particulates (PM_{10})				
Maximum 24 hr concentration ($\mu g/m^3$)		54	58	56
Number of days exceeded:	State: > 50 $\mu g/m^3$	1	2	4
	Federal: > 150 $\mu g/m^3$	0	0	0
Annual arithmetic average concentration ($\mu g/m^3$)		20	20	19
Exceeded for the year:	State: > 20 $\mu g/m^3$	No	No	No
	Federal: > 50 $\mu g/m^3$	No	No	No
Fine Particulates ($PM_{2.5}$) (Concord)				
Maximum 24 hr concentration ($\mu g/m^3$)		49	62	47
Number of days exceeded:	Federal: > 65 $\mu g/m^3$	0	0	0
Annual arithmetic average concentration ($\mu g/m^3$)		9.1	10.0	8.7
Exceeded for the year:	State: > 12 $\mu g/m^3$	No	No	No
	Federal: > 15 $\mu g/m^3$	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1 hr concentration (ppm)		0.058	0.052	0.051
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.011	0.011	0.010
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No
Sulfur Dioxide (SO_2)				
Maximum 1 hr concentration (ppm)		0.030	0.045	0.047
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Maximum 3 hr concentration (ppm)		0.018	0.025	0.024
Number of days exceeded:	Federal: > 0.5 ppm	0	0	0
Maximum 24 hr concentration (ppm)		0.009	0.009	0.007
Number of days exceeded:	State: > 0.04 ppm	0	0	0
	Federal: > 0.14 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.002	0.003	0.002
Exceeded for the year:	Federal: > 0.030 ppm	No	No	No

ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
ND = No data. There was insufficient (or no) data to determine the value.
Source: ARB and EPA Web sites.

the monitoring results, no violations of the federal PM_{10} standard were recorded during the period of 2005 to 2007. The federal $PM_{2.5}$ standard was not exceeded in any of the past three years. The State 1-hour O_3 standard was exceeded three times in 2006 and once in 2007 at this monitoring station. The

federal 8-hour ozone standard was exceeded once in 2006 at this monitoring station. CO, SO_2, and NO_2 standards were not exceeded in this area during the 3-year period.

c. Air Quality Issues. Five key air quality issues related to the proposed project – CO hotspots, vehicle emissions, fugitive dust, odors, and construction equipment exhaust – are described below.

(1) Local Carbon Monoxide Hotspots. Local air quality is most affected by CO emissions from motor vehicles. CO is typically the pollutant of greatest concern because it is created in abundance by motor vehicles and it does not readily disperse into the air. Because CO does not readily disperse, areas of vehicle congestion can create "pockets" of high CO concentration, called "hot spots." These pockets have the potential to exceed the State 1-hour standard of 20 ppm and/or the 8-hour standard of 9.0 ppm.

While CO transport is limited, it does disperse over time and with distance from the source under normal meteorological conditions. However, under certain meteorological conditions, such as stagnant air or temperature inversions CO concentrations near congested roadways or intersections may reach unhealthful levels affecting local sensitive receptors (e.g., residents, schoolchildren, the elderly, and hospital patients). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service or with extremely high traffic volumes. In areas with high ambient background CO concentration, air quality modeling is needed to determine a project's effect on local CO levels.

(2) Vehicle Emissions. Long-term air emission impacts are those associated with increases in automobile travel within and around the City over time. Mobile source emissions would result from vehicle trips associated with increased vehicular travel. As is true throughout much of the U.S., motor vehicle use is projected to increase substantially in the region. The BAAQMD, local jurisdictions, and other parties responsible for protecting public health and welfare are continually seeking ways of minimizing the air quality impacts of growth and development in order to avoid further exceedances of the standards.

(3) Fugitive Dust. Fugitive dust emissions are generally associated with demolition, land clearing, exposure of soils to the air, and cut and fill operations. Dust generated during construction varies substantially on a project-by-project basis, depending on the level of activity, the specific operations and weather conditions. The U.S. EPA has developed an approximate emission factor of 1.2 tons per acre per month of activity for construction-related emissions of total suspended particulate. This factor assumes a moderate activity level, moderate silt content in soils being disturbed and a semi-arid climate. The California Air Resources Board estimates that 64 percent of construction-related total suspended particulate emissions occur in the form of PM_{10}. The State emission factors for uncontrolled construction-related PM_{10} emissions are:

- 0.77 tons per acre per month of PM_{10}; or
- 51 pounds per acre per day of PM_{10}.

However, construction emissions can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors. There are a number of feasible control measures that can be reasonably implemented to signifi-

cantly reduce PM_{10} emissions from construction. The ARB has not yet established methods to calculate emissions of $PM_{2.5}$.

(4) Odors. Odors are also an important element of local air quality conditions. Specific land uses (e.g., restaurants, landfills, manufacturing plants and agricultural operations) can raise concerns on the part of nearby neighbors. While sources that generate objectionable odors must comply with air quality regulations, the public's sensitivity to locally produced odors often exceeds local ordinance regulations.

(5) Construction Equipment Exhaust. Construction activities cause combustion emissions from utility engines, heavy-duty construction vehicles, equipment hauling materials to and from construction sites and motor vehicles transporting construction crews. Exhaust emissions from construction activities vary daily as construction activity levels change. The use of construction equipment results in localized exhaust emissions.

2. Impacts and Mitigation Measures

This section identifies the air quality impacts associated with implementation of the proposed project. The subsection begins with the criteria of significance, which establish the thresholds for determining whether a project impact is significant. The latter part of this subsection presents the potential air quality impacts associated with the proposed project. Mitigation measures are recommended, as appropriate, for significant impacts to eliminate or reduce them to a less-than-significant level. This section also identifies impacts that are considered to be less than significant.

a. Criteria of Significance. The project would result in a significant air quality impact if it would:

- Violate the Bay Area Air Quality Management District's air quality standards or contribute substantially to an existing or projected air quality violation by:
  - Contributing to CO concentrations exceeding the State ambient air quality standards of 9 ppm averaged over 8 hours and 20 ppm for 1 hour; or
  - Generating criteria air pollutant emissions of Reactive Organic Gases (ROG),[3] NO_x, or PM_{10} in excess of 15 tons per year, or 80 pounds per day.
- Frequently expose members of the public to objectionable odors.
- Expose sensitive receptors (including residential areas) or the general public to toxic air contaminants in excess of the following thresholds:
  - Probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds 10 in one million; or
  - Ground-level concentrations of non-carcinogenic toxic air contaminants would result in a Hazard Index greater than 1 for the MEI.
- Result in a cumulative air quality impact. Projects that would individually have a significant air quality impact due to project operations would also result in a cumulative air quality impact. For projects that do not individually have significant operational air quality impacts, a cumulative

[3] Reactive Organic Gases (ROG) are classes of organic compounds that transform with heat and sunlight to form smog or ozone.

impact would result if the project would cause the City's General Plan to conflict with the Clean Air Plan or, if the City's General Plan is already inconsistent with the Clean Air Plan, and the project would combine with other reasonably foreseeable future projects to either: 1) exceed the BAAQMD individual operational thresholds of significance or 2) exceed the CAP population and vehicle miles traveled (VMT) assumptions for growth in the City or County.

The BAAQMD provides various quantitative thresholds that can be used to better define the above criteria. For ROG, NO_x and PM_{10}, a net increase of 80 pounds per day is considered significant, while for CO, an increase of 550 pounds per day would be considered significant if it leads to or contributes to CO concentrations exceeding the State Ambient Air Quality Standard of 9 ppm averaged over 8 hours and 20 ppm for 1 hour (i.e., if it creates a "hot spot"). Generally, if a project results in an increase in ROG, NO_x, or PM_{10} of more than 80 pounds per day, then it would also be considered to contribute considerably to a significant cumulative effect. For projects that would not lead to a significant increase of ROG, NO_x, or PM_{10} emissions, the cumulative effect is evaluated based on a determination of the consistency of the project with the regional Clean Air Plan.
Impacts from $PM_{2.5}$ emissions have not been analyzed quantitatively as there are no recommended significance thresholds from the BAAQMD. Therefore, impacts from $PM_{2.5}$ emissions from the implementation of the proposed project (particularly the diesel particulate matter) have been analyzed qualitatively.

It should be noted that the emission thresholds were established based on the attainment status of the air basin in regard to air quality standards for specific criteria pollutants. Because the concentration standards were set at a level that protects public health with an adequate margin of safety (EPA), these emission thresholds are regarded as conservative and would overstate an individual project's contribution to health risks.

b. Less-than-Significant Air Quality Impacts. The project would result in the following less-than-significant air quality impacts.

(1) Clean Air Plan (CAP) Consistency. The BAAQMD has prepared the 2005 Ozone Strategy for the San Francisco Bay Area as a roadmap to show how the region will continue to make progress toward meeting the State 1-hour ozone standard as expeditiously as practicable, and how the region will reduce transport of ozone and ozone precursors to neighboring areas.

The proposed project would locate new residential development on a parcel designated for residential use. The proposed project would be generally consistent with General Plan land use-related goals, objectives, and policies that envision development on the site. In this way, the proposed project is consistent with growth anticipated under the City's General Plan and falls within the population projections prepared by ABAG. As a result, the project would not conflict with the Bay Area 2005 Ozone Strategy or create a cumulative air quality impact.

(2) Odor Emissions. Heavy-duty equipment in the project area during construction would emit odors. However, the construction activity would be short-term and would cease to occur after individual construction is completed. No other sources of objectionable odors have been identified for the proposed project. No mitigation measures are recommended, and the conditions outlined in the criteria of significance will not occur.

(3) Toxic Air Contaminants. The implementation of the proposed project would not result in any new sources of Toxic Air Contaminants, and the project land uses would not be located near any existing major sources of Toxic Air Contaminants. The project would not have the potential to expose sensitive receptors or the general public to substantial levels of Toxic Air Contaminants and would be deemed to have a less-than-significant impact.

(4) Operational Emissions–CO Analysis. Vehicular traffic associated with the proposed project would emit carbon monoxide (CO) into the air along roadway segments and near intersections. As previously described, because CO does not readily disperse, areas of vehicle congestion can create pockets of high CO concentrations, called "hot spots." Typically, high CO concentrations are associated with roadways or intersections operating at deficient levels of service (LOS) or with extremely high traffic volumes. An analysis of the potential CO hotspots was performed for intersections within the vicinity of the project site (including the proposed high school access road and Sand Creek Road intersection).

Table IV.C-5 lists the 1-hour and 8-hour CO concentrations for the near-term (2011) conditions and near-term plus project at 14 intersections in the project study area. Table IV.C-6 lists the cumulative (2025) concentrations with and without the project. Based on the methodology suggested by the U.S. EPA and the California Department of Transportation, the second highest CO concentrations monitored at 583 W. 10th Street, Pittsburg, the nearest air monitoring station, in the past 2 years (in this case 3.2 ppm for the 1-hour period and 1.7 ppm for the 8-hour period) were used as the background CO concentrations. Emission factors for study scenarios were obtained from the latest confirmed California Air Resources Board (ARB) data. The modeled input/output data is provided in Appendix D.

Table IV.C-5 shows that 1-hour and 8-hour CO concentrations for all near-term conditions with- and without-the-project would be below the federal and State CO standards. The 1-hour CO levels range from 3.3 to 6.5 ppm, much lower than the State CO standard of 20 ppm. The 8-hour CO levels range from 1.8 ppm to 4.0 ppm, also much lower than the State and federal standard of 9 ppm.

Table IV.C-6 shows that all cumulative (2025) 1-hour and 8-hour CO concentrations with the project would be below the federal and State CO standards. The 1-hour CO levels range from 3.5 ppm to 4.8 ppm, which are much lower then the State standard of 20 ppm. The 8-hour CO levels would range from 1.9 ppm to 2.8 ppm, which are much lower than the State standard of 9 ppm.

Based on the results of the traffic analysis, in some cases intersection traffic volumes were reduced with implementation of the proposed project. For those intersections, CO concentrations were also reduced with implementation of the project.

(5) Operational Emissions–Regional Emissions. Long-term air emission impacts would be those associated with changes in usage of the project site. Mobile source emissions would result from vehicle trips associated with the proposed project. The Urban Emission Model (URBEMIS 2007) computer program, which is the most current air quality model available in California for estimating emissions associated with land use development projects, was used to calculate long-term mobile source emissions associated with the proposed project. The model results detail and summary data are provided in Appendix D.

Table IV.C-5: CO Concentrations for Near-Term 2011 No Project and Near-Term 2011 Plus Project Conditions

Intersection	Receptor Distance to Road Centerline (Meters)	Project Related Increase 1-hr/ 8-hr (ppm)	Without/With Project One-Hour CO Concentration (ppm)	Without/With Project Eight-Hour CO Concentration (ppm)	Exceeds State Standards	
					1-Hr	8-Hr
Deer Valley Road and Lone Tree Way	21	0.0 / 0.0	5.6 / 5.6	3.4 / 3.4	No	No
	17	0.1 / 0.1	5.5 / 5.6	3.3 / 3.4	No	No
	17	0.0 / 0.0	5.5 / 5.5	3.3 / 3.3	No	No
	15	0.1 / 0.0	5.3 / 5.4	3.2 / 3.2	No	No
Deer Valley Road and Marita Drive	17	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	17	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	15	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	15	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
Deer Valley Road and Mammoth Way	17	0.1 / 0.1	4.1 / 4.2	2.3 / 2.4	No	No
	17	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	15	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	15	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
Deer Valley and Wellness Way	17	0.0 / 0.0	4.0 / 4.0	2.3 / 2.3	No	No
	17	0.0 / 0.0	4.0 / 4.0	2.3 / 2.3	No	No
	17	0.0 / 0.0	4.0 / 4.0	2.3 / 2.3	No	No
	15	0.0 / 0.0	3.9 / 3.9	2.2 / 2.2	No	No
Project Entrance and Sand Creek Road	8	0.0 / 0.0	3.3 / 3.3	1.8 / 1.8	No	No
	8	0.0 / 0.0	3.3 / 3.3	1.8 / 1.8	No	No
	8	0.0 / 0.0	3.3 / 3.3	1.8 / 1.8	No	No
	8	0.0 / 0.0	3.3 / 3.3	1.8 / 1.8	No	No
Hillcrest Avenue and Sand Creek Road	12	0.0 / 0.0	3.4 / 3.4	1.8 / 1.8	No	No
	12	0.0 / 0.0	3.4 / 3.4	1.8 / 1.8	No	No
	12	0.1 / 0.0	3.3 / 3.4	1.8 / 1.8	No	No
	10	0.1 / 0.0	3.3 / 3.4	1.8 / 1.8	No	No
Hillcrest Avenue and Project Entrance	14	0.2 / 0.1	3.3 / 3.5	1.8 / 1.9	No	No
	14	0.1 / 0.0	3.3 / 3.4	1.8 / 1.8	No	No
	14	0.1 / 0.0	3.3 / 3.4	1.8 / 1.8	No	No
	12	0.1 / 0.0	3.3 / 3.4	1.8 / 1.8	No	No
Hillcrest Avenue and Prewett Ranch Drive	17	0.1 / 0.1	3.6 / 3.7	2.0 / 2.1	No	No
	17	0.1 / 0.1	3.5 / 3.6	1.9 / 2.0	No	No
	15	0.1 / 0.1	3.5 / 3.6	1.9 / 2.0	No	No
	15	0.0 / 0.0	3.5 / 3.5	1.9 / 1.9	No	No
Hillcrest Avenue and Vista Grande Drive	14	0.1 / 0.1	3.6 / 3.7	2.0 / 2.1	No	No
	14	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	14	0.1 / 0.1	3.5 / 3.6	1.9 / 2.0	No	No
	12	0.1 / 0.1	3.5 / 3.6	1.9 / 2.0	No	No
Hillcrest Avenue and Lone Tree Way	17	0.0 / 0.0	5.9 / 5.9	3.6 / 3.6	No	No
	17	0.1 / 0.1	5.8 / 5.9	3.5 / 3.6	No	No
	17	0.0 / 0.0	5.7 / 5.7	3.5 / 3.5	No	No
	15	0.0 / 0.0	5.6 / 5.6	3.4 / 3.4	No	No
Vista Grande Drive and Lone Tree Way	17	0.0 / 0.0	5.7 / 5.7	3.5 / 3.5	No	No
	17	0.1 / 0.1	5.6 / 5.7	3.4 / 3.5	No	No
	15	0.0 / 0.0	5.6 / 5.6	3.4 / 3.4	No	No
	15	0.1 / 0.1	5.4 / 5.5	3.2 / 3.3	No	No

Table IV.C-5 *Continued*

Intersection	Receptor Distance to Road Centerline (Meters)	Project Related Increase 1-hr/ 8-hr (ppm)	Without/With Project One-Hour CO Concentration (ppm)	Without/With Project Eight-Hour CO Concentration (ppm)	Exceeds State Standards	
					1-Hr	8-Hr
Heidorn Ranch Road and Lone Tree Way	17	0.0 / 0.0	5.7 / 5.7	3.5 / 3.5	No	No
	17	0.1 / 0.1	5.5 / 5.6	3.3 / 3.4	No	No
	17	0.0 / 0.0	5.5 / 5.5	3.3 / 3.3	No	No
	17	0.0 / 0.0	5.5 / 5.5	3.3 / 3.3	No	No
Canada Valley Road and Lone Tree Way	24	0.0 / 0.0	5.8 / 5.8	3.5 / 3.5	No	No
	21	0.1 / 0.0	5.7 / 5.8	3.5 / 3.5	No	No
	21	0.0 / 0.0	5.4 / 5.4	3.2 / 3.2	No	No
	19	0.0 / 0.0	5.3 / 5.3	3.2 / 3.2	No	No
SR-4 Bypass and Lone Tree Way	14	0.1 / 0.1	6.4 / 6.5	3.9 / 4.0	No	No
	14	0.0 / 0.0	6.3 / 6.3	3.9 / 3.9	No	No
	14	0.1 / 0.0	6.0 / 6.1	3.7 / 3.7	No	No
	12	0.1 / 0.1	5.8 / 5.9	3.5 / 3.6	No	No
High School Access and Sand Creek Road	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No

Note: Includes ambient 1-hour concentrations of 3.2 ppm and ambient 8-hour concentration of 1.7 ppm, measured at the 10th Street, Pittsburg air monitoring station.
Source: LSA Associates, Inc., June 2008.

Table IV.C-6: CO Concentrations for Cumulative 2025 No Project and Cumulative 2025 Plus Project Conditions

Intersection	Receptor Distance to Road Centerline (Meters)	Project Related Increase 1-hr/ 8-hr (ppm)	Without/With Project 1-Hour CO Concentration (ppm)	Without/With Project 8-Hour CO Concentration (ppm)	Exceeds State Standards	
					1-Hr	8-Hr
Deer Valley Road and Lone Tree Way	21	0.0 / 0.0	4.0 / 4.0	2.3 / 2.3	No	No
	19	0.0 / 0.0	3.9 / 3.9	2.2 / 2.2	No	No
	17	0.0 / 0.0	3.9 / 3.9	2.2 / 2.2	No	No
	17	0.0 / 0.0	3.9 / 3.9	2.2 / 2.2	No	No
Deer Valley Road and Marita Drive	17	0.0 / 0.0	3.5 / 3.5	1.9 / 1.9	No	No
	17	0.0 / 0.0	3.5 / 3.5	1.9 / 1.9	No	No
	15	0.0 / 0.0	3.5 / 3.5	1.9 / 1.9	No	No
	15	0.0 / 0.0	3.5 / 3.5	1.9 / 1.9	No	No
Deer Valley Road and Mammoth Way	17	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	17	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	15	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	15	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
Deer Valley and Wellness Way	17	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	17	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	17	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	15	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
Project Entrance and Sand Creek Road	8	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	8	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	8	-0.1 / -0.1	3.7 / 3.6	2.1 / 2.0	No	No
	8	-0.1 / -0.1	3.7 / 3.6	2.1 / 2.0	No	No

Table IV.C-6 *Continued*

Intersection	Receptor Distance to Road Centerline (Meters)	Project Related Increase 1-hr/ 8-hr (ppm)	Without/With Project 1-Hour CO Concentration (ppm)	Without/With Project 8-Hour CO Concentration (ppm)	Exceeds State Standards	
					1-Hr	8-Hr
Hillcrest Avenue and Sand Creek Road	14	0.0 / 0.0	3.9 / 3.9	2.2 / 2.2	No	No
	14	0.0 / 0.0	3.9 / 3.9	2.2 / 2.2	No	No
	14	0.0 / 0.0	3.8 / 3.8	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.8 / 3.8	2.1 / 2.1	No	No
Hillcrest Avenue and Project Entrance	17	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	17	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	15	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
	15	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
Hillcrest Avenue and Prewett Ranch Drive	17	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	17	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	15	0.1 / 0.1	3.6 / 3.7	2.0 / 2.1	No	No
	15	0.0 / 0.0	3.6 / 3.6	2.0 / 2.0	No	No
Hillcrest Avenue and Vista Grande Drive	14	0.1 / 0.0	3.7 / 3.8	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
Hillcrest Avenue and Lone Tree Way	17	0.0 / 0.0	4.3 / 4.3	2.5 / 2.5	No	No
	17	0.1 / 0.1	4.2 / 4.3	2.4 / 2.5	No	No
	17	0.0 / 0.0	4.2 / 4.2	2.4 / 2.4	No	No
	15	0.0 / 0.0	4.2 / 4.2	2.4 / 2.4	No	No
Vista Grande Drive and Lone Tree Way	17	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	17	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	15	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
	15	0.0 / 0.0	4.1 / 4.1	2.3 / 2.3	No	No
Heidorn Ranch Road and Lone Tree Way	17	0.0 / 0.0	4.3 / 4.3	2.5 / 2.5	No	No
	17	0.0 / 0.0	4.2 / 4.2	2.4 / 2.4	No	No
	17	0.0 / 0.0	4.2 / 4.2	2.4 / 2.4	No	No
	15	0.0 / 0.0	4.2 / 4.2	2.4 / 2.4	No	No
Canada Valley Road and Lone Tree Way	22	0.0 / 0.0	4.4 / 4.4	2.5 / 2.5	No	No
	21	0.0 / 0.0	4.4 / 4.4	2.5 / 2.5	No	No
	21	0.0 / 0.0	4.3 / 4.3	2.5 / 2.5	No	No
	19	0.0 / 0.0	4.3 / 4.3	2.5 / 2.5	No	No
SR-4 Bypass and Lone Tree Way	14	0.0 / 0.0	4.8 / 4.8	2.8 / 2.8	No	No
	14	0.0 / 0.0	4.7 / 4.7	2.8 / 2.8	No	No
	14	0.0 / 0.0	4.6 / 4.6	2.7 / 2.7	No	No
	12	0.0 / 0.0	4.6 / 4.6	2.7 / 2.7	No	No
High School Access and Sand Creek Road	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No
	14	0.0 / 0.0	3.7 / 3.7	2.1 / 2.1	No	No

Note: Includes ambient 1-hour concentrations of 3.2 ppm and ambient 8-hour concentration of 1.7 ppm, measured at the 10th Street, Pittsburg air monitoring station.
Source: LSA Associates, Inc., June 2008.

The daily emission increase associated with project operational vehicular trip generation is identified in Table IV.C-7 for reactive organic gases (ROG) and nitrogen oxides (NO_x) (two precursors of ozone) as well as coarse particulate matter (PM_{10}). The BAAQMD has established thresholds of significance for ozone precursors and fugitive dust of 80 pounds per day. Proposed project emissions shown in Table IV.C-7 would not exceed these thresholds of significance for ROG, NO_x, and PM_{10}, and therefore, the proposed project would not have a significant effect on regional air quality.

Table IV.C-7: Project Regional Emissions in Pounds Per Day

	Reactive Organic Gases	Nitrogen Oxides	PM_{10}
Regional Emissions	60.47	44.34	44.12
BAAQMD Significance Threshold	80	80	80
Exceed?	**No**	**No**	**No**

Source: LSA Associates, Inc., October 2008.

c. Significant Air Quality Impacts. The project would result in the following significant air quality impact.

<u>Impact AIR-1</u>: Construction period activities during future development of the project site could generate significant dust, exhaust, and organic emissions. (S)

To prepare the project site for development, excavation of soil from the site would be required, which has a high potential for creating air pollutants. In addition to the dust created during site preparation for construction, substantial dust emissions could be created as debris and soil are loaded into trucks for disposal.

Construction activities from vehicles and equipment would generate exhaust, fugitive particulate matter, and organic gas emissions that would also affect local air quality. Solvents in adhesives, non-water-base paints, thinners, and some insulating and caulking materials would evaporate into the atmosphere that would participate in the photochemical reaction that creates urban ozone. Asphalt used in paving is also a source of organic gases for a short time after its application. Effects of project-related construction activities would be increased dustfall and locally elevated levels of PM_{10} downwind of construction activity. Construction dust would be generated at levels that would create an annoyance to nearby properties.

In addition to particulate emissions from earthmoving, air pollutants also would be emitted in the exhaust of construction equipment. To minimize this impact, prolonged idling of construction vehicles should be restricted and all construction equipment should be properly tuned and fitted with manufacturer's standard level exhaust controls.

According to the BAAQMD, if the construction emission control measures outlined in their CEQA Guidelines are implemented, then air pollutant emissions from construction activities would be considered a less-than-significant impact. The following mitigation measure includes all of the BAAQMD's control measures for construction emissions of PM_{10} applicable for all construction sites greater than four acres in area.

> <u>Mitigation Measure AIR-1</u>: Consistent with guidance from the BAAQMD, the following controls shall be implemented at all construction sites for the project to control dust production and fugitive dust.

- Water all active construction areas at least twice daily and more often during windy periods; active areas adjacent to existing sensitive land uses shall be kept damp at all times, or shall be treated with non-toxic stabilizers to control dust;
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard;
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites;
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites;
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets;
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more);
- Enclose, cover, water twice daily or apply (non-toxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.);
- Limit traffic speeds on unpaved roads to 15 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways;
- Replant vegetation in disturbed areas as quickly as possible;
- On-site idling of construction equipment shall be minimized as much as feasible (no more than 5 minutes maximum);
- All construction equipment shall be properly tuned and fitted with manufacturer's standard level exhaust controls;
- Contractors shall consider using alternative powered construction equipment (i.e., hybrid, compressed natural gas, biodiesel, electric) when feasible;
- Contractors shall use add-on control devices such as diesel oxidation catalysts or particulate filters; and
- All contractors shall use equipment that meets California Air Resources Board's (ARB) most recent certification standard for off-road heavy duty diesel engines. (LTS)

Implementation of this mitigation measure would reduce construction period air quality impacts to a less-than-significant level.

d. Project's Criteria Pollutants and Public Health. Despite great progress in improving air quality, approximately 105.6 million people nationwide lived in counties with pollution levels above the National Ambient Air Quality Standards (NAAQS) in 2006. In these nonattainment areas, however, the severity of air pollution episodes has decreased. Air quality in the San Francisco Bay Area Air Basin in the past 20 years has improved steadily and dramatically, even with the tremendous increase in population and vehicles and other sources.

As shown in Table IV.C-2, long term exposure to elevated levels of criteria pollutants could result in potential health effects. However, as stated in the thresholds of significance, emission thresholds

established by the air district are used to manage total regional emissions within an air basin, based on the air basin attainment status for criteria pollutants. These emission thresholds were established for individual projects that would contribute to regional emissions and pollutant concentrations that may affect or delay the projected attainment target year for certain criteria pollutants.

Because of the conservative nature of the thresholds and the basin-wide context of individual project emissions, there is no direct correlation of a single project to localized health effects. One individual project having emissions exceeding a threshold does not necessarily result in adverse health effects for residents in the project vicinity. This condition is especially true when the criteria pollutants exceeding thresholds are those with regional effects, such as ozone precursors like NOx and ROG.

Based on the above discussion, the potential for an individual project to significantly deteriorate regional air quality or contribute to significant health risk is small, even if the emission thresholds are exceeded by the project. Because of the overall improvement trend on air quality in the air basin, it is unlikely the regional air quality or health risk would worsen from the current condition due to emissions from an individual project. As shown in the project specific analysis, the proposed project would not contribute significant regional emissions or create localized CO hot spots.

D. NOISE

This section describes existing noise conditions in the vicinity of the project area, describes criteria for determining the significance of noise impacts, and estimates the likely noise that would result from the proposed project. Where appropriate, mitigation measures are recommended to reduce project-related noise impacts to a less-than-significant level.

1. Setting

The setting section begins with an introduction to several key concepts and terms that are used in evaluating noise. It then explains the various agencies that regulate the noise environment in the City of Antioch and summarizes key standards that are applied to proposed development. This setting section concludes with a description of current noise sources that affect the project site and the noise conditions that are experienced in the project site vicinity.

a. Characteristics of Sound. Noise is generally defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: *pitch* and *loudness*. Pitch is the number of complete vibrations or cycles per second of a wave that results in the range of tone from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effects on adjacent sensitive land uses.

(1) Measurement of Sound. Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. Table IV.D-1 contains a list of typical acoustical terms and definitions. Table IV.D-2 shows representative outdoor and indoor noise levels in units of dBA.

A decibel (dB) is a unit of measurement which indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense. Each 10-dB increase in sound level is perceived as approximately a doubling of loudness.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Geometric spreading causes the sound

Table IV.D-1: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of five decibels to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, 1991.

Table IV.D-2: Typical A-Weighted Sound Levels

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments
Near Jet Engine	140	Deafening
Civil Defense Siren	130	Threshold of pain
Hard Rock Band	120	Threshold of feeling
Accelerating Motorcycle at a Few Feet Away	110	Very loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very loud
Ambulance Siren; Food Blender	95	Very loud
Garbage Disposal	90	Very loud
Freight Cars; Living Room Music	85	Loud
Pneumatic Drill; Vacuum Cleaner	80	Loud
Busy Restaurant	75	Moderately loud
Near Freeway Auto Traffic	70	Moderately loud
Average Office	60	Moderate
Suburban Street	55	Moderate
Light Traffic; Soft Radio Music in Apartment	50	Quiet
Large Transformer	45	Quiet
Average Residence Without Stereo Playing	40	Faint
Soft Whisper	30	Faint
Rustling Leaves	20	Very faint
Human Breathing	10	Very faint

Source: Compiled by LSA Associates, Inc., 2007.

level to attenuate or be reduced, resulting in a 6 dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise sensitive receptor of concern.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq}, the community noise equivalent level (CNEL), and the day-night average level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening relaxation hours. CNEL and L_{dn} are within one dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours. Typical A-weighted sound levels from various sources are described in Table IV.D-2.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions, and addresses the annoying aspects of intermittent noise.

Noise standards in terms of percentile exceedance levels, L_n, are often used together with the L_{max} for noise enforcement purposes. When specified, the percentile exceedance levels are not to be exceeded by an offending sound over a stated time period. For example, the L_{10} noise level represents the level exceeded ten percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the lowest noise level experienced during a monitoring period. It is normally referred to as the background noise level. For a relatively steady noise, the measured L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first is audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dBA or greater, since, as described earlier, this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1.0 dB that are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

(2) Psychological and Physiological Effects of Noise. Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, and thereby affecting blood pressure, functions of the ear, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell

damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling.

b. Existing Noise Environment. The project components are located in primarily urban areas. The following section describes the existing noise environment and identifies primary noise sources in each of the component areas of the project.

(1) Existing Traffic Noise Levels. Vehicular traffic is a major source of ambient noise levels in urban settings. The existing traffic noise levels for roadway segments in the project vicinity are listed in Table IV.D-3 below. This table was generated from roadway traffic volumes data, vehicle speeds, and roadway geometry, using the Federal Highways Administration (FHWA) Highway Traffic Noise Prediction Model (see Appendix E). Existing noise levels along select roadway segments in the vicinity of the project (at 50 feet outward from the roadway center line) range from 59.8 dBA CNEL to 70.6 dBA CNEL. Figure IV.B-1 (see Section IV.B, Transportation and Circulation) shows the roadway segments analyzed in this study.

(2) Existing Railroad Noise Levels. Railroad activities in the City of Antioch include the Southern Pacific Railroad. The Southern Pacific Railroad line passes approximately 2 miles to the east of the proposed project site. The proposed project is located beyond railroad 55 dBA noise contours.

(3) Existing Aircraft Noise Levels. Byron Airport is located approximately 9 miles southeast of the project site. Buchanan Field Airport is located approximately 15 miles west of the project site. Rio Vista Municipal Airport is located approximately 18 miles to the north of the project site. Travis Air Force Base is located approximately 22 miles to the northwest of the project site. The proposed project would not locate any new sensitive receptors within airport 55 dBA noise contours nor within an airport land use plan.

Table IV.D-3: Existing (2008) Baseline Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Deer Valley Road - Lone Tree Way to Marita Drive	12,900	< 50 [a]	91	191	66.5
Deer Valley Road - Marita Drive to Prewett Ranch Drive	12,300	< 50	88	185	66.3
Deer Valley Road - Prewett Ranch Drive to Mammoth Way	10,200	< 50	79	164	65.5
Vista Grande Drive - Lone Tree Way to Hillcrest Avenue	3,600	< 50	< 50	84	60.9
Hillcrest Avenue - Lone Tree Way to Vista Grande Drive	2,800	< 50	< 50	73	59.9
Hillcrest Avenue - Vista Grande Drive to Prewett Ranch Drive	3,000	< 50	< 50	76	60.2

[a] Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Source: LSA Associates Inc., June 2008.

c. Noise Regulatory Framework. The following section summarizes the regulatory framework related to noise, including federal, State, and City of Antioch plans, policies and standards.

(1) U.S. Environmental Protection Agency (EPA). In 1972 Congress enacted the Noise Control Act. This act authorized the EPA to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table IV.D-4. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dB. The "(24)" signifies an L_{eq} duration of 24 hours. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor L_{dn} of 55 dB are summarized in Table IV.D-5. At 55 dB L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 3.5 meters, and no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

(2) State of California. The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the "State Noise Insulation Standard," it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the

Table IV.D-4: Summary of EPA Protective Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, 1974. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." March.

Table IV.D-5: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meters (1.15 feet). 99 percent sentence intelligibility (average) at 1.0 meters (3.3 feet). 95 percent sentence intelligibility (average) at 3.5 meters (11.5 feet)
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below "vigorous action."
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency, 1974. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." March.

extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City has adopted and modified the State's land use compatibility guidelines, as discussed below.

(3) City of Antioch. The City of Antioch addresses noise in the General Plan[1] and in the Municipal Code.[2] These are described below.

Antioch General Plan. The Antioch General Plan addresses noise in the Environmental Hazards Element. Noise objectives and polices that relate to the proposed project are included below.

Environmental Hazards

- *Noise Objective 11.6.1:* Achieve and maintain exterior noise levels appropriate to planned land uses throughout Antioch… (Residential: Single Family: 60 dBA CNEL within rear yards and Multi-Family: 60 dBA CNEL within interior open space).
  - *Noise Compatible Land Use and Circulation Patterns Policy 11.6.2c:* Minimize motor vehicle noise in residential areas through proper route location and sensitive roadway design. Provide planned industrial areas with truck access routes separated from residential areas to the maximum feasible extent. Where needed, provide traffic calming devices to slow traffic speed within residential neighborhoods.
  - *Noise Analysis and Mitigation Policy 11.6.2d:* Where new development (including construction and improvement of roadways) is proposed in areas exceeding the noise levels identified in the General Plan Noise Objective, or where the development of proposed uses could result in a significant increase in noise, require a detailed noise attenuation study to be prepared by a qualified acoustical engineer to determine appropriate mitigation and ways to incorporate such mitigation into project design and implementation.
  - *Noise Analysis and Mitigation Policy 11.6.2f:* In reviewing noise impacts, utilize site design and architectural design features to the extent feasible to mitigate impacts on residential neighborhoods and other uses that are sensitive to noise. In addition to sound barriers, design techniques to mitigate noise impacts may include, but are not limited to:
    - Increased building setbacks to increase the distance between the noise source and sensitive receptor.
    - Orient buildings which are compatible with higher noise levels adjacent to noise generators or in clusters to shield more noise sensitive areas and uses.
    - Orient delivery, loading docks, and outdoor work areas away from noisesensitive uses.
    - Place noise tolerant use, such as parking areas, and noise tolerant structures, such as garages, between the noise source and sensitive receptor.

[1] Antioch, City of, 2003. *General Plan*. November.

[2] Antioch, City of, 2006. *Code of Ordinances*. July.

  - Cluster office, commercial, or multifamily residential structures to reduce noise levels within interior open space areas.
  - Provide double glazed and double paned windows on the side of the structure facing a major noise source, and place entries away from the noise source to the extent possible.
- *Noise Analysis and Mitigation Policy 11.6.2g:* Where feasible, require the use of noise barriers (walls, berms, or a combination thereof) to reduce significant noise impacts. Noise barriers must have sufficient mass to reduce noise transmission and high enough to shield the receptor from the noise source.
  - To be effective, the barrier needs to be constructed without cracks or openings.
  - The barrier must interrupt the line of sight between the noise source and noise receptor.
  - The effects of noise "flanking" the noise barrier should be minimized by bending the end of the barrier back from the noise source.
  - Require appropriate landscaping treatment to be provided in conjunction with noise barriers to mitigate their potential aesthetic impacts.
- *Noise Analysis and Mitigation Policy 11.6.2h:* Continue enforcement of California Noise Insulation Standards (Title 25, Section 1092, California Administrative Code).

The General Plan also addresses temporary construction noise. Under Temporary Construction in section 11.6.2 Noise Policies, the General Plan encourages the use of temporary noise-attenuation fences and limiting noise-producing construction related activities to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday, with no construction allowed on Sundays and public holidays.

Antioch Municipal Code. The key regulatory codes for the City of Antioch related to the proposed project are found in Chapter 5, Articles 17 & 19, and in Chapter 17, Sections 5-17.04 & 5-17.05, of the City's Municipal Code. According to the Municipal Code, noise-producing construction activity is limited to weekdays between the hours of 8:00 a.m. and 5:00 p.m. when work is within 300 feet of occupied dwellings, and to weekends between the hours of 9:00 a.m. and 5:00 p.m. irrespective of the distance from occupied dwellings. It should be noted that the construction hours listed in the Municipal Code differ from those listed in the General Plan. The most conservative combination of these standards has been applied to the impacts and mitigation measures outlined in this report.

2. Impacts and Mitigation Measures

This section evaluates potential noise impacts associated with implementation of the proposed project. It also identifies mitigation measures to address these impacts where appropriate.

a. Criteria of Significance. A project would have a significant noise effect if it would substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the State's noise criteria, the City of Antioch's Noise Element of the General Plan, and applicable sections of the City's Municipal Code. For the purposes of this project, a noise impact is considered significant if the project would:

- Cause exterior noise levels in rear yards of single family residences to permanently exceed 60 dBA CNEL (City criteria);
- Increase permanent ambient exterior noise levels by more than 5 dBA over existing levels without the project (even if resulting levels are still under 60 dBA CNEL) for noise-sensitive uses in the project vicinity (City criteria);

- Cause a substantial (over 5 dBA) temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project (City criteria);
- Expose persons to or generate excessive groundborne vibration or noise levels (State criteria); or
- Expose people residing or working within an airport land use plan area or within two miles of a public use airport, if no airport land use plan has been adopted, to excessive noise levels (State criteria).

For the purpose of this analysis, noise sensitive uses/receptors include existing residences adjacent to the project and the project itself.

b. Less-Than-Significant Noise Impacts. The following noise types/sources would produce less-than-significant noise effects at or near the project site.

(1) Existing Railroad Noise Impacts. The Southern Pacific Railroad line passes approximately 2 miles to the east of the proposed project site. Due to the distance and location of the railroad line from the site, ambient noise levels on the project site are not significantly affected by railroad operations.

(2) Existing Aircraft Noise Impacts. Byron Airport is located approximately 9 miles southeast of the project site. Buchanan Field Airport is located approximately 15 miles west of the project site. Rio Vista Municipal Airport is located approximately 18 miles to the north of the project site. Travis Air Force Base is located approximately 22 miles to the northwest of the project site. Due to the project site's distance from and the flight path orientation of these airports, the noise effect from aircraft noise sources is less-than-significant for the project site in terms of 24 hour averaged noise levels such as CNEL or L_{dn}.

c. Significant Noise Impacts. The following noise sources would produce significant noise levels at or near the project site.

(1) Construction Period Impacts. The project site is currently surrounded by residential development to the north, Kaiser Hospital to the west and open space to the east and south. Project construction would result in short-term noise impacts on these adjacent land uses. The level and types of noise impacts that would occur during construction are described below.

<u>Impact NOISE-1</u>: Construction period activities could create significant short-term noise impacts on existing residential properties and on buildings that would become occupied within the project site before completion of the entire project. (S)

Noise levels from construction activities such as finished grading and building erection for the proposed project may range up to 91 dBA L_{max} at 50 feet from the active construction area for a limited time period.

The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on existing access roads leading to the site. Noise impacts from trucks would occur on the site for the duration of the construction period. Noise from passing trucks (86 dBA L_{max} at 50 feet) would be similar to existing truck-generated noise. Noise generated during

excavation, grading, and building erection on the project site would result in potential noise impacts to off-site uses and to on-site uses while later phases of construction continue. Existing residents in the vicinity of the project site may also experience short-term noise generated by construction equipment and activities on the project site when construction occurs near the project boundary.

Construction of the proposed project (including construction related to the off-site high school access road and the utility lines construction) is expected to require the use of earthmovers such as bulldozers and scrapers, loaders and graders, water trucks, and pickup trucks. Use of pile drivers and rock drills is not expected during construction of the proposed project. As shown in Table IV.D-6, the typical maximum noise level generated by each bulldozer on the project site is assumed to be 85 dBA L_{max} at 50 feet from the operating earthmover. The maximum noise level generated by hydraulic backhoes is approximately 86 dBA L_{max} at 50 feet. The maximum noise level generated by water and other trucks is approximately 86 dBA L_{max} at 50 feet from these vehicles. Each doubling of the sound sources with equal strength would increase the noise level by 3 dBA. Assuming each piece of construction equipment operates at some distance apart from the other equipment, the worst-case combined noise level at the nearest uses to the site during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from an active construction area. The only sensitive receptors for construction related noise would be the residential properties located along the northern property line and properties that would be occupied on the site before construction is complete.

Table IV.D-6: Typical Construction Equipment Maximum Noise Levels

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	74 to 84	80
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Cranes	79 to 86	82
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	77 to 90	85
Tractors	77 to 82	80
Front-End Loaders	77 to 90	86
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 89	86
Trucks	81 to 87	86

Source: Bolt, Beranek & Newman, 1987. *Noise Control for Buildings and Manufacturing Plants.*

In accordance with City standards, implementation of the following multi-part mitigation measure for project construction would reduce potential construction period noise impacts to less-than-significant levels:

> Mitigation Measure NOISE-1a: The construction contractor shall limit all noise producing construction related activities, including haul truck deliveries or warming up and idling of heavy construction equipment, to the hours of 8:00 a.m. to 5:00 p.m. on weekdays. On Saturdays, noise producing construction activities shall be limited to 9:00 a.m. to 5:00 p.m., irrespective of the distance from occupied dwellings. No construction shall be allowed on Sundays and public holidays. All weekend noise producing construction activity is subject to approval by the City Engineer.

Mitigation Measure NOISE-1b: During all project site excavation and on-site grading, the construction contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

Mitigation Measure NOISE-1c: The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

Mitigation Measure NOISE-1d: The construction contractor shall locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

Mitigation Measure NOISE-1e: The construction contractor shall use temporary noise attenuation fences at least 6 feet in height to protect all sensitive receptors along the northern property line that are not currently protected by a sound wall of at least 6 feet in height. (LTS)

(2) Operational Period Impacts. Significant long-term noise impacts that could be experienced as a result of the project include increased traffic noise levels on roadway segments adjacent to and in the vicinity of the project site.

Impact NOISE-2: Local traffic would generate long-term exterior noise exceeding normally acceptable levels on the project site and could expose site uses to unacceptable noise levels. (S)

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the project site. The resultant noise levels were weighed and summed over a 24-hour period in order to determine the CNEL values. The existing, near-term (year 2011), and cumulative (year 2025) traffic volumes for roadway segments in the project vicinity were used in the traffic noise impact analysis. Tables IV.D-7 and IV.D-9 show the near-term (2011) and cumulative (2025) traffic noise levels without the project for roadway segments in the project site vicinity. Tables IV.D-8 and IV.D-10 show the predicted near-term (2011) and cumulative (2025) traffic noise levels with the project for roadway segments in the project site vicinity. The bolded text in the tables indicates the roadway segments most affecting the project site.

According to the significance criteria of the City of Antioch, a significant impact would occur if the project would permanently increase ambient exterior noise levels by more than 5 dBA over existing levels without the project. The segment of Hillcrest Avenue from Prewett Ranch Drive to the project's east entrance under the near-term plus project conditions would experience the highest increase in traffic noise levels of up to 2.4 dBA over near term (2011) conditions without the project. No roadway segment would experience an increase in traffic noise levels with implementation of the project of 5 dBA or greater over levels without the project. Therefore, implementation of the proposed project would result in a less-than-significant increase in traffic noise levels.

The significance criteria also state that a significant impact would occur if the project would cause exterior noise levels in rear yards of single family residences to permanently exceed 60 dBA CNEL. All roadway segments under the cumulative (2025) without the project conditions would experience traffic noise levels above 60 dBA CNEL. Since these traffic noise levels would exist even without implementation of the proposed project, off-site traffic noise impacts would not be considered a significant impact as a result of project implementation. However, mitigation would be required to protect the planned residential land uses within the proposed project.

Table IV.D-7: Near-Term (2011) Traffic Noise Levels without the Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Deer Valley Road - Lone Tree Way to Marita Drive	17,600	56	111	234	67.8
Deer Valley Road - Marita Drive to Prewett Ranch Drive	17,000	< 50	108	229	67.7
Deer Valley Road - Prewett Ranch Drive to Mammoth Way	16,500	< 50	106	224	67.6
Vista Grande Drive - Lone Tree Way to Hillcrest Avenue	4,300	< 50	< 50	94	61.7
Hillcrest Avenue - Lone Tree Way to Vista Grande Drive	5,200	< 50	< 50	106	62.5
Hillcrest Avenue - Vista Grande Drive to Prewett Ranch Drive	5,300	< 50	< 50	107	62.6
Hillcrest Avenue - Prewett Ranch Drive to East Entrance	**2,400**	**< 50**	**< 50**	**66**	**59.2**
Hillcrest Avenue - East Entrance to Sand Creek Road	**1,700**	**< 50**	**< 50**	**< 50**	**57.7**
Sand Creek Road - Hillcrest Avenue to South Entrance	**1,600**	**< 50**	**< 50**	**< 50**	**57.4**
Sand Creek Road - South Entrance to Future school access road	**1,600**	**< 50**	**< 50**	**< 50**	**57.4**

[a] Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Bold indicates roadway segments most affecting the project site.
Source: LSA Associates Inc., June 2008

Table IV.D-8: Near-Term (2011) Traffic Noise Levels with the Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase from Near-Term Condition
Deer Valley Road - Lone Tree Way to Marita Drive	17,600	56	111	234	67.8	0.0
Deer Valley Road - Marita Drive to Prewett Ranch Drive	17,100	< 50	109	230	67.7	0.0
Deer Valley Road - Prewett Ranch Drive to Mammoth Way	16,600	< 50	107	225	67.6	0.0
Vista Grande Drive - Lone Tree Way to Hillcrest Avenue	4,300	< 50	< 50	94	61.7	0.0
Hillcrest Avenue - Lone Tree Way to Vista Grande Drive	7,000	< 50	63	128	63.8	1.3
Hillcrest Avenue - Vista Grande Drive to Prewett Ranch Drive	7,100	< 50	64	129	63.9	1.3
Hillcrest Avenue - Prewett Ranch Drive to East Entrance	**4,200**	**< 50**	**< 50**	**93**	**61.6**	**2.4**
Hillcrest Avenue - East Entrance to Sand Creek Road	**1,900**	**< 50**	**< 50**	**58**	**58.2**	**0.5**
Sand Creek Road - Hillcrest Avenue to South Entrance	**1,900**	**< 50**	**< 50**	**58**	**58.2**	**0.8**
Sand Creek Road - South Entrance to Future school access road	**1,600**	**< 50**	**< 50**	**< 50**	**57.4**	**0.0**

[a] Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Bold indicates roadway segments most affecting the project site.
Source: LSA Associates Inc., June 2008

Table IV.D-9: Cumulative (2025) Traffic Noise Levels without the Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Deer Valley Road - Lone Tree Way to Marita Drive	17,400	< 50	110	232	67.8
Deer Valley Road - Marita Drive to Prewett Ranch Drive	16,700	< 50	107	226	67.6
Deer Valley Road - Prewett Ranch Drive to Mammoth Way	21,700	63	127	269	68.7
Vista Grande Drive - Lone Tree Way to Hillcrest Avenue	5,300	< 50	< 50	107	62.6
Hillcrest Avenue - Lone Tree Way to Vista Grande Drive	23,200	65	132	281	69.0
Hillcrest Avenue - Vista Grande Drive to Prewett Ranch Drive	25,100	68	139	296	69.4
Hillcrest Avenue - Prewett Ranch Drive to East Entrance	**23,800**	**66**	**134**	**286**	**69.1**
Hillcrest Avenue - East Entrance to Sand Creek Road	**20,900**	**61**	**124**	**262**	**68.6**
Sand Creek Road - Hillcrest Avenue to South Entrance	**20,000**	**56**	**118**	**255**	**68.4**
Sand Creek Road - South Entrance to Future school access road	**20,000**	**56**	**118**	**255**	**68.4**

[a] Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Bold indicates roadway segments most affecting the project site.
Source: LSA Associates Inc., June 2008

Table IV.D-10: Cumulative (2025) Traffic Noise Levels with the Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase from Cumulative Condition
Deer Valley Road - Lone Tree Way to Marita Drive	17,400	< 50	110	232	67.8	0.0
Deer Valley Road - Marita Drive to Prewett Ranch Drive	16,700	< 50	107	226	67.6	0.0
Deer Valley Road - Prewett Ranch Drive to Mammoth Way	21,700	63	127	269	68.7	0.0
Vista Grande Drive - Lone Tree Way to Hillcrest Avenue	5,300	< 50	< 50	107	62.6	0.0
Hillcrest Avenue - Lone Tree Way to Vista Grande Drive	23,700	66	134	285	69.1	0.1
Hillcrest Avenue - Vista Grande Drive to Prewett Ranch Drive	25,900	69	142	302	69.5	0.1
Hillcrest Avenue - Prewett Ranch Drive to East Entrance	**24,600**	**67**	**137**	**292**	**69.3**	**0.2**
Hillcrest Avenue - East Entrance to Sand Creek Road	**21,100**	**62**	**124**	**264**	**68.6**	**0.0**
Sand Creek Road - Hillcrest Avenue to South Entrance	**20,200**	**56**	**119**	**256**	**68.4**	**0.0**
Sand Creek Road - South Entrance to Future school access road	**20,300**	**57**	**120**	**257**	**68.5**	**0.1**

[a] Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Bold indicates roadway segments most affecting the project site.
Source: LSA Associates Inc., June 2008

As stated above, roadway segments adjacent to the project site would experience noise levels in excess of 60 dBA CNEL under the cumulative condition without the project. Proposed residential land uses within 50 feet of the centerline of the outermost travel lane of the segments of Hillcrest Avenue from Prewett Ranch Drive to Sand Creek Road would experience traffic noise levels of up to 69.3 dBA CNEL with the project. Proposed residential land uses within 50 feet of the centerline of the outermost travel lane of the segments of Sand Creek Road from Hillcrest Avenue to the future school access road on the western border of the project site would experience traffic noise levels of up to 69.3 dBA CNEL with the project.

A sound wall barrier analysis was performed to determine adequate sound wall heights to reduce the traffic noise impacts on planned residential land uses within the project site to less-than-significant levels. The results of this barrier analysis are shown in Table IV.D-11. Results indicate that a sound wall of 8 feet in height along Hillcrest Avenue, and a sound wall of 8 feet in height along Sand Creek Road, would reduce traffic noise levels to within the City's acceptable range of 60 dBA CNEL[3] for new residential outdoor activity areas. These sound wall heights are measured in feet above the finished roadway elevation.

Table IV.D-11: Predicted Traffic Noise Levels at the First Row of Outdoor Activity Areas with Varying Barrier Heights

Roadway Segment	Modeled Receptor Location	Modeled Barrier Location	Traffic Noise Level Without Barrier, dBA CNEL	Barrier Height	Traffic Noise Level With Barrier, dBA CNEL
Hillcrest Avenue - Prewett Ranch Drive to East Entrance	Outdoor active use areas assumed to be 50 feet from edge of roadway	Barrier modeled at 12 feet from edge of roadway	69.3	6' **8'** 10'	62.5 **60.8** 58.9
Hillcrest Avenue - East Entrance to Sand Creek Road			68.6	6' **8'** 10'	61.9 **60.2** 58.3
Sand Creek Road - Hillcrest Avenue to South Entrance			68.4	6' **8'** 10'	61.7 **60.0** 58.1
Sand Creek Road - South Entrance to Future school access road			68.5	6' **8'** 10'	61.7 **60.0** 58.1

Bold indicates the minimum barrier height necessary to reduce traffic noise level to meet the City's standard of 60 dBA CNEL for new residential outdoor activity areas. For the Hillcrest Avenue segments, the 0.8 dBA and 0.2 dBA in excess of the exterior noise standard for new residential land uses is marginal and within the modeling statistical margin of error. It is, therefore, the conclusion of this analysis that such a noise level meets the City's standard.
Source: LSA Associates Inc., June 2008

Implementation of the following multi-part mitigation measure would reduce noise levels to below the exterior noise threshold of 60 dBA CNEL and the interior noise threshold of 45 dBA CNEL:

> Mitigation Measure NOISE-2a: A sound wall barrier at least 8-feet-high (measured above the finished roadway elevation) shall be constructed along the project property line adjacent to Hillcrest Avenue to reduce traffic noise impacts to a less-than-significant level. The sound

[3] For the Hillcrest Avenue segments, the 0.8 dBA and 0.2 dBA in excess of the exterior noise standard for new residential land uses is marginal and within the modeling statistical margin of error. It is, therefore, the conclusion of this analysis that such a noise level meets the City's standard.

wall should be of solid construction without gaps (including at the bottom), and have a minimum surface weight of 4 pounds per square foot.

Mitigation Measure NOISE-2b: A sound wall barrier at least 8-feet-high (measured above the finished roadway elevation) shall be constructed along the project property line adjacent to Sand Creek Road to reduce traffic noise impacts to a less-than-significant level. The sound wall should be of solid construction without gaps (including at the bottom), and have a minimum surface weight of 4 pounds per square foot. (LTS)

Implementation of these mitigation measures would sufficiently mitigate traffic noise levels to comply with the City's General Plan requirements and thus reduce the traffic noise impact on the project from cumulative development without the project to a less-than-significant level.

E. CULTURAL AND PALEONTOLOGICAL RESOURCES

This section provides an overview of the potential for cultural and paleontological resources to occur within the project area and assesses potential impacts to those resources that could result from development of the proposed project. William Self Associates (WSA) has conducted extensive surveys of the project area and vicinity, the results of which are referenced throughout this section.

Cultural resources are sites, buildings, structures, objects, and districts that have traditional or cultural value for the historical significance they possess. Paleontological resources are the fossilized remains of plants and animals. The California Environmental Quality Act (CEQA) requires that effects to cultural and paleontological resources be considered in the planning process.

1. Setting

The results of records searches, literature reviews, field surveys, and contacts with potentially interested parties undertaken to identify the potential for cultural and paleontological resources to occur within the project area and vicinity are provided in this section.

a. Cultural Resources. This section describes the research and field methods used, and then describes the prehistory, ethnography, and history of the project area.

(1) Research Methods. Research for this cultural resources analysis included a records search, literature review, field survey, and consultation with potentially interested parties. The background research was conducted to: (1) identify previously-recorded or otherwise known cultural resources and cultural resource studies in or adjacent to the project area; and (2) understand the archaeological, ethnographic, and environmental history of the project area. Field surveys of both the project area and the off-site corridors were conducted to identify unrecorded cultural resources within or adjacent to the project area and off-site corridors.

Records Search and Literature Review. The staff at the California Historical Resources Information System, Northwest Information Center (NWIC) at Sonoma State University conducted a records search of the project vicinity on November 6, 2006 (File No. 06-341). The NWIC conducted a second records search on May 20, 2008 (File No. 07-1665) to include the off-site corridors in the eastern portion of the project area. The records searches included a review of all cultural resource and excavation reports and recorded archaeological sites within a ¼-mile radius of the project area boundaries. The literature review included a review of archaeological, ethnographic, historical, and environmental literature as well as records and maps on file at the California Archaeological Inventory.

Three studies[1] have been conducted within the project area and another seven[2] within or immediately adjacent to the off-site corridors to the east of the project area. Two additional studies[3] have occurred within a ¼-mile radius of the records search areas. The survey conducted by William Self Associates in 1993 (report prepared in 1994) for the Future Urban Area 1 project was an intensive pedestrian survey that included the entire project area, with the exception of a portion of the Heidorn Ranch Road expansion corridor. CA-CCO-682H (P-07-000005), partially located within the off-site Sand Creek Road (east) corridor, was recorded during this survey. The site is described as a historic ranching outpost with five habitation-associated features consisting of an earthen loading ramp, a metal water tank made from an old truck bed, a kidney-shaped depression representing a possible foundation, a circular cistern, and a barbed-wire fence enclosure surrounding a well. Square-headed wrought iron nails and a fragment of white stoneware were also observed within the site area.[4] The site marks the location of A.G. Darby's ranch, an early settler within the area who farmed the land throughout the mid- to late-1800s. The site was subsequently taken over by Henry Heidorn, another well-known local settler, whose grown daughter and her family lived at the site in the early- to mid-1900s. WSA stated that CA-CCO-682H appeared to be potentially eligible for listing on the National Register of Historic Places (NRHP) / California Register of Historical Resources (CRHR) under

[1] William Self Associates, Inc., 1990. Cultural Resources Assessment Report for Lone Tree Valley Feasibility Study, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

William Self Associates, Inc., 1994. Archeological Survey Report, Future Urban Area 1, Antioch, Contra Costa County, California. Report prepared for Mundie & Associates, San Francisco, California.

Samuelson, Ann, Carolyn Rice, Carrie Wills, and William Self, 1994. Archaeological Survey and Testing Report, Sand Creek Flood Detention Basin Project, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

[2] Mayfield, David W., 1978. Ecology of the Pre-Spanish San Francisco Bay Area. On file at the NWIC, Rohnert Park, California.

Bramlette, Allan G., Mary Praetzellis, Adrian Praetzellis, Katherine M. Dowdall, Patrick Brunmeier, and David A. Fredrickson, 1991. Archaeological Resources Inventory for Los Vaqueros Water Conveyance Alignments, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

Moratto, Michael, Richard Pettigrew, Barry Price, Lester Ross, Randall Schalk, Judith Willig, Christian Miss, Clayton Lebow, Ricky Atwell, Gary Bowyer, Lou Ann Speulda, Lynda Sekora, Robert Bryson, Craig Skinner, William Hildebrandt, and Patricia Mikkelsen, 1995. Archaeological Investigations, PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California (Volume I, II, III, IV, V). On file at the NWIC, Rohnert Park, California.

Jones & Stokes Associates, Inc., 1996. Cultural Resources Investigation for the Proposed City of Brentwood Interim Water Supply Program, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

Meyer, Jack and David A. Fredrickson, 1996. Results of a Subsurface Archaeological Survey of the Proposed Los Vaqueros and Transfer Pipeline Routes, Los Vaqueros Project, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

Windmiller, Ric and Daniel J. Osanna, 2004. Bridle Gate, Cultural Resources Inventory and Evaluation, Brentwood, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

Basin Research Associates, 2006. Historic Properties Survey Report/Finding of Effect (No Historic Properties Affected), PG&E Delta Distribution Planning Area (DPA) Capacity Increase Substation Project, City of Antioch, Contra Costa County, California. On file at the NWIC, Rohnert Park, California.

[3] Jensen & Associate, 1986. Class III Intensive Archaeological Field Reconnaissance of the Kellogg Reformulation Unit, Highline Canal Alternative, Contra Costa and Alameda Counties. On file at the NWIC, Rohnert Park, California.

U.S. Bureau of Reclamation, 1983. Class II Archaeological Survey, San Luis Drain and Alternatives, Central Valley Project, San Luis Unit, California, 1983. On file at the NWIC, Rohnert Park, California.

[4] William Self Associates, 1993. Archaeological Site Record for P-07-000005/ CA-CCO-682H. On file at the NWIC, Rohnert Park, California.

criterion D/4.[5] The site was revisited by Basin Research Associates in 2006, and five test pits were excavated along the south, southeast and east site boundaries. No subsurface cultural material was located and Basin Research Associates concluded that the site was not eligible for inclusion in the NRHP and/or CRHR under Criterion D/4.[6] However, their testing plan was limited in scope, with testing undertaken only around the two margins of the site that would be affected by their proposed project. It is likely that intact subsurface deposits may exist in those portions of the site that were not tested by Basin Research Associates.

The records search indicated that there are no historic properties within the project area that are listed on the NRHP, the CRHR, the California Inventory of Historic Resources, the California Historical Landmarks, or the California Points of Historical Interest. No buildings or structures are depicted within the project boundary on the 1862 Grant Land Office maps.

Native American Consultation. On October 24, 2006, the Native American Heritage Commission (NAHC) was contacted with a request for information on known Native American traditional or cultural properties within the project area, and a listing of interested Native Americans with cultural affiliation to the area. In a letter dated November 1, 2006, NAHC staff replied "a record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area." The NAHC letter of response also provided a list of Native American Contacts.

Field Survey. As discussed previously, an intensive pedestrian field survey of most of the project area was conducted in association with the 1994 FUA-1 project.[7] The methodology and results of that survey are summarized below. A field survey of the Heidorn Ranch Road expansion corridor was undertaken on June 3, 2008. Site CA-CCO-682H was also revisited at this time.

Methodology. A pedestrian survey of the FUA-1 project area was conducted in October and November of 1994. The area, which included the entirety of the project area, with the exception of a portion of the Heidorn Ranch Road expansion corridor, was evaluated for the presence of historic or prehistoric site indicators. The archaeological survey was conducted using transect intervals of 30 meters, except on hillsides with slopes greater than 45 degrees, which were excluded from the survey. Ground visibility varied from excellent (disked agricultural fields) to poor (lowland and upland soils covered in thick pasture grasses).

The objective of the cultural resource survey was to locate, record, and evaluate the significance of all cultural resources within the FUA-1 project area. Visible ground surface was examined for the presence of historic or prehistoric site indicators, such as charcoal, obsidian or chert flakes, grinding bowls, shell fragments, bone, and pockets of dark, friable soils (for prehistoric sites), and glass, metal, ceramics, brick, wood and similar debris (for historic sites). Hillsides were examined visually for the presence of mine entrances, ventilation holes, debris and rock outcroppings that might have served as shelters or contained petroglyphs and bedrock mortars.

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[5] William Self Associates Inc., 1994. op. cit.

[6] Basin Research Associates, 2006. Department of Parks and Recreation Continuation Sheet for P-07-000005/ CA-CCO-682H. On file at the NWIC, Rohnert Park, CA.

[7] William Self Associates Inc., 1990. op. cit.

A pedestrian survey of the Heidorn Road expansion corridor was undertaken on June 3, 2008. Ground surface visibility ranged from excellent in areas that had been recently ploughed to very poor in heavily vegetated areas.

Survey Results. One site (CA-CCO-682H) was recorded within the area of the off-site Sand Creek Road (east) corridor during the FUA-1 project. No new sites were recorded during the survey of the Heidorn Ranch Road expansion corridor. Ground visibility in the project area varied from zero to 90 percent, depending on the density of vegetation. Visibility was better in ploughed areas, trampled areas, roadways, and areas where rodent burrowing exposed soils for viewing. Ground visibility was otherwise nonexistent in low-lying pastures, which were covered in grasses. Site CA-CCO-682H was also revisited during the June 2008 survey (see Appendix F). The site condition was found to be consistent with the 2006 site update. Based on the potential for subsurface historic deposits relating to the early settlement of the area to exist at this location, the site appears potentially eligible for inclusion in the CRHR under criterion 4. One additional recorded historic site is located within ¼ mile of the project area: (1) CA-CCO-681H, which is the historic Sullinger Ranch Complex, situated southwest of the project area. No prehistoric sites or isolates were recorded within the project area or vicinity during the survey.

(2) Prehistory and Ethnography. Data recovered from Delta and Bay Area archaeological sites indicate a widespread but sparsely populated culture of hunters and gatherers in the region as early as 5,660 years ago.[8] This culture was replaced around 3,950 years ago by one adapted to bayshore and marshland habitation. By 3,400 years ago, this latter group had settled in the southern Bay Area. From there they spread northward to the peninsula, westward to the coast, and southward to the Santa Clara Valley. They would remain in these areas until historic times. By 1,920 years ago, the lifeways of these people had developed into one characterized by the bow and arrow, tubular tobacco pipes, cremation, intensive acorn utilization, and complicated exchange systems.

At the time of historic contact with Spanish missionaries and explorers (c. 1775), the project area was occupied by the Bay Miwok group of Native Americans. The Bay Miwok spoke a language now considered one of the major subdivisions of the Miwok-Costanoan, which belonged to the Utian family within the Penutian language stock.[9] The Miwok comprised a group of people united by language but broken into triblets (independent political entities), each occupying defined territories over with they controlled access to natural resources. Although each triblet had one or more permanent villages, their territory contained numerous smaller camp sites. Extended families lived in domed, conical structures built of thatched grass. Semi-subterranean men's houses were built at the larger village sites, also using grass and earth cover.[10] Tule or balsa canoes were used to navigate to

[8] Henn, W. G. and R. E. Schenk, 1970. An Archaeological Analysis of Skeletal Material Excavated from the Civic Center of BART. San Francisco: *Society for California Archaeology, R.E. Schenk Memorial Archives of California Archaeology* 11.

Henn, W. G., T. L. Jackson and J. Schlocker, 1972. Buried Human Bones at the "BART" Site, San Francisco, California. Sacramento. *California Geology* 25(9):208-209.

[9] Shipley, William, 1978. *Native Languages of California*. Vol. 8 of Handbook of North American Indians. Heizer, Robert F., ed. Washington: Smithsonian Institution: 80-90.

[10] Kroeber, Alfred, 1970. *Handbook of the Indians of California*. 3rd ed.

and from islands and for hunting and gathering forays into the Delta. It was this emerging cultural pattern that was destroyed by the Spanish mission system and subsequent historical developments.[11]

(3) Regional History. For the purposes of establishing a historic context from which to assess the potential significance of historic sites, the history of northern California and Contra Costa County are typically divided into several phases: the Spanish (1775 to 1822), Mexican (1822 to 1848), and American (1848 to the present) periods.

Due to its location beyond the eastern slope of Mount Diablo, about 30 (air) miles from San Francisco Bay, the project area was largely isolated from the Spanish and Mexican periods of California. Therefore, events associated with the Spanish and Mexican periods and cultural remains from those periods are not expected to occur within the project area and vicinity.

The region historically comprised good grazing and agricultural lands, orchards, and nearby coal mines. The discovery of coal on the northern slopes of Mount Diablo in 1848 at the dawn of the American Period drew settlers to the region; however, by the mid-1880s when the coal boom was over, the mining "boom towns" were abandoned. After the mines closed, the population centers of Pittsburg, Antioch and Brentwood survived due to their reliance on an agricultural economic base, including olive and almond orchards. The region has recently experienced rapid urban residential development. The mild climate, vast network of waterways within the Delta region, and availability of a broad transportation network has been one of the major factors in the region's economic and population growth.

(4) Archeological Sensitivity. No prehistoric resources have been identified on the project area to date. One historic resource that appears to be potentially eligible to the CRHR is located within the off-site Sand Creek Road corridor. The potential exists for previously undiscovered archeological resources to also occur within the project area and vicinity.

b. Paleontological Resources. This section describes the research and field methods conducted and then describes the paleontological setting and sensitivity of the project area.

(1) Methods. Recently completed paleontological resource evaluations[12,13] conducted within the vicinity of the project area were used to evaluate the paleontological sensitivity of the project area. No site-specific paleontological research was conducted for the proposed project. These studies include background research to determine if paleontological resources (fossils) and geologic units known to contain fossils are known to occur within the project vicinity. Previous research consists of a fossil locality search and a literature review to identify geologic units, paleontological studies, fossil localities (i.e., a location at which paleontological resources have been documented), and the types of fossils that may be present within the project vicinity. A paleontological field survey was not done for the project area due to a lack of surface geological features.

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[11] Moratto, M. J., 1984. *California Archaeology*. Academic Press, Orlando, Florida.

[12] LSA Associates, Inc., 2007. *A Cultural/Paleontological Resources Study for the Deer Valley Estates Master Plan Project*. April. Mundie & Associates, 2003. *Recirculated Draft Environmental Impact Report: Sand Creek Specific Plan.* September 19.

[13] Mundie & Associates, 2003. *Recirculated Draft Environmental Impact Report: Sand Creek Specific Plan.* September 19.

Fossil Locality Search. A fossil locality search was performed on Feb. 22, 2007 by the staff of the University of California Museum of Paleontology (UCMP) at Berkeley.[14] No fossil localities have been identified within the project vicinity. The search identified six fossil localities within 4 miles of the project area, the closest being over 2.5 miles away.

Of the six localities, two were located in the Miocene San Pablo sandstone formation, and included Clarendonian aged (11.8 to 9 million years ago) fauna such as mammoth, hipparion (horse), and gomphotherium (a fur-tusked elephant) fossils. The other four were located in Pleistocene sediments (10 thousand years to 1.8 million years million years old), and included Rancholabrean aged fauna such as mammoth, horse, bison, badger, and deer.

Literature Review. Previous studies conducted adjacent to the project area reviewed paleontological and geological literature relevant to the project area and its vicinity. This review identified the project vicinity as being underlain by Pleistocene alluvium.[15] The alluvium is underlain by a group of middle Eocene (48 to 37 million years ago) aged formations of the Markley sandstone, the Nortonville shale, and the Domengine sandstone. The Markley Sandstone is approximately 1,070 meters thick, and is composed of sandy turbidites[16] that grade upwards into turbiditic mudstones. The Nortonville Shale is approximately 125 meters thick, and is composed of bathyal offshore mudstones and was deposited on a western sloping shelf. The oldest and deepest formation, the Domengine Sandstone, is between 215 and 260 meters thick, and is composed mainly of estuarine sandstones overlain by offshore mudstones.

Project area soils consist of Altamont and Capay series soils. Series soils are well-drained and underlain by shale and soft, fine-grained sandstone. Capay Series soil are moderately well-drained situated on the lower edges of valley fill and on old benches that have been slowly dissected.[17]

(2) Paleontological Sensitivity. Although six fossil localities are located within 4 miles of the project vicinity, none were identified within the same geologic setting as the project area. However, the potential exists for undiscovered paleontological resources to occur within the project area.

2. Regulatory Context

The following describes the regulatory setting for cultural and paleontological resources, including State and local regulations.

a. State Regulations. CEQA details appropriate measures for the evaluation and protection of cultural resources in §15064.5 of the *CEQA Guidelines*. For the purposes of CEQA, "historical resources" are those cultural resources that are: (1) listed in or eligible for listing in the California

[14] LSA Associates, Inc., 2007. op. cit.

[15] Helley, E.J., and K.R. Jajoie, 1979. Flatland Deposits of the San Francisco Bay Region, California - Their Geology and Engineering Properties, and their Importance to Comprehensive Planning. U.S. Geological Survey, Geological Survey Professional Paper 943.

[16] A sedimentary deposit formed by a turbidity current.

[17] Welch, Lawrence E., 1997. *Soils of Contra Costa*. United States Department of Agriculture, Soil Conservation Service, Concord, California.

Register of Historical Resources (California Register); (2) listed in a local register of historical resources (as defined at PRC 5020.1(k)); (3) identified as significant in a historical resource survey meeting the requirements of §5024.1(g) of the Public Resources Code; or (4) determined to be a historical resource by a project's lead agency (§15064.5(a)). The subsection further states that "A project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (§15064.5(b)).

CEQA applies to effects on archaeological sites (§15064.5(c)). CEQA requires a lead agency to determine if an archaeological cultural resource fits into one of three legal categories (14 CCR §15064.5(c)(1-3)). A lead agency, in this case the City of Antioch, applies a two-step screening process to determine if an archaeological site meets the definition of a historical resource, a unique archaeological resource, or neither. Prior to considering potential impacts, the lead agency must determine whether a cultural resource meets the definition of a historical resource in §15064.5(a). If the cultural resource meets the definition of a historical resource, then it is treated like any other type of historical resource in accordance with §15126.4. If the cultural resource does not meet the definition of a historical resource, then the lead agency applies the second criterion to determine if the resource meets the definition of a unique archaeological resource as defined in §21083.2(g). Should the archaeological site meet the definition of a unique archaeological resource, then it must be treated in accordance with §21083.2. If the archaeological site does not meet the definition of a historical resource or an archaeological resource, then effects to the site are not considered significant effects on the environment (§15064.5(c)(4)).

CEQA also addresses impacts to paleontological resources (*CEQA Guidelines* Appendix G(V)(c)). Paleontological resources consist of fossils and fossiliferous deposits.

Public Resources Code (PRC) §5097.5 provides for the protection of cultural and paleontological resources. PRC §5097.5 prohibits the removal, destruction, injury, or defacement of cultural features on any lands under the jurisdiction of State or local authorities.

Because the proposed project does not require a General Plan Amendment, consultation with potentially interested parties is not required.

b. Antioch General Plan. The Resource Management Element of the Antioch General Plan contains the following objective and policies related to the preservation of archaeological, paleontological, and historic resources within the City.

Resource Management

- *Cultural Resources Objective 10.9.1:* Preserve archeological, paleontological, and historic resources within the Antioch Planning Area for the benefit and education of future residents.
  - *Cultural Resources Policy 10.9.2a:* Require new development to analyze, and therefore avoid or mitigate impacts to archeological, paleontological, and historic resources. Require surveys for projects having the potential to impact archeological, paleontological, or historic resources. If significant resources are found to be present, provide mitigation in accordance with applicable CEQA guidelines and provisions of the California Public Resources Code.
  - *Cultural Resources Policy 10.9.2.b:* If avoidance and/or preservation in the location of any potentially significant cultural resource is not possible, the… [mitigation measures detailed in the General Plan] shall be initiated for each impacted site.

- *Cultural Resources Policy 10.9.2.c:* When existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor site grading activities with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate repository, and file a report with the Community Development Department documenting any paleontological resources found during site grading.
- *Cultural Resources Policy 10.9.2.d:* As a standard condition of approval for new development projects, require that if unanticipated cultural or paleontological resources are encountered during grading, alteration of earth materials in the vicinity of the find shall be halted until a qualified expert has evaluated the find and recorded identified cultural resources.

3. Impacts and Mitigation Measures

This section analyzes the impacts related to cultural resources that could result from implementation of the proposed project. The subsection begins with criteria of significance, which establish the thresholds for determining whether an impact is significant. The latter part of this section presents less-than-significant impacts, which do not require mitigation, and significant impacts, which would require mitigation.

a. Criteria of Significance. The proposed project would have a significant impact on cultural and paleontological resources if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in *CEQA Guidelines* §15064.5. Specifically, substantial adverse changes include physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to *CEQA Guidelines* §15064.5;
- Directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature; or
- Disturb any human remains, including those interred outside of formal cemeteries.

b. Significant Cultural Resource Impacts. The following discussion describes the significant impacts that could result from construction of the proposed project. The recommended mitigation measures are designed to meet the requirements of 14 CCR Section §15126.4(b).

<u>Impact CULT-1</u>: Site preparation, grading, and construction activities could adversely impact subsurface historic resources at site CA-CCO-682H. (S)

Due to the potential for subsurface historic deposits that may produce information important to early development of the area on a local scale, ground disturbing activities could adversely impact site CA-CCO-682H. Implementation of the following mitigation measure would reduce potential impacts to the site to a less-than-significant level.

> <u>Mitigation Measure CULT-1</u>: If feasible, the site shall be avoided. If avoidance is not feasible, an Archaeological Research Design and Testing Plan (ARDTP) shall be developed. Once the ARDTP is reviewed and approved by the City of Antioch, and testing is completed, a report shall be prepared detailing the methods and results, and the site shall be evaluated using the California Register of Historic Resources eligibility criteria. The report shall be submitted to

the project applicant, the City of Antioch, and the Northwest Information Center (NWIC). If the site appears to be ineligible for the California Register, project construction activity within the area of the site may begin. If the site is found to be potentially eligible, a Cultural Resources Treatment Plan (CRTP) shall be developed to mitigate project effects. Once the program is approved by the City, and the work completed, project construction activities within the site area can begin. A Cultural Resources Treatment Report (CRTR) shall be prepared and submitted to the project applicant and the City for review and comment. Final copies of the CRTR shall be submitted to the project applicant, the City of Antioch, and the NWIC. (LTS)

Impact CULT-2: Site preparation, grading, and construction activities could adversely impact previously undiscovered archeological resources. (S)

Due to the proximity of recorded archeological sites, the potential exists for unknown archeological resources to occur on the project site. A review of the sacred lands file by the Native American Heritage Commission (November 1, 2006) did not identify any Native American cultural resources within the vicinity of the project area; however, the potential also exists for undiscovered Native American resources to occur within the project area. Implementation of the following mitigation measure would reduce potential impacts to undiscovered archeological resources to a less-than-significant level.

Mitigation Measure CULT-2: If deposits of prehistoric or historic archeological materials[18] are encountered during project activities, all work within 25 feet of the discovery shall be redirected and a qualified archeologist shall be contacted to assess the deposit finds and make recommendations.

While deposits of prehistoric or historic archeological materials should be avoided by project activities, if the deposits cannot be avoided, they shall be evaluated for their California Register eligibility. If the deposits are not eligible for the California Register, avoidance is not necessary. If the deposits are eligible for the California Register, they shall be avoided. If avoidance is not feasible, project impacts shall be mitigated in accordance with the recommendations of the evaluating archaeologist and CEQA Guidelines §15126.4 (b)(3)(C), which requires implementation of a data recovery plan and avoidance of human remains. Upon completion of the archaeologist's assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the discovered archaeological materials. The report shall be submitted to the project applicant, the City of Antioch, and the Northwest Information Center (NWIC). Once the report is reviewed and approved by the City, and any appropriate resource recovery completed, project construction activity within the area of the find may resume. (LTS)

Impact CULT-3: Ground disturbing activities associated with site preparation, grading, and construction activities could result in adverse impacts to previously undiscovered paleontological resources. (S)

[18] Prehistoric materials include flaked-stone tools (e.g. projectile points, knives, choppers) or obsidian, chert, or quartzite toolmaking debris; culturally darkened soil (i.e., midden soil often containing heat affected rock, ash and charcoal, shellfish remains, and cultural materials); and stone milling equipment (e.g., mortars, pestles, handstones). Historical materials can include wood, stone, concrete, or adobe footings, walls and other structural remains; debris-filled wells or privies; and deposits of wood, glass, ceramics, and other refuse.

No unique geologic features were located within the project area. Although six fossil localities are located within 4 miles of the project area, none were identified within the same geologic setting as the project area. However, there is a possibility that construction activities could impact paleontological resources within the Pleistocene alluvium. Implementation of the following mitigation measure would ensure that potential impacts to paleontological resources are reduced to a less-than-significant level.

> Mitigation Measure CULT-3: If paleontological resources[19] are encountered during site preparation or grading activities, all work within 25 feet of the discovery shall be redirected until a qualified paleontologist has assessed the discoveries and made recommendations. If the paleontological resources are found to be significant, adverse effects to such resources shall be avoided by project activities. If project activities cannot avoid the resources, the adverse effects shall be mitigated. Mitigation shall include data recovery and analysis, preparation of a final report, and the formal transmission or delivery of any fossil material recovered to a paleontological repository, such as the University of California Museum of Paleontology (UCMP). Upon completion of recovery activities, a final report documenting methods and findings of the mitigation shall be prepared and submitted to the project applicant, the City of Antioch, and a suitable paleontological repository. Once the final report is reviewed and approved by the City, project construction activity within the area of the find may resume. (LTS)

Impact CULT-4: Ground disturbing activities associated with site preparation, grading, and construction activities could disturb human remains, including those interred outside of formal cemeteries. (S)

The potential to uncover Native American human remains exists in locations throughout California. Although not anticipated, human remains may be identified during site-preparation and grading activities, resulting in a significant impact to Native American cultural resources. Implementation of the following mitigation measure would reduce potential adverse impacts to human remains to a less-than-significant level.

> Mitigation Measure CULT-4: If human remains are encountered, work within 25 feet of the discovery shall be redirected and the Contra Costa County Coroner notified immediately. At the same time, an archaeologist shall be contacted to assess the situation and consult with the appropriate agencies. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods.
>
> Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations

[19] Paleontological resources include fossil plants and animals, and evidence of past life such as trace fossils and tracks. Ancient marine sediments may contain invertebrate fossils such as snails, clam and oyster shells, sponges, and protozoa; and vertebrate fossils such as fish, whale, and sea lion bones. Vertebrate land mammals may include bones of mammoth, camel, saber tooth cat, horse, and bison. Paleontological resources may also include plant imprints, petrified wood, and animal tracks.

of the MLD. The report shall be submitted to the project applicant, the City of Antioch, and the Northwest Information Center. Once the report is reviewed and approved by the City, and any appropriate treatment completed, project construction activity within the area of the find may resume. (LTS)

F. GEOLOGY, SOILS AND SEISMICITY

This section describes the project's geologic environment based on published and unpublished geologic reports and maps, a site reconnaissance, and site-specific technical reports. This section also assesses potential impacts from strong seismic ground shaking, liquefaction, slope failure, lateral slope deformation, differential settlement and unstable or expansive soils. Mitigation measures for the identified significant impacts are provided, as appropriate.

A site-specific geotechnical feasibility investigation was prepared by Berlogar Geotechnical Consultants for the proposed project site and is included as Appendix G of this report. The scope of the investigation was to address geologic and geotechnical aspects that will have primary cost impacts on the proposed residential development of the site. The investigation included the review of the available data pertinent to the site, inquiry to the City of Antioch about the Antioch fault issue, study of aerial photographs, field exploration, laboratory testing, and preliminary engineering analyses. [1] At the time of the preparation of this EIR, a geotechnical report has not been prepared for areas of off-site improvements.

1. Setting

The existing geologic and seismic conditions of the project site and vicinity, along with associated hazards, are described below.

a. Geologic Conditions. Site geography, topography, and soils are discussed below.

(1) Geology. The proposed project site is located at the eastern edge of the Coast Ranges Geomorphic Province near the boundary with the Great Valley Geomorphic Province of California, a relatively geologically young and seismically-active region on the western margin of the North American plate. The regional structure of the Coast Ranges consists of northwest-trending folds and faults created by transitional shear along the San Andreas Fault Zone (SAFZ). As a result, northwest-southeast trending ranges of low mountains and intervening valleys dominate this region. In general, the Coast Ranges are composed of sedimentary bedrock (interspersed with volcanic rocks).[2] Nearer the surface, layers of alluvium fill the intervening valleys. The proposed project site is underlain by the Markley[3] sandstone formation, which is mantled by Quaternary-period alluvium.[4, 5, 6] The project site is located about 4.5 miles south of the San Joaquin River in the upper Lone Tree Valley, which climbs to the west towards Mount Diablo. Locally, Mount Diablo, which has risen over the last two million years and is approximately eight miles southwest of the site, influences land forms such as Lone Tree Valley.[7] Contrary to the regional trend of mountains and valleys in the Coast Ranges, the Lone Tree Valley trends west to east. Sand Creek is the main creek draining the Lone Tree Valley.

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[1] Berlogar Geotechnical Consultants, 2006. *Revised Report, Geologic/Geotechnical Feasibility Investigation, Williamson Property, Hillcrest Avenue, Antioch, California*, Job No. 2793.100. June 5.

[2] California Geographic Survey, 2002. *California Geomorphic Provinces, Note 36*.

[3] Also spelled "Markeley."

[4] U.S. Geological Survey, 1993. *Quaternary Geologic Map of the San Francisco 4° x 6° Quadrangle*.

[5] Graymer, R. W., Jones, D. L., Brabb, E. E., 1994, *Preliminary Geologic Map Emphasizing Bedrock Formations in Contra Costa County, California*, USGS OFR 94-622

[6] U.S. Geological Survey, 2006. Geologic Map of Contra Costa County, *Geologic Map of Contra Costa County*, USGS Scientific Investigations Map 2918. Website: http://geomaps.wr.usgs.gov/.

[7] Sloan, Doris, 2006. *Geology of the San Francisco Bay Region*, University of California Press.

(2) Topography. The topography of the project site and adjacent off-site road improvement areas north of Sand Creek is relatively level, with an elevation of approximately 200 feet mean sea level (msl) along the western boundary sloping to about 170 feet msl along the eastern boundary. The incised channel of Sand Creek crosses the southeast corner of the site. The relatively steep creek banks are about 14 to 20 feet high. South of Sand Creek, the site is hilly with gradients as steep as 1.5:1 (horizontal to vertical) with a maximum elevation of about 328 feet msl.[8, 9] The off-site alignment for sanitary sewer infrastructure is also in the relatively level area north of San Creek and slopes down gently to the northeast to an elevation of approximately 150 feet msl where it will tie into the existing infrastructure.

(3) Soils. Soil is generally defined as the unconsolidated mixture of mineral grains and organic material that mantles the land surface. Soils can develop on unconsolidated sediments and weathered bedrock. The characteristics of soil reflect the five major influences on their development: topography, climate, biological activity, parent (source) material, and time. The project site is mantled by surface soils that reflect the characteristics of the underlying materials on which the soil is developed. The soil types at the project site, as described below, have been mapped by the Natural Resource Conservation Service.[10]

Surface soils at the project site and off-site improvement areas are mapped as Capay Clay over the flat central portion of the site, with a narrow band of Altamont Clay along the northern edge of the site. The lowlands adjacent to Sand Creek are mapped as Rincon Clay Loam and the upland area south of Sand Creek as Altamont Fontana Complex. Capay soil with slopes of less than two percent is characterized as being moderately well drained with slow permeability, low strength, slow runoff with little erosion, but with high shrink-swell potential and moderate to high corrosivity. Altamont series soils are characterized as being well-drained with slow permeability, medium runoff with moderate to high erosion potential, low strength, high shrink-swell potential and a high corrosivity. Rincon Clay Loam is characterized as being well-drained with moderate permeability, medium strength, slow runoff with little erosion, but with high shrink-swell potential and moderate corrosivity.

The site-specific geotechnical feasibility investigation documented the installation of five borings and ten test pits at the project site.[11] The majority of the site - the relatively flat portion north of the creek - was explored with the five borings. The ten test pits were located in the hilly area south of Sand Creek. The site stratigraphy consists of very stiff to hard sandy clay, silty clay and clayey silt; with interbedded layers of medium dense to dense clayey sand, silty sand and sandy silt at depths generally greater than 20 feet.[12] The site-specific report identifies nearly the entire project site (virtually all the flat portion) as Quaternary terrace deposits. Lab testing of samples of the upper silty clays indicated high shrink-swell potential. Further, the southern hillside portion of the project site included areas of landside debris, colluvium, residual soils and exposed bedrock. Development is not proposed for the areas south of Sand Creek, and therefore limited discussions of the geologic issues of this area are presented in this section.

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[8] U.S. Geological Survey, 1978. *Antioch South (CA) 7.5' Topographic Quadrangle.*

[9] Berlogar Geotechnical Consultants, 2006. op. cit.

[10] Natural Resource Conservation Service, 2008. *Soil Maps, Contra Costa County (CA013) Version 1 (Feb 3, 2004), Soils Data Version 6 (Dec 6, 2007).* Website: websoilsurvey.nrcs.usda.gov (Web Soil Survey), U.S. Department of Agriculture (USDA).

[11] Berlogar Geotechnical Consultants, 2006. op. cit.

[12] Ibid.

(4) Seismic Conditions. Regional and site specific seismic conditions are discussed below.

Regional Seismicity. The entire San Francisco Bay Area is located in a region of active seismicity. The seismicity of the region is primarily related to the. The SAFZ is a complex of active faults forming the boundary between the North American and the Pacific lithospheric plates. Movement of the plates relative to one another result in the accumulation of strain along the faults, which is released during earthquakes. Historically, numerous moderate to strong earthquakes have been generated in northern California by several major faults in the SAFZ system.

The SAFZ includes numerous faults found by the California Geologic Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act (A-PEFZA) to be "active" (i.e., to have evidence of surface rupture in the last 11,000 years). The latest maps issued by California Geologic during CGS in conformance with the A-PEFZA [13] do not indicate there are active or potentially active faults at, or adjacent to, the project site. The nearest A-PEFZA fault zones are the Greenville fault zone, approximately 6.1 miles to the southwest, and the Concord-Green Valley fault, approximately 12.6 miles west of the project. Other major A-PEFZA faults in the region include the Rodgers Creek/Hayward, Calaveras, and San Andreas faults.[14]

The A-PEFZA maps faults that manifest surface rupture; however, there are other seismic sources in the region. The Coast Range-Sierran Block Boundary (CRSBB) forms the western geomorphic boundary of the Central Valley with the Coast Ranges to the west. A seismically active fold and thrust belt underlies this actively deforming boundary. The CRSBB is currently recognized as a potential seismic source capable of generating moderate earthquakes that could affect the project site.[15] Eleven earthquakes (magnitude[16] 5.8 to 6.8) have been documented along the CRSBB zone during the last 150 years.[17] Specifically, the Great Valley thrust fault system is located about four miles to the east of the project site. Representative earthquakes of the Great Valley thrust fault include the Winters (1892, M_W6.25[18]), Vacaville (1892, M_W6.5), Antioch (1889 M_W6.25) and the more recent 1983 Coalinga (M_W6.7) event.[19] Regional faults are shown on Figure IV.F-1.

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[13] The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

[14] Jennings, C. W., 1994. *Fault Activity Map of California and Adjacent Areas,* Department of Conservation Division of Mines and Geology.

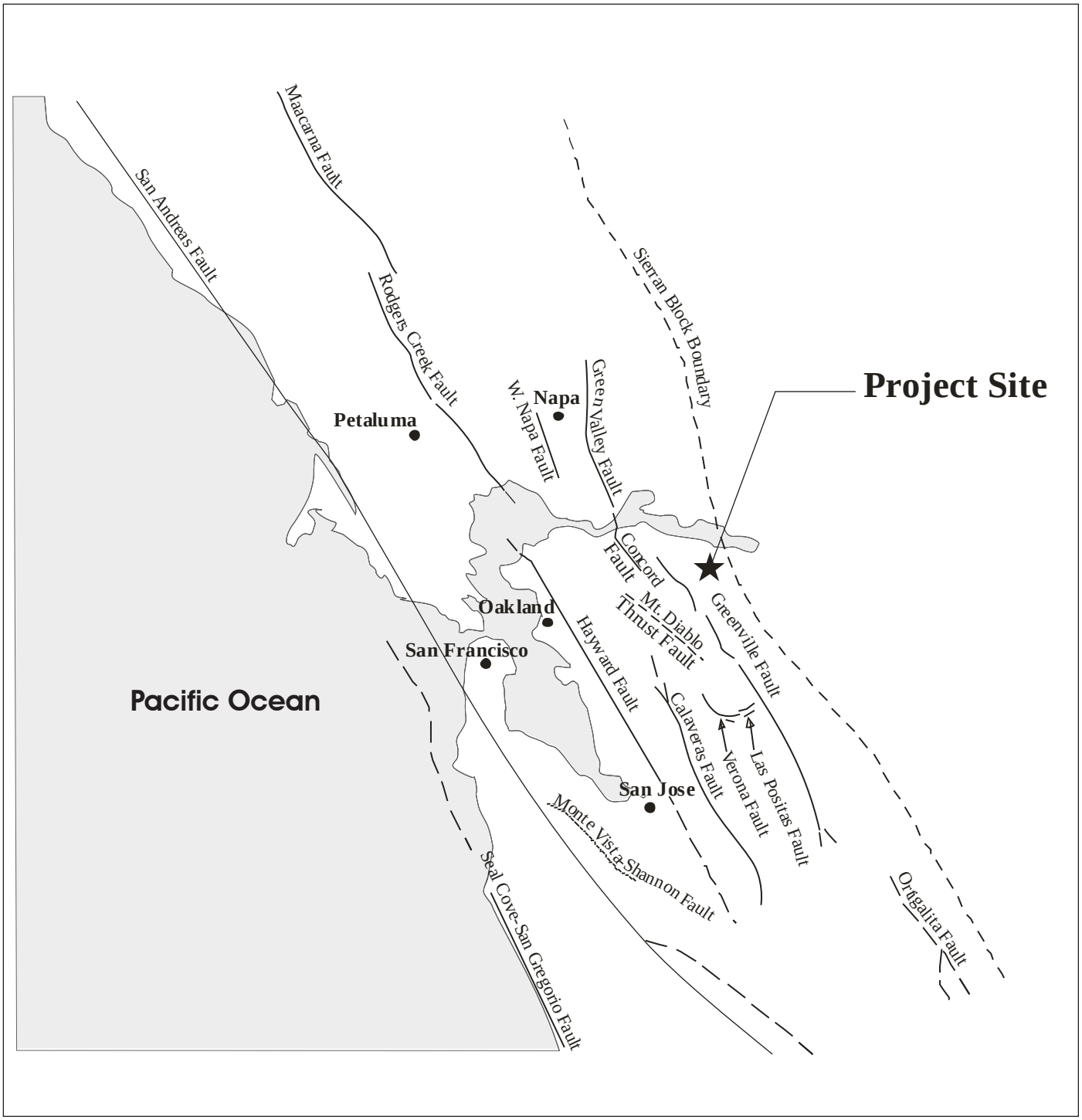
[15] Wong, I.G., Ely, R.W., and Lollmann, A.C., 1988. Contemporary Seismicity and Tectonics of the Northern and Central Coast Ranges-Sierran Block Boundary Zone, California, Journal of Geophysical Research, 93:7813-7833.

[16] Moment magnitude (M_W) is now commonly used to characterize seismic events as opposed to Richter Magnitude. Moment magnitude is determined from the physical size (area) of the rupture of the fault plane, the amount of horizontal and/or vertical displacement along the fault plane, and the resistance to rupture of the rock type along the fault. All magnitude scales are calibrated to yield approximately the same value for any given earthquake; however, since the moment magnitude scale is calculated based on the amount of energy released, rather than on seismograph readings, as the Richter magnitudes are, the different magnitudes do not always agree, particularly for very large quakes, where the Richter scale tends to underestimate the true magnitude.

[17] Wakabayashi, J. and Smith, D.L., 1994. Evaluation of Recurrence Intervals, Characteristic Earthquakes, and Slip Rates Associated with Thrusting along the Coast Range-Central Valley Geomorphic Boundary, California, Bulletin of the Seismological Society of America, 84(6): 1960-1970.

[18] Magnitudes prior to 1898 given as 'adjusted intensity magnitude', a subjective rating based on historical description.

[19] U.S. Geological Survey, 2005.*Great Valley Thrust Faults.* Website: quake.wr.usgs.gov/prepare/ncep/greatvalley.html.



LSA

FIGURE IV.F-1

Legend

Active Fault -
Fault has evidence of surface displacement within the past 11,000 years (dashed where inferred)

Potentially Active Fault -
Fault has evidence of surface displacement in the past 1.6 million years, but not within the past 11,000 years

Seismic Source without Surface Rupture

N

0 10 20
MILES

Aviano Adult Community Project EIR
Regional Faults

SOURCE: BASELINE ENVIRONMENTAL CONSULTING, 2005.

I:/CAN0601 aviano/figures/Fig_IVF1.ai (4/12/07)

The U.S. Geological Survey's Working Group on California Earthquake Probabilities estimated that there is a 62 percent probability that one or more M_W6.7 or greater magnitude earthquakes will occur in the San Francisco Bay Area between 2002 and 2031.[20] The probability of a M_W6.7 magnitude or greater earthquake occurring along individual faults was estimated to be 21 percent along the San Andreas Fault, 27 percent along the Hayward-Rodgers Creek Fault, eleven percent along the Calaveras Fault, four percent along the Concord-Green Valley Fault, and three percent on the Greenville Fault. When predictions are expanded to 100 years it is estimated that about three M_W6.7 or greater events could occur during that time. Thus the probability of at least one M_W6.7 or greater magnitude earthquake rises to the near certainty of about 96 percent when calculated for a 100-year span.[21]

Site-Specific Seismicity. The United States Geological Survey (USGS) maps the nearest active fault as the Mt. Diablo thrust fault, which underlies the proposed project. This fault does not reach the ground surface, and so does not pose a significant hazard for surface rupture; however, it is a known seismic risk. The active Great Valley 5 (GV-5) fault is approximately four miles east of the project site (see discussion of the CRSBB above). Two other faults are reported to be near, or cross, the project site. The Antioch fault was originally classified as an A-PEFZA fault, however, in the early 1990's further study concluded that there was no evidence that an active, surface fault existed in Antioch.[22] Subsequently, the following revision of the A-PEFZA map no longer carried the Antioch Fault, and it is no longer classified as an active fault. Lastly, the Davis fault runs north-south and crosses Lone Tree Valley near the western boundary of the project site. The Davis fault has been verified in early quaternary alluvium; however the exact trace is undefined in the alluvium of the floor of Lone Tree Valley at the project site. The Davis fault is a right lateral strike slip fault[23] with an approximately north-south axis. No geomorphic features suggesting Holocene displacements along the fault have been found, and hence, the Davis fault is not classified as active.[24]

b. Seismic and Geologic Hazards. Seismic and geological hazards at the proposed project including potential for surface rupture, ground shaking, liquefaction, lateral spreading, expansive soils, slope stability and subsidence are discussed below.

(1) Surface Rupture. Surface rupture occurs when the ground surface is broken due to fault movement during an earthquake. The location of surface rupture generally can be assumed to be along an active or potentially active major fault trace. No active faults which pose a hazard for surface rupture have been mapped across the proposed project and no portion of the site is located within an Alquist-Priolo Earthquake Fault Zone.

(2) Ground Shaking. Ground shaking is a general term referring to all aspects of motion of the earth's surface resulting from an earthquake, and is normally the major cause of damage in seismic events. The extent of ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. Magnitude is a measure of the energy released by an earthquake; seismographs that measure the amplitude of seismic waves assess

[20] U.S. Geological Survey, 2003. Earthquake Probabilities in the San Francisco Bay Region: 2002 to 2031 – A Summary of Findings, Open File Report 03-214.

[21] Ibid.

[22] Wills, C. J., 1992. *The Elusive Antioch Fault,* in Borchardt, Glenn and others, eds., Proceedings of the Second Conference on Earthquake Hazards in the Eastern San Francisco Bay Area: CDC, CDMG Special Publication 113.

[23] Right-lateral: if the trace of the fault were viewed while standing on one side during an event, it would appear that the ground on the other side of the fault moved to the right. Strike-slip: the sides of a fault are moving laterally relative to each other with little or no vertical movement.

[24] Wills, 1992. op. cit.

it. Intensity is a subjective measure of the perceptible effects of seismic energy at a given point and varies with distance from the epicenter and local geologic conditions.

The Modified Mercalli Intensity Scale (MMI) is the most commonly used scale for measurement of the subjective effects of earthquake intensity (Table IV.F-1). Intensity can also be quantitatively measured using accelerometers (strong motion seismographs) that record ground acceleration at a specific location, providing a measure of force applied to a structure under seismic shaking. Acceleration is measured as a fraction or percentage of the acceleration due to gravity (g)[25].

Strong to Very Strong ground shaking is expected in the area of the proposed project during a large earthquake on either the Mount Diablo Thrust or Greenville faults. Very Strong ground shaking corresponds to an MMI-VIII, during which some masonry and frame structures would be damaged, and unbolted structures shifted off their foundations. This level of seismic shaking could cause injuries and/or fatalities and structural and non-structural damage to buildings at the site.

A related concept, peak acceleration, is the maximum acceleration experienced by an object during the course of the earthquake. Estimates of the peak ground acceleration have been made for the Bay Area based on probabilistic models that account for multiple seismic sources. Under these models, consideration of the probability of expected seismic events is incorporated into the determination of the level of ground shaking at a particular location. The expected peak horizontal acceleration (with a ten percent chance of being exceeded in the next 50 years) generated by any of the seismic sources potentially affecting the project area, is estimated by the California Geological Survey as 0.43.[26] This level of ground acceleration at the project site is a potentially significant hazard.

(3) Liquefaction. Liquefaction is the temporary transformation of loose, saturated granular sediments from a solid state to a liquefied state as a result of seismic ground shaking. In the process, the soil undergoes transient loss of strength, which commonly causes ground displacement or ground failure to occur. Since saturated soils are a necessary condition for liquefaction, soil layers in areas where the groundwater table is near the surface have higher liquefaction potential than those in which the water table is located at greater depths.

Liquefaction susceptibility at the site is rated as moderate by the USGS.[27] By considering the susceptibility rating along with other factors such as proximity to faults and groundwater level, ABAG has rated the area of the project site as having a moderately low level of hazard for liquefaction.[28] The site-specific investigation found groundwater at depths of 25 to 29.5 feet below ground surface and concludes, based on the depth to groundwater and relative density of soil deposits that the liquefaction hazard at the project site is considered low.[29]

(4) Lateral Spreading. Lateral spreading is a form of horizontal displacement of soil toward an open channel or other "free" face, such as an excavation boundary. Lateral spreading can result from either the slump of low cohesion, unconsolidated material or more commonly by liquefaction of either the soil layer or a subsurface layer underlying soil material on a slope, resulting in gravity-

[25] The standard value of gravity, or normal gravity, g, is defined as ~32.2 feet per second squared.

[26] California Geological Survey, 2003. Probabilistic Seismic Hazards at: www.consrv.ca.gov/cgs/rghm/pshamap.

[27] Association of Bay Area Governments, 2004. ABAG Earthquake Hazards Program Map (based on USGS OFR 00-244) Website: www.abag.ca.gov.

[28] Ibid.

[29] Berlogar Geotechnical Consultants, 2006. op. cit.

Table IV.F-1: Modified Mercalli Scale

I	Not felt except by a very few under especially favorable circumstances.
II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.
IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII	Everybody runs outdoors. Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Board fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted.

Source: California Geological Survey, 2002, How Earthquakes and Their Effects are Measured, Note 32.

driven movement. Earthquake shaking leading to liquefaction of saturated soil can result in lateral spreading where the soil undergoes a temporary loss of strength.

The lateral spreading hazard will tend to mirror the liquefaction hazard for a project site, and by definition needs an open channel or "free" face to expand into. Based on the low susceptibility to liquefaction at the project site, lateral spreading is unlikely except during the construction phase when un-reinforced open trenches related to utility or foundation construction could present a transitory opportunity for a lateral spreading event to occur.[30] The Capay clay and Altamont clay soil types of the site are rated by the NRCS to be prone to collapse and caving in excavation and trenches, and present a potential hazard to workers during the construction-phase of the proposed project.

(5) Expansive Soils. Expansion and contraction of volume can occur when expansive soils undergo alternating cycles of wetting (swelling) and drying (shrinking). During these cycles, the volume of the soil changes markedly. As a consequence of such volume changes, structural damage

[30] Rauch, Alan F., 1997. EPOLLS: An Empirical Method for Predicting Surface Displacements due to Liquefaction-Induced Lateral Spreading in Earthquakes, Ph. D. Dissertation, Virginia Tech, Blacksburg, VA.

to building and infrastructure may occur if the potentially expansive soils were not considered in project design and during construction.

The proposed project is located on alluvial and terrace deposit soils consisting primarily of very stiff to hard sandy clay, silty clay and clayey silt. The soils underlying the project site, including areas for off-site improvements, have been identified as having moderate to high shrink-swell potential and as expansive.[31]

(6) Slope Stability. Slope failure can occur as either rapid movement of large masses of soil ("landslide") or slow, continuous movement ("creep"). The primary factors influencing the stability of a slope are: 1) the nature of the underlying soil or bedrock, 2) the geometry of the slope (height and steepness), 3) rainfall, and 4) the presence of previous landslide deposits.

The City of Antioch General Plan notes that the Lone Tree Valley has little susceptibility to landslides; however, the hills south of the valley have moderately unstable to unstable slopes. The USGS maps the relatively level northern portion of the project site as Category 1: "Stable areas of 0 to 5 percent slope, which are not underlain by known landslides", however, south of Sand Creek where the site rises to an elevation of about 328 feet, the hillsides are Category 3: "generally to marginally stable" or Category 5: "unstable".[32] The site-specific investigation has mapped a landslide on the northwest face of these hills.[33] The project site south of Sand Creek is not proposed for development as a part of the proposed project; however, a conceptual plan-element for a potential extension of the south entrance road south of Sand Creek road to the edge of the project site is included.

(7) Settlement and Differential Settlement. Differential settlement or subsidence could occur if buildings or other improvements were built on low-strength foundation materials (including imported fill) or if improvements straddle the boundary between different types of subsurface materials (e.g., a boundary between native material and fill). Although differential settlement generally occurs slowly enough that its effects are not dangerous to inhabitants, it can cause significant building damage over time.

The Capay and Altamont clays are rated as having a high shrink-swell potential (also known as linear extensibility or as expansive soils). Grading of the site would result in areas of newly introduced engineered fill being adjacent to these native undisturbed soils, and/or areas where fills of different thickness underlie structures, utilities or flatwork (such as sidewalks and roadways). The site-specific geotechnical feasibility investigation noted undocumented or un-engineered fill present on the site. In addition, investigation trenches on the site have been backfilled with non-engineered fill. Lastly, there could be fill related to the pipeline that crosses the site or other earthworks on the site that have not been properly prepared for overlying loads such as structures or streets. Portions of the project site containing loose or uncontrolled (non-engineered) fill may be susceptible to differential settlement once buildings and improvements have been constructed. Based on NRCS mapping, off-site improvement areas would be located in soils similar to those assessed in the site-specific geotechnical feasibility investigation for the project site, and would be subject to the same sort of potential impacts.

[31] U.S. Department of Agriculture, 1977. op cit.

[32] U.S. Geological Survey, 1979. Relative Slope Stability and Land Use Planning in the San Francisco Bay Region, California, CGS Professional Paper 944.

[33] Berlogar Geotechnical Consultants, 2006. op. cit.

c. Regulatory Setting. The following describes the regulatory setting applicable to the proposed project site.

(1) California Building Code. The (2006) Uniform Building Code (UBC) is published by the International Conference of Building Officials (ICBO), and is the widely adopted model building code in the United States. The (2007) California Building Code (CBC) is another name for the body of regulations known as the California Code of Regulations (CCR), Title 24, Part 2, which is a portion of the California Building Standards Code (CBSC). The CBC incorporates by reference the UBC requirements with necessary California amendments. Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable. Compliance with the 2007 California Building Code (CBC) requires that (with very limited exceptions) structures for human occupancy be designed and constructed to resist the effects of earthquake motions. The Seismic Design Category for a structure is determined in accordance with either; CBC Section 1613 - *Earthquake Loads*: or, American Society of Civil Engineers (ASCE) Standard No. 7-05, *Minimum Design Loads for Buildings and Other Structures*. In brief, based on the engineering properties and soil-type of soils at a proposed site, the site is assigned a Site Class ranging from A to F. The Site Class is then combined with Spectral Response (ground acceleration induced by earthquake) information for the location to arrive at a *Seismic Design Category* ranging from A to D; D being the most severe conditions. The classification of the site and related calculations must be determined by a qualified person and are site-specific.

(2) Alquist-Priolo Earthquake Fault Zoning Act (A-PEFZA). Surface rupture is the most easily avoided seismic hazard. The A-PEFZA was passed in December 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The A-PEFZA's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The A-PEFZA only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards (the Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides). The law requires the State Geologist to establish regulatory zones, known as Earthquake Fault Zones, around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and State agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. Before a project can be permitted, cities and counties must require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults. The evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back 50 feet from the fault trace.

(3) Seismic Hazards Mapping Act (SHMA). In 1990, following the Loma Prieta earthquake, the California Legislature enacted the SHMA to protect the public from the effects of strong ground shaking, liquefaction, landslides and other seismic hazards. The SHMA established a State-wide mapping program to identify areas subject to violent shaking and ground failure; the program is intended to assist cities and counties in protecting public health and safety. The SHMA requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. As a result, the California Geologic Survey is mapping SHMA Zones and has completed seismic hazard mapping for the portions of California most susceptible to liquefaction, ground shaking, and landslides; primarily the San Francisco Bay area and Los Angeles basin. Before a development permit

is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. At the time of the preparation of this EIR, the area of the project has not yet been mapped in conformance with the SHMA.

(4) City of Antioch General Plan Policies. The following policies from the Environmental Hazards Element of the City of Antioch 2003 General Plan specifically address soils, geology and/or seismic hazards and are applicable to the proposed project.

Environmental Hazards

- *Geology and Seismicity Objective 11.3.1*: Minimize the potential for loss of life, physical injury, property damage and, and social disruption resulting from seismic groundshaking and other geologic events.
    - *Geology and Seismicity Policy 11.3.2a*: Require geologic and soils reports to be prepared for proposed development sites, and incorporate the findings and recommendations of these studies into project development requirements. As determined by the City of Antioch Building Division, a site-specific assessment shall be prepared to ascertain potential ground shaking impacts on new development. The site-specific ground shaking assessment shall incorporate up-to-date data from government and non-government sources and may be included as part of any site-specific geotechnical investigation. The site-specific ground shaking assessment shall include specific measures to reduce the significance of potential ground shaking hazards. This site-specific ground shaking assessment shall be prepared by a licensed geologist and shall be submitted to the City of Antioch Building Division for review and approval prior to the issuance of building permits. For purposes of this policy, "development" applies to new structures and existing structures or facilities that undergo expansion, remodeling, renovation, refurbishment or other modification. This policy does not apply to second units or accessory buildings.
    - *Geology and Seismicity Policy 11.3.2g*. Require that engineered slopes be designed to resist seismically-induced failure.
    - *Geology and Seismicity Policy 11.3.2h*. Require that parcels overlying both cut and fill areas within a grading operation be over-excavated to mitigate the potential for seismically-induced differential settlement.
    - *Geology and Seismicity Policy 11.3.2i*. Limit development in those areas, which, due to adverse geological conditions, will be hazardous to the overall community and those who will inhabit the area.
    - *Geology and Seismicity Policy 11.3.2j*. Require evaluations of potential slope stability for developments proposed within hillside areas, and incorporate the recommendations of these studies into project development requirements.
    - *Geology and Seismicity Policy 11.3.2k*. Require specialized soils reports in areas suspected of having problems with potential bearing strength, expansion, settlement, or subsidence, including implementation of the recommendations of these reports into the project development, such that structures designed for human occupancy are not in danger of collapse or significant structural damage with corresponding hazards to human occupants. Where structural damage can be mitigated through structural design, ensure that potential soils hazards do not pose risks of human injury or loss of life in outdoor areas of a development site.
    - *Geology and Seismicity Policy 11.3.2l*. Where development is proposed within an identified or potential liquefaction hazard area (as determined by the City), adequate and appropriate measures such as (but not limited to) designing foundations in a manner that limits the effects of liquefaction, the placement of an engineered fill with low liquefaction potential, and the alternative siting of structures in areas with a lower liquefaction risk, shall be implemented to reduce potential liquefaction hazards. Any such measures shall be submitted to the City of Antioch Building Division for review prior to the approval of the building permits.
    - *Geology and Seismicity Policy 11.3.2p*. Construction of structures for human occupancy shall be prohibited within areas found to have a high probability of surface collapse or subsidence, unless foundations are designed that would not be affected by such surface collapse or subsidence, as determined by site-specific investigations and engineered structural design.
    - *Geology and Seismicity Policy 11.3.2q*. The locations of all oil or gas wells on proposed development sites shall be identified in development plans. Project sponsors of development containing existing or former oil or gas wells shall submit documentation demonstrating that all abandoned wells have been properly abandoned pursuant to the requirements of the California Department of Conservation Oil, Gas, and Geothermal Resources.

Per the City's Engineering Division, the site-specific soils and geology report required by Policy 11.3.2a, may be prepared in conjunction with final conceptual site design and development plans.

2. Impacts and Mitigation Measures

This section identifies potential impacts related to geology, soils and seismicity and recommends mitigation measures. The criteria of significance are listed below, and then less-than-significant impacts are discussed, followed by a discussion of significant impacts and associated mitigation measures.

a. Criteria of Significance. These criteria are derived from the CEQA Guidelines Environmental Checklist, Appendix G. The project would have a significant geology, soils, or seismicity impact if it would:

- Expose people or structures to substantial risk of loss, injury, or death involving:
  - Rupture of a known active or potentially active earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area, or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking; or
  - Seismic-related ground failure, including liquefaction; or
  - Landslides.
- Result in substantial soil erosion or loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in an on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse; or
- Be located on expansive soils (as defined in Table 18-1-B of the 1994 Uniform Building Code) or corrosive soils, which could cause substantial damage to building foundations, pavements, utilities, and/or other improvements.

b. Less-than-Significant Geology, Soils and Seismicity Impacts. No active faults which pose a hazard for surface rupture have been mapped across the proposed project and no portion of the proposed project is located within an Alquist-Priolo Earthquake Fault Zone; therefore, the potential for fault rupture at the project is negligible. The USGS maps the hillsides south of Sand Creek as Category 3: "generally to marginally stable" or Category 5: "unstable".[34] The site-specific investigation has mapped a landslide on the northwest face of these hills.[35] The area south of Sand Creek is not proposed for development as a part of this proposed project; however, a conceptual plan-element for an eventual extension of the south entrance road south of Sand Creek Road to the edge of the project site is included in area plans. If a project is eventually developed south of Sand Creek, the issue of slope stability and determination of the appropriate level of environmental review under CEQA would need to be addressed at that time. The portion of the proposed project to be developed north of Sand Creek is not subject to landslide hazards. The proposed project is not located on an unstable geologic unit, which if developed would be subject to, or contribute to, on- or off-site fault rupture, liquefaction or lateral spreading. Implementation of the proposed project would not result in

[34] U.S. Geological Survey, 1979. Relative Slope Stability and Land Use Planning in the San Francisco Bay Region, California, CGS Professional Paper 944.

[35] Berlogar Geotechnical Consultants, 2006. op. cit.

the loss of a known mineral resource; the area of the project is classified MRZ-1, "Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources."[36] USGS mapping does not indicate any present or historical mines at the project site;[37] therefore, the risk of subsidence at the site related to collapsing mine structures is negligible. Potential impacts associated with erosion and loss of topsoil is discussed in the Hydrology and Water Quality section of this DEIR.

c. Significant Geology, Soils and Seismicity Impacts. The following five significant impacts associated with the project have been identified.

<u>Impact GEO-1:</u> Seismically-induced ground shaking at the project site could result in injuries, fatalities, and property damage. (S)

The entire San Francisco Bay Area is located in a region of active seismicity. Historically, numerous moderate to strong earthquakes have been generated in northern California by several major faults and fault zones in the SAFZ system. The CBC incorporates by adoption the Uniform Building Code of the International Conference of Building Officials with necessary California Amendments.

The site-specific geotechnical feasibility investigation notes that the site is situated in the vicinity of the Mt. Diablo thrust fault, the Great Valley 5 fault, the Greenville fault and the Concord-Green Valley fault. Because of this proximity to active faults it is likely that the project site including the off-site areas will be subjected to strong ground shaking from at least one moderate to severe earthquake during the life span of the project. The geotechnical feasibility investigation recommends that a final design-level geotechnical investigation be prepared that would provide detailed recommendations on specific design and site layout parameters.

Ground shaking from earthquakes along the known active faults in the site vicinity and general region could cause damage to people and property unless properly mitigated. Ground shaking potential is estimated on a worst-case basis by taking the maximum expected earthquake and designing for the peak accelerations that it could generate. The adverse impacts of seismically-generated ground shaking on potential development infrastructure, structures and people can be reduced to acceptable levels by completing the project seismic design and construction in conformance with, or by exceeding, current best standards for earthquake resistant construction per the CBC as adopted and amended for the City of Antioch Building Code.[38] Appropriate grading and design elements prepared by a Certified Engineering Geologist or Geotechnical Engineer would also help reduce the potential impact to areas that have undergone extensive grading and are prone to the secondary effects of ground shaking, such as differential settlement or liquefaction. However, in the event of a major earthquake, some structural damage is likely to occur to some residences/structures and infrastructure.

Strong to Very Strong ground shaking is expected at the project during a large earthquake on either the Greenville or Mount Diablo Thrust faults. This level of seismic shaking could cause injuries and/or fatalities and structural and non-structural damage to buildings at the site. A design level geotechnical investigation report for the project including the off-site areas would provide specific design criteria for construction of the project in response to expected seismic events.

[36] California Department of Conservation, 1987. Mineral Land Classification Special Report 146-II, updated with CDMG OFR 96-03, 1996.

[37] U.S. Geological Survey, 2007. *Mineral Resources On-Line Spatial Data.* Website: mrdata.usgs.gov/index.html.

[38] City of Antioch Municipal Code, Title 8: Building Regulations, Chapter 1: Building Code

All design criteria and specifications set forth in the site-specific design-level geotechnical investigation report shall be implemented to reduce impacts associated with seismically induced ground shaking to a less-than-significant level.

> Mitigation Measure GEO-1: Project design and construction shall be in conformance with, or exceed, current best standards for earthquake resistant construction in accordance with the California Building Code, applicable local codes, and in accordance with the generally accepted standards of geotechnical practice for seismic design in Northern California. In addition, project design for on- and off-site project elements shall follow the recommendations of a site-specific design-level geotechnical investigation report to be prepared by a Certified Engineering Geologist or Geotechnical Engineer. The City Engineer shall approve all final design and engineering plans. (LTS)

It is acknowledged that seismic hazards cannot be completely eliminated, even with site-specific geotechnical investigation and advanced building practices (as provided in the mitigation measure above). However, exposure to seismic hazards is a generally accepted part of living in the seismically active areas of California, and therefore the mitigation measure described above reduces the potential hazards associated with seismic activity to a less-than-significant level.

Impact GEO-2: Differential settlement at the project site could result in damage to project buildings and other improvements. (S)

Grading of the project site including off-site areas in preparation for construction of buildings and utilities may result in areas of cut and fill. Fills of different thickness and fills adjacent to cut areas could create the potential for differential settlement. Construction on un-compacted and loose fill, if present, on the site would be subject to varying rates of settlement. If the settlement is not uniform, structural damage could occur. Buried utilities may also experience differential settlement along their alignments. Structures, utilities and paved paths built over discontinuous materials of varying densities and compactness may be subject to stress or damage due to differential settlement. Sidewalks and paved paths, either asphalt or concrete, may eventually present an irregular surface due to settlement, resulting in pedestrian tripping hazards or tire hazards for wheeled vehicles such as bicycles and jog-strollers.

The site-specific geotechnical feasibility investigation for the project site notes that undocumented artificial fill containing concrete rubble was placed along the eastern and northern property lines, and that in general, existing fill not removed by design cut should be over-excavated entirely and replaced with engineered fill. The geotechnical feasibility investigation recommends that a final design-level geotechnical investigation be prepared that would address these issues based on specific design and site layout parameters to be finalized as the part of the development process.

All design criteria and specifications set forth in the site-specific design-level geotechnical investigation report shall be implemented to reduce impacts associated with problematic soils to a less-than-significant level.

> Mitigation Measure GEO-2: A site-specific design-level geotechnical investigation report for on- and off-site project elements shall be prepared by a licensed professional and submitted to the City Engineer for review and approval. The report shall include specific recommendations for mitigating potential settlement associated with native soil/fill boundaries and areas of

different fill thickness, if any. The report shall specifically address treatment of test pit areas and trenches to ensure that differential settlement will not occur in those areas. (LTS)

Impact GEO-3: Damage to structures or property could result from expansive or corrosive soils. (S)

Soils underlying the project site have been identified as having a high shrink/swell potential.[39] Structural damage of buildings or rupture of utilities may occur if the potentially expansive soils were not considered in the design and construction of the proposed project.

The site-specific geotechnical feasibility investigation for the project site notes that to reduce the adverse effects of on-site surface soils with high expansion potential, post-tensioned concrete slab foundations should be considered. It is also noted that at the early stage of planning, it is difficult to determine what the actual foundations supporting materials will be. It is recommended that additional study be carried out at the design-state and, at that time, the geotechnical parameters for foundation design can be provided based on the soils conditions at different areas with the project site. The geotechnical feasibility investigation recommends that a final design-level geotechnical investigation be prepared that would provide detailed recommendations on specific design and site layout parameters.

All design criteria and specifications set forth in the site-specific design-level geotechnical investigation report shall be implemented to reduce impacts associated with problematic soils to a less-than-significant level.

Mitigation Measure GEO-3: A site-specific design-level geotechnical investigation report for both on- and off-site project elements, prepared by a licensed professional, shall be prepared. The report shall include recommendations for foundations and improvements, including sidewalks, paved paths, parking lots, and subsurface utilities, considering expansive soil conditions. Measures shall be incorporated into the report to ensure that potential damage due to shrink/ swell potential of soils is minimized. Corrective measures, as recommended by a licensed professional, may include removal and replacement of problematic soils with engineered and compacted fill, proper drainage design, or design and construction of improvements to withstand the forces exerted by expected shrink/ swell cycles. The report shall be submitted to the City Engineer for review and approval.

In addition, the design-level geotechnical study shall include an evaluation of the potential for corrosive soils. If the study results indicate corrosive soil conditions, appropriate measures to mitigate these conditions shall be incorporated into the design of project improvements that may come into contact with site soils. Wherever corrosive soils are found in sufficient concentrations, recommendations shall be made to protect iron, steel, metal, and concrete from long-term deterioration caused by contact with corrosive onsite soils. In general, these recommendations are expected to include, but not be limited to, the following provisions:

- Protect buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron (including all buried metallic pressure piping) against corrosion from soil.
- Protect buried metal and cement structures in contact with earth surfaces from chloride ion concentrations.

[39] Natural Resource Conservation Service, 2008. op. cit.

- Use sulfate-resistant concrete mix for all concrete in contact with the ground.
- Consult a corrosion expert during the project's detailed design phase to design the most effective corrosion protection.

All design criteria and specifications set forth in the site-specific design-level geotechnical investigation report shall be implemented to reduce impacts associated with problematic soils to a less-than-significant level. (LTS)

Impact GEO-4: The presence of improperly abandoned oil or gas wells at the project site could result in instability of surface soils. (S)

The proposed project is located within the Brentwood Oil and Gas Field. Approximately eight wells are located within the project site area but all are mapped as plugged and capped by the State.[40] If any of these wells have not been properly capped and are exposed during grading, they could cause caving hazards and/or undermine project improvements. The City of Antioch General Plan states that the locations of all oil or gas wells on proposed development sites shall be identified on development plans including those of off-site improvements. Project sponsors of development containing existing or former oil or gas wells shall submit documentation demonstrating that all abandoned wells have been properly abandoned pursuant to the requirements of the California Department of Conservation, Oil, Gas, and Geothermal Resources Division.

The site-specific geotechnical feasibility investigation makes no recommendations regarding the potential presence of oil or gas wells at the project site. A final design-level geotechnical investigation would address these issues based on specific design and site layout parameters to be finalized as the part of the development process.

All design criteria and specifications set forth in the site-specific design-level geotechnical investigation report shall be implemented to reduce impacts associated with problematic soils to a less-than-significant level.

Mitigation Measure GEO-4: Research and verification of closure records, as well as physical verification of well closure and capping shall be completed during preparation of the site-specific design-level geotechnical investigation report for on- and off-site project elements. Any improperly abandoned wells within the project boundaries shall be brought into compliance with the requirements of California Department of Conservation and City of Antioch. The report shall be submitted to the City Engineer for review and approval. (LTS)

Impact GEO-5: Personal injury could result during construction due to inadequately shored walls in trenches and excavations. (S)

The California Division of Occupational Safety and Health (DOSH) (which acts to protect workers from safety hazards through its California OSHA (Cal/OSHA)) issues guidelines and regulations regarding worker safety and shoring methods for trenches and excavations.[41] As previously discussed, soils in the project vicinity have a low potential for liquefaction, lateral spreading or landslide.

[40] California Department of Conservation, 2006. Oil and Gas Well Map 608, Division of Oil, Gas and Geothermal Resources.

[41] Title 8, California Code of Regulations, Sections 1539-1543. Construction Safety Orders can be reviewed at: www.dir.ca.gov/Title8/sub4.html.

However, based on NRCS mapping, the Capay and Altamont clays have a high potential for caving at excavations and trenches. This has the potential to be a significant impact during the construction phase. Implementation of the following mitigation would reduce this potential impact to a less-than-significant level.

> Mitigation Measure GEO-5: The applicant shall ensure that the requirements for worker health and safety as specified by Cal/OSHA are implemented. In particular, due to the caving proclivity of the soil types of the project site, shoring requirements of the California standards for workers dealing with and work in excavations as specified in the California Code of Regulations, Title 8, Section 1540 et. al., *Excavations*, shall be observed for all on- and off-site operations. This article applies to all open excavations made in the earth's surface. Excavations are defined to include trenches. (LTS)

G. HYDROLOGY AND STORM DRAINAGE

This section describes the existing hydrological setting, including runoff, drainage, and water quality, for the project site and off-site improvement areas. Data sources for this section include information submitted with the project application, review of previously prepared environmental investigation reports, other published materials, and a site reconnaissance. This section identifies potential impacts related to hydrology and storm drainage that may result from project development, and recommends mitigation measures to reduce potential impacts.

1. Setting

A description of the existing conditions related to hydrology and storm drainage is provided below.

a. Climate. The climate of the San Francisco Bay area is characterized as dry-summer subtropical (often referred to as Mediterranean), with cool wet winters and relatively warmer dry summers. In the vicinity of the project the annualized average high temperature for the period of 1955 to 2007 is 73.3º Fahrenheit (F); the average low is 47.9º F. The mean annual rainfall in the vicinity of the proposed project, for the same period is approximately 13 inches, the majority of which occurs from November through April. During this period of record, annual rainfall has varied from 5.87 inches (1976) to 27.75 inches (1983), with a one-day high of 3.0 inches of precipitation on October 13, 1962. Analysis of long-term precipitation records indicates that wetter and drier cycles lasting several years are common in the region. Severe, damaging rainstorms occur in the Bay Area at a frequency of about once every three years.[1]

b. Runoff and Drainage. The topography of the project site consists of relatively flat, but gently eastward sloping lowlands ranging in elevation from about 200 feet (in the west) to about 170 feet (in the east) above mean sea level (msl). The off-site alignment for sanitary sewer infrastructure slopes gently from the east edge of the project site towards the northeast to an elevation of approximately 150 feet msl, where it will tie into the existing infrastructure. The uplands to the south (on the south side of Sand Creek) rise to an elevation of about 325 feet above msl.

In an undeveloped setting like the project site, when rainfall intensities exceed the infiltration capacity of surface soils, runoff flows over the ground surfaces toward established natural drainage channels. Stormwater runoff is then conveyed away from the area in creeks and streams. Runoff from the site flows toward Sand Creek, which crosses the southern portion of the site. The project site is located within Drainage Area 130, as designated by the Contra Costa County Flood Control and Water Conservation District (CCCFCD).

An unnamed drainage ditch is located along the eastern site boundary. This ditch, which is about 2,280 feet long and discharges to Sand Creek to the south, was constructed to act as a detention and stormwater conveyance feature for the residential development to the north.[2] This ditch also collects drainage from the project site. Other minor ephemeral drainages and areas of ponding were noted to occur at the site in the wetland delineation report;[3] however, these remnant features do not appear to

[1] Western Regional Climate Center, 2008. *Station 040232 - Antioch Pump Plant 3*. Accessed 6-3-08 at: www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0232

[2] Monk and Associates, 2005, Request for Jurisdictional Determination, Williamson/Ginochio Project Site, Antioch, Contra Costa County, California, May10.

[3] Ibid.

convey substantial quantities of stormwater. Runoff from the site either moves through these minor drainages or as overland flow toward Sand Creek.

Sand Creek, a perennial (year-round) stream that traverses the southern portion of the project site, [4] drains the Lone Tree Valley. During storms, Sand Creek receives surface water flow from several unnamed tributaries and Horse Valley Creek. The main fork of Sand Creek (and an unnamed tributary that drains Oil Canyon) originates in the Black Diamond Mines Regional Preserve west of the project site. Sand Creek is a tributary to Marsh Creek and located within the Marsh Creek watershed. Water flowing in these creeks evaporates, infiltrates into the subsurface, or eventually discharges into the San Joaquin River.

All runoff from the areas west and northwest of the project site drains to double 84-inch underground pipes (oriented north to south) that discharge to the CCCFCD's Upper Sand Creek Basin (USCB). The USCB is a work in progress, with a significant portion having been completed. The USCB, when completed, will be a dual-use facility that will also serve as the City of Antioch's regional Sports Complex. Coordination between the City and CCCFCD for the project began in the early 1990s and the facility is included in Antioch's 2003 General Plan.[5] Plans for the USCB indicate that, when completed, the approximately 48-acre facility will allow Sand Creek to enter the constructed basin from a drop inlet in the southwestern corner, pass along the southern edge of the basin in a 'low flow' channel, and exit to the existing Sand Creek channel at the southeast corner. During significant storms, the basin will detain excess runoff and allow for gradual release and/or infiltration[6] of stormwater. The 'floor' of the basin slopes to the south with an adequate angle to ensure reasonable drain time. The basin floor has a base elevation of approximately 160 feet.[7] Recreational fields would be clustered towards the higher northern portion of the basin floor. During a 10-year storm event, water would rise to an elevation of approximately 180 feet. During a 100-year storm event, the basin would fill to capacity at approximately 191 feet msl. The southeastern face of the USCB will consist of a weir designed to act as an emergency spillway and basin overflow outlet, at an elevation of approximately 191 feet msl.[8] The CCCFCD is currently working to complete the USCB as soon as possible.[9] Due to the height of the weir and water capacity[10] of the USCB, the facility will come under the jurisdiction and oversight of the State of California Department of Water Resources Division of Safety of Dams. At the time of the preparation of this EIR, a final dam inundation

[4] Monk and Associates, 2005, Request for Jurisdictional Determination, Williamson/Ginochio Project Site, Antioch, Contra Costa County, California, May 10.

[5] David Gates & Associates, 2003. *Sand Creek Basin Park Master Plan*, City of Antioch and Contra Costa County Flood Control District, July.

[6] Due to soil types in the area, infiltration may be limited, see Geology section of this EIR for further discussion of soils of the area.

[7] Datum for USCB elevations is NAVD 88

[8] Contra Costa County Flood Control District, 2008. Letter of Comment on Administrative Draft EIR for the Aviano Adult Community Project to Nina Oshinsky, City of Antioch, from Teri E. Rie, Contra Costa County Flood Control and Water Conservation District. August 13.

[9] Contra Costa County Flood Control and Water Conservation District, 2006, NOP Comment Letter to Nina Oshinsky, City of Antioch, from Wes Cooley, Contra Costa County Flood Control and Water Conservation District. August 9.

[10] Dams under jurisdiction are those with either a height of 25 feet or more, or an impounding capacity of 50 acre-feet or more.

calculation and map has not been prepared for the USCB facility; however, CCCFCD is in the process of preparing such a map.

c. Flooding. The portion of the project proposed for development, including the off-site improvement areas, is not located within the 100-year flood hazard zone, as mapped by the Federal Emergency Management Agency (FEMA).[11,12] Areas within the 100-year flood zone have a one percent or greater chance of flooding in any given year. A relatively narrow band (approximately 300 feet wide) along Sand Creek is designated as being within the 100-year flood hazard zone as mapped by FEMA. This area would remain undeveloped under the proposed project. Sand Creek currently does not have the capacity to convey the 100-year storm flows downstream of the project site. Flooding of residential areas adjacent to Sand Creek (downstream of the project site) occurred as recently as winter 2005-2006.[13]

Based on the distance from the project site to the San Joaquin River (approximately four miles) and the elevation of the site (ranging from about 170 to about 328 feet above mean sea level), coastal hazards, such as tsunamis, extreme high tides, and sea level rise would not be a hazard of concern.

The proposed project, including off-site improvement areas, is not located in any currently mapped dam failure inundation zones.[14] As noted above, the USCB facility will, when complete, require oversight by the California Division of Safety of Dams and an inundation map is currently being prepared by the CCCFCD. Based on current plans it is not anticipated that residential development of the proposed project will occur within the area likely to be affected by inundation due to failure of the USCB.[15]

d. Water Quality. The quality of surface water and groundwater in the vicinity of the proposed project is affected by past and current land uses at the site and within the watershed, and the composition of geologic materials in the vicinity. The State Water Resources Control Board and the Regional Water Quality Control Boards regulate water quality in surface water and groundwater bodies. The area of the proposed project is under the jurisdiction of the Central Valley Regional Water Quality Control Board (Water Board), which is responsible for implementation of State and federal water quality protection statutes and regulations in the Delta Area. The Water Board implements the Water Quality Control Plan (Basin Plan),[16] a policy document for managing water

[11] Federal Emergency Management Agency (FEMA), 1987. Flood Insurance Rate Map (FIRM), Contra Costa County, California, Community Panel Numbers 060025 0335B, July 16. (Note: This is the FIRM that covers the project site. The site is now located within the City of Antioch. At the time the FIRMs were prepared, the site was in the unincorporated County area).

[12] FEMA, 2001. Flood Insurance Rate Map (FIRM), Contra Costa County, California, Community Panel Numbers 060025 0355C, Sept 7.

[13] Contra Costa County Flood Control and Water Conservation District, 2006, op.cit.

[14] Association of Bay Area Governments, 2007. Interactive ABAG (GIS) Maps Showing Dam Failure Inundation Website: http://www.abag.ca.gov.

[15] City of Antioch, 2008. op. cit.

[16] Central Valley Regional Water Quality Control Board, 1998 (as revised through 2007). *Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins*. September 15.

quality issues in the region.[17] The Basin Plan establishes beneficial water uses for waterways and water bodies within the region.

The water quality in the Marsh Creek watershed is degraded. Several factors have contributed to this degradation including extensive agriculture operations, urbanization, and mercury mining activities that began in the 1850s. Marsh Creek Reservoir (located about two miles east of the site) has been closed to fishing since the mid-1980s due to high concentrations of mercury found in fish both in and upstream of the reservoir.[18]

In addition, the land use history of the Marsh Creek watershed has included oil and gas exploration and production operations and coal mining operations.[19] These past activities have likely affected water quality in many of the creeks within the watershed. Discharges of wastewater from oil/water separation processes, as part of production at oil fields, to Sand Creek have commonly occurred in the past.

Historic coal mining to the west of the proposed project (a portion of this area is now operated as the Black Diamond Mines Regional Preserve [BDMRP], an East Bay Regional Parks District facility), included construction of mine tunnels and shafts below the regional groundwater table. One of the abandoned shafts, a dewatering shaft of the abandoned Empire Mine, daylights at the Zeka/Higgins parcel approximately two miles west of the project site. The opening to the shaft, which was partially plugged in 1982, is currently discharging acid mine leachate into a tributary of Sand Creek. Under dry weather conditions, the leachate infiltrates into the subsurface prior to reaching the main branch of Sand Creek. During wet weather, the acidic leachate mixes with and is diluted by flows within the creek. In 1987, an inspection report was completed on the acid mine drainage from the Empire Mine by personnel from the Central Valley Water Board. It was determined that acid mine drainage was flowing from a shaft at a rate of 16 gallons per minute (gpm). At the mine opening the drainage had a pH of 2.6 (a strong acid), electrical conductivity of 4,400 umhos/cm, and contained elevated levels of metals, including aluminum, beryllium, boron, cobalt, chromium, iron, manganese, nickel, and zinc. During a field visit to the area during preparation of previous environmental documentation for the Sand Creek Specific Plan area,[20] the pH of the mine shaft discharge was measured to be 3.3 and the electrical conductivity 3,350 umhos/cm. In 1993, another water sample was collected from the mine shaft discharge and was reported to have a pH of 2.79 and electrical conductivity of 2,650 umhos/cm.[21]

In 1995, an additional attempt was made to complete the seal of the seep at the Zeka/Higgins parcel. The 1995 effort included a small amount of excavation in the area of the seep and injection of a polyurethane material. The Office of Surface Mining (OSM) did not believe the attempt to seal the seep with the polyurethane material would be effective because of the relatively high flow volume

[17] See discussion below for details of joint NPDES implementation with San Francisco Regional Water Board.

[18] CALFED, 2005, Fish Passage Improvement: An Element of CALFED's Ecosystem Restoration Program, Bulletin 250, June

[19] City of Antioch, 2002, Draft Environmental Impact Report, Sand Creek Specific Plan and Four Associated Development Plans, Antioch, California, August.

[20] Mundie & Associates and City of Antioch. 2003. Recirculated DEIR, Sand Creek Specific Plan, Antioch, California. Volume II. State Clearinghouse No. 2001122004.

[21] Ibid.

and hydraulic pressure (head) at the seep discharge location. Based on interviews with Water Board staff in 2007, no further monitoring or remediation activity has occurred at the abandoned mine discharge location or along Sand Creek.[22] It is unknown whether the documented upstream acid mine drainage significantly affects water quality in Sand Creek in the vicinity of the project site.

Two aspects of water quality are described in greater detail, below: stormwater quality and groundwater quality.

(1) Stormwater Quality. Runoff water quality is regulated by the National Pollutant Discharge Elimination System (NPDES) Program (established through the Clean Water Act). The NPDES program objective is to control and reduce pollutant discharges to surface water bodies. Locally, the NPDES Program is administered by the Central Valley Regional Water Quality Control Board; however, both the San Francisco Bay[23] and Central Valley Water Boards have jurisdiction within Contra Costa County, and have jointly conveyed responsibility for implementation of storm water regulations in the vicinity of the proposed project to the Contra Costa County CCCWP by issuing NPDES permits covering all participating agencies within the County, including the City of Antioch. Compliance with the NPDES permits is mandated by State and federal statutes and regulations.

Participating agencies, including the City of Antioch, must comply with the provisions of the CCCWP NPDES permit by ensuring that new development and redevelopment mitigate, to the maximum extent practicable, water quality impacts to stormwater runoff both during construction and operation periods of projects. Recent changes to the permit held by the CCCWP are detailed in Water Board Order R2-2003-0022 (NPDES Permit No. CAS0029912) as amended. Revisions set forth in that document that potentially apply to the proposed project include Provision C.3. The proposed project would be required to meet all the terms of the permit, including, but not limited to:

- Numeric Sizing Criteria for Pollutant Removal Treatment Systems. The project must include source controls, design measures, and treatment controls to minimize stormwater pollutant discharges. Treatment controls must be sized to treat a specific amount – about 85 percent – of average annual runoff (in the Bay Area this is equivalent to about the 1-inch storm).
- Operation and Maintenance of Treatment Measures. Treatment controls often do not work unless adequately maintained. The permit requires an operations and maintenance (O&M) program.
- Limitation on Increase of Peak Stormwater Runoff Discharge Rates and Impacts Associated with Hydrograph Modification. Urbanization creates impervious surfaces that reduce the landscape's natural ability to absorb water and release it slowly to creeks. These impervious surfaces increase peak flows in creeks and can cause erosion. Projects must evaluate the potential for this to occur and provide mitigation, as necessary. The Contra Costa County Clean Water Program has completed a Hydrograph Modification Management Plan (dated May 15, 2005) to assist new development projects in complying with the requirements of the county-wide permit.

[22] Atkinson, Ross, 2007, Engineering Geologist, Central Valley Regional Water Quality Control Board, personal communication with Bruce Abelli-Amen of BASELINE, March 13.

[23] San Francisco Bay Regional Water Quality Control Board, 2006 (amended 2007). *Water Quality Control Plan*, December 22.

Projects disturbing more than one acre of land during construction are required to file a Notice of Intent (NOI) with the Water Board to be covered under the State NPDES General Construction Permit for discharges of stormwater associated with construction activity. A developer must propose control measures that are consistent with the State General Construction Permit. A Stormwater Pollution Prevention Plan (SWPPP) must be developed and implemented for each site covered by the general permit. A SWPPP should include Best Management Practices (BMPs) designed to reduce potential impacts to surface water quality during the construction of the project.

(2) Groundwater Quality. The project site is located within the San Joaquin Valley Groundwater Basin. Groundwater quality in this area tends to improve with distance from the Delta, since those areas near the Delta are influenced by salt water mixing. There are no designated groundwater recharge areas in the Sand Creek Specific Plan area.[24]

e. Regulatory Considerations. The following describes the regulatory considerations applicable to the proposed project.

(1) Contra Costa County. The Contra Costa County Flood Control and Water Conservation District implements County Flood Control Ordinance No. 2007-06, which establishes the requirement to collect drainage fees from new developments that create new impervious surfaces in Drainage Area 130. The ordinance finds that new development, with the associated increase in impervious cover, would have adverse effects on regional drainage systems, and that those systems require upgrade and maintenance. All building permits or subdivision maps filed in Drainage Area 130 are subject to the provisions of the drainage fee ordinance. The ordinance requires the collection of fees based on $0.56 per square foot of newly created impervious surface area.

(2) Provision C.3.f of County National Pollution Discharge Elimination System Permit (NPDES). This provision specifies the enhanced requirements for limiting "the increase of peak stormwater runoff rates." It states that member agencies will:

> *Manage increases in peak runoff flow and increased runoff volume, for all Group 1 Projects, where such increased flow and/or volume is likely to cause increased erosion of creek beds and banks, silt pollutant generation, or other waterbody impacts to beneficial uses due to increased erosive force. Such management shall be through implementation of a Hydrograph Modification Management Plan (HMP). The HMP, once approved by the Regional Board, will be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the increased stormwater discharge rates and/or durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in the amount and timing of runoff. The term duration in this Provision is defined as the period that flows are above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams.*

(3) Contra Costa Clean Water Program. The following is an excerpt from CCCWP's Hydrograph Modification Management Plan,[25] Attachment 1 (page 1):

[24] City of Antioch, 2002, op.cit.

[25] Contra Costa Clean Water Program, 2005. Hydrograph Modification Management Plan, May 15.

All projects subject to this standard shall ensure estimated post-project runoff peaks and durations do not exceed estimated pre-project peaks and durations if increased stormwater runoff peaks or durations could cause erosion or other significant effects on beneficial uses.

(4) Antioch General Plan. The following implementing programs from the City of Antioch General Plan would apply to the project:

Water Resources

Water Resources Policy 10.7.2f: Participate in the Contra Costa Clean Water program to reduce stormwater pollution and protect the water quality of the City's waterways.

Water Resources Policy 10.7.2g: Require public and private development projects to be in compliance with applicable National Pollution Discharge Elimination System (NPDES) permit requirements, and require the implementation of best management practices to minimize erosion and sedimentation resulting from new development.

Water Resources Policy 10.7.2h: Participate in regional watershed planning efforts to enhance area water quality.

Water Resources Policy 10.7.2i: Design drainage within urban areas to avoid runoff from landscaped areas and impervious surfaces from carrying pesticides, fertilizers, and urban and other contaminants into natural streams.

Environmental Hazards

Flood Protection Objective 11.4.1: Minimize the potential for loss of life, physical injury, property damage, and social disruption resulting from flooding.

- *Flood Protection* Policy *11.4.*2a: Prohibit all development within the 100-year floodplain, unless mitigation measures consistent with the National Flood Insurance Program are provided.
- *Flood Protection* Policy *11.4.*2b: Minimize encroachment of development adjacent to the floodway in order to convey flood flows without property damage and risk to public safety. Require such development to be capable of withstanding flooding and to minimize the use of fill.
- *Flood Protection* Policy *11.4.*2*c*: Prohibit alteration of floodways and channelization of natural creeks if alternative methods of flood control are technically and financially feasible. The intent of this policy is to balance the need for protection devices with land use solutions, recreation needs, and habitat preservation.
- *Flood Protection* Policy *11.4.*2*d*: Require new development to prepare drainage studies to assess storm runoff impacts on the local and regional storm drain and flood control system, along with implementation of appropriate detention and drainage facilities to ensure that the community's storm drainage system capacity will be maintained and peak flow limitations will not be exceeded.
- *Flood Protection* Policy *11.4.*2*e*: Where construction of a retention basin is needed to support new development, require the development to provide for the perpetual funding and ongoing maintenance of the basin.
- *Flood Protection* Policy *11.4.*2*f*: Eliminate hazards caused by local flooding through improvements to the area's storm drain system or creek corridors.

(5) City of Antioch Municipal Code. As stated in Section 8-13-01 of the Municipal Code, Stormwater pollution control measures shall be implemented during all construction phases of development to prevent pollution from entering the waterways.

2. Impacts and Mitigation Measures

This section analyzes the impacts related to hydrology and water quality that could result from the project. The subsection begins with criteria of significance, which establish the thresholds for determining whether a project impact is significant. The latter part of this section presents the potential hydrology and storm drainage impacts associated with the proposed project. Mitigation measures are provided as appropriate.

a. Criteria of Significance. These criteria are derived from the *CEQA Guidelines* Environmental Checklist, Appendix G. The proposed project would result in significant flooding, hydro-logic, water quality, or storm drainage impacts if it would have any one of the following effects:

- Violate any local, State or federal water quality standards or waste discharge requirements;
- Create or contribute runoff that would be an additional source of water quality degradation;
- Result in substantial erosion or sedimentation on- or off-site that would affect the quality of receiving waters;
- Create or contribute runoff that would exceed the capacity of existing or planned stormwater drainage systems and/or increase upstream or downstream flooding and require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Expose people or structures to a substantial risk of loss, injury or death involving flooding;
- Expose people or structures to a substantial risk of inundation by seiche, tsunami, extreme high tides, and/or sea level rise; or
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a significant net deficit in aquifer volume or a lowering of the local groundwater table level.

b. Less-than-Significant Hydrology and Storm Drainage Impacts. According to the most recent FEMA mapping, the portion of the project proposed for development, including off-site improvement areas, is not located within the 100-year flood hazard zone, and therefore, no placement of housing or other structures in a flood hazard zone would occur under the proposed project. The project is roughly three miles from the coastline with a minimum elevation of 170 feet above mean sea level; therefore coastal hazards, such as extreme high tides, tsunami, or sea level rise would not represent significant impacts.

The project is not located in any currently mapped dam failure inundation zones.[26] It may be that the inundation zone[27] for the USCB will overlie a portion of the proposed Aviano project area.[28] Based on current plans it is not anticipated that residential development of the proposed project would occur within the area that would be affected by inundation due to failure of the USCB.[29] Therefore, potential impacts of dam failure inundation would be less-than-significant.

It is likely that, with the installation of new buildings, improved pavement surfaces, and a stormwater conveyance system, on-site recharge would be reduced relative to the existing condition. However, implementation of the proposed project is not expected to contribute to depletion of groundwater sup-

[26] Association of Bay Area Governments, 2007. Interactive ABAG (GIS) Maps Showing Dam Failure Inundation Website: http://www.abag.ca.gov.

[27] The inundation zone for the planned USCB has not yet been officially mapped.

[28] Contra Costa County Flood Control District, 2008. op. cit.

[29] City of Antioch, 2008. op. cit.

plies because the proposed project would not use groundwater underlying the site. In addition, stormwater treatment best management practices (BMPs) that detain water on-site will include an infiltration component (detention basins) that will encourage recharge.

c. Significant Hydrology and Storm Drainage Impacts. The following three significant impacts associated with the project have been identified.

Impact HYD-1: Increased runoff volume resulting from creation of new impervious surfaces could cause hydromodification impacts. (S)

Development of the project would result in more surface area covered by impervious surfaces (buildings, paved roadways and parking areas, paved pathways (Sand Creek trail), sidewalks) relative to existing conditions. The existing project site has a lower runoff coefficient than would occur under the proposed project, meaning that more water would leave the site as runoff under the developed site condition. Increased runoff volume and the increased rate of delivery of runoff to Sand Creek could result in hydromodification impacts to downstream creeks (Sand Creek and Marsh Creek). Hydromodification is defined as the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. In the case of a stream channel, this is the process whereby a stream bank is eroded by flowing water. This typically results in the suspension of sediments in the watercourse and resulting degradation of water quality.

Historically, detention basins have been used to detain stormwater and reduce peak flows (the highest flows during a storm). This type of detention basin would ensure that the maximum discharge from the developed site would not increase, relative to existing conditions (and therefore reduce the potential for hydromodification impacts). However, operation of these basins tends to increase the *duration* of discharge, which can contribute to hydromodification impacts by increasing the duration of time that downstream creek channels are subject to erosive flows.

A preliminary stormwater control plan (stormwater plan) has been prepared for the project site and is included as Appendix H of this report.[30] This stormwater plan proposes to use a three-tiered approach to address stormwater management (in accordance with the County NPDES permit): 1) site design, 2) source control, and 3) treatment control. Properly designed, site design and treatment controls would serve the dual function of reducing runoff volumes/velocities and improving water quality. Potential impacts to water quality are further discussed below under Impact HYD-3.

Under the stormwater plan, site design features that could reduce potential hydromodification impacts of the project include clustering development in the north to provide a buffer area along Sand Creek and to reduce the amount of directly-connected impervious surfaces. Of the total project site area of about 189 acres, approximately 70 acres would remain as pervious parks or undeveloped open space; including individual lot landscaping results in roughly 50 percent of the project site remaining pervious surface post-development. The Sand Creek trail would result in approximately one-half acre of additional impermeable surface in close proximity to the Creek, and needs to be included in the final design-level calculations for the site. Source control measures, which address water quality only, are discussed under Impact HYD-3.

[30] Balance Hydrologics, Inc., 2008. Preliminary Stormwater Control Plan, Aviano Project, City of Antioch, California, May.

Under the stormwater plan, eight multi-purpose basins would be located on the site. Six basins would be within the central PG&E corridor through the residential development area of the project, and two basins (referred to as "Basin 3" and "East Basin") would be south of Sand Creek road adjacent the Sand Creek buffer area. The East Basin is also partially within the PG&E corridor and all basins within the PG&E right-of-way would require approval of PG&E to use the central open space corridor for stormwater detention and/or treatment. These basins would be designed to provide detention of stormwater for 1) water quality treatment and 2) hydromodification mitigation.

The stormwater control plan provides an adequate conceptual strategy for complying with the County NPDES permit. The stormwater plan will be supplemented during the final design development process with detailed design-level calculations based on the preliminary control plan, identification of specific BMP types, sizes and locations, and design-level demonstration that the proposed basins would adequately mitigate potential hydromodification impacts. Therefore, the following mitigation measure must be implemented to ensure that significant impacts related to downstream hydromodification are addressed as part of the final design process.

> Mitigation Measure HYD-1: As a condition of approval of the final grading and drainage plans for the project, and prior to issuance of a grading permit the applicant shall demonstrate through detailed hydraulic analysis that implementation of the proposed drainage plans for all on-site and off-site improvements will not create potential hydromodification impacts downstream by implementing the following:
>
> 1) A qualified licensed engineering firm retained by the applicant shall develop final design-level drainage and C.3 compliant stormwater management plans for the proposed project including all on-site and off-site improvements. The project drainage plan shall include a design that, when implemented, would ensure that post-project runoff does not exceed estimated pre-project rates and/or durations, where the increased stormwater discharge rates and/or durations will result in increased potential for erosion.
>
> 2) Include drainage components that are designed in compliance with City of Antioch standards. The qualified licensed engineering firm preparing drainage plans shall consider the proximity of the proposed detention basins to Sand Creek and shall implement adequate design measures so as to not result in bank instability in Sand Creek. The grading and drainage plans shall be reviewed for compliance with these requirements by the City of Antioch.
>
> 3) Neither the City of Antioch nor any other government agency shall be responsible for maintenance of C.3 compliance facilities. The project must include a self-perpetuating drainage system maintenance program (to be managed by a homeowners association or similar entity) that includes annual inspections and necessary maintenance of detention basins, sedimentation basins, drainage ditches, and drainage inlets. Any accumulation of sediment or other debris shall be promptly removed and damage to the drainage system repaired in a timely manner.
>
> 4) Storm Water Control Plans shall be in conformance with the engineering guidance and specifications provided by the Contra Costa County Flood Control and Water Conservation District. (LTS)

Impact HYD-2: Increased runoff resulting from creation of new impervious surfaces could potentially exacerbate downstream flooding problems. (S)

Increased runoff volume and peak discharges to Sand Creek from the site would, if left unmitigated, increase under the proposed project, potentially exacerbating cumulative flooding impacts in downstream areas along Sand Creek that already are prone to flooding. Under the stormwater plan, project design would include features that would reduce peak flows and runoff durations relative to current site conditions. These features (see HYD-1) would also reduce potential impacts to downstream flooding. The following mitigation measure must be implemented to ensure that significant impacts related to downstream flooding are addressed as part of the final design process.

> Mitigation Measure HYD-2: As a condition of approval of the final grading and drainage plans for the project, and prior to issuance of a grading permit the applicant shall demonstrate through detailed hydraulic analysis that implementation of the proposed drainage plans will not impact flooding conditions or create potential flooding impacts downstream, by implementing the following:
>
> 1) The qualified licensed engineering firm retained by the applicant shall analyze the potential for the project including all on-site and off-site improvements to contribute to downstream flooding impacts at the project limits, as well as downstream of the site, to the junction of Sand Creek and Marsh Creek. The project drainage plan shall include a design that, when implemented, would not increase peak flows above existing flows, or exacerbate downstream flooding.
>
> 2) Storm Water Control Plans, including underlying hydrology and hydraulic analysis, shall be submitted to the CCCFCD for review to ensure that the design is in conformance with CCCFCD engineering guidance and specifications and that the proposed design is compatible with the future plans for the USCB. The applicant shall work closely with the City of Antioch and the CCCFCD to ensure that the proposed uses within the on-site open space immediately downstream of the USCB dam structure are compatible with the dam inundation zone, emergency release route, and primary spillway alignment of the proposed USCB facility. (LTS)

Implementation of this mitigation measure would reduce this impact to a less-than-significant level. Properly implemented hydrograph modification mitigation (see HYD-1) would also mitigate the potential for impacting downstream flooding impacts.

Impact HYD-3: Construction activities and post-construction site uses could result in degradation of water quality in the San Joaquin River by reducing the quality of stormwater runoff. (S)

(1) Construction-Period Impacts. During the construction period, grading and excavation activities, including those in the off-site improvement areas, would result in exposure of soil to runoff, potentially causing erosion and entrainment of sediment and contaminants in the runoff. Soil stockpiles and excavated areas on the project site and off-site improvements would be exposed to

runoff and, if not managed properly, the runoff could cause erosion and increased sedimentation and pollutants in stormwater.

The potential for chemical releases is present at most construction sites given the types of materials used, including fuels, oils, paints, and solvents. Once released, these substances could be transported to the San Joaquin River in stormwater runoff, wash water, and dust control water, potentially reducing water quality.

(2) Operation-Period Impacts. New construction and intensified land uses of the project would result in increased vehicle use and potential discharge of associated pollutants. Increased numbers of vehicles and outdoor parking facilities at the project site will likely result in increased leaks of fuel, lubricants, tire wear, and fallout from exhaust, which will contribute petroleum hydrocarbons, heavy metals, and sediment to the pollutant load in runoff being transported to receiving waters. Runoff from landscaped areas at the site may contain residual pesticides and nutrients. Long-term degradation of water quality runoff from the site could impact local water quality in the San Joaquin River.

(3) Water Quality Impairment. Runoff from the project eventually enters the San Joaquin River, a water body the Central Valley Water Board has designated as water quality impaired for several pesticides (including DDT), boron, electrical conductivity, mercury, and toxaphene.[31] All of these pollutants have an identified source of "agriculture" or "resource extraction." If there were a chance that the project would increase the load of any of these pollutants discharged to the River, then a significant impact would occur (the Central Valley Water Board has determined that the assimilative capacity of the San Joaquin River for these pollutants has already been exceeded). However, none of the contaminants that have been identified as causing the water quality impairment of the River are likely to be used at the site (or to be generated in concentrations exceeding existing conditions).

As described above under Impact HYD-1, the stormwater control plan provides an adequate conceptual strategy for complying with the County NPDES permit with regard to stormwater management. Under the stormwater plan, treatment controls would include, where feasible, storm flow routing through turf areas, and use of pervious pavements and pavers. Under the stormwater plan, source control measures designed to reduce impacts to water quality would include distribution of information (e.g. brochures) and signage to inform the local residents about stormwater and water quality issues. All drainage inlets would be labeled "No Dumping, Drains to Sand Creek" or similar wording to reduce illegal dumping. In addition, the applicant would distribute informational materials about safe use of pesticides and fertilizers and vehicle washing to reduce the flow of these pollutants to the storm drains. However the stormwater plan is preliminary, did not include all on and off-site improvements, and is subject to revision during and in response to the final development design process and the addition of features such as the Sand Creek trail.

Therefore, the following two-part mitigation measure must be implemented to ensure that significant impacts related to stormwater quality are addressed.

[31] Regional Water Quality Control Board, Central Valley Region, 2006, Proposed 2006 CWA Section 303(d) List of Water Quality Limited Segment, Approved by SWRCB, October 2006.

Mitigation Measure HYD-3a: As a condition of approval of the final grading plans, the applicant shall prepare a Storm Water Pollution Prevention Plan (SWPPP) designed to reduce potential impacts to surface water quality through the construction period of the project including all on- and off-site improvements. The SWPPP shall be submitted for approval to the City of Antioch prior to issuance of a grading permit. The SWPPP must be maintained on-site and made available to City inspectors and/or San Francisco Bay or Central Valley Water Board staff upon request. The SWPPP shall include specific and detailed BMPs designed to mitigate construction-related pollutants. At a minimum, BMPs shall include practices to minimize the contact of construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, adhesives) with stormwater. The SWPPP shall specify properly designed centralized storage areas that keep these materials out of the rain.

An important component of the stormwater quality protection effort is the knowledge of the site supervisors and workers. To educate on-site personnel and maintain awareness of the importance of stormwater quality protection, site supervisors shall conduct regular tailgate meetings to discuss pollution prevention. The frequency of the meetings and required personnel attendance list shall be specified in the SWPPP.

The SWPPP shall specify a monitoring program to be implemented by the construction site supervisor, which must include both dry and wet weather inspections. In addition, in accordance with State Water Resources Control Board Resolution No. 2001-046,[32] monitoring would be required during the construction period for pollutants that may be present in the runoff that are "not visually detectable in runoff."[33] Water Board and/or City personnel, who may make unannounced site inspections, are empowered to levy considerable fines if it is determined that the SWPPP has not been properly implemented.

BMPs designed to reduce erosion of exposed soil may include, but are not limited to: soil stabilization controls, watering for dust control, perimeter silt fences, placement of fiber rolls, and sediment basins. The potential for erosion is generally increased if grading is performed during the rainy season as disturbed soil can be exposed to rainfall and storm runoff. If grading must be conducted during the rainy season, the primary BMPs selected shall focus on erosion control; that is, keeping sediment on the site. End-of-pipe sediment control measures (e.g., basins and traps) shall be used only as secondary measures. Entry and egress from the construction site shall be carefully controlled to minimize off-site tracking of sediment. Vehicle and equipment wash-down facilities shall be designed to be accessible and functional during both dry and wet conditions

Mitigation Measure HYD-3b: The design-level stormwater control plan shall demonstrate through detailed hydraulic analysis that implementation of the proposed drainage plan would result in treatment of the appropriate percentage of the runoff from the project including all on- and off-site improvements (in compliance with the County NPDES permit). The amount of

[32] State Water Resources Control Board, 2001. Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity.

[33] Construction materials and compounds that are not stored in water-tight containers under a water-tight roof or inside a building are examples of materials for which the discharger may have to implement sampling and analysis procedures.

runoff that is typically required to be treated is about 85 percent of the total average annual runoff from the site (depending on whether the volume-based or flow-based approach is used). The qualified professionals preparing the design-level stormwater control plan shall include as many of the BMPs identified in the preliminary stormwater plan as feasible and consider additional measures designed to mitigate potential water quality degradation of runoff from all portions of the completed development. The project's design-level stormwater control plan must meet the requirements of the Water Board and City of Antioch per the terms of the NPDES permit.

City staff shall review and approve the SWPPP and design-level stormwater control plan prior to approval of the grading plan. (LTS)

Impact HYD-4: Water supply well(s) at the project, if not properly managed or decommissioned, could be damaged during construction, potentially resulting in impacts to groundwater quality. (S)

No water supply wells were observed at the project site during the reconnaissance conducted in February 2007. However, it is possible that wells may be discovered during project site or off-site improvements preparation and grading. If any on-site wells are disturbed during grading, surface seals could be damaged and allow surface water (potentially containing pollutants) to preferentially seep into the well(s) and the underlying aquifer, causing water quality degradation. In addition, there are known abandoned oil and gas wells at the project site and in the vicinity. Management of the abandoned oil and gas wells is discussed in the Public Health and Safety section of this DEIR.

Mitigation Measure HYD-4: Any existing water supply wells that may be discovered during site preparation shall either be:

1) Properly abandoned in compliance with the California Department of Water Resources, California Well Standards; or

2) Inspected by a qualified professional to determine whether the well is properly sealed at the surface to prevent infiltration of water-borne contaminants into the well casing or surrounding gravel pack. The California Well Standards require an annular surface seal of at least 20 feet for water supply wells. If any of the wells are found not to comply with this requirement, the applicant shall retain a qualified well driller to install the required seal. (LTS)

H. PUBLIC HEALTH AND SAFETY

This section provides an overview of the potential presence of hazardous materials[1] and other hazards on and near the project site and assesses potential impacts to public health and safety that could result from development of the project.

1. Setting

The following section describes hazardous materials issues and other public health and safety hazards at the project site, including off-site impact areas, as well as the regulatory agency framework and local policies that address those hazards.

a. Hazardous Materials Setting. Potential hazardous materials issues at the project site were evaluated in an Environmental Investigation, prepared in 2004[2] and included as Appendix I of this report The Environmental Investigation included a Phase I Environmental Site Assessment (Phase I ESA), including a review of historical land use information, a site reconnaissance, interviews with the property owner and other persons familiar with the property, and a review of regulatory databases regarding hazardous materials storage and releases in the project area. The Environmental Investigation also included limited shallow soil sampling for agricultural chemical residues.

The Environmental Investigation study area included the project site and the AUSD Medical High School site. Surrounding areas, including the off-site corridors to the east and west that would be affected by the proposed project, were included in the site reconnaissance and the review of historical land use and regulatory database information.[3] The Environmental Investigation identified three potential sources of hazardous material contamination at the project site and surrounding areas.

(1) Agricultural Land Uses. Based on records reviewed for the Environmental Investigation, the project site has been used for agricultural purposes since the date of the earliest available land use records.[4] The owner of the project site stated that grain and hay were grown at the project site until approximately 30 years ago (mid-1970's), and that the project site has been used for livestock grazing since that time. Based on historical land resources referenced in the Environmental Investigation, the off-site impact areas were historically used for the same types of low-intensity agricultural uses as the project site, including field crops and pastureland.

Agricultural use of the project site adjacent off-site impact areas may have involved the use of agricultural chemicals such as insecticides, herbicides, fertilizers, and/or fungicides. While present day chemicals are less persistent, organic compounds in agricultural chemicals prior to the 1970s

[1] The California Health and Safety Code defines a hazardous material as "...any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or to the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, radioactive materials, and any material which a handler or administering agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment." (Health and Safety Code Section 25501).

[2] Ingram Mason & Fairbairn, 2004, Environmental Investigation Report, Williamson Property, Antioch, Contra Costa County, California, November.

[3] Ibid.

[4] Ibid.

often included highly persistent compounds such as DDT. Inorganic compounds containing heavy metals such as arsenic, lead, and mercury were commonly used prior to the 1950s.

Chemicals that could have been used at the project site prior to the 1970s have the potential to leave residual inorganic or organic components in shallow soils that could persist for many decades. If present in elevated concentrations, these residues could pose a potential health risk to future construction workers, residents, and other persons who may come in direct contact with surface soils.

To evaluate this issue, the Environmental Investigation included a limited soil sampling investigation. Six shallow soil samples (from 6 to 12 inches below the ground surface) were collected from randomly-selected locations at the site. All six samples were analyzed for organochlorine pesticides and four of the samples were also analyzed for arsenic, lead, and mercury, metals commonly contained in inorganic pesticides. None of the samples contained lead, arsenic, or organochlorine pesticides above laboratory reporting limits. Three of the four samples contained mercury, at concentrations ranging from 0.022 to 0.045 mg/kg, which the report concluded was below thresholds of regulatory concern.[5] Based on these results, the Environmental Investigation report concluded that agricultural chemical residues in shallow soils were not a potential issue at the project site and the concentrations of those compounds identified at the project site were several orders of magnitude below risk-based screening levels for construction workers.[6]

(2) Historic Oil and Natural Gas Production and Coal Mining. The project site and off-site impact areas are within the Brentwood Oil Field, and oil and natural gas production has been conducted in the project vicinity for approximately 50 years. The Environmental Investigation identified two lease agreements that were executed in 1960 and 1969 for exploration of oil and gas within the project site. Several wells were advanced for oil and gas exploration at the site and adjoining properties between 1963 and 1983.[7] State resource maps identified four historic wells at the site: the SWEPI "Williamson 11-9" well, the Venturini Associates, Inc. "Williamson 1" well, the Sinco Oil Corporation "Williamson 1" well, and the Occidental Petroleum Corp. "Williamson 3-9" well.[8] According to the map, only the Occidental Petroleum well was ever a production well; the remaining three wells were mapped as dry holes. All wells have been plugged and abandoned. Two plugged and abandoned wells were noted at the project site during a reconnaissance for the Environmental Investigation.[9]

Although no evidence of releases or contamination was observed near the well locations, oil production at the project site could potentially have resulted in releases of petroleum hydrocarbons

[5] These mercury concentrations are below Environmental Screening Levels (ESLs) for residential land uses established by the RWQCB, which are conservative risk-based standards designed to screen laboratory data in the absence of a more detailed human health risk assessment. The applicable ESL for mercury is 3.7 mg/kg, approximately 80 times greater than the highest concentration identified at the project site in the Environmental Investigation.

[6] San Francisco Regional Water Quality Control Board, 2007, Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, Table K-2. Direct Exposure Soil Screening Levels, Commercial/Industrial Worker Exposure Scenario, Interim Final, November.

[7] Ingram Mason & Fairbairn, 2004. op cit.

[8] State of California - Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 2006. Map 608, February 23.

[9] Ingram Mason & Fairbairn, 2004. op cit.

and related volatile organic compounds to soils and groundwater. These compounds can pose a potential human health threat through direct exposure to contaminated soils and groundwater, and volatile compounds can migrate via soil gases to affect indoor air quality in buildings and other enclosed spaces.

In addition to the potential contamination from oil and natural gas production identified in the Environmental Investigation, historic coal mining in the project vicinity may have affected surface water quality at Sand Creek. One abandoned coal mining shaft, a dewatering shaft of the abandoned Empire Mine, daylights at the Zeka/Higgins parcel approximately two miles west of the project site. The opening to the shaft, which was partially plugged in 1982, is currently discharging acid mine leachate into a tributary of Sand Creek. In 1987, an inspection report was completed on the acid mine drainage from the Empire Mine by personnel from the Central Valley Regional Water Quality Control Board (RWQCB). It was determined that acid mine drainage was flowing from a shaft at a rate of 16 gallons per minute. At the mine opening the drainage had a pH of 2.6 (a strong acid) and contained elevated levels of metals, including aluminum, beryllium, boron, cobalt, chromium, iron, manganese, nickel, and zinc. During a field visit to the area by BASELINE Environmental Consulting during preparation of previous environmental documentation for the Sand Creek Specific Plan area, the pH of the mine shaft discharge was measured to be 3.3. In 1993, another water sample was collected from the mine shaft discharge and was reported to have a pH of 2.79.[10] Based on interviews with RWQCB staff in 2007, no further monitoring or remediation activity has occurred at the abandoned mine discharge location or along Sand Creek.[11] Given the distance from the source of the upstream acid mine drainage, effects on Sand Creek in the vicinity of the project site would be expected to be less significant, but the nature and magnitude of this potential effect is unknown.

(3) Pipeline Hazards. An underground natural gas pipeline is located along the western edge of the project site, along the property line shared with the Kaiser complex currently under construction. In addition, a 25-foot wide Shell Oil Company pipeline easement runs in an east-west direction across the site and the pipeline can be seen above ground where it crosses Sand Creek in the southeast portion of the site.

Research for the Environmental Investigation report identified a release from the natural gas pipeline on October 31, 1994, when a backhoe caused a breach in the line.[12] No injuries or fire was caused by the breach, which was repaired. No evidence of past releases from the Shell Oil petroleum pipeline was identified during the investigation.

Petroleum pipelines are regulated under the federal Hazardous Liquid Pipeline Safety Act, which requires inspection of pipeline rights-of-way at least every three weeks, and no less than 26 times per year (Title 49, Code of Federal Regulations, Part 195.412). In California, the Office of the State Fire Marshal acts as an agent of the federal Office of Pipeline Safety (OPS) to enforce these Federal regulations. The California Department of Conservation, Oil, Gas and Geothermal Resources Department implements additional regulations for oil and natural gas pipelines (California Code of

[10] City of Antioch, 2002. *Draft Environmental Impact Report, Sand Creek Specific Plan and Four Associated Development Plans, Antioch, California.* August.

[11] Atkinson, Ross, 2007. Engineering Geologist, Central Valley Regional Water Quality Control Board, personal communication with Bruce Abelli-Amen of Baseline Environmental Consulting. March 13.

[12] Ingram Mason & Fairbairn, 2004. op cit.

Regulations, Title 14, Chapter 4). These regulations require that petroleum and natural gas pipelines be designed with equipment such as low-pressure alarms and safety shutdown devices to minimize spill volume in the event of a leak. The regulations also require that a pipeline management plan, with additional inspection, safety, and reporting requirements, must be prepared for "environmentally sensitive pipelines," which includes pipelines located within 300 feet of any public recreational area, residences, schools, hospitals, and businesses, or within 200 feet of environmentally sensitive habitat.

Construction near pipelines must be conducted with care to prevent inadvertent damage to the pipelines. The Common Ground Alliance, a non-profit organization sponsored by OPS and energy industry groups, has established Best Practices for construction activities near pipelines.[13] These practices are designed to prevent pipeline damage and accidental releases of petroleum and natural gas during construction.

b. Electromagnetic Fields (EMF) Hazards. An approximately 200-foot wide Pacific Gas and Electric (PG&E) right-of-way with four 230-kilovolt (kV) electrical transmission lines runs from the southeast corner of the site to approximately the center of the northern property boundary. Residents in the vicinity of transmission lines are exposed to electromagnetic fields generated by these power lines, in addition to electromagnetic fields from electrical distribution lines, household wiring, and appliances.

Electromagnetic fields are generated by man-made sources, including electrical transmission and distribution lines, building wiring, and electrical appliances, as well as from natural phenomena such as lightning or static electricity. There is a low, but measurable “background” level of EMF in the environment that is not related to any particular man-made source. The overall strength of EMFs dissipates quickly with distance from the source. Typically, EMFs are measured at “background” levels about three to four feet away from an electrical appliance, 60 to 200 feet from an electrical distribution line, and about 300 to 1,000 feet from a transmission line.[14]

There has been significant public concern about the potential health effects associated with EMFs from manmade sources, such as transmission lines. Human cells have their own electric fields, and some laboratory studies have shown that these internal fields can be disrupted by exposure to even low-energy EMFs. However, determining what effects, if any, EMFs may have on living tissue over long periods of time has proven to be a difficult scientific challenge. Beginning in 1980, more than 100 epidemiological studies have been performed to determine the link, if any, between EMFs and potential health effects.

A 1999 review of the literature, prepared by the National Institute of Environmental Health Science (NIEHS), concluded that “The NIEHS believes that the probability that extremely low frequency (ELF) and EMFs exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal, scientific support that exposure to this agent is causing any degree of harm.”[15]

[13] Common Ground Alliance (CGA), 2004. Best Practices, Version 2.0, December.

[14] California EMF Program, Short Fact Sheet on EMF, 1999.

[15] National Institute of Environmental Health Science (NIEHS), 1999. Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields, Prepared n Response to the 1992 Energy Policy Act. NIH Publication No. 99-4493.

The California EMFs Program, developed by the California Public Utilities Commission (PUC), California Department of Health Services (DHS), and the Public Health Institute, completed a risk evaluation of EMFs in June 2002. Three DHS scientists evaluated existing EMF study data, in coordination with DHS toxicologists, physicians, and epidemiologists. Due to the lack of clear association between EMFs and health risks in the available data, the California EMF Program did not identify any specific policy measures to address potential risks of EMFs, and DHS is making no policy recommendations at this time.[16]

c. Regulatory Agency Framework. In California, U.S. Environmental Protection Agency (U.S. EPA) has granted most enforcement authority over Federal hazardous materials regulations to the California Environmental Protection Agency (Cal EPA). In turn, a local agency, the Hazardous Materials Program of Contra Costa Health Services (CCHS), has been granted responsibility for implementation and enforcement of many hazardous materials regulations in Contra Costa County under the Certified Unified Program Agency (CUPA) Program (California Health and Safety Code Chapter 6.11). Another local agency, the Contra Costa Fire Protection District, provides emergency response to hazardous materials incidents within the City of Antioch.

In California, State and regional agencies are responsible for programs regulating intentional and accidental release of hazardous materials to the environment. At the project site, the Bay Area Air Quality Management District (BAAQMD) has oversight over air emissions, and the Central Valley Regional Water Quality Control Board (RWQCB) regulates discharges and releases to surface and groundwater. The Cal EPA Department of Toxic Substances Control (DTSC) regulates remediation of sites where discharges to land could potentially present a public health risk. CCHS may act as lead agency to ensure proper remediation of leaking underground petroleum product tank sites and certain other contaminated sites within Contra Costa County.

Worker health and safety is protected by Federal and State regulations. The Occupational Health and Safety Administration (OSHA) is the Federal administering agency for worker health and safety regulations. The California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH) enforces State regulations.

d. Antioch General Plan. The Environmental Hazards element of the Antioch General Plan contains the following policies intended to address hazardous materials and other hazards that may apply to the proposed project:

Environmental Hazards

- *Hazardous Materials Objective 11.7.1:* Minimize the negative impacts associated with the storage, use, generation, transport, and disposal of hazardous materials.
  - *Hazardous Materials Policy 11.7.2a:* Promote the reduction, recycling, and safe disposal of household hazardous wastes through public education and awareness.
  - *Hazardous Materials Policy 11.7.2b:* Implement the provisions of the Contra Costa County Hazardous Waste Management Plan, including, but not limited to, provisions for pretreatment and disposal, storage, handling, and emergency response.
  - *Hazardous Materials Policy 11.7.2k:* Ensure adequate provision is made for emergency response to all crises involving hazardous materials.

[16] California EMF Program, 2002. An Evaluation of the Possible Risks From Electric and Magnetic Fields (EMFs) From Power Lines, Internal Wiring, Electrical Occupations, and Appliances, Final Report. June.

    - Require emergency response plans for all hazardous waste processors and large generators to be submitted as part of use permit applications.
    - Require training of employees of all facilities in emergency procedures, and that they be acquainted with the properties and health effects of the hazardous materials involved in the facilities' operations.

- *Disaster Response Objective 11.8.1:* Maintain a level of preparedness to adequately respond to emergency situations to save lives, protect property, and facilitate recovery with minimal disruption.
    - *Disaster Response Policy 11.8.2a:* Maintain and update the City's emergency Response Plan, as required by State law.
    - *Disaster Response Policy 11.8.2b:* Disseminate disaster preparedness information to local residents and businesses, describing how emergency response will be coordinated, how evacuation, if needed, will proceed, and what residents and businesses can do to prepare for emergency situations.
    - *Disaster Response Policy 11.8.2c:* Maintain an effective and properly equipped emergency operations center, along with trained personnel, for receiving emergency calls, providing initial response and key support to major incidents, meeting the demands of automatic and mutual aid programs, and maintaining emergency incident statistical data.
    - *Disaster Response Policy 11.8.2d:* Maintain ongoing emergency response coordination with surrounding jurisdictions.
    - *Disaster Response Policy 11.8.2e:* Encourage private businesses and industrial uses to be self-sufficient in an emergency by:
        - Maintaining a fire control plan, including onsite fire fighting capability and volunteer response teams to respond to and extinguish small fires; and
        - Identifying personnel who are capable and certified in first aid and CPR.
    - *Disaster Response Policy 11.8.2f:* Regularly review and clarify emergency evacuation plans for dam failure, fire, and hazardous materials releases.

2. Impacts and Mitigation Measures

This section outlines potential impacts related to public health and safety and recommends mitigation measures. Criteria of significance for public health and hazards are listed first. Less-than-significant impacts are then discussed, followed by significant impacts.

a. Criteria of Significance. A significant hazardous materials or public health and safety impact would occur if the project would:

- Create a significant hazard to the public or environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or environment through reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment;
- Create a significant hazard to the public or environment through exposure to hazardous materials present in soils, surface water, ground water, and/or building materials as a result of historical land uses in the project vicinity;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school;
- Be located on or adjacent to a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would result in a safety hazard for people residing or working in the area;

- Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

b. Less-than-Significant Public Health and Safety Impacts. Less-than-significant impacts related to public health and hazards are discussed below.

(1) Agricultural Chemical-Related Hazards. Agricultural use of the project site and off-site impact areas may have involved the use of agricultural chemicals such as insecticides, herbicides, fertilizers, and/or fungicides. Based on soil sampling data from the Environmental Investigation prepared in 2004 for the project site, a review of historical land use information, a site reconnaissance, interviews with the property owner and persons familiar with the property, and a review of regulatory databases, agricultural chemical residues in shallow soils are determined to not be a potential issue at the project site or the off-site impact areas.

(2) School Sites. A proposed school site has been designated immediately southwest of the project site. The nearest existing schools, Diablo Vista Elementary, at 4791 Prewett Ranch Drive, Heritage Baptist Academy Christian School, 5200 Heidorn Ranch Road, and Deer Valley High School, 4700 Lone Tree Way, are located between one-quarter and one-half mile from the project site. As the proposed project would not emit hazardous emissions of significant risk or handle significant quantities of hazardous materials, substances, or waste, there would be no significant impact to existing or proposed school facilities at these locations.

(3) Government Code Sites. The project site is not located on or adjacent to a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5.[17]

(4) Airport/Airfield Hazards. No airports or private air strips are located in the project vicinity, and therefore residents of the proposed project would not face any hazards in that regard.

(5) Emergency Response/Emergency Evacuation. Roadways and sidewalks at the project site would be constructed in accordance with City of Antioch requirements. As addressed in Section IV.B, Transportation and Circulation, all roadways and intersections would meet City design standards. The project would not restrict vehicular, pedestrian, or bicycle access within or in the vicinity of the project site. Development of the project would not be expected to interfere with the City's Emergency Plan.[18]

(6) Wildland Fire Hazards. The project site is not in or adjacent to an area mapped as presenting a wildland fire hazard.[19]

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[17] IMFC, 2004. op cit.

[18] City of Antioch, General Plan, 2003. Section 11.8, Disaster Response, November 24.

[19] California Department of Forestry and Fire Protection (CDF), 2000. Contra Costa County Natural Hazards Disclosure (Fire), Map ID NHD-07. January 6.

(7) EMFs. As no specific health effects of EMFs have been conclusively demonstrated, there are no health-based or regulatory risk standards for EMF exposure. Therefore, describing impacts of the current or potential effects of EMFs would necessarily be speculative in nature. The *CEQA Guidelines* state that if, after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact.[20] Pursuant to this section, the assessment of the effects of EMFs in this EIR is limited to the qualitative discussion in the Setting section and no impacts related to EMFs are identified.

c. Significant Public Health and Safety Impacts. The following discussion describes the significant impacts related to public health and hazards that could result from the proposed project.

<u>Impact HAZ-1</u>: Development of the project site and off-site areas could expose construction workers and future residents to hazardous materials from historic oil and gas exploration. (S)

Although no obvious evidence of contamination is apparent at the project site or is anticipated at the off-site impact areas, there is the potential that areas of stained and/or odorous soils resulting from contamination from historic oil and natural gas exploration and production may be discovered during project construction. If present, this contamination could pose a human health risk to construction workers and future residents who may be directly exposed to contaminated soils and groundwater or to volatile contaminants that have migrated into indoor air.

Implementation of the following mitigation measure would reduce this impact to a less-than-significant level.

> <u>Mitigation Measure HAZ-1:</u> Prior to the issuance of grading or construction permits for the project site and off-site impact areas, a Construction Risk Management Plan (CRMP) should be prepared to address potential hazardous material issues during construction of the project. The CRMP shall include provisions to protect construction workers and the nearby public from health risks from pipeline hazards and potential contaminated soils associated with oil and natural gas production in the project vicinity.
>
> The CRMP shall incorporate Best Practices defined by the Common Ground Alliance to ensure construction worker safety and prevent accidental releases from oil and natural gas pipelines. The CRMP shall also require site inspections during initial grading activities at the site; provide procedures to be undertaken in the event that previously unreported petroleum contamination or subsurface hazards are discovered during construction; incorporate construction safety measures for excavation and other construction activities; establish detailed procedures for the safe storage, stockpiling, use, and disposal of hazardous materials at the project site; provide emergency response procedures; and designate personnel responsible for implementation of the CRMP. Any areas of contamination that may be discovered during project development shall be immediately reported to CCHS and investigated and remediated under the oversight of CCHS or other appropriate agency in accordance with existing regulatory programs. The CRMP shall be submitted to the City of Antioch for review and approval. (LTS)

[20] *CEQA Guidelines*, Section 15145.

Impact HAZ-2: Development of the proposed project could expose future open space recreational users to hazardous materials and corrosives that may be present in Sand Creek. (S)

No data is available to evaluate whether the waters of Sand Creek near the project site have been affected by acid mine drainage within the regional watershed. Although the nearest source of the acid mine drainage is approximately two miles away, there is a potential for acidic water or metals leached into that water to migrate to the project site via Sand Creek. This water could potentially pose a health risk to future users of the proposed open space areas and the Sand Creek trail, if the users were to have direct contact with the Creek waters.

Implementation of the following mitigation measure would reduce this impact to a less-than-significant level.

> Mitigation Measure HAZ-2: Prior to the issuance of a certificate of occupancy at the site, a qualified environmental professional shall conduct a surface water quality investigation at the portion of Sand Creek within the project site. At least one surface water sample shall be collected from Sand Creek during three different quarters of the year to evaluate water quality at the start of, during, and at the end of the rainy season. The samples shall be analyzed for pH and California Title 22 heavy metals, and the laboratory results shall be compared to established residential health risk standards (RWQCB Environmental Screening Levels).[21] Water quality sampling results shall be provided to the Mining Section of the Central Valley RWQCB, which is responsible for implementation of water quality regulations related to mining wastes, to aid their investigation and remediation of the source of the acid mine drainage. The surface water quality investigation shall also be submitted to the City of Antioch for review and approval. If acidic conditions are identified (pH lower than 6.5) and/or concentrations of metals in excess of residential water quality standards, warning signs shall be posted on both banks of Sand Creek warning open space users to avoid contact with Creek water. (LTS)

Impact HAZ-3: Oil and natural gas pipelines may create safety hazards for construction workers during development of the project. (S)

Construction in the vicinity of the oil and natural gas pipelines during development of the project has the potential to damage the pipelines, which could result in a significant release of hazardous materials that could affect construction workers and the environment.

Implementation of the following mitigation measure would reduce this impact to a less-than-significant level.

> Mitigation Measure HAZ-3: Preparation and implementation of the CRMP in Mitigation Measure HAZ-1, which requires compliance with best management practices for construction safety in pipelines, would reduce this potential impact to a less than significant level. (LTS)

[21] San Francisco Bay Regional Water Quality Control Board, 2005. Screening For Environmental Concerns at Sites with Contaminated Soil and Groundwater. February.

Impact HAZ-4: Improper use, storage, or disposal of hazardous materials during construction activities could result in releases affecting construction workers, the public, and the environment. (S)

Construction of residences, roadways, pedestrian paths, and landscaping features at the project site would require the use and transport of hazardous materials. These materials would include fuels, oils, and other chemicals used during construction activities. Improper use and transportation of hazardous materials could result in accidental releases or spills, potentially posing health risks to workers, the public, and environment.

In addition to the CRMP required under Mitigation Measure HAZ-1, construction activities at the project site would be required to comply with stormwater permitting requirements, including preparation of a Storm Water Pollution Prevention Plan (SWPPP). Requirements of the SWPPP are discussed in the Hydrology and Water Quality section of this DEIR. The SWPPP would incorporate current Best Management Practices (BMPs) for construction, including site housekeeping practices, hazardous material storage, inspections, maintenance, worker training in pollution prevention measures, and containment of releases to prevent run off into existing storm drains and sewers. Although designed to protect storm water quality, the SWPPP would also serve to mitigate potential hazardous material releases that could affect construction workers, the public, and the environment.

Implementation of the following mitigation measure would reduce this impact to a less-than-significant level.

> Mitigation Measure HAZ-4: Preparation and implementation of the CRMP in Mitigation Measure HAZ-1 as well as the required SWPPP for construction (see Mitigation Measure HYD-2a) would reduce the potential impacts of hazardous materials releases during construction to a less-than-significant level. No additional mitigation is required. (LTS)

I. BIOLOGICAL RESOURCES

This section addresses: existing biological resources; potentially occurring special-status species and/or species of special interest; sensitive habitats such as wetlands; and potential impacts to biological resources associated with implementation of the proposed project; and mitigation measures where necessary. The Biological Assessment[1] prepared for the project site is referenced throughout this section and is included as Appendix J of this report.

1. Setting

This section provides a discussion of methods, a description of the existing conditions of the site including vegetation communities and wildlife habitats of the site, the regulatory context for the project, and a discussion of special-status species known to occur in the project vicinity and their likelihood to occur on the project site.

a. Methods. Searches for published accounts of special-status plant and animal species potentially occurring in the project vicinity were conducted by Live Oak Associates, Inc. (LOA) utilizing the California Department of Fish and Game (CDFG) Natural Diversity Database (CNDDB 2006), the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (2001), and the *CalFlora* electronic inventory of rare and endangered vascular plants of California (2007). These searches included occurrences documented within the United States Geological Survey (USGS) 7.5-minute Antioch South quadrangle in which the project site is located, and within the eight surrounding quadrangles (Antioch North, Brentwood, Byron Hot Springs, Clayton, Honker Bay, Tassajara, Jersey Island, and Diablo).

Additionally, biological studies conducted on the site and vicinity were reviewed for the preparation of this EIR. These studies included those completed for the greater Sand Creek Specific Plan Area (SCSPA); for the project site itself; and for adjacent parcels. These background materials included detailed surveys for many of the biotic resources that are known to occur, or potentially occur, on the project site. Preparers of these studies include Sam McGinnis, H.T. Harvey & Associates, May Consulting Services, EDAW, Sycamore Associates LLC, Swaim Biological Consulting, Condor Country Consulting, Monk & Associates, and Live Oak Associates, Inc. A summary of available research that was reviewed is provided below.

During the early to mid 1990s, H.T. Harvey & Associates' biologists conducted numerous reconnaissance-level field surveys over the entire SCSPA. Biologists conducting the surveys identified and mapped biotic habitats, evaluated botanical and wildlife resources, and assessed the suitability of the SCSPA to support special-status plant and animal species. Such surveys were initially conducted in July and August 1991 and October, November, and December 1993. Surveys for burrowing owls and/or suitable breeding habitat were conducted in November 1993. Surveys focusing on special-status plants were conducted in March, April, May, and July 1994. Additional vertebrate wildlife surveys, including the identification of general wildlife use, were conducted in November 1993 and June and September 1994. Detailed San Joaquin kit fox surveys were conducted in June and September 1994, but on the Kaiser Hospital site only, located adjacent to and immediately west of the project site. These surveys were conducted in accordance with the U.S. Fish and Wildlife Service's (USFWS) 1993 San Joaquin Kit Fox survey protocol for the northern part of

[1] Monk & Associates, 2007. *Biological Assessment, Aviano Project Site, City of Antioch, California.* July 5.

their range. This protocol included night spotlighting over much of Sand Creek, but more detailed surveys on only a portion of the SCSPA. However, detailed kit fox surveys were conducted over the entire SCSPA site in 1991 using the previous USFWS protocol.[2] Survey personnel included a plant ecologist (Mary Bacca), a botanist (Brian Cleary), wildlife ecologists (Gretchen Flohr and Dr. Sue Townsend), a herpetologist (Dr. Mark Jennings), and wildlife biologists (Drs. Rick Hopkins and Stephen Rottenborn).

During the mid to late 1990's, subsequent reconnaissance-level surveys to identify plant communities, review previous mapping of botanical resources, and confirm the distribution of special-status plants were conducted by May Consulting Services on the SCSPA. Their biologists conducted these surveys in April, May, June, and September 1998.[3] H. T. Harvey & Associates' biologists also conducted a reconnaissance-level survey on the project site to identify plant communities and review previous mapping of botanical resources in March 1999 for a portion of the Zeka/Higgins parcel. Species-specific surveys for special-status plants were not conducted as part of the 1999 survey. The survey method involved hiking the entire SCSPA to observe the habitats on site.

Wendy Weber, Principal Biologist of Condor Country Consulting, conducted branchiopod surveys on the Nunn property, located adjacent to and immediately east of the project site.[4] These surveys were carried out on January 7, 16, 17, and 31, and February 14 and 27, 2002, in accordance with the *Interim Survey Guidelines to Permittees under Section 10(a)(1)(1A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods*.

Protocol-level rare plant surveys were conducted on the project site as part of surveys conducted for the greater SCSPA in 1998 and 2002. May Consulting Services conducted early-flowering special-status plant surveys on the greater SCSPA on April 8, 14 and 30; May 5, 8, 26 and 28; June 24, 27 and 28, 1998; as well as late-flowering surveys on September 10 and 11, 1998.[5] Additional rare plant surveys were conducted by LOA staff over the SCSPA on April 12 and 26; May 3, 10 and 17; June 13 and 14; and July 9, 2002 for early-flowering species; and on August 2, 6, 29, September 3 and 5, 2002 for late-flowering species.[6] Monk & Associates (M&A) has conducted more recent rare plant surveys on the project site on April 6 and 7, May 5, June 9, and July 7, 2005 (see Appendix J of this report).[7]

In addition to the rare plant surveys conducted in 2002, LOA has conducted various surveys of the SCSPA for special-status animal species. Surveys for amphibians and reptiles were conducted on April 13, May 15, and June 6, 2002. A habitat evaluation for the San Joaquin kit fox and the

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[2] McGinnis, Sam. 1996. A report on the status of the special-status animal and plant species on the Sky Ranch planned development site, City of Antioch, Contra Costa County, California, prepared for Henn, Etzel & Weiss, Inc.

[3] May Consulting Services. 1998. *Biological Resources Assessment of the Sand Creek Specific Plan Area, Draft, Antioch, Contra Costa County*. July.

[4] Condor Country Consulting. 2002. Letter regarding Results of Branchiopod Surveys for the Northern Portion of the Vineyards Project in FUA #1 (Ginochio/Nunn Parcel), prepared for Sycamore Associates, LLC, dated March 14, 2002.

[5] May Consulting Services. 1998. *Draft Biological Resources Assessment of the Sand Creek Specific Plan Area, Antioch, Contra Costa County, California.*

[6] LOA. 2002. Findings from rare plant surveys for Sand Creek, Antioch. Unpublished letter submitted to the City of Antioch, dated November 5, 2002. 3pp.

[7] Monk & Associates, 2007. op. cit.

burrowing owl were conducted on June 6, 7, 13 and 16, and July 9 and 11, 2002.[8] There were also several other special-status animal habitat evaluations completed for the SCSPA, including for the Alameda whipsnake, San Joaquin kit fox,[9] and burrowing owl (the habitat evaluation completed for the kit fox by EDAW in 1998 also served as a habitat evaluation for the burrowing owl).

In addition to the extensive literature review described above, LOA Associate Ecologist Pamela Peterson conducted a reconnaissance-level biological survey on the project site on February 6, 2007, at which time the principal biotic habitats of the site were identified and mapped, and the constituent plants and animals observed in each habitat were noted. Dr. Mark Jennings, LOA Associate Herpetologist, conducted a site survey on February 3, 2007, to assess the likelihood that special-status amphibian and reptile species that are known to occur in the project region, occur on the site or immediate vicinity. On May 27, 2008, an additional reconnaissance-level site visit was conducted by LOA ecologist Pamela Peterson to assess off-site biological project impacts on the Royal Formosa/Chen, Ginochio/Nunn, and Aera Energy properties as a result of the construction of the High School Access Road, the off-site portion of the Hillcrest Avenue extension, and the installation of the sanitary sewer pipeline. As the City was unable to obtain permission to access the Royal Formosa/Chen parcel to evaluate potential impacts, this evaluation was done from the western boundary of the project site, as impacts from the road that would occur on this parcel would be within 100 feet of the project site's western boundary.

b. Existing Conditions. The site is currently undeveloped and supports primarily non-native grassland habitat that is utilized for cattle and horse grazing. The narrow, deeply incised channel of Sand Creek traverses the site generally west to east in the southern portion, and a manmade detention channel occurs along the eastern boundary. To the north of Sand Creek, the site is mainly topographically level at an approximate elevation of 160 feet (49 meters) National Geodetic Vertical Datum (NGVD), while south of the creek, the land slopes steeply to an approximate elevation of 320 feet (98 meters) NGVD.

Three soil mapping units occur on the site: Capay clay 0-2 percent slopes, Rincon clay loam 0-2 percent slopes, and Altamont-Fontana complex 30-50 percent slopes.[10] None of these soils is considered to be a hydric soil. Additionally, none of these soils is considered to be serpentine, a soil type that supports several special-status species in the project region. Both Capay clay and Rincon clay loam can exhibit an alkaline pH, however, and alkaline soils in the project region may support special-status plant species adapted to such soils.

Non-native annual grassland is the dominant habitat on-site, as indicated previously; however, the site also supports some riparian habitat and seasonal wetland habitat, as well as a manmade detention channel. These are described in further detail below and depicted in Figure IV.I-1.

(1) Non-Native Annual Grassland. The dominant vegetation community on the site is non-native annual grassland, which is characterized by non-native annual grasses and forbs of European

[8] Live Oak Associates, Inc. 2002. *Sand Creek Specific Plan EIR* Vegetation and Wildlife, July 2002.

[9] EDAW. 1998. San Joaquin Kit Fox Habitat Evaluation for the Sand Creek Specific Plan Area, Antioch California, prepared for FUA #1 Property Owners Coordinating Committee. September 2.

[10] Natural Resource Conservation Service. 1977. Soil Survey of Contra Costa County, California, USDA.

origin. Common non-native annual grasses observed in this habitat on the site include wild oats (*Avena* spp.), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceous*), hare barley (*Hordeum murinum* ssp. *leporinum*), Italian ryegrass (*Lolium multiflorum*), and red brome (*Bromus madritensis* ssp. *rubens*). Non-native forbs observed in this habitat on the site include bellardia (*Bellardia trixago*), black mustard (*Brassica nigra*), yellow star thistle (*Centaurea solstitialis*), dove's-foot geranium (*Geranium molle*), and red-stem filaree (*Erodium cicutarium*).

The grasslands occurring to the north of Sand Creek are well-grazed and at the time of the February 2006 survey, the vegetation in this portion of the site averaged only 1-2 inches in height. This portion of the site is relatively level; however, within grasslands along the northern boundary of the site, dirt fill and scattered piles of rocks have been deposited, resulting in this portion of the site being raised an average of 2-3 feet from the adjacent grasslands. Similar piles of dirt fill were observed deposited within this habitat in the southwestern area of the site along the western boundary immediately north of Sand Creek. There appears to be relatively less grazing pressure in grasslands of the site occurring to the south of the creek on north-facing slopes, and the average height of vegetation in that portion of the site was 4-5 inches. These latter grasslands support a few blue oaks (*Quercus douglasii*) and may also be expected to support some native spring-flowering forbs common to the region such as California poppy (*Eschscholzia californica*), soap plant (*Chlorogalum pomeridianum*), and blue-eyed grass (*Sisyrinchium bellum*).

Non-native annual grassland is also the habitat type occurring in the portion of the Royal Formosa/Chen property that would be affected by the construction of the High School Access Road.

Non-native grasslands provide important habitat to many terrestrial vertebrates. As many as 25 species of reptiles and amphibians, 100 species of birds, and 50 species of mammals are known to use grassland habitats of central California.[11] A number of these species are expected to utilize grasslands occurring on the site throughout all or part of the year as breeding and foraging habitat.

Rock piles in the northern portion of the site provide habitat for several reptile species, including the western fence lizard (*Sceloporus occidentalis*) and gopher snake (*Pituophis catenifer*), which forage in grasslands for small mammals and birds.

Resident and migratory birds breed and forage in grassland habitats. Birds observed in grasslands on the site include the mourning dove (*Zenaida macroura*), red-winged blackbird (*Agelaius phoeniceus*), and western meadowlark (*Sturnella neglecta*). Several raptor species were observed foraging over the grasslands in the southern portion of the site including turkey vultures (*Cathartes aura*), red-tailed hawks (*Buteo jamaicensis*), and American kestrels (*Falco sparverius*). Other raptors that would be expected to forage in this habitat include the northern harrier (*Circus cyaneus*) and white-tailed kite (*Elanus leucurus*). Numerous California ground squirrel (*Spermophilus beecheyi*) burrows were observed along the eastern and western boundaries of the site, and in the raised area along the site's northern boundary. These burrows provide nesting habitat for western burrowing owls (*Athene cunicularia*), and burrowing owls were observed in these areas during the February 2007 survey.

[11] Mayer, Kenneth E. and William F. Laudenslayer, Jr. Ed. 1988. A guide to wildlife habitats of California. California Department of Forestry and Fire Protection. Sacramento, CA. 166 pp.

LSA

FIGURE IV.I-1

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PROJECT BOUNDARY
SEASONAL WETLAND
MAN-MADE DETENTION CHANNEL
SAND CREEK
RIPARIAN
NON-NATIVE GRASSLAND
AGRICULTURAL / RUDERAL
PAVED ROADWAY
DEVELOPED

Aviano Adult Community Project EIR
Biotic Habitats

SOURCE: CARLSON, BARBEE & GIBSON, INC.; LIVE OAK ASSOCIATES, INC.; MONK & ASSOCIATES, 2008.

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Several mammals are expected to occur within the grasslands of the site. California ground squirrels and their burrows were very prevalent along the eastern and northern portions of the site, and several black-tailed hares (*Lepus californicus*) were also observed in this habitat during the 2007 site visit. Other small mammals likely to occur in this habitat include the ornate shrew (*Sorex ornatus*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), and California meadow vole (*Microtus californicus*). Small mammals often attract predators, such as the reptiles and birds previously discussed, as well as larger mammals known to occur in the region, such as the coyote (*Canis latrans*), American badger (*Taxidea taxus*), gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*).

(2) Riparian. Riparian habitat occurs along Sand Creek in the southern portion of the site. This habitat on the site is characterized by a very sparse open canopy of native riparian trees including valley oak (*Quercus lobata*), western sycamore (*Platanus racemosa*), and California buckeye (*Aesculus californica*). Because of the open canopy, the understory in this habitat is largely undifferentiated from the surrounding non-native grasslands, supporting primarily the same non-native annual grasses and forbs. A shrub understory is generally lacking from this habitat on the site. The Sand Creek channel averages about 30 feet in width between the tops of opposing banks and is deeply incised by approximately 15-20 feet from the surrounding landscape. Sand Creek is a seasonal creek, although the creek was inundated with approximately 1-2 feet of water, with deeper water occurring within some scattered small plunge pools, during the February 2006 survey. However, the creek channel on the site, including the pools, has been observed to be completely dry during the summer months in prior years during surveys conducted for the Sand Creek Specific Plan Area. The wetted areas of the creek channel on the site were observed to support a minimal amount of wetland vegetation including sparse patches of cattails (*Typha* spp.), mugwort (*Artemisia californica*), and water cress (*Rorippa nasturtium-aquaticum*), primarily at the location where flows from the manmade detention channel enter the creek in the southeastern portion of the site.

Riparian habitats are generally considered of high biotic value because they provide an essential source of food, water, cover, and breeding sites for a diversity of native wildlife. However, impacts to the creek from cattle grazing, as well as the lack of a dense riparian canopy and complex understory layers, probably limits the value of this habitat on the site for native wildlife. Nonetheless, several wildlife species were observed using this habitat during the 2006 survey, and others that were not directly observed may also be expected to occur within and forage in this habitat from time to time, or to utilize the channel as a movement corridor.

The riparian and aquatic areas of the creek provide habitat for several amphibian and reptile species including the Pacific treefrog (*Pseudacris regilla*), western fence lizard, and southern alligator lizard (*Elgaria multicarinata*). Western pond turtles (*Actinemys marmorata*) may occasionally use the creek channel during the wet season to move through the site, although the seasonal nature of the creek and the lack of basking habitat and deeper pools would preclude this species from being resident in this habitat on the site.

Birds observed in this habitat during the 2006 survey included snowy egret (*Egretta thula*), chestnut-backed chickadee (*Poecile rufescens*), black phoebe (*Sayornis nigricans*), barn owl (*Tyto alba*), Anna's hummingbird (*Calypte anna*), bushtit (*Psaltriparus minimus*), Nuttall's woodpecker (*Picoides nuttallii*), western scrub-jay (*Aphelocoma californica*), song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), and California towhee (*Pipilo crissalis*). Although no

nests were observed within the riparian habitat during the survey, trees in this habitat could provide some minimal nesting habitat for raptor species such as red-tailed hawks.

A diverse assemblage of small mammals including the California mouse (*Peromyscus californicus*), deer mouse (*Peromyscus maniculatus*), brush rabbit (*Sylvilagus bachmani*) and Botta's pocket gopher are also expected to occur in this habitat. Mammalian predators such as the raccoon (*Procyon lotor*), ringtail (*Bassariscus astutus*), coyote, and bobcat would also be expected to forage in this habitat.

(3) Seasonal Wetland. Several small, seasonal wetlands are scattered within the grassland habitat of the site north of Sand Creek within low depression areas. The majority of these wetlands occur along the northern boundary of the site, however, a few small areas supporting wetland vegetation also are associated with a ditch that exists on the east side of the manmade detention basis along the site's eastern boundary, and one is present in the south central portion of the site. All of the seasonal wetlands of the site were mapped by M&A[12] pursuant to a protocol-level wetland delineation that they conducted on the site in April 2005. Due to the lack of rainfall prior to the February 2007 survey, the seasonal wetlands of the site were completely dry and dominated by upland species such as doveweed (*Eremocarpus setigerus*), with only senescent remains of some wetland grasses and forbs still observable, including rabbit's-foot grass (*Polypogon monspeliensis*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and hyssop loosestrife (*Lythrum hyssopifolium*). During their delineation, M&A additionally observed several common wetland plant species, including several species typically found in vernal pool habitats, to be present in these areas. These latter species included curly dock (*Rumex crispus*), toad rush (*Juncus bufonius*), popcornflower (*Plagiobothrys stipitatus* var. *micranthus* and *P. trachycarpus*), purslane speedwell (*Veronica peregrine xalapensis*), and woolly marbles (*Psilocarphus* sp.).

Seasonal wetlands are also present along the eastern boundary of the Ginochio/Nunn property as depicted in Figure IV.I-2, both in the northeastern corner and in the southeastern corner near the boundary with the Aera Energy property, in the immediate vicinity and partially within the footprint of the proposed sewer pipeline alignment along Heidorn Ranch Road.[13]

The seasonal wetlands of the project site and the Ginochio/Nunn property provide potential habitat for several vernal pool invertebrate species that have been documented in the site's immediate vicinity, including the vernal pool tadpole shrimp (*Lepidurus packardi*), and vernal pool fairy shrimp (*Branchinecta lynchi*), although protocol-level surveys have not been conducted on the site for these species. The value of these areas for amphibian species such as the western toad (*Bufo boreas halophilus*) and Pacific treefrog would be extremely limited as a result of their small size, extremely shallow depth, and ephemeral nature.

During the wet season, several bird species may be expected to forage in these wetlands for invertebrate prey. These include the great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret.

[12] Monk & Associates, 2005. Request for jurisdictional determination, Williamson/Ginochio project site, Antioch, Contra Costa County, California.

[13] Monk & Associates, 2007. op. cit.

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FIGURE IV.I-2

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PROJECT BOUNDARY (141 ACRES)

DATA POINTS

POTENTIAL WETLANDS (0.55 ACRE)

WETLAND #	SQ. FT.
W1	2,000
W2	2,291
W3	14,914
W4	4,558

Aviano Adult Community Project EIR

Preliminary Wetland Delineation for Ginochio/Nunn Property

SOURCE: MONK & ASSOCIATES, JULY 2007.

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Additionally, these wetlands may provide a limited seasonal source of water for wildlife species occurring in surrounding upland habitats.

(4) Manmade Detention Channel. A manmade detention channel flows onto the site through a culvert in its northeastern corner. The channel then flows south for more than 2000 feet along the eastern boundary of the site, eventually discharging into Sand Creek. The channel was created to drain storm water runoff from residential development existing to the north of the site. The channel is approximately 20 feet wide at the top of opposing banks and approximately 10 feet deep. During the February 2007 survey, the depth of water in the channel was between 3-12 inches and the channel was observed to be dominated by wetland vegetation including cattails, whorled pennywort (*Hydrocotyle verticillata*), and watercress.

The detention channel may provide breeding habitat for common amphibian species such as the Pacific treefrog and western toad, and several bird species would be expected to forage over the channel for invertebrate prey, including the black phoebe and various species of swallows. Patches of cattails may also provide breeding habitat for red-winged blackbirds (*Agelaius phoeniceus*) that were observed foraging within the channel. Mammalian predators utilizing the adjacent grassland and riparian habitats of the site also would be expected to forage along the channel for invertebrate, amphibian and avian prey.

(5) Dry-farm Agricultural and Ruderal. Portions of the Ginochio/Nunn property that would be permanently and temporarily affected by the construction of the Hillcrest Avenue extension and the installation of the sanitary sewer pipeline, respectively, consist predominantly of dry-farm agricultural crop lands. At the time of LOA's May 2008 site visit, the majority of the property was planted in a dense cover of wheat (*Triticum aestivum*) approximately 24 inches in height. At the edges of the wheat fields, such as along Heidorn Ranch Road and at the property's western boundary with the project site, as well as in openings in the fields, barren soils and sparse ruderal vegetation were present. Ground squirrel burrows were sparse but present within openings in the crop cover and within the ruderal habitat at the property edges along the western and eastern boundaries of the property.

c. Regulatory Context. The following section describes the regulatory context of the project.

(1) California Environmental Quality Act (CEQA). The purpose of CEQA is to assess the impacts of proposed projects on the environment before they are constructed. For example, with regard to biological resources, Appendix G of CEQA, *Statute and Guidelines* defines a significant impact to biological resources in a number of ways (see Section 2.a, Criteria of Significance, below).

(2) Threatened and Endangered Species. State and federal "endangered species" legislation has provided the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS) with a mechanism for conserving and protecting plant and animal species of limited distribution and/or low or declining populations. Species listed as threatened or endangered under provisions of the state and federal Endangered Species Acts, candidate species for such listing, state species of special concern, and some plants listed as endangered by the California Native Plant Society are collectively referred to as "special-status species." Permits may be required from both the CDFG and USFWS if activities associated with a proposed project would result in the take of a listed species. To "take" a listed species, as defined by the state of California, is "to hunt, pursue, catch,

capture, or kill, or attempt to hunt, pursue, catch, capture or kill" said species (California Fish and Game Code, Section 86). "Take" is more broadly defined by the federal Endangered Species Act to include "harm" of a listed species.[14]

Furthermore, the CDFG and the USFWS are responding agencies under the California Environmental Quality Act (CEQA). Both agencies review CEQA documents in order to determine the adequacy of their treatment of endangered species issues and to make project-specific recommendations for their conservation.

(3) Migratory Birds. State and federal law also protect most bird species. The Federal Migratory Bird Treaty Act prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs.[15]

(4) Birds of Prey. Birds of prey are protected in California under provisions of the State Fish and Game Code, Section 3503.5,[16] which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto". Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "taking" by the CDFG.

(5) Wetlands and Other "Jurisdictional Waters". Natural drainage channels and wetlands are considered "Waters of the United States" (hereafter referred to as "jurisdictional waters"). The U.S. Army Corps of Engineers (USACE) regulates the filling or grading of such waters under the authority of Section 404 of the Clean Water Act.[17] The extent of jurisdiction within drainage channels is defined by "ordinary high water marks" on opposing channel banks. Wetlands are habitats with soils that are intermittently or permanently saturated, or inundated. The resulting anaerobic conditions select for plant species known as hydrophytes that show a high degree of fidelity to such soils. Wetlands are identified by the presence of hydrophytic vegetation, hydric soils (soils saturated either intermittently or permanently), and wetland hydrology according to methodologies outlined in the 1987 Corps of Engineers Wetlands Delineation Manual.[18]

As determined by the United States Supreme Court in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (the SWANCC decision), channels and wetlands isolated from other jurisdictional waters cannot be considered jurisdictional on the basis of their use, hypothetical or observed, by migratory birds. However, the U.S Supreme Court decisions *Rapanos v. United States* and *Carabell v. U.S. Army Corps of Engineers* (referred together as the Rapanos decision) impose a

[14] 16 USC, Section 1532(19), 50 CFR, Section 17.3

[15] Federal Migratory Bird Treaty Act: 16 U.S.C., scc. 703, Supp. I, 1989

[16] California Department of Fish and Game. 1995. California Fish and Game Code. Gould Publications. Binghamton, N.Y.

[17] Wetland Training Institute, Inc. 1990. Federal Wetland Regulation Reference Manual. B. N. Goode and R. J. Pierce (editors). WTI 90-1. 281pp.

[18] USACE. 1987. Corps of Engineers Wetlands Delineation Manual. Department of the Army.

"significant nexus" test for federal jurisdiction over wetlands. In June 2007, the USACE and Environmental Protection Agency (EPA) established guidelines for applying the significant nexus standard. This standard includes 1) a case-by-case analysis of the flow characteristics and functions of the tributary or wetland to determine if they significantly affect the chemical, physical, and biological integrity of downstream navigable waters and 2) consideration of hydrologic and ecologic factors (EPA and USACE 2007).[19]

All activities that involve the discharge of fill into jurisdictional waters are subject to the permit requirements of the USACE.[20] Such permits are typically issued on the condition that the sponsor agrees to provide mitigation that will result in no net loss of wetland functions or values. No permit can be issued until the Regional Water Quality Control Board (RWQCB) issues a certification (or waiver of such certification) that the proposed activity will meet state water quality standards. The RWCQB is also responsible for enforcing National Pollution Discharge Elimination System (NPDES) permits, including the General Construction Activity Storm Water Permit. All projects requiring federal money must also comply with Executive Order 11990 (Protection of Wetlands).

The CDFG has jurisdiction over the bed and bank of natural drainages according to provisions of Section 1602 of the California Fish and Game Code. Activities that would disturb these drainages are regulated by the CDFG via a Streambed Alteration Agreement. Such an agreement typically stipulates that certain measures will be implemented to protect the habitat values of the drainage in question.

(6) The City of Antioch's General Plan. The Resource Management Element of the City of Antioch's General Plan contains the following objectives and policies on biological resources which are relevant to this project:

Resource Management

- *Biological Resources Objective10.4.1*: Preserve natural streams and habitats supporting rare and endangered species of plants and animals.
  - *Biological Resources Policy10.4.2d*: Through the project approval and environmental review processes, require new development projects to protect sensitive habitat areas, including, but not limited to, oak woodlands, riparian woodland, vernal pools, and native grasslands. Ensure the preservation in place of habitat areas found to be occupied by state and federally protected species.

    If impacts to sensitive habitat areas are unavoidable, appropriate compensatory mitigation shall be implemented through provisions of a Resource Management Plan ("RMP") as described in Policy 10.3.2.e, except where, in the discretion of the Community Development Director, an RMP is not necessary or appropriate due to certain characteristics of the site and the project. Among the factors that are relevant to determining whether an RMP is necessary or appropriate for a given project are the size of the project and the project site, the location of the project (e.g., proximity to existing urban development or open space), the number and sensitivity of biological resources and habitats on the project site, and the nature of the project (e.g., density and intensity of development).
  - *Biological Resources Policy 10.4.2j*: Whenever a biological resources survey is undertaken to determine the presence or absence of a threatened or endangered species, or a species of special concern identified by the U.S. Fish and Wildlife Service or the California Department of Fish and Game, require the survey to follow established

[19] EPA and USACE. 2007. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States* & *Carabell v. United States*. Environmental Protection Agency and U.S. Army Corps of Engineers. Washington, D.C.

[20] Wetland Training Institute, Inc. 1990. op. cit.

protocols for the species in question prior to any final determination that the species is absent from the site.

(7) The City of Antioch's Tree Ordinance. The City of Antioch has adopted a tree ordinance with the purpose of protecting certain categories of trees on public and private property within the City. Categories of trees subject to protection include the following:

- Established Tree. Any tree that is at least ten inches in diameter, as measured 4.5 feet above natural or finished grade.
- Mature Tree. Any tree that is at least 26 inches in diameter, as measured 4.5 feet above natural or finished grade.
- Landmark Tree. Any tree which is at least 48 inches in diameter and/or in excess of 40 feet in height.
- Indigenous Tree. A naturally growing tree of the following species: blue oak (*Quercus douglasii*); valley oak (*Quercus lobata*); coast live oak (*Quercus agrifolia*); canyon live oak (*Quercus chrysolepis*); interior live oak (*Quercus wislezenii*); California buckeye (*Aesculus californicus*); and California bay (*Umbellularia californica*).

d. Special-Status Species. Several species of plants and animals within the state of California have low populations, limited distributions, or both. Such species may be considered "rare" and are vulnerable to extirpation as the state's human population grows and the habitats these species occupy are converted to agricultural and urban uses. As previously described, state and federal laws have provided the CDFG and the USFWS with a mechanism for conserving and protecting the diversity of plant and animal species native to the state. A sizable number of native plants and animals have been formally designated as threatened or endangered under state and federal endangered species legislation. Others have been designated as "candidates" for such listing. Still others have been designated as "species of special concern" by the CDFG. The California Native Plant Society (CNPS) has developed its own set of lists of native plants considered rare, threatened or endangered. Collectively, these plants and animals are referred to as "special-status species."

A number of special-status plants and animals occur in the vicinity of the study area. These species, and their potential to occur in the study area, are listed in Tables IV.I-1 and IV.I-2 on the following pages. Sources of information for this table included *California's Wildlife, Volumes I, II, and III*,[21] *California Natural Diversity Data Base*,[22] *Endangered and Threatened Wildlife and Plants*,[23] *Special Animals List*,[24] *Special Vascular Plants, Bryophytes, and Lichens List*,[25] *Annual Report on the Status*

[21] Zeiner, D. C., W. F. Laudenslayer, K. E. Mayer, and M. White. (eds). 1988-1990. California's Wildlife, Volumes I-III. Department of Fish and Game. Sacramento, CA.

[22] California Department of Fish and Game. 2006. California Natural Diversity Database. The Resources Agency, Sacramento, CA.

[23] U. S. Fish and Wildlife Service. 2006. Threatened and Endangered Wildlife and Plants.

[24] California Department of Fish and Game. 2008a. Special Animals. Department of Fish and Game, Biogeographic Data Branch. February.

[25] California Department of Fish and Game. 2008b. Special Vascular Plants, Bryophytes, and Lichens List. Department of Fish and Game, Natural Diversity Database. July.

Table IV.I-1: Special-Status Plant Species Potentially Occurring On or In the Vicinity of the Project Site

Species	Status	Habitat	Occurrence in the Study Area[a]
Plants Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act			
Large-flowered fiddleneck (*Amsinckia grandiflora*)	FE, CE	Cismontane woodland, valley and foothill grassland, at elevations between 275-305 meters.	**Absent.** Although suitable habitat occurs on the project site, site is well below the elevation range for this species and it was not found during rare plant surveys in 1998, 2002, and 2005.
Soft bird's-beak (*Cordylanthus mollis* spp. *mollis*)	FE, CR	Coastal salt marshes.	**Absent.** No suitable habitat occurs on the project site.
Palmate bird's-beak (*Cordylanthus palmatus*)	FE, CE	Alkali meadow and alkali scrub.	**Absent.** Although marginally suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Contra Costa goldfields (*Lasthenia conjugens*)	FE, CNPS 1B	Alkaline soils in mesic valley and foothill grasslands and vernal pools.	**Absent**. Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Other Special-Status Plants Listed by CNPS			
Bent-flowered fiddleneck (*Amsinckia lunaris*)	CNPS 1B	Coastal bluff scrub, cismontane woodland, valley and foothill grassland. At elevations between 3-500 meters.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
California androsace (*Androsace elongata* ssp. *acuta*)	CNPS 4	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland at elevations between 305-1200 meters.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Mt. Diablo manzanita (*Arctostaphylos auriculata*)	CNPS 1B	Chaparral (sandstone) at elevations between 135-650 meters.	**Absent.** No suitable habitat occurs on the project site.
Contra Costa manzanita (*Arctostaphylos manzanita* ssp. *laevigata*)	CNPS 1B	Chaparral (rocky); elevation 500-1100 meters.	**Absent.** No suitable habitat occurs on the project site.
Alkali milk vetch (*Astragalus tener* var. *tener*)	CNPS 1B	Coastal bluff scrub, dunes and coastal prairies, at elevations between 1-60 meters.	**Absent.** No suitable habitat occurs on the project site.
Heartscale (*Atriplex cordulata*)	CNPS 1B	Alkali grassland, alkali meadow, and alkali scrub.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Species was observed during surveys conducted by Sycamore Associates on parcels southeast of the project site.

Table IV.I-1 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
Crownscale (*Atriplex coronata* var. *coronata*)	CNPS 4	Alkaline soils in valley and foothill grassland, vernal pools and chenopod scrub.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Species was determined to be present on parcels located to the west of the project site on the other side of Deer Valley Road.
Brittlescale (*Atriplex depressa*)	CNPS 1B	Alkaline and clay soils of meadows and seeps, playas, valley and foothill grassland and vernal pools.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Species was found present in the southwest portion of the Albers parcel near Deer Creek.
San Joaquin spearscale (*Atriplex joaquiniana*)	CNPS 1B	Alkali grassland and alkali scrub.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Species was found present in the southwest portion of the Albers parcel near Deer Creek. Species was also observed during surveys conducted by Sycamore Associates just south of the Ginochio/Nunn parcel southeast of the project site.
Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)	CNPS 1B	Chaparral, cismontane woodland, valley and foothill grassland at elevations between 90-1400 meters.	**Absent.** Although marginally suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Big tarplant (*Blepharizonia plumosa* ssp. *plumosa*)	CNPS 1B	Valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. This species was observed to be present on a parcel to the west of the project site near Empire Mine Road.
Brewer's calandrinia (*Calandrinia breweri*)	CNPS 4	Sandy to loamy soil in disturbed areas, burns in chaparral and coastal scrub.	**Absent.** No suitable habitat occurs on the project site.
Mt. Diablo fairy lantern (*Calochortus pulchellus*)	CNPS 1B	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Round-leaved filaree (*California macrophylla* [= *Erodium macrophyllum*])	CNPS 1B	On clay soils in cismontane woodland, and valley and foothill grassland.	**Present.** Species was observed south of Sand Creek during surveys conducted by Monk & Associates on the site in 2005 in an area designated to remain permanent open space.

Table IV.I-1 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
Congdon's tarplant (*Centromadia* [=*Hemizonia*] *parryi* ssp. *congdonii*)	CNPS 1B	In alkaline soils in foothill and valley grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Brewer's clarkia (*Clarkia breweri*)	CNPS 4	Chaparral, cismontane woodland and coastal scrub.	**Absent.** No suitable habitat occurs on the project site.
Hoover's cryptantha (*Cryptantha hooveri*)	CNPS 1A	In sandy soils of valley and foothill grasslands at elevations between 3-150m	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Hospital Canyon larkspur (*Delphinium californicum* ssp. *interius*)	CNPS 1B	Openings in chaparral and in mesic cismontane woodland at elevations between 230 – 1095 meters.	**Absent.** No suitable habitat occurs on the project site.
Recurved larkspur (*Delphinium recurvatum*)	CNPS 1B	In alkaline soils of chaparral, cismontane woodland and valley and foothill grasslands.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Western leatherwood (*Dirca occidentalis*)	CNPS 1B	Broadleaved upland forest, closed-cone forest, cismontane woodland, North Coast condiferous forest, riparian scrub, riparian woodland.	**Absent.** Although marginally suitable habitat occurs on the project site along Sand Creek, species was not found during rare plant surveys in 1998, 2002, and 2005.
Dwarf downingia (*Downingia pusilla*)	CNPS 2	In moist soils of valley and foothill grasslands and in vernal pools.	**Absent.** Although limited suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*)	CNPS 1B	In sandy soils of chaparral, cismontane woodland, lower montane coniferous forest.	**Absent.** No suitable habitat occurs on the project site.
Mt. Diablo buckwheat (*Eriogonum truncatum*)	CNPS 1B	In sandy soils of chaparral, coastal scrub, valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Species was last observed in 1936.
Jepson's woolly sunflower (*Eriophyllum jepsonii*)	CNPS 4	Chaparral, cismontane woodland and coastal scrub, sometimes on serpentine.	**Absent.** No suitable habitat occurs on the project site.
Diamond-petaled California poppy (*Eschscholzia rhombipetala*)	CNPS 1B	In alkaline and clay soils of valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Stink bells (*Fritillaria agrestis*)	CNPS 4	In clay soils of chaparral, cismontane woodland, pinion and juniper woodland, valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Fragrant fritillary (*Fritillaria liliacea*)	CNPS 1B	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland, often on serpentine.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.

Table IV.I-1 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
Diablo helianthella (*Helianthella castanea*)	CNPS 1B	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Brewer's western flax (*Hesperolinon breweri*)	CNPS 1B	Mainly occurs on serpentine soils of chaparral, cismontane woodland, and valley and foothill grassland.	**Absent.** Although marginally suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Carquinez goldenbush (*Isocoma arguta*)	CNPS 1B	In alkaline soils of valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*)	CNPS 1B	Vernal pools and mesic soils in chaparral, grassland and woodlands.	**Absent.** Although limited suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Jared's peppergrass (*Lepidium jaredii*)	CNPS 1B	In alkaline and adobe soils of valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Bristly leptosiphon (*Leptosiphon* [=*Linanthus*] *acicularis*)	CNPS 4	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Woolly-headed lessingia (*Lessingia hololeuca*)	CNPS 3	Clay and serpentine soils of broadleaved upland forest, coniferous forest and valley and foothill grassland.	**Absent.** Although marginally suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Showy madia (*Madia radiata*)	CNPS 1B	Valley and foothill grassland and cismontane woodland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Historical occurrences in CNDDB from 1935 and 1941 on the parcel immediately west (Kaiser), but species has not been observed in the immediate vicinity since that time.
Hall's bushmallow (*Malacothamnus hallii*)	CNPS 1B	Chaparral and coastal scrub.	**Absent.** No suitable habitat occurs on the project site.
Mt. Diablo cottonweed (*Micropus amphibolus*)	CNPS 3	In rocky soils of broadleaved upland forest, chaparral, cismontane woodland, and valley and foothill grassland.	**Absent.** No suitable habitat occurs on the project site.
Robust monardella (*Monardella villosa* ssp. *globosa*)	CNPS 1B	Openings in chaparral, cismontane woodland and coastal scrub.	**Absent.** No suitable habitat occurs on the project site.

Table IV.I-1 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
Delta woolly-marbles (*Psilocarphus brevissimus* var. *multiflorus*)	CNPS 4	Vernal pools.	**Absent.** Although limited suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005.
Rayless ragwort (*Senecio aphanactis*)	CNPS 2	In alkaline soils of chaparral, cismontane woodland and coastal scrub.	**Absent.** No suitable habitat occurs on the project site.
Caper-fruit tropidocarpum (*Tropidocarpum capparideum*)	CNPS 1B	In alkaline soils of valley and foothill grassland.	**Absent.** Although suitable habitat occurs on the project site, species was not found during rare plant surveys in 1998, 2002, and 2005. Last observance of this species occurred in 1957.

Source: Live Oak Associates, 2008.

Table IV.I-2: Special-Status Animal Species Potentially Occurring On or In the Vicinity of the Project Site

Species	Status	Habitat	Occurrence in the Study Area[a]
Animals Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act			
Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)	FE	Clear to highly turbid vernal pools, either mud- or grass-bottomed.	**Possible.** Suitable habitat occurs for this species in seasonal wetland habitat on-site. However, it is not widely known from the vicinity of the site. In the absence of surveys, however, this species must be presumed present on the site. This species was not found present during surveys conducted on wetlands of the adjacent Ginochio-Nunn parcel that may be temporarily impacted by the installation of the sanitary sewer line.
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)	FT	Grassland swales, slumps or basalt-flow depressions with grass or mud bottoms	**Possible.** Suitable habitat occurs for this species in seasonal wetland habitats of the project site, and, in the absence of protocol-level surveys, this species must be presumed present. This species was determined to be present in wetlands of the adjacent Ginochio-Nunn parcel. Wetlands providing habitat for this species occurring along the eastern boundary on this latter property may be temporarily impacted by the installation of the sanitary sewer line.
Callippe Silverspot Butterfly (*Speyeria callippe callippe*)	FE	Native grasslands. Host plant is *Viola pedunculata*.	**Absent.** The host plant required for survival of the Callippe silverspot butterfly was not observed on any of the parcels in the Sand Creek Specific Plan Area during botanical surveys.

Table IV.I-2 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
California Tiger Salamander (*Ambystoma californiense*)	FT, CSC	Breeds in vernal pools and stock ponds of central California; adults aestivate in small mammal burrows within grassland habitats adjacent to the breeding sites.	**Possible.** Marginally suitable, breeding habitat for this species occurs in the seasonal wetlands and manmade detention channel on-site. Additionally, marginal breeding habitat occurs in wetlands of the adjacent Allied parcel to the northwest and adjacent Ginochio-Nunn parcel to the east, the latter of which may be temporarily impacted by the installation of the sanitary sewer line along Heidorn Ranch Road. Suitable upland habitat is present on-site and also in off-site impact areas occurring on the Royal Formosa/Chen and Ginochio-Nunn parcels. While CTS have not been detected on-site or in the off-site, protocol-level surveys of the site have not been conducted. In the absence of protocol-level surveys, CTS must be presumed to be breeding and/or inhabiting uplands in these areas. CTS have been detected breeding in stock ponds and seasonal wetlands on the Zeka/Higgins and Richland parcels located 1-3 miles west of the project site on the opposite side of Deer Valley Road. The most recent sighting of CTS in the vicinity of the site occurred in 2006 approximately 3,600 feet south of the project site in an unnamed tributary of Sand Creek.
California Red-legged Frog (*Rana aurora draytonii*)	FT, CSC	Rivers, creeks and stock ponds of the Sierra foothills and coast range, preferring pools with overhanging vegetation.	**Present**. While California red-legged frogs are not expected to breed on the site, adults and larvae have been observed in Sand Creek 3.2 miles upstream of the project site, and adult frogs were observed by biologists from M&A in Sand Creek within the project site and immediately upstream of the site just to the west of Deer Valley Rd. in 2005.
Alameda Whipsnake (*Masticophis lateralis euryxanthus*)	FT, CT	Ranges from the inner coast range in western and central Contra Costa and Alameda Counties. Found in rock outcroppings and talus pilings, scrub communities, grasslands, oak, and oak/bay woodlands.	**Absent.** No suitable habitat occurs on the project site for this species. The closest suitable habitat for this species has been identified on the Zeka/Higgins parcel and the western edge of the Richland parcel, approximately 1-3 miles west of the site. It should be noted that this latter area is considered the very edge of the range for this animal.

Table IV.I-2 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
Swainson's Hawk (*Buteo swainsoni*)	CT	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields.	**Possible.** The site and adjacent lands support suitable foraging for this species, however, only very marginal nesting habitat occurs on the site, consisting of a few scattered trees within the Sand Creek corridor and the open space area to the south of the creek.
American Peregrine Falcon (*Falco peregrinus anatum*)	CE	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large populations of other bird species.	**Possible.** Although no suitable nesting habitat occurs on the project site, the site supports suitable foraging habitat.
San Joaquin Kit Fox (*Vulpes macrotis mutica*)	FE, CT	Saltbush scrub, grassland, oak woodlands, savanna, and freshwater marsh.	**Unlikely.** Suitable habitat is present on the project site, however no San Joaquin kit fox or evidence (i.e., scat, dens, prey remains, prints) has been detected on the site or the immediate surrounding area. The species has been detected at Black Diamond Mines to the north, and Round Valley and Altamont Hills to the south. The most recent sighting within 10 miles of the site occurred in 1997. There is also a sighting just east of Brushy Peak in 2002, 13.5 air miles from the site.
Animals Designated as State Species of Special Concern			
Western Pond Turtle (*Actinemys* [=*Clemmys*] *marmorata*)	CSC	Open slow-moving water of rivers and creeks of central California with rocks and logs for basking.	**Possible.** Turtles may occasionally occur within Sand Creek or the manmade detention channel on the project site during the wet season, however, habitat is very marginal on the site for this species.
Coast Horned Lizard (*Phrynosoma coronatum*)	CSC	Exposed gravelly-sandy substrate with scattered shrubs, clearings in riparian woodlands, dry uniform chamise chaparral, annual grasslands with seepweed or saltbrush.	**Absent.** No suitable habitat occurs on the project site.
Silvery Legless Lizard (*Anniella pulchra pulchra*)	CSC	Sandy or loose loamy soils under sparse vegetation of beaches, chaparral, pine-oak woodlands or native riparian vegetation.	**Absent.** Although this species has been documented in the vicinity on the southwest portion of the Zeka/Higgins parcel, no suitable habitat occurs on the project site for this species.
Golden Eagle (*Aquila chrysaetos*)	CFP	Typically frequents rolling foothills, mountain areas, sage-juniper flats and desert.	**Possible.** Species may forage on the site, however, very limited suitable nesting habitat occurs on the project site. No stick nests were observed on the site during the February 2007 or May 2008 surveys.
Northern Harrier (*Circus cyaneus*)	CSC	Frequents meadows, grasslands, open rangelands, freshwater emergent	**Possible.** Species may forage on the site; however, suitable nesting habitat is marginal on the project site.

Table IV.I-2 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
		wetlands; uncommon in wooded habitats.	
White-tailed Kite (*Elanus leucurus*)	CFP	Open grasslands and agricultural areas throughout central California.	**Possible.** Species may forage on the site; however, very limited suitable nesting habitat occurs on the project site. No stick nests were observed on the site during the February 2007 or May 2008 surveys.
Burrowing Owl (*Athene cunicularia*)	CSC	Found in open, dry grass-lands, deserts and ruderal areas. Requires suitable bur-rows. This species is often associated with California ground squirrels.	**Present.** Burrowing owls were observed to be inhabiting ground squirrel burrows in the northern and eastern portions of the site during surveys conducted in 2002 and 2007.
Short-eared Owl (*Asio flammeus*)	CSC	Open areas with few trees, especially swamplands, low-land meadows and grasslands, irrigated alfalfa fields; tule patches or tall grass for nest-ing and daytime seclusion.	**Possible.** Species may forage on the site; however, suitable nesting habitat is absent on the project site.
Loggerhead Shrike (*Lanius ludovicianus*)	CSC	Nests in tall shrubs and dense trees, forages in grasslands, marshes, and ruderal habitats.	**Possible**. Species may forage on the site; however, suitable nesting habitat is absent on the project site.
Purple Martin (*Progne subis*)	CSC	Abandoned woodpecker holes in valley oak and cot-tonwood forests for nesting; also nests in vertical drainage holes under elevated freeways and highway bridges; open areas required for feeding.	**Possible.** Species may forage on the site; however, suitable nesting habitat is absent on the project site.
Tricolored Blackbird (*Agelaius tricolor*)	CSC	Breeds near fresh water in dense emergent vegetation.	**Possible.** Tricolored blackbirds have been observed foraging in annual grasslands in the site's vicinity, and cattails within the manmade detention channel may provide very limited nesting habitat.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	CSC	Primarily a cave-dwelling bat that may also roost in buildings. Occurs in a variety of habitats of the state.	**Possible.** Suitable foraging habitat occurs on the site; however, roosting habitat is absent.
Western Mastiff Bat (*Eumops perotis californicus*)	CSC	Forages over many habitats, requires tall cliffs or buildings for roosting.	**Possible.** Suitable foraging habitat occurs on the site; however, roosting habitat is absent.
Pallid Bat (*Antrozous pallidus*)	CSC	Grasslands, chaparral, woodlands, and forests of California; most common in dry rocky open areas providing roosting opportunities.	**Possible.** Suitable foraging habitat occurs on the site; however, roosting habitat is absent.
American Badger (*Taxidea taxus*)	CSC	Occurs in open areas with friable soils that support grasslands	**Possible.** Badgers have been documented in the immediate vicinity of the site, and the site provides suitable foraging and denning habitat for this species.

Table IV.I-2 *Continued*

Species	Status	Habitat	Occurrence in the Study Area[a]
Ringtail (*Bassariscus astutus*)	CFP	Occurs in riparian and heavily wooded habitats near water.	**Possible.** The ringtail may forage on the project site along Sand Creek, but is likely to be constrained to more densely forested habitats off the site.

[a] Explanation of Occurrence Designations and Status Codes
Present: Species observed on the site at time of field surveys or during recent past.
Likely: Species not observed on the site, but it may reasonably be expected to occur there on a regular basis.
Possible: Species not observed on the site, but potential habitat is available on the site.
Unlikely: Species not observed on the site, and would not be expected to occur there except, perhaps, as a transient.
Absent: Species not observed on the site, and precluded from occurring there either because habitat requirements are not met, or the species was determined to be absent through formal surveys.

STATUS CODES
FE Federally Endangered
FT Federally Threatened
CE California Endangered
CT California Threatened
CR California Rare
CFP California Fully Protected
CSC California Species of Special Concern
CNPS California Native Plant Society Listings:
1A Plants Presumed Extinct in California
1B Plants Rare, Threatened, or Endangered in California and elsewhere
2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere
3 Plants about which we need more information – a review list
4 Plants of limited distribution – a watch list

of California State Listed Threatened and Endangered Animals and Plants,[26] and The California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California.[27] These searches included occurrences documented within the United States Geological Survey (USGS) 7.5-minute Antioch South quadrangle in which the project site is located, and within the eight surrounding quadrangles (Antioch North, Brentwood, Byron Hot Springs, Clayton, Honker Bay, Tassajara, Jersey Island, and Diablo). This information was used to evaluate the potential for special-status plant and animal species to occur on site. Figure IV.I-3 shows the location of special-status species found by the California Natural Diversity Data Base (CNDDB) within a three-mile radius ofthe project site, while Figure IV.I-4 shows the locations of observances of San Joaquin kit fox within a ten-mile radius of the site.

[26] California Department of Fish and Game. 2006. Annual Report on the Status of California Sate Listed Threatened and Endangered Animals and Plants. The Resources Agency, Sacramento, CA.

[27] California Native Plant Society. 2001. Inventory of Rare and Endangered Plants of California (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA. x + 388pp.

(1) Special-Status Plants. A total of 45 special-status plant species occur, or once occurred, in the project vicinity based on CNDDB records, literature reviews, and LOA's familiarity with the flora of the region. Of these 45 species, the site provides suitable habitat for 31 species based on the site survey conducted by LOA in February 2007 and the survey of off-site impact areas conducted on May 27, 2008. Protocol-level rare plant surveys were conducted on the project site, as well as on adjacent parcels including Royal Formosa/Chen and Ginochio/Nunn where off-site impacts would occur, as part of surveys conducted for the greater Sand Creek Specific Plan Area (SCSPA) in 1998 and 2002. May Consulting Services conducted early-flowering special-status plant surveys on the greater SCSPA on April 8, 14 and 30; May 5, 8, 26 and 28; June 24, 27 and 28, 1998; as well as late-flowering surveys on September 10 and 11, 1998.[28] Additional rare plant surveys were conducted by LOA staff over the Sand Creek Specific Plan Area on April 12 and 26; May 3, 10 and 17; June 13 and 14; and July 9, 2002 for early-flowering species; and on August 2, 6, 29, September 3 and 5, 2002 for late-flowering species.[29] M&A has conducted more recent rare plant surveys on the project site and on the Ginochio/Nunn parcel on April 6 and 7, May 5, June 9, and July 7, 2005; and on April 5 and 6, May 16 and 17, July 27 and 28, and September 13, 2006.[30] [31]These surveys were sufficient to cover the blooming periods for all of the special-status plant species having potential to occur on the site and only one species, round-leaved filaree (*California macrophylla* [=*Erodium macrophyllum*]) (CNPS List 1B: "Plants rare or endangered in California and elsewhere"), was found to be present on the project site. A population of round-leaved filaree was found just south of Sand Creek within the area to be designated as preserved open space (see Figure IV.I-3). No special-status plant species were found present in the off-site locations on the Ginochio/Nunn parcel. All other special-status plant species are considered absent from the project site and from the vicinity of off-site impacts.

(2) Special-Status Wildlife. Based on CNDDB records, literature reviews, and LOA's familiarity with the fauna of the region, 25 wildlife species were considered in the evaluation of special-status animals that may occur within the project vicinity. Four of these species were eliminated from consideration due to the lack of suitable habitat on the site and/or because the site's location is outside of the known range of the species. These species include the Callippe silverspot butterfly (*Speyeria callippe callippe*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), Coast horned lizard (*Phrynosoma coronatum*), and silvery legless lizard (*Anniella pulchra pulchra*).

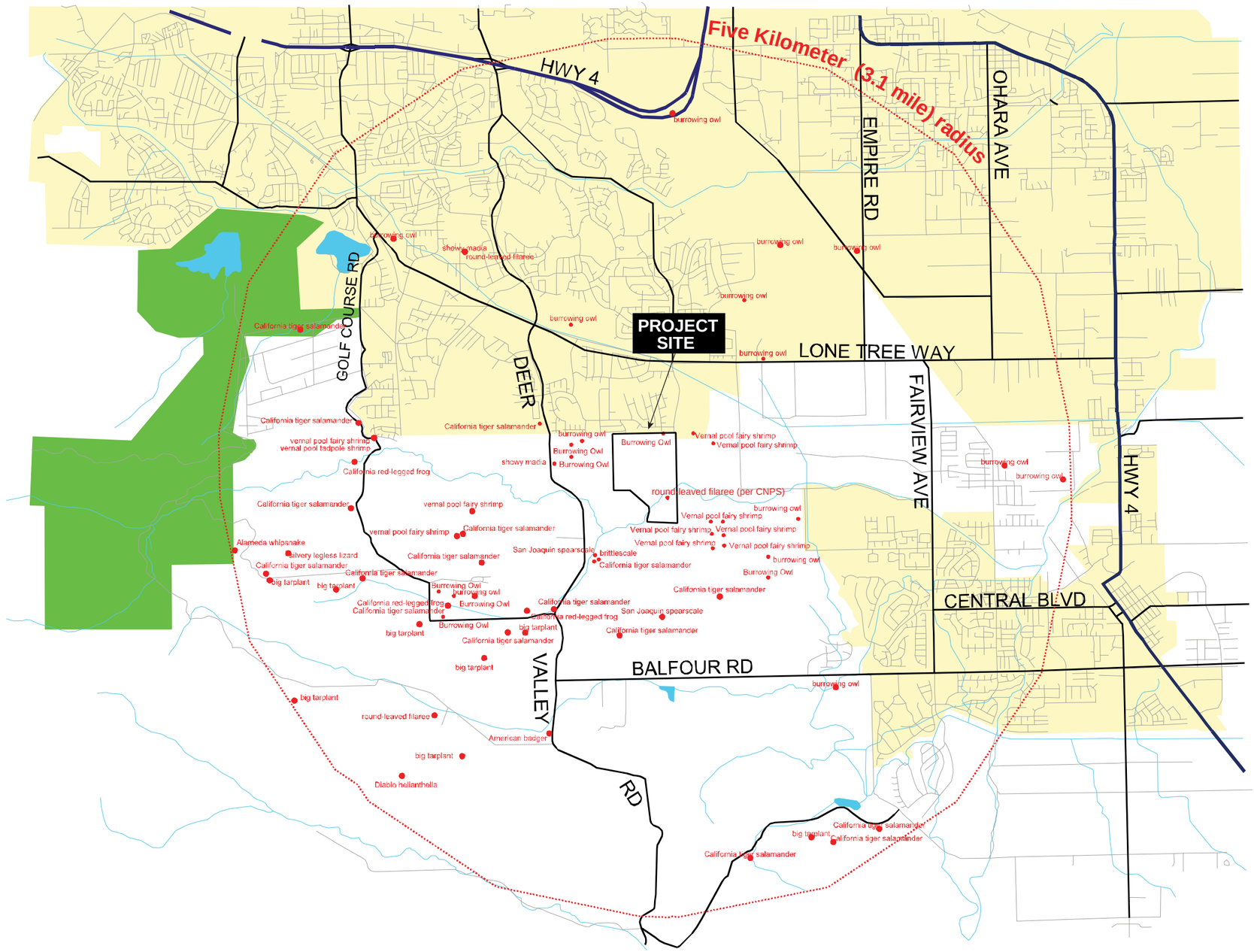
Seven other special-status animals may occasionally forage on the site but would not breed on the site either because breeding habitat is absent, or because the species does not breed in the region. These latter species include the American peregrine falcon (*Falco peregrinus anatum*), short-eared owl (*Asio flammeus*), purple martin (*Progne subis*), Townsend's big-eared bat (*Corynorhinus townsendii*), western mastiff bat (*Eumops perotis californicus*), pallid bat (*Antrozous pallidus*), and ringtail (*Bassariscus astutus*).

[28] May Consulting Services. 1998. Draft biological resources assessment of the Sand Creek Specific Plan Area, Antioch, Contra Costa County, California.

[29] LOA. 2002. Findings from rare plant surveys for Sand Creek, Antioch. Unpublished letter submitted to the City of Antioch, dated November 5, 2002. 3pp.

[30] Monk & Associates. 2007. op. cit..

[31] Monk & Associates. 2006. Special-status plant survey report, Ginochio/Nunn project site, Antioch, Contra Costa County, dated September 26, 2006.



LSA

N

0 0.5 1

MILES (APPROXIMATE SCALE)

● SPECIAL STATUS SPECIES OBSERVATION

FIGURE IV.I-3

Aviano Adult Community Project EIR

Special-Status Species

SOURCE: LIVE OAK ASSOCIATES, INC., 2007.

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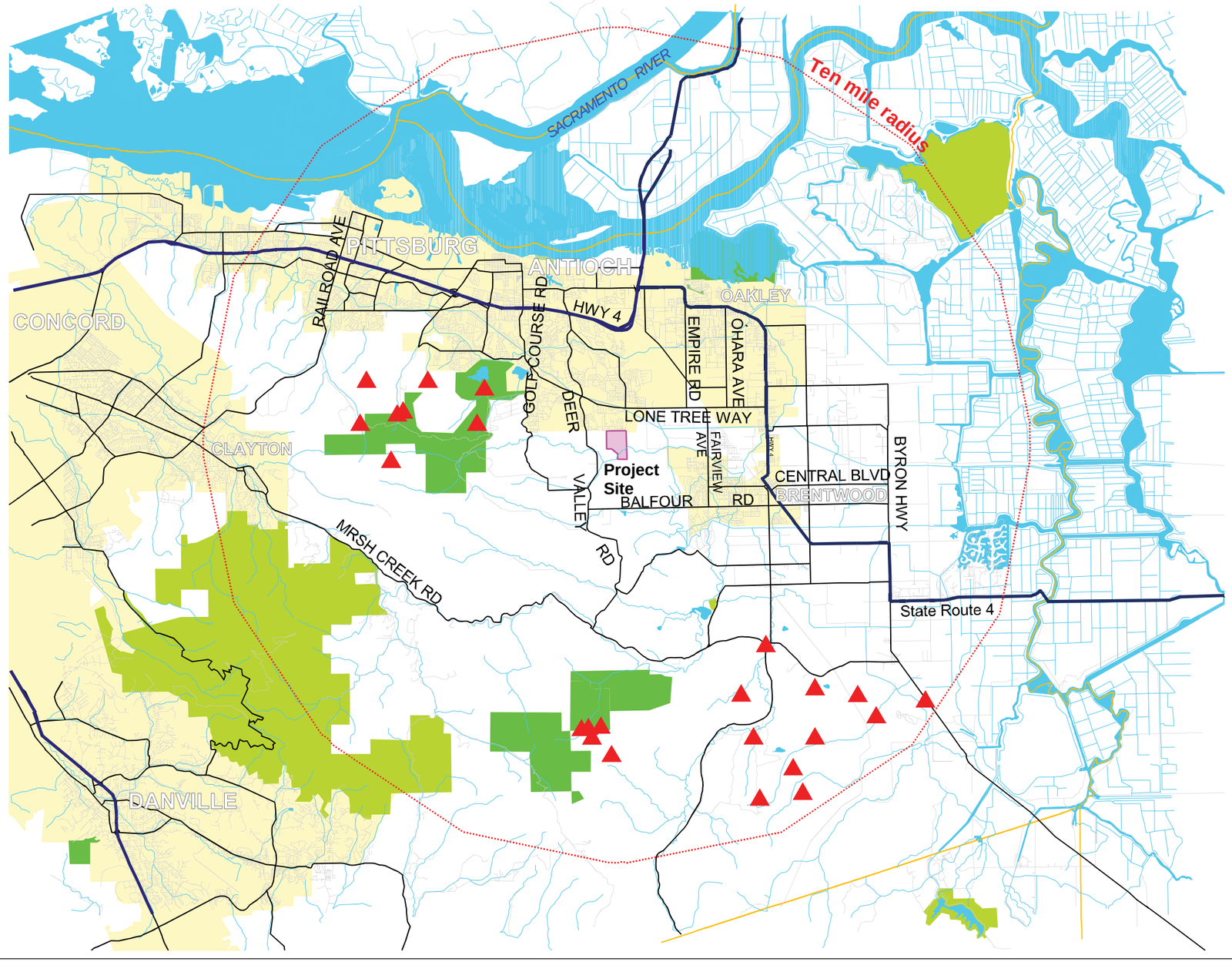

LSA

FIGURE IV.I-4

N

0 1.5 1

MILES (APPROXIMATE SCALE)

▲ SPECIAL STATUS SPECIES OBSERVATION

Aviano Adult Community Project EIR

San Joaquin Kit Fox

SOURCE: LIVE OAK ASSOCIATES, INC., 2007.

I:I:\CAN0601 aviano\figures\Fig_IVI4.ai (7/23/07)

Burrowing owls (*Athene cunicularia*) were documented to be foraging and nesting on the site by LOA staff beginning in 2002 and were still confirmed to be present on the site during the February 2007 reconnaissance surveys. Although not observed on the site, the site provides potential foraging habitat and at least marginal breeding habitat for six other special-status bird species including the golden eagle (*Aquila chrysaetos*), Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), white-tailed kite (*Elanus leucurus*), loggerhead shrike (*Lanius ludovicianus*), and tricolored blackbird (*Agelaius tricolor*).

Although the site does not provide suitable breeding habitat for California red-legged frogs (*Rana aurora draytonii*), adult frogs have been documented on the site within the Sand Creek channel by Monk & Associates staff and may also utilize the manmade detention channel during dispersal movements.

The site provides potential habitat for one state species of special concern, the American badger (*Taxidea taxus*), and four other species listed as threatened or endangered under the state and/or federal Endangered Species Acts including the vernal pool tadpole shrimp (*Lepidurus packardi*), vernal pool fairy shrimp (*Branchinecta lynchi*), California tiger salamander (*Ambystoma californiense*) and San Joaquin kit fox (*Vulpes macrotis mutica*). Although there are no incidental observations of these species on the site, species-specific surveys to detect their presence were not conducted and these species are assumed present.

Six of the special-status animal species indicated above deserve further discussion, either because they are confirmed to be present on the site (California red-legged frog and burrowing owl), or because they are state- and/or federally-listed as endangered or threatened and assumed to be present on the site based on the presence of suitable habitat, occurrence in the vicinity of the project site, and lack of species-specific survey data to support a finding of absence (vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander and San Joaquin kit fox). These six species and their occurrence, or likelihood of occurrence, on the site is discussed in further detail below.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi*); Federal Listing Status: Threatened; State Status: None. The USFWS listed the vernal pool fairy shrimp (VPFS) as threatened on September 19, 1994. Vernal pool fairy shrimp have a rather wide distribution with occurrences documented throughout the Central Valley and some disjunctive occurrences in Riverside County at the Santa Rosa Plateau. Despite its wide distribution, vernal pool fairy shrimp are an uncommon species and if it co-occurs with other fairy shrimp species it is greatly outnumbered.

Life History and Ecology. This species is found in grassland swales, slumps or basalt-flow depressions with grass or mud-bottoms in unplowed grassland habitat. It appears to be able to survive (for over 5 years) in man-altered situations, where other fairy shrimp species do not. Pools containing this organism can be very small (e.g., 3 cm in depth and covering an area of only 0.56 m^2). In fact this species is found in the shortest-lived fairy shrimp habitat (i.e., 6-7 weeks).

Vernal pool fairy shrimp are active from early December to early May. Hatching out shortly after pools fill, this fairy shrimp reaches maturity within 18 days under optimal conditions and can produce multiple cohorts within a single season. This species has the shortest mean longevity documented at 90 days. Females carry eggs that are either dropped or sink with the female when she dies. Cysts can hatch out within the same season they are released if a storm comes in which drops pond temperatures

back down to 10° C. Some eggs hatch when the pool fills with water in subsequent seasons, while other cysts are held in "banks" within the soil. Depending upon the species, the resting eggs of fairy shrimp can survive freezing, heat and prolonged desiccation. In fact, the sediment may contain eggs deposited from several years of breeding.

In general, fairy shrimp eat algae, detritus and associated microorganisms. Amphibians, dytiscid beetle larvae, caddisfly larvae, and waterfowl are the chief predators of fairy shrimp. Waterfowl may play an important role in dispersal of fairy shrimp since viable eggs can pass through waterfowl digestive tracts.[32,33,34,35,36]

Potential to Occur On-Site. The 0.32 acres of seasonal wetlands on the project site support suitable habitat for the VPFS. Protocol-level surveys, currently consisting of surveying for shrimp over the course of two wet seasons, or one wet season and one dry season,[37] to determine the presence or absence of this species on the site have not been conducted, and therefore its presence on the site must be presumed. This species was determined to be present during surveys occurring in wetlands of the adjacent Ginochio/Nunn parcel. Wetlands on this latter parcel may be temporarily impacted by installation of the sanitary sewer line along Heidorn Ranch Road.[38]

Vernal Pool Tadpole Shrimp (*Lepidurus packardi*). Federal listing status: Endangered; State status: None. The USFWS listed the vernal pool tadpole shrimp as endangered on September 19, 1994. Vernal pool tadpole shrimp range from east of Redding in Shasta County, south through the Central Valley, to the San Luis National Wildlife Refuge in Merced County.

Life History and Ecology. Pools containing vernal pool tadpole shrimp (VPTS) have clear to highly turbid water and range in size from 5 m^2 to 36 ha. These pools may be highly turbid and mud-bottomed or grass-bottomed in old alluvial soils underlain by hardpan.

Vernal pool tadpole shrimp hatch from cysts that lie dormant during dry weather. Vernal pool tadpole shrimp reach maturity 3 to 4 weeks after initial inundation of the vernal pool. Eggs are deposited on vegetation on the pool bottom. Females produce up to six clutches per season, yielding more then 800 eggs. A portion of the eggs hatch immediately and the rest enter diapause (dormancy), remaining in the soil to hatch in wet autumns and winters in subsequent years. Adults remain present and

[32] Eng, L. L., D. Belk and C. H. Eriksen. 1990. California Anostraca: Distribution, habitat and status. Journal of Crustacean Biology 10(2): 247-277.

[33] Sugnet & Associates Environmental Consultants. 1993. Preliminary compilation of documented distribution, fairy shrimp and tadpole shrimp proposed for listing. April 29.

[34] Eriksen, C. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Pools and Playas. Mad River Press, Inc. Eureka, CA.

[35] Helm, B. 1998. The biogeography of eight large branchiopods endemic to California. Pages 124-139 in: C. W. Witham, E. Bauder, D. Belk, W. Ferren, and R. Ornduff (Editors), Ecology, Conservation and Management of Vernal Pool Ecosystems, Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, California.

[36] Pennak, R. W. 1989. Fresh-water Invertebrates of the United States: Protozoa to Mollusca. John Wiley & Sons, Inc., New York, NY.

[37] USFWS. 1996. Revised Interim Survey Guidelines for the Listed Vernal Pool Branchiopods. April 23.

[38] Condor Country Consulting. 2002. Summary of Branchiopod surveys (fairy shrimp and tadpole shrimp) conducted in 2002. Unpublished letter report dated March 13.

reproductively active until the pools dry up.

Tadpole shrimp serve an important ecological role in vernal pool communities. They are omnivorous, consuming detritus, earthworms, mollusks, dead tadpoles, frog eggs and microorganisms. Amphibians, dytiscid beetle larvae, caddisfly larvae, and waterfowl are the chief predators of vernal pool tadpole shrimp. Waterfowl may play an important role in dispersal of vernal pool tadpole shrimp since viable eggs can pass through waterfowl digestive tracts. [39, 40,41,42]

Potential to Occur On-Site. The 0.32 acres of seasonal wetlands on the project site provide only marginally suitable habitat for VPTS. Protocol-level surveys, currently consisting of surveying for shrimp over the course of two wet seasons, or one wet season and one dry season,[43] to determine the presence or absence of the this species on the site have not been conducted, and therefore its presence on the site must be presumed. This species was not observed during surveys occurring in wetlands of the adjacent Ginochio/Nunn parcel that may be temporarily impacted by installation of the sanitary sewer line along Heidorn Ranch Road.[44] It is unknown if results of these surveys were formally accepted by the USFWS as evidence of the absence of this species on this site; and in the absence of such documentation, the wetlands of the site must still be presumed to provide habitat for this species.

California Tiger Salamander (*Ambystoma californiense*). Federal listing status: Threatened; State status: Species of Special Concern. The U.S. Fish and Wildlife Service listed the California tiger salamander as Threatened under the authority of the Federal Endangered Species Act on 3 September 2004. The California tiger salamander was listed because it has been extirpated from approximately 55 per cent of its historical range. Remaining populations are currently threatened by a wide variety of human impacts, including urban development, conversion of natural habitat to agriculture, construction of reservoirs and water diversions, introduction of exotic predatory animals, and other anthropogenic factors such as rodent control programs, vehicular-related mortality. To date, the USFWS has not released a Draft Recovery Plan for the California tiger salamander. On 23 August 2005, the USFWS released a final ruling for designating critical habitat for the California tiger salamander, which took affect on 22 September 2005. Approximately 199,109 acres occurring in 19 counties fall within the boundaries of what the USFWS determined as critical habitat for the central California population of California tiger salamander. It is important to note that only those areas that support the critical elements for the salamander were classified as critical habitat.

Life History and Ecology. Breeding of adult California tiger salamanders has been observed from late November through February, following the onset of warm rains. Based on observations during the 1990's (Jennings, unpublished data) salamanders often do not breed during periods of unusually cold rains or during drought (whether breeding ponds are filled with water or not). Both

[39] Eng, L. L., D. Belk and C. H. Eriksen. 1990. op cit.

[40] Sugnet & Associates Environmental Consultants. 1993. op. cit.

[41] Ahl, J. S. B. 1991. Factors affecting contributions of the tadpole shrimp, *Lepidurus packardi*, to its oversummering egg reserves. Hydrobiologia, 212: 137-143.

[42] Pennak, R. W. 1989. op cit.

[43] USFWS. 1996. op. cit.

[44] Condor Country Consulting. 2002. op. cit.

males and females engage in nocturnal breeding migrations traveling up to 1 mile (1.6 km) or more from subterranean refuge sites (e.g. small mammal burrows) to egg deposition sites (long-lasting rain pools). Adult salamanders are possibly stimulated to move to breeding sites by the vibrations of rainwater falling on the soil, as adult male salamanders have been observed (after preceding night(s) of rainfall) wandering on the dry soil of rain pools that had not yet filled (Jennings, unpub. data).

Males generally precede females during the breeding season by 1-2 weeks. Following underwater courtship from one or more males, females deposit moderate-sized [0.13- 0.21 inches (3.6-5.9 mm) diameter] eggs singly on vegetation and other debris in the shallow margins of rainwater pools. Under rare conditions, fertilized eggs may be deposited in small groups of 2-4 (or more) on submerged vegetation. Large females may deposit up to 350 eggs per season, although most females only deposit 100-200 eggs (Jennings, unpub. data). Adult salamanders apparently leave breeding ponds soon after spawning, although they may forage for up to a month in the general area if conditions continue to be moist. Most salamanders soon return to upland habitats in small mammal burrows where they spend approximately 9-10 months underground until the next winter rains.

Embryos of California tiger salamanders hatch in approximately 14-28 days after being laid and the resulting gilled, aquatic larvae [0.41-0.43 inches (10.5-11 mm) in length] require a minimum of about 10-12 weeks to complete development through metamorphosis. At metamorphosis, young salamanders have attained a total length of about 2.6 inches (75 mm). Metamorphosis is apparently initiated by receding water levels in breeding ponds and most larval salamanders do not metamorphose until they are as large as possible. Although the native breeding habitat for this species normally dries each year and metamorphosis is paramount under such conditions, there are a few observations of larval salamanders over wintering in artificially constructed, permanent ponds. The over wintering of larvae (especially to sexual maturity) is common in many closely related species of mole salamanders (*Ambystoma* spp.) found in other parts of North America.

Following metamorphosis (normally from early May through July), juveniles emigrate en masse at night from the drying breeding pond after spending a few hours or days near the pond margin. Traveling distances of 1 mile (1.6 km) or more from breeding sites, juvenile salamanders wander into small mammal burrows or deep cracks in the soil, which they use as refugia during the hot summer and fall months. Juveniles will also wander into certain man-made structures such as wet basements, wells, underground pipes, and septic tanks drains. Mortality of juveniles can be high during this transition period due to the stress of metamorphosis and the problems of finding a suitable refuge site before the sun comes up. Juveniles probably feed on the rich invertebrate fauna that is normally associated with small mammal burrows and grow rapidly over the next several months. Data suggest that most individuals require 2 years to become sexually mature, but some individuals may be slower to mature during periods of drought or aseasonal rainfall.

Although predation to salamanders is minimal in underground refugia, juveniles and adults are known to be eaten by bullfrogs (*Rana catesbeiana*), garter snakes (*Thamnophis* spp.), and probably black-crowned night herons (*Nycticorax nycticorax*) and raccoons (*Procyon lotor*) when they are present on the surface during the wet winter and spring months. Larvae are eaten by a wide variety of predators including garter snakes, bullfrogs, California red-legged frogs (*Rana aurora draytonii*), herons (Ardeidae), terns (*Sterna* spp.), and apparently fish when the latter are introduced into breeding ponds.

Anecdotal evidence indicates that salamanders have a high degree of site fidelity to their breeding ponds and also to the small mammal burrows they use for refugia. For example, a gravid, adult, female California tiger salamander removed from a breeding site and transported to a newly-created mitigation pond, moved a straight line distance of approximately 0.9 mile (1.4 km) back to the original point of capture over a 3-week period. Sites used for reproduction are typically natural pools that fill with rainwater and artificial stock ponds; however, salamanders have also been observed to breed in springs, wells, artificial reservoirs, quarry ponds, man-made canals, and rarely, in the slack waters of oxbows in small- to medium-sized streams. Such sites may, or may not contain dense amounts of aquatic and streamside vegetation. The highest numbers of larvae appear to occur in aquatic habitats that are largely devoid of any vegetation and contain very turbid water. Salamanders may also turn up in certain man-made structures (e.g. wet basements, wells, swimming pools, underground pipes, and septic tank drains, sometimes many years after their local breeding site has been destroyed by urbanization.

Juvenile and adult salamanders typically use the burrows of California ground squirrels (*Spermophilus beecheyi*) and pocket gophers (*Thomomys bottae*) as underground refugia, but may use a variety of burrows including cracks within the soil which may extend up to 15-feet (4.6-m) deep from the soil surface (Jennings, unpub. data). Juvenile and adult salamanders are especially common in situations where piles of concrete, rock, or other rubble are mixed with dirt and are located near breeding sites (Jennings, unpub. data). This is probably because such sites are attractive to burrowing rodents that create extensive tunnel and burrow systems that in turn are used by juvenile and adult salamanders.[45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60]

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[45] Long, M. M. 1992. Endangered and threatened wildlife and plants, 90-day finding, and commencement of status review for a petition to list the California tiger salamander. Federal Register, 57(224): 54545-54546. Thursday, November 19.

[46] Shaffer, H. B., R. N. Fisher, and S. E. Stanley. 1993. Status report: the California tiger salamander (*Ambystoma californiense*). Final report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under contract numbers 9422 and 1383. 93 pp.

[47] Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under contract number 8023. iii+225 pp.

[48] Sorenson, P. C. 1994. Endangered and threatened wildlife and plants; 12-month petition finding for the California tiger salamander. Federal Register, 59 (74): 18353-18354. April 18.

[49] Fisher, R. N. , and H. B. Shaffer. 1996. The decline of amphibians in California's Great Central Valley. Conservation Biology, 10(5): 1387-1397.

[50] Jennings, M. R. 1998. Conservation and biodiversity of amphibians and reptiles along the central California coast. Pages 33-40 in: Nona Chiariella and Raymond V. Dasmann (editors). Proceedings of the Symposium on Biological Diversity of the Central California Coast. Association for the Golden Gate Biosphere Reserve, University of California, Department of Environmental Science, Policy, and Management: Cooperative Extension Forestry. vii+122pp.

[51] Storer, T. I. 1925. A synopsis of the Amphibia of California. University of California Publications in Zoology, 27:1-342.

[52] Loredo, I., D. Van Vuren, and M. L. Morrison. 1996. Habitat use and migration behavior of the California tiger salamander. Journal of Herpetology, 39(2): 282-285.

[53] Austin, C. C., and H. B. Shaffer. 1992. Short-, medium-, and long-term repeatability of locomotor performance in the tiger salamander *Ambystoma californiense*. Functional Ecology, 6(2): 145-153.

[54] Twitty, V. C. 1941. Data on the life history of *Ambystoma tigrinum californiense* Gray. Coppeia, 1941(1): 1-4.

Potential to Occur On-Site. California tiger salamanders are known to be present in the vicinity of the project site, breeding in stock ponds and seasonal wetlands on the Zeka/Higgins and Richland parcels located west of the project site within the SCSPA, on the opposite side of Deer Valley Road (between one and three miles from the site). In 2006, CTS were discovered breeding in an unnamed tributary to Sand Creek, approximately 3,600 feet (approximately 0.7 miles) south of the site. CTS have been observed to move up to 1.3 miles from breeding ponds[61] although most of the salamanders around a breeding pond occur closer to the pond. Using trapping data from a population of CTS in Solano County, Trenham and Shaffer[62] modeled CTS occurrence around a breeding site and determined that the area within approxiamtley 2,066 feet of the pond contained approximately 95 percent of adult and subadult CTS from that breeding pond. The remaining 5 percent of the population would occur beyond 2,066 feet from the pond. The USFWS generally considers areas within 1.3 miles of breeding habitat to constitute upland habitat for the species.

In their biological assessment (see Appendix J) of the site, the project sponsor's biological consultant, Monk & Associates,[63] determined that the manmade detention on-site may provide marginal breeding habitat for CTS, and also that CTS may breed in the seasonal wetlands of the site, during years of heavy rainfall, although the wetlands on the site may not remain inundated for the length of time necessary for such breeding to be successful. Based on his own assessment of the site in February 2007, as well as his knowledge of prior studies completed for the SCSPA dating back to the early 1990's, Dr. Mark Jennings did not believe that the project site provided suitable breeding habitat for CTS.

LOA has reviewed aerial photos of the site taken in the spring of 1993, 2000, 2002 and 2005 that indicate that seasonal wetlands of the site were completely dry, or almost completely dry. Additionally, during surveys conducted on the site by LOA in April 2002, February 2007, and May 2008, seasonal wetlands of the site were completely dry. Due to the perennial nature of the manmade detention basin, it is considered likely by both M&A biologists and by Dr. Jennings that this feature

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[55] Anderson, P. R. 1968. The reproductive and developmental history of the California tiger salamander. Unpublished M.A. Thesis, Fresno State College, Fresno, California, vii+82pp.

[56] Baldwin, K. S., And R. A. Stanford. 1987. Life history notes: *Ambystoma tigrinum californiense*, predation. Herpetological Review, 18(2): 33.

[57] Petranka, J. W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington D.C. vii+587pp.

[58] Holland, D. C., M. P. Hayes, and E. McMillan. 1990. Late summer movement and mass mortality in the California tiger salamander (Ambystoma californiense). The Southwestern Naturalist, 35(2): 217-220.

[59] Pickwell, G. 1947. Amphibians and reptiles of the Pacific states. Stanford University Press, Stanford, California, xiv+236pp.

[60] Feaver, P. E. 1971. Breeding pool selection and larval mortality of three California amphibians: *Ambystoma tigrinum californiense* Gray, *Hyla regilla* Baird and Girard, and *Schaphiopus hammondii* Girard. Unpublished M.A. Thesis, Fresno State College, Fresno, California. vii+58pp.

[61] U.S.Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Tiger Salamander; and Special Rule Exemption for Existing Routine Ranching Activities; Final Rule. Federal Register. 69 (149): 47212-47248.

[62] Trenham, Peter C., and H. Bradley Shaffer, 2005. Amphibian Upland Habitat Use and its Consequences for Population Viability. Ecological Applications, 15(4): 1158-1168.

[63] Monk & Associates. 2007. op. cit.

supports populations of predatory non-native bullfrogs. However, bullfrogs have not been observed in the detention basin. If bullfrogs occur in the detention channel, their presence may reduce the likelihood that CTS could successfully breed in this feature, and this feature's existence on-site may be detrimental to local populations of the salamander.

While Dr. Jennings did not believe that suitable breeding habitat was present on the site, he did determine that a seasonal wetland occurring immediately west of the project site (within 250 feet of the site's western boundary) on the adjacent Allied parcel may provide marginally suitable breeding habitat for the species. CTS were not detected there during surveys for larvae conducted by May Consulting in 1998 and by LOA in 2002. The parcel is surrounded to the south and north by development (the Kaiser Hospital medical facility and residential development, respectively). In the absence of formal surveys conducted on the Allied parcel and on the project site that satisfy requirements of both the CDFG and the USFWS, the species must be presumed to be breeding and/or occupying uplands on the project site. Even in the best of circumstances, however, CTS could only breed in the seasonal wetlands of the site in heavy rainfall years, and some of these breeding attempts are likely to fail if these features dry before larvae can metamorphose. Although CTS have been known to co-occur with bullfrogs, the potential presence of bullfrogs in the manmade detention channel could pose a stress to a CTS population attempting to breed there. This, along with surrounding lands uses (development, crop production) would reduce the habitat value of the site for CTS compared to an undisturbed site that was predator free.

California Red-Legged Frog (*Rana aurora draytonii*). Federal listing status: Threatened; State status: Species of Special Concern. On May 23, 1996, the California red-legged frog (*Rana aurora draytonii*) was listed as Threatened by the U.S. Fish and Wildlife Service under the authority of the Federal Endangered Species Act. The frog was listed because it had been extirpated from 70 percent of its historic range and remaining populations are currently threatened by a wide variety of human impacts. On March 13, 2001, the FWS made the Final Determination of Critical Habitat for the California red-legged frog. On July 2, 2002, FWS greatly reduced the Critical Habitat for the California red-legged frog after a settlement in a lawsuit. The revised critical habitat map for this species was approved April 13, 2006.

The California red-legged frog is the largest native frog in California with adults attaining a length of 3.4-5.4 inches (85-138 mm) snout-to-vent length (SVL). On the dorsal surface, the background color varies from brown to gray to reddish-brown, normally with some dark mottling peppered around spots with light-colored centers. The distribution of reddish pigment is highly variable, but is usually restricted to the groin and undersurfaces of the thighs, legs, and feet. This red coloration is not diagnostic for species identification. Two distinctive, prominent folds of skin ("dorsolateral folds"), run in a complete line from the rear of the eyes to the groin. The groin has a distinctly mottled pattern of black on a light-colored background. Juvenile frogs range from 1.5-3.4 inches (40-84 mm) SVL and have the same coloration as adults except that the dorsolateral folds are normally yellow or orange colored. This coloration is distinct even at a distance. Larval frogs range from 0.6-3.1 inches (14-80 mm) SVL.

Life History And Ecology. Adult California red-legged frogs have been observed breeding from late November through early May after the onset of warm rains. Male frogs typically attract females by emitting low short calls in small mobile groups of 3-7 individuals. Females move toward the calling groups and amplex a male. Following amplexus, the females move to chosen oviposition

sites where they attach an egg mass of 2,000-6,000 moderate-sized (2.0-2.8 mm diameter) eggs to an emergent vegetation brace such as tule stalks, grasses, or willow roots located just below the water surface. Once laid, the egg mass will swell with water for about 24 hours, finally reaching the size of a softball. Males usually remain at the breeding sites for several weeks after reproduction before moving to foraging habitats, while females immediately remove to foraging habitats.

California red-legged frog embryos hatch about 6-14 days following fertilization. The resulting larvae (8.8-10.3 mm) require 14-28 weeks to reach metamorphosis, which usually occurs between July and September, although there are scattered observations of overwintering larvae in perennial ponds such as at the arboretum at Golden Gate Park in San Francisco. Tadpoles generally metamorphose at 65-85 mm total length and the newly emerged juvenile frogs are generally 25-30 mm SVL. Larvae are thought to graze on algae, but they are rarely observed in the field because they spend most of their time concealed in submergent vegetation, algal mats or detritus. Post-metamorphic frogs grow rapidly feeding on a wide variety of invertebrates.

Males typically reach sexual maturity at 2 years and females at 3 years; however, frogs of both sexes may reach sexual maturity in a single year if resources are sufficient. Conversely, frogs may take 3-4 years to reach maturity during extended periods of drought. Based on limited field data, California red-legged frogs appear to live up to 10 years in the wild. Adult frogs apparently eat a wide variety of animal prey including invertebrates, small fishes, frogs, and small mammals.

California red-legged frogs have been observed in a number of aquatic and terrestrial habitats throughout their historic range. Larvae, juveniles, and adult frogs have been collected from natural lagoons, dune ponds, pools in or next to streams, streams, marshlands, sag ponds, and springs, as well as human-created stockponds, secondary and tertiary sewage treatment ponds, wells, canals, golf course ponds, irrigation ponds, sand and gravel pits (containing water), and large reservoirs (Jennings 1988). The key to the presence of frogs in these habitats is the presence of perennial (or near perennial) water and the general lack of introduced aquatic predators such as largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), and bluegill (*L. macrochirus*), crayfish (*Pacifastacus leniusculus* and *Procambarus clarkii*), and bullfrogs (*Rana catesbeiana*). The habitats observed to contain the largest densities of red-legged frogs are associated with deep-water pools (27 inches [>0.7 meters] deep) with stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha latifolia*), tules (*Scirpus* spp.), or sedges (*Carex* sp.). However, California red-legged frogs have also been observed to inhabit stock ponds, sewage treatment ponds, and artificial (concrete) pools completely devoid of vegetation.

Continued survival of frogs in all aquatic habitats seems to be based on the continued presence of ponds, springs, or pools that are disjunct from perennial streams. Such habitats provide the continued basis for successful reproduction and recruitment year after year into nearby drainages that may lose frog populations due to stochastic events such as extreme flooding or droughts.

Juvenile frogs are often observed sunning themselves during the day in the warm, surface-water layer associated with floating and submerged vegetation. Adult frogs are largely nocturnal and are known to sit on stream banks or on the low hanging limbs of willow trees over pools of water where they can detect small mammal prey.

Radio tracking studies conducted in lagoons and the lower portions of streams along the Central Coast of California show that adult red-legged frogs will move within the riparian zone from well-

vegetated areas to pools of water to hydrate during periods of time when many of the Central Coast streams are dry except for isolated pools. During wet periods (especially in the winter and early spring months), red-legged frogs can move long distances (e.g., 1 mile) between aquatic habitats, often over areas that are considered to be unsuitable for frogs (e.g., roads, open fields, croplands, etc.). Such activities can result in frogs ending up in isolated aquatic habitats well away from the nearest known frog populations.[64,65,66,67,68,69,70,71]

Potential to Occur On-Site. Based on the habitat assessment conducted by LOA Associate Herpetologist Mark Jennings in February 2007, the site provides no breeding habitat for California red-legged frogs (*Rana aurora draytonii*) (CRLF). However, according to the California Natural Diversity Database (CNDDB), in 1998, several adult California red-legged frogs and many larvae were observed in small pools along a reach of Sand Creek approximately 3.2 miles upstream of the project site.[72] Additionally, M&A biologists observed adult CRLF in Sand Creek on several occasions in 2005, both within the project site and upstream of the project site just west of Deer Valley Road. Therefore, the entire Sand Creek channel on-site is considered CRLF habitat. In addition to Sand Creek, CRLF may also utilize the manmade detention channel on-site during migration movements, although the species has not been documented in the channel. If predatory, non-native bullfrogs occur in the channel, this feature's existence may be detrimental to local red-legged frog populations.

Burrowing Owl (*Athene cunicularia*). Federal listing status: None; State status: Species of Special Concern. The burrowing owl (BUOW) is considered a California species of special concern. This decision was based on the fact that the burrowing owl's population levels were decreasing due to

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[64] Jennings, M.R. 1990. Unpublished data.

[65] Jennings, M.R., and M. P. Hayes. 1990. Final report of the status of the California red-legged frog (*Rana Aurora draytonii*) in the Pescadero Marsh Natural Preserve. Final report prepared for the California Department of Parks and Recreation, Sacramento, California, through Agreement 4-823-9018. Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, California. 56pp.

[66] Stebbins, R. C. 1985. A field guide to western reptiles and amphibians. Second edition, revised. Houghton Mifflin Company, Boston, Massachusetts. xiv+336pp.

[67] Storer, T. I. 1925. op cit.

[68] Livezey, R. L., And A. H. Wright. 1947. A synoptic key to the salientian eggs of the United States. The American Midland Naturalist, 37(1): 179-222.

[69] Hayes, M. P., and M. R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*); implications for management. Pages 144-158 in: R. Sarzo, K. E. Serverson, and D. R. Patton (technical coordinators). Proceedings of the Symposium on the management of amphibians, reptiles, and small mammals in North America. United States Department of Agriculture, Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, Colorado. General Technical Report (RM-166): 1-458.

[70] Hayes, M. P., and M. R. Tennant. 1985. Diet and feeding behavior of the California red-legged frog, *Rana aurora dryatonii* (Ranidae). The Southwestern Naturalist, 30(4): 601-605.

[71] Rathbun, G. B., M. R. Jennings, T. G. Muphey, and N. R. Siepel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico Creeks, San Luis Obispo County, California. Final report prepared for the California Department of Parks and Recreation, San Simeon Region, through Cooperative Agreement (14-16-0009-01-1909). U. S. Fish and Wildlife Service, National Ecology Research Center, Piedras Blancas Research Station, San Simeon, California. ix+103pp.

[72] EDAW. 1998. Site Assessment and Field Surveys for California Red-legged Frog at the Sand Creek Specific Plan Area, Antioch, California. July 22.

habitat destruction, roadside nesting (vulnerability to human interference) and indirectly, ground squirrel poisoning.

The burrowing owl is a small, long-legged, semi-fossorial bird that averages a height of 9.5 inches, has an average wingspan of 23 inches, and weighs an average of 5.25 ounces. Burrowing owls are unique, as they are the only owl that regularly lives and breeds in underground nests. In California, these birds typically occur in the Central and Imperial Valleys, primarily utilizing ground squirrel burrows (or the burrows of other animals, e.g., badgers, prairie dogs and kangaroo rats) found in grasslands, open shrub lands, deserts, and to a lesser extent, grazing and agricultural lands. Burrowing owls in this region are typically found in lower elevations, and have strong site fidelity. Pairs have been known to return to the same area year after year, and some pairs are known to utilize the same burrow as the previous year.

Life History and Ecology. Burrowing owls feed on various small mammals including deer mice, voles, and rats. They also prey on various invertebrates including crickets, beetles, grasshoppers, spiders, centipedes, scorpions and crayfish. Peak hunting periods occur around dusk and dawn.

The breeding season for the burrowing owl runs from February to August, with a peak between April and July. Clutch size varies from six to 12 eggs, with an average of seven to nine eggs. Females generally produce only one clutch per year. The female incubates the eggs for a month, while the male provides her with food. The male continues to provide food during the brooding period. The young remain in the burrow for approximately two weeks after hatching, and become fully independent of their parents between eight to ten weeks of age. Burrowing owls are a fairly short-lived species, with an average life expectancy of 4.8 years. The oldest known wild burrowing owl was eight years and eight months old at the time of its death.

Burrowing owls are subject to predation by larger mammals (e.g., feral cats, bobcats, foxes and coyotes). They are also susceptible to anthropogenic effects such as collisions with automobiles, and destruction or disruption of their nests, especially during the breeding season. The burrowing owl may also be affected by ground squirrel eradication efforts. Burrowing owl numbers have been in decline over the past 30 to 40 years in California. The decline in numbers is due mainly to habitat destruction by way of development and agricultural practices.

Potential to Occur On-Site. LOA biologists observed two pairs of owls on the site during surveys that occurred in 2002 for the SCSPA. Two individual owls, as well as numerous ground squirrel burrows exhibiting owl sign (whitewash, pellets, and/or feathers), were observed by LOA staff during the February 2007 reconnaissance site visit. M&A biologists indicate that they have observed as many as three pairs of owls on this site. It is currently unknown, however, how many individual owls or owl pairs inhabit the site. In addition to the project site, grasslands of the adjacent Royal Formosa/Chen property and ruderal areas on the adjacent Ginochio/Nunn property that would be temporarily or permanently affected by the project provide potential breeding habitat for this species due to the presence of ground squirrel burrows.

San Joaquin Kit Fox (*Vulpes macrotis mutica*). Federal Listing Status: Endangered; State Listing Status: Threatened. The U.S. Fish and Wildlife Service listed the San Joaquin kit fox as Endangered under the authority of the Federal Endangered Species Act on March 11, 1967. The kit

fox was listed because it had been extirpated from much of its historic range. On June 27, 1971, the State of California listed the kit fox as Threatened; and in 1998, the USFWS adopted a final recovery plan for the San Joaquin kit fox.

Life History and Ecology. The kit fox (*Vulpes macrotis*) is one of nine species in the genus Vulpes in the family Canidae in the order Carnivora. The San Joaquin kit fox is one of seven subspecies of kit fox and is considered the most genetically distinct. The San Joaquin kit fox is the smallest North American canid (member of the dog family, Canidae). Adult males weigh approximately 2.3 kilograms (approximately 5 lbs.) and adult females weigh 2.1 kilograms (approximately 4.6 lbs.), on average.

Historically, the San Joaquin kit fox (*Vulpes macrotis mutica*) occurred extensively throughout California's Central Valley and parts of the Salinas and Santa Clara valleys. Kit fox currently inhabit some areas of suitable habitat on the San Joaquin Valley floor and in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains. They are found in southern Kern County north to Contra Costa, Alameda, and San Joaquin Counties. They are also found near La Grange, Stanislaus County on the east side of the Valley, and in some of the larger scattered islands of natural land on the Valley floor in Kern, Tulare, Kings, Fresno, Madera, and Merced Counties. Kit foxes also occur westward into the interior coastal ranges in Monterey, San Benito and Santa Clara Counties (Pajaro River watershed), in the Salinas River watershed, Monterey and San Luis Obispo Counties, and in the upper Cuyama River Watershed in northern Ventura and Santa Barbara Counties and southeastern San Luis Obispo County.[73]

Kit foxes prefer habitats of open or low vegetation with loose soils. In the northern portion of their range, they occupy grazed grasslands and to a lesser extent valley oak woodlands. In the southern and central portion of the Central Valley, kit foxes are found in Valley Sink Scrub, Valley Saltbrush Scrub, Upper Sonoran Subshrub Scrub and Annual Grassland. Kit foxes are also found in grazed grasslands, urban settings and in areas adjacent to tilled or fallow fields.

The kit fox requires underground dens to raise pups, to avoid predators, and to regulate temperature and avoid other adverse environmental conditions. In the northern portion of their range, burrowing mammals, primarily ground squirrels (*Spermophilus beecheyi*) usually provide these holes. Dens are usually located on loose-textured soils on slopes less than 40 degrees. Natal pupping dens are generally found on slopes of less than 6 degrees. Dens have been recorded at the elevation of 363 meters (1,200 feet).

Pairs may share home ranges all year but may use different dens. Kit foxes breed from late December to March. One litter of two to six pups is born sometime between February and late March. Males provision the female and pups for some period after birth. Dispersal distances vary considerable. A six-year study at Elk Hills Petroleum Preserves in California showed that pups dispersed an average distance of 5 miles.

[73] Description taken from the Recovery Plan for Upland Species of the San Joaquin Valley, California, USFWS 1998, p.124

Age range of kit fox varies from 2 years to over 10 years in captivity. Kit foxes in the wild have been known to live to 7, and even 8 years. However, kit foxes have high mortality rates as adults (0.50) and as juveniles (0.70).[74,75,76,77,78,79,80,81,82,83]

Potential to Occur On-Site. The site provides potentially suitable foraging and breeding habitat for the San Joaquin kit fox (SJKF); however, no SJKF or evidence (i.e., scat, dens, prey remains, prints) has been detected on the site or the immediate surrounding area (within three miles). The closest known sites where the species has been detected include within Black Diamond Mines approximately 4 miles northwest of the project site), at Round Valley, approximately 6 miles south of the site, and in Altamont Hills approximately 6 miles southeast of the site) (Figure IV.I-4). The most recent sighting of kit fox in the vicinity of the site occurred ten years ago (1997) in Black Diamond Mines more than 4 miles northwest of the site.

As indicated previously, the project site lies within the Sand Creek Specific Plan Area (SCSPA). Several reports prepared to support the *Sand Creek Specific Plan DEIR*[84] addressed potential San Joaquin kit fox presence in the project area. These reports include the *San Joaquin Kit Fox Habitat Evaluation for the Sand Creek Specific Plan Area, Antioch, California*,[85] *San Joaquin Kit Fox Preliminary Report, Roddy Ranch Proposed Golf Course*,[86] and *Distribution of the San Joaquin Kit Fox in the North Part of its Range*.[87] These reports all indicate that San Joaquin kit fox is unlikely to be present in the project site

[74] Morrell, S. H. 1971. Life history of the San Joaquin kit fox. CDFG, Sacramento, Spec. Wildl. Invest., Unpubl. Rep. 25pp.

[75] Morrell. S. H. 1972. Life history of the San Joaquin kit fox. CDFG 58:162-174.

[76] USFWS. 1998. Recovery plan for upland species of the San Joaquin Valley, California. U. S. Fish and Wildlife Service, Region 1, Portalnd, Oregon.

[77] Golightly, R. T. , and R. D. Ohmart. 1984. Water Economy of Two Desert Canids: Coyote and Kit Fox. J. Mamm. 65:51-58.

[78] O'Farrell, T. P. 1980. Elk Hills Endangered and Threatened Species Program, Phase 1 Progress Summary. U. S. Dept. Energy Tropical Rep. No. Egg 1183-2403, Santa Barbara Operations. U. S. Department of Energy, Goleta, CA 19pp.

[79] O'Farrell, T. P. and P. M. McCue. 1981. Inventory of San Joaquin Kit Fox on U. S. BLM Lands in the western San Joaquin Valley – Final Report. Rep. No. EGG 1183-2416, EG&G Energy Measurements, Goleta, CA. 33pp.

[80] Zoellick, B. W., T. P. O'Farrell, and T. T. Kato. 1987. Movements and home range of San Joaquin kit foxes on the Naval Petroleum Reserves, Kern County, CA. Rep. No. EGG 10282-2184, EG&G Energy Measurements, Goleta, CA, 38pp.

[81] Grinnell, J., J. S. Dixon and J. M. Linsdale. 1937. Furbearing Mammals of California. Vol. II. University of California Press, Berkeley.

[82] McGrew, J. C. 1979. *Vulpes macrotis*. Mammalian Species No. 123. 6pp.

[83] Scrivner, J. H., T. P. O'Farrell, T. T. Kato, and M.K. Johnson. 1987. Diet of the San Joaquin kit fox *Vulpes macrotis mutica*, on Naval Petroleum Reserve #1, Kern County, California, 1980-1984. Rep. No. EFF 10282-2168, EG&G Energy Measurements, Goleta, CA, 26pp.

[84] Mundie & Associates. 2003. Recirculated Draft Environmental Impact Report. Sand Creek Specific Plan, Antioch, California. Prepared by Mundie & Associates and the City of Antioch September 19.

[85] EDAW. 1998. San Joaquin kit fox habitat evaluation for the Sand Creek Specific Plan Area, Antioch, California. September 2.

[86] H. T. Harvey & Associates. 1998. San Joaquin Kit Fox Preliminary Report, Roddy Ranch Proposed Golf Course, Project #1641-01. July 21.

area, and development of the area would not likely have substantial impacts on the species.

The U.S. Fish and Wildlife Service has shown considerable interest in the protection of identified kit fox habitat in the region during recent years. This interest has been the result of historic sightings and the presumption that the species may still be present in rangeland habitats of Contra Costa County, even if in relatively low numbers. As such, in the absence of protocol-level surveys to confirm their absence, the Service would consider the project site to be potential kit fox habitat.

e. Jurisdictional Waters. A formal wetland delineation was conducted on the project site by Monk & Associates in April 2005[88] and was subsequently verified by USACE in July 2006.[89] The USACE claimed 0.72 acres of jurisdictional Waters of the U.S. on the site, which included all of the non-isolated seasonal wetlands (0.09 acres) and Sand Creek to the extent of Ordinary High Water (OHW) (0.63 acres). Areas not claimed as jurisdictional by USACE included isolated seasonal wetlands (0.23 acres) and the manmade detention channel (0.86 acres).

All waters claimed as jurisdictional by USACE, along with the 0.23 acres of isolated seasonal wetlands not claimed by USACE, would be considered jurisdictional Waters of the State by the RWQCB, totaling 0.95 acres. The manmade detention channel on-site would not be claimed as jurisdictional by RWQCB as it is a manmade feature created in upland habitat.

The Sand Creek channel on the project site, to the edge of the top of the bank, or to the dripline of riparian vegetation, whichever is greater, would be considered jurisdictional by CDFG.

2. Impacts and Mitigation Measures

The following section provides the criteria of significance and presents a discussion of potential impacts to biological resources that could result from the implementation of the proposed project.

a. Criteria of Significance. The proposed development of the project would have a significant effect on biological resources if it would:

- Result in substantial reduction in numbers of, restriction in range for, or loss of habitat for a population of any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means;
- Create substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the

[87] H. T. Harvey & Associates. 1997. Distribution of the San Joaquin Kit Fox in the Northern Part of its Range, Project Number 673-11. March 13.

[88] Monk & Associates, 2005. Request for jurisdictional determination, Williamson/Ginochio project site, Antioch, Contra Costa County, California. Submitted to USACE on May 10.

[89] USACE, 2006. Verification letter sent to Michael Serpa/Pulte Homes dated July 27.

use of native wildlife nursery sites;

- Conflict with the provisions of an approved local, regional, or state policy or ordinance protecting biological resources; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.

b. Less-than-Significant Biological Resources Impacts. Less-than-significant impacts to biological resources associated with implementation of the project are discussed below.

(1) Wildlife Movement Corridors. The area proposed for development occurs to the north of Sand Creek and is comprised mainly of non-native grassland, which supports a diverse assemblage of native wildlife species. This portion of the site is adjacent to developed lands along both the western and northern boundaries, consisting of the Kaiser Hospital facility and residential development respectively. As such, this portion of the site is unlikely to function as a significant movement corridor, although wildlife occurring on the site may move within this area. Sand Creek potentially functions as a movement corridor for native species; however, the Sand Creek riparian corridor would be preserved within a riparian buffer zone with a setback averaging 100 feet.

(2) Special-status Plants. As noted previously, although the site provides potential habitat for several special-status plant species, protocol-level surveys for rare plants have determined that all but one, round-leaved filaree (CNPS 1B), are absent from the project site. The population of round-leaved filaree occurs within the area that has been designated as preserved open space and would be avoided during project development. Therefore, no impacts to special-status plants would occur as a result of the proposed project.

(3) Conflict with Plans. The City of Antioch is not currently participating in a Habitat Conservation Plan (HCP), Natural Communities Conservation Plan or other such plan. East Contra Costa County does have an HCP/NCCP, however, and the mitigation measures proposed below have been developed with consideration for that plan. Mitigation measures proposed are consistent with the City's own General Plan policies with regard to preservation and management of biological resources.

c. Significant Biological Resources Impacts. The implementation of the proposed project may result in a significant loss of habitat for special-status grassland and vernal pool animal species; in harm or mortality to individual special-status animals; in loss of habitat for the California red-legged frog; in destruction or abandonment of nests of several species of special-status birds; and in the loss of wetlands and riparian areas subject to USACE, RWQCB and/or CDFG jurisdiction. Any of the foregoing project effects would be considered a significant adverse impact to biological resources of the site. The following discussion describes and evaluates significant impacts to biological resources and proposes measures that would reduce these impacts to the maximum extent possible, to a less-than-significant level.

<u>Impact BIO-1</u>: Grading and construction of the proposed project would result in a loss of habitat for special-status grassland and vernal pool species including the vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, burrowing owl, and San Joaquin kit fox. (S)

Grading and construction of the proposed project would result in a loss of 149.6 acres of non-native grassland habitat on-site on the north side of Sand Creek, and the loss of 1.4 acres of such habitat on the Royal Formosa/Chen parcel as a result of road construction. Additionally, the proposed project would result in the loss of 3.0 acres of dry-farmed agricultural fields and ruderal areas on the Ginochio/Nunn parcel as a result of the Hillcrest Avenue extension, and temporary impacts to another 20.3 acres of agricultural fields and ruderal areas on the Ginochio/Nunn and Aera Energy parcels as a result of the installation of the sanitary sewer line. Grasslands of the project site provide known nesting and foraging habitat for the burrowing owl, a State Species of Special Concern. Grasslands, agricultural fields and ruderal areas of the Royal Formosa/Chen and Ginochio/Nunn parcels also provide potential nesting and foraging habitat for this species. These same habitats also provide suitable foraging and denning habitat for the San Joaquin kit fox and suitable upland habitat for the California tiger salamander. Although neither of the latter two species have been observed on the site, protocol-level studies to confirm their absence have not been conducted and these species are assumed to be present.

Grading and construction occurring on the project site to the north of Sand Creek would also result in the loss of approximately 0.32 acres of seasonal wetlands and 0.86 acres of manmade detention channel, while temporary impacts to seasonal wetlands occurring along the eastern boundary of the Ginochio/Nunn parcel near Heidorn Ranch Road, estimated at less than 0.10 acre, may occur as a result of the installation of the sanitary sewer line. The seasonal wetlands of the site provide potential habitat for the vernal pool fairy shrimp and marginal habitat for the vernal pool tadpole shrimp. As protocol-level surveys have not been conducted, vernal pool fairy shrimp and vernal pool tadpole shrimp are assumed to be present on the sites. Seasonal wetlands of the Ginochio/Nunn parcel are known to support populations of the vernal pool fairy shrimp. The seasonal wetlands of both the project site and the Ginochio/Nunn parcel, as well as the manmade detention channel on the project site, may also provide marginal breeding habitat for the California tiger salamander.

Implementation of the following multiple-part mitigation measure would reduce these habitat loss impacts to a less-than-significant level for the listed vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander,, and San Joaquin kit fox, and non-listed, special-status burrowing owl, that also shares this habitat. Although these measures would lessen direct project-related impacts to burrowing owl habitat to a less-than-significant level, project impacts taken together with the loss of habitat occurring for this species as a result of other completed or planned projects in the immediate project vicinity will result in a significant cumulative loss of habitat for this species (see Chapter VI, CEQA-Required Assessment Conclusions for a discussion of cumulative project impacts).

> Mitigation Measure BIO-1a: The project sponsor shall compensate for the permanent loss of 154 acres of suitable habitat for listed grassland and vernal pool species (vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamanders, and San Joaquin kit fox) at a ratio of 1:3 (e.g, for each acreage impacted, a minimum of 3 acres of suitable habitat will be preserved). This would result in a mitigation requirement of 462 acres of suitable habitat for listed grassland species. Mitigation for impacts to listed species habitat may be accomplished 1) through on and/or off-site preservation as described below or 2) through the purchase of habitat credits equivalent to preservation of habitat at a 1:3 ratio (loss:preserved) at an approved mitigation bank that includes the City of Antioch in its service area. Alternatively, the project sponsor may negotiate and pay development fees to the East Contra Costa County Habitat

Conservation Plan/Natural Community Conservation Plan (ECC HCP/NCCP) Implementing Entity consistent with the applicable fee schedule for projects covered under the ECC HCP/NCCP (see Mitigation Measure BIO-1d).

To compensate for the permanent loss of habitat for grassland and vernal pool animals, the project sponsor shall be required to preserve and/or create suitable habitat on-site and/or off-site within eastern Contra Costa County. Habitat to be preserved on-site would partially compensate for impacts to San Joaquin kit fox and burrowing owl in the on-site preserve as described below. The remainder of the mitigation would be accomplished at off-site mitigation areas. Habitat to be preserved off-site must be grassland habitat possessing the following characteristics: 1) the site shall be located within the northern range of the San Joaquin kit fox in Contra Costa County and shall be contiguous with other suitable kit fox habitat, 2) the site shall provide suitable foraging and denning habitat for kit foxes; 3) the site shall encompass seasonal wetlands/vernal pools that support vernal pool fairy shrimp and/or vernal pool tadpole shrimp; 4) the site shall provide breeding and upland habitat for California tiger salamanders; 5) the site shall provide upland and migration habitat for California red-legged frogs, and 6) the site shall have supported breeding burrowing owls in the last 3 years.

The basis for this required mitigation is as follows. While it is acknowledged that the project site is outside the area covered by the HCP/NCCP, and the HCP/NCCP does not set forth specific ratios for preservation or creation of habitat, it does set a goal of the acquisition and preservation of 13,900 acres of grassland habitat. This is to compensate for projected impacts to between 3,920 and 5,578 acres of such habitat in the plan area. Using these impacted and preserved acreage values roughly translates to a loss:preservation ratio between 1:2.5 to 1:3.5 for grassland species such as California tiger salamander and San Joaquin kit fox. Participants in the HCP/NCCP divide the responsibility for land acquisition and preservation to meet the HCP/NCCP goals between new development at 52 percent and existing development (i.e., the public) at 48 percent. Since there is no cost sharing for projects not covered by HCP/NCCP, the entire responsibility to mitigate the impacts in a manner consistent with the regional HCP/NCCP would fall to new development (i.e., the project sponsor).

Consistent with the derived ratio above, the 1:3 (loss:preservation) ratio is the standard used by the USFWS and CDFG to determine appropriate compensation for impacts to listed grassland species' habitat (e.g., California tiger salamander, San Joaquin kit fox) for other projects in these species' ranges including those in eastern Contra Costa and Solano counties [90]. Given that both the derived ratio from the regional HCP/NCCP and the resource agencies' typical requirements are similar, the 1:3 (loss:preservation) ratio is justified for this project. For mitigation purposes, the minimum loss:preservation ratio is 1:3, unless the applicable resource agencies determine a lower ratio to be acceptable.

Upland habitat mitigation for both San Joaquin kit fox and California tiger salamander may be accomplished on the same acreage provided that 1) the mitigation site is determined to be suitable for both of these species by a qualified biologist in consultation with USFWS and CDFG and 2) the management plan includes measures for conservation of both species and

[90] USFWS and CDFG. 2007. Personal communication with S. Larsen and L. Triffleman (USFWS) and J Gan (CDFG), Dec 2007. Personal communication with M. Tovar and A. Raabe (USFWS) and A. Holmes (CDFG), Nov. 2007.

enhancement of habitat for both species.

The additional acreage purchased by the project sponsor to mitigate habitat impacts for California tiger salamander must be grassland habitat that supports ground squirrels and either has known breeding habitat on-site or is within migration range of, and has preserved connectivity to, known breeding habitat for this species. The known breeding habitat must be located on a site that is preserved and managed for California tiger salamanders and other native wildlife and plants (i.e., regional or state park, mitigation or conservation bank, or other area preserved in a conservation easement). Additional acreage purchased by the project sponsor to mitigate for impacts for San Joaquin kit fox must be within the USFWS mapped range of the species, must have connectivity to areas where kit fox are known to occur, and provide suitable foraging and denning habitat.

The project sponsor must either establish a conservation easement on the additional mitigation lands to preserve them in perpetuity as wildlife habitat or donate the additional mitigation lands acres to a qualified conservation organization. The project sponsor must also establish an endowment fund to provide for the long-term management, maintenance, and monitoring of the mitigation site.

Requirements for each preservation/creation (on-site and off-site) are detailed below.

On-site Preservation. The project sponsor shall preserve 35.9[91] acres as an Open Space Preserve at the south end of the project site. Approximately 4.7 acres of the preserved area are located north of the Sand Creek channel and would serve to buffer the Sand Creek riparian corridor from the development north of the creek. The on-site preserved area excludes 2.5 acres that have been set-aside for a potential future road extending from Sand Creek Road southwest through the Preserve, as well as another 1.0 acre which has been granted as an easement to PG&E for grading and landscaping associated with a new substation located at the eastern boundary of the preserve. On-site habitat preservation within the Preserve would provide habitat for San Joaquin kit fox and burrowing owl. The population of round-leaved filaree is located within the on-site preserve. The on-site preserve also would provide habitat for common wildlife and plant species that occur in the grasslands of the region.

The Preserve would include a permanently protected riparian buffer along the north side of Sand Creek on the project site averaging 100 feet from the top-of-bank. The development plan for the project site shall include the transfer of the preserve averaging 100 feet from top-of-bank. The development plan for the project site shall include the transfer of the preserve into a dedicated parcel. A deed restriction shall be recorded over the parcel, ensuring that its ecological values would be maintained in perpetuity. An endowment fund shall be established by the project sponsor and held and administered by an appropriate public agency such as CDFG, to provide for the long-term maintenance, monitoring, and management of the on-site preserve including the plantings established in the Riparian Enhancement Plan (described in

[91] The area designated as Open Space Preserve differs slightly from the acreage described in Chapter III, Project Description. The difference (from 36.9 to 35.9 acres) is due to the deduction of the 1.0 acre easement adjacent to the PG&E Substation. This land is not suitable for inclusion in the Open Space Preserve as it will be graded and landscaped as part of the new substation.

Mitigation Measure BIO-2b). As required by the City's General Plan, the site would be managed pursuant to a Resource Management Plan (a draft version of which is provided herein as Appendix K).

Off-site Preservation. The project sponsor has purchased a 205.6-acre property known as the Ralph Property in eastern Contra Costa County as partial mitigation for impacts associated with the development of the project site. Approximately 166.6 acres would be used as off-site mitigation for biological impacts resulting from the proposed project. The Ralph property is located approximately two miles south of the Byron Airport, just outside the town of Byron, California, and is composed of two parcels: APN 001-031-018-3 (147.02 acres), and APN 001-031-019-1 (58.53 acres).

Per an agreement with CDFG in 2006, 39 acres of the 205.6-acre Ralph property have already been designated as mitigation for impacts that occurred to burrowing owls at another of the project sponsor's project sites in Oakley. As mitigation compensation for the proposed project, the project sponsor shall donate the remaining 166.6 acres of the Ralph property to a qualified conservation organization to mitigate impacts to waters of the U.S. and State, and for habitat loss for the vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, western burrowing owl, and San Joaquin kit fox. The project sponsor shall establish an endowment fund to provide for the long-term maintenance and monitoring of the site. As required by the City's General Plan, the site shall be managed pursuant to a Resource Management Plan (Appendix K).

The 166.6 acres of the Ralph property that would be preserved as compensation for impacts to special-status grassland and vernal pool species is comprised of predominantly non-native grassland habitat (estimated at 136.6 acres), with the remaining acreage (estimated at 30 acres) supporting a mosaic of vernal pool, seasonal wetland channel, and seasonal alkali wetland habitats.

The Ralph site is within USFWS Critical Habitat for vernal pool crustaceans and within the mapped range of San Joaquin kit fox. The site also supports known populations of four species of vernal pool crustaceans including the vernal pool fairy shrimp; breeding and upland habitat for the California tiger salamander; and breeding and overwintering habitat for burrowing owls. Additionally, occurrences of California red-legged frog have been documented upstream of the site in a seasonal wetland channel that enters the site in the southwest corner.

Adding to the resource value of the site, the Ralph property is located just outside the 2,000-foot protection zone established around the Byron Airport and therefore would remain part of a much larger preservation complex with regional importance as identified in the ECC HCP/NCCP. The HCP/NCCP indicates that there are already areas adjacent to the Ralph property that are preserved in perpetuity and whose resources will be managed for the benefit of native wildlife and plants (816 acres within the airport boundaries and121 acres in a private mitigation bank). The Ralph property is immediately outside the indicated preserved areas and thus has regional significance as a property that can be added to existing preserved areas.

Based on information provided by M&A, information contained in the HCP/NCCP, and on a reconnaissance-level site visit to the Ralph property by LOA staff in April 2007, the Ralph

mitigation site appears to provide higher habitat value for special-status animals that occur on the site or its vicinity than the project site itself.

Acreages of impacts and mitigations for the loss of habitat for individual special-status grassland and vernal pool species impacted by the project are provided in Table IV.I-3 and discussed in further detail in the text that follows.

Table IV.I-3: Acreages of Permanent Project Impacts and Mitigations for Special-status Grassland and Vernal Pool Species.

Habitat Type	Acreages Impacted On-site	Acreages Impacted Off-site[a]	Acreages Preserved On-site	Acreages Preserved Off-site (estimated)[b]	Acreages Created Off-site	Total Acreages Preserved or Created	Loss: Preservation and/or Loss: Creation ratio
Vernal Pool Crustacean	0.32	0.00	0.00	9.00	0.91	9.91	1:31
California Tiger Salamander Breeding	1.18	0.00	0.00	10.00	0.00	10.00	1:8
California Tiger Salamander Breeding and Upland combined	149.60	4.40	0.00	462.00 (146.6 - Ralph, 315.40 - Other)	0.00	462.00	1:3
Burrowing Owl Breeding and Foraging	149.60	4.40	35.9	166.60	0.00	202.5	1:1.3
San Joaquin Kit Fox	149.60	4.40	35.9	426.10 (166.6 - Ralph, 259.5- Other)	0.00	462.00	1:3

[a] Includes acreages of off-site habitats that would be permanently affected due to project activities; does not include acreages of temporary off-site impacts.

[b] Habitats on the off-site mitigation property (Ralph property) have not been formally mapped, therefore acreages have been estimated based on field surveys and aerial photography. Approximately 10 of the 30 acres of vernal pool, seasonal wetland channel, and seasonal alkali wetland habitats on the Ralph property were confirmed by Monk & Associates.[92]
Source: Live Oak Associates, 2007.

Vernal Pool Crustaceans. The Ralph property occurs within vernal pool fairy shrimp critical habitat and, although no formal wetland delineation has been conducted on the site, it is roughly estimated that the site contains at least 9.0 acres of vernal pool habitat.[93] In 2006, M&A conducted wet season protocol-level surveys for federally-listed vernal pool crustaceans on the Ralph site. The site was found to support one listed fairy shrimp species – vernal pool fairy shrimp (*Branchinecta lynchi*), and three non-listed species – Lindahl's fairy shrimp

[92] Monk & Associates, 2007. op. cit.

[93] Ibid.

(*Branchinecta lindahli*), Midvalley fairy shrimp (*Branchinecta mesovallensis*), and alkali fairy shrimp (*Branchinecta mackini*).[94] Vernal pool tadpole shrimp were not found to be present on the mitigation site.

The proposed project would result in a loss of 0.32 acres of potential vernal pool crustacean habitat occurring on the project site, and would result in temporary impacts to another approximately 0.10 acres of such habitat occurring on the Ginochio/Nunn site. This loss would be compensated by the preservation of an estimated 9.0 acres of occupied vernal pool crustacean habitat on the Ralph property, resulting in a loss: preservation ratio greater than 1:20 and well in excess of the 1:3 mitigation ratio generally required by the USFWS. Additionally, the project sponsor shall create another 0.91 acres of seasonal wetland habitats that shall be suitable for vernal pool fairy shrimp and vernal pool tadpole shrimp. The created wetlands shall be inoculated with salvaged soils from the seasonal wetlands on the project site, resulting in a greater than 1:2 loss:creation ratio. The salvaging of topsoil from the seasonal wetlands is described in Mitigation Measure BIO-3.

California Tiger Salamander. The Ralph site is known to support breeding habitat for California tiger salamanders. On April 7, 2005, M&A staff observed numerous California tiger salamander larvae in one of the larger alkali wetlands located in the south central portion of the site confirming the presence of this species on the site.[95] The extent of this known breeding habitat on the site is estimated at approximately 6.0 acres, however, another large, approximately 4.0-acre wetland occurring in the northeastern portion of the site also supports proper hydrology for salamander breeding.[96] Additionally, a CNDDB record from 1994 reports California tiger salamanders breeding in a stock pond located approximately 1,500 feet east of the Ralph site. As such, all 146.6 acres of the Ralph site are considered to be salamander breeding and upland habitat. Additionally, the Ralph site is surrounded by open rangeland, over 900 acres of which has already been preserved and is being managed for sensitive resources according to the HCP/NCCP,[97] that likely provides an additional significant amount of upland habitat for salamanders breeding on the Ralph site.

The project would result in a loss of 0.32 acres of seasonal wetland/vernal pool habitat, and 0.86 acres of manmade detention channel (totaling 1.18 acres) which provides low quality breeding habitat for salamanders as a result of the surrounding land uses (development, crop production); the shallow nature, small size and observed hydrologic regime of the seasonal wetlands; and the hydrologic regime and likely presence of predatory non-native bullfrogs in the detention channel. Additionally, the project would result in the loss of 149.6 acres of potential upland habitat on-site for this species and the loss of another 4.4 acres of potential upland habitat for the species due to off-site impacts on the Royal Formosa/Chen parcel and the Ginochio/Nunn parcel. The loss of 1.18 acres of low quality potential tiger salamander breeding

[94] Monk & Associates, 2006. Vernal pool crustacean surveys, Ralph property mitigation site, Contra Costa County, California. October 3, 2006. 19pp.

[95] Monk & Associates, 2007. op. cit.

[96] Pers. comm. Geoff Monk. Monk & Associates, on July 11, 2007.

[97] Jones & Stokes. 2006. Final East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan. October (J&S 01478.01) Prepared for the East Contra Costa County Habitat Conservation Plan Association. Prepared by Jones & Stokes, San Jose, CA.

habitat on-site along with the loss of another 154 acres of upland habitat would be partially off-set by the preservation of 146.6 acres of combined breeding and upland habitat on the Ralph property, of which approximately 10 acres is wetland habitat that is either known to support breeding salamanders, or that has the proper hydrology to provide such habitat. Although 35.9 acres of grassland habitat would be preserved on-site, this preserved acreage has not been considered in the mitigation of habitat impacts for this species. This area has been excluded because of the unlikely future preservation of off-site migration corridors to the Preserve area from known salamander breeding habitat in the site's vicinity, as well as the uncertainty that such off-site breeding habitat would be preserved in perpetuity.

The combination of breeding habitat in proximity to suitable upland habitat is most important for the ongoing viability of the tiger salamander populations. Breeding habitat on the Ralph property supports not just upland habitat on the site, but also many more acres of upland habitat on open rangeland surrounding the site. According to the HCP/NCCP,[98] over 900 acres of such habitat is already preserved in the immediate vicinity of the Ralph property. However, given that the loss:preservation ratio for salamander habitat on the Ralph property alone is below the minimum by the resource agencies, or as derived from the HCP/NCCP, acreage on the Ralph property alone does not adequately mitigate this impact, and additional mitigation is required (see BIO-1b).

Burrowing Owl. As many as three pairs of burrowing owls have been observed to be present on the project site; however, formal surveys for this species have not been conducted and, potentially, more individuals or pairs could be present. The project would result in the loss of 149.6 acres of known breeding and/or foraging habitat for this species on-site, as well as another 4.4 acres of potential breeding and/or foraging habitat off-site on the Royal Formosa/Chen and Ginochio/Nunn properties. Typically, CDFG has required that 6.5 acres of habitat be preserved to compensate for each pair of owls, or each individual owl. Mitigation for the three pairs known to occur on the site based on this ratio would be 19.5 acres of preserved habitat.

Approximately 35.9 acres of grassland habitat would be preserved on-site, and another approximately 166.6 acres of combined breeding and foraging habitat would be preserved off-site on the Ralph property which is known to support breeding burrowing owls, totaling 202.5 acres, or more than 10 times the habitat preservation that would typically be required by CDFG for impacts to the three pairs of owls known to occur on the project site. Considered another way, preservation of approximately 202.5 acres of suitable foraging and nesting habitat would be adequate mitigation for up to 31 pairs of owls.

M&A has confirmed the presence of at least three pairs of burrowing owls on the Ralph property over a two-year period.[99] M&A staff has observed these owls on an on-going basis beginning in the fall of 2005 and continuing through the 2006 breeding season. Most recently these owls were observed in the non-breeding season in January 2007. This indicates that a burrowing owl population is firmly established on the Ralph property, and that they use the site

[98] Jones & Stokes. 2006. op. cit.

[99] Monk & Associates, 2007. op. cit.

both as breeding and wintering habitat. The entire Ralph site would be considered breeding and foraging habitat for this species.

San Joaquin Kit Fox. The site provides marginal habitat for this species because of surrounding land uses (i.e., residential, agricultural and commercial), and its location along the very northern edge of the USFWS mapped range for kit fox. These factors make it unlikely that the project would directly impact this species. However, as the project sponsor has opted at this time not to conduct protocol-level studies to demonstrate that kit foxes do not occur on the site, presence is presumed. The project, therefore, would result in a loss of 154 acres of suitable foraging and denning habitat for kit foxes: 149.6 acres of grassland habitat on-site and another 4.4 acres of habitat off-site which is considered suitable kit fox habitat.

Although protocol-level studies for San Joaquin kit fox have not been conducted on the Ralph site, the site occurs well within the USFWS mapped range of this species, and the USFWS considers the site to be kit fox habitat based on M&A's informal consultation with USFWS in February 2006.[100] Additionally, there have been eleven occurrences of kit fox documented in the vicinity of Byron in the period from 1987 to 2002, within 1 and 6 miles north and northwest of the Ralph site, with the latest of these sightings in 2002.[101] [102]

Approximately 166.6 acres of grasslands and seasonal wetlands that provide habitat for this species would be preserved off-site on the Ralph property, and additionally, another 35.9 acres of grassland habitat would be preserved on-site, totaling 202.5 acres.

Preservation of the on-site and off-site mitigation lands would result in a 1:1.3 (loss:preservation) ratio. This ratio is below the minimum ratio of 1:3 (loss:preservation) required to mitigate this impact to a standards used by the USFWS, CDFG, and the ratio derived from the regional HCP/NCCP. Therefore, the preserved acreage on-site and off-site on the Ralph property would not adequately mitigate this impact, and additional mitigation is required (see BIO-1b).

Resource Management Plan (RMP). Pursuant to the City of Antioch's General Plan, Resource Management Section 10.3.2e and Section 10.4.2d, a Resource Management Plan (RMP) has been developed for the management of natural resources to be preserved both on-site within the open space and riparian buffer areas, and for the off-site mitigation lands (Ralph mitigation site and other lands that may be purchased by the project sponsor as mitigation pursuant to Mitigation Measure BIO-1b) (see Appendix K). The project sponsor must be required to implement and adhere to all recommendations contained in the RMP.

<u>Mitigation Measure BIO-1b</u>: In order to achieve the 1:3 (loss:preservation) ratio for impacts to listed species grassland habitat on the project site (462 acres), the project sponsor shall purchase 315.4 acres of additional land that is suitable habitat for California tiger salamander. Additional mitigation lands must meet the criteria as described in Mitigation Measure BIO-1a.

[100] Monk & Associates, 2007. op. cit.

[101] Monk & Associates, 2007. op. cit.

[102] EDAW. 1998. op. cit.

Of this additional 315.4 acres, at least 259.4 acres must also provide suitable foraging and denning habitat for San Joaquin kit fox as described in Mitigation Measure BIO-1a.

Alternatively, the sponsor may choose to purchase an equivalent amount of preservation credits in an accredited mitigation bank within eastern Contra Costa County that includes the City of Antioch in its service area. This would result in a total of 462.00 acres of on-site and/or off-site habitat being preserved for these two species and a 1:3 (loss:preservation) ratio.

Mitigation for both kit fox and California tiger salamander may be accomplished on the same acreage provided that 1) the mitigation site is determined to be suitable for both of these species by a qualified biologist in consultation with USFWS and CDFG and 2) the management and monitoring plan includes measures for conservation of both species and enhancement of habitat for both species.

The additional acreage purchased by the project sponsor to mitigate habitat impacts for California tiger salamander must be grassland habitat that supports ground squirrels and either has known breeding habitat on-site or is within migration range of, and has preserved connectivity to, known breeding habitat for this species. The known breeding habitat must be located on a site that is preserved and managed for California tiger salamanders and other native wildlife and plants (i.e., regional or state park, mitigation or conservation bank, or other area preserved in a conservation easement). Additional acreage purchased by the project sponsor to mitigate for impacts for San Joaquin kit fox must be within the USFWS mapped range of the species, must have connectivity to areas where kit fox are known to occur, and provide suitable foraging and denning habitat.

The project sponsor must either establish a conservation easement on the additional mitigation lands to preserve them in perpetuity as wildlife habitat or donate the additional mitigation lands acres to a qualified conservation organization. The project sponsor must also establish an endowment fund to provide for the long-term management, maintenance, and monitoring of the mitigation site.

<u>Mitigation Measure BIO-1c</u>: The installation of the sewer pipeline along the eastern boundary of the Ginochio/Nunn property may result in temporary impacts to seasonal wetlands that provide habitat for special-status vernal pool crustaceans, estimated at less than 0.10 acres.

To the maximum extent possible, wetlands on the Ginochio/Nunn property shall be avoided during pipeline installation. A qualified biologist shall stake a minimum buffer of 25 feet along the edge of all wetlands adjacent to the pipeline corridor prior to ground disturbance and pipeline excavation activities. Exclusionary fencing shall be erected along the edge of the buffer to ensure wetlands are protected from construction related impacts. A biological monitor shall inspect the exclusionary fencing on a twice-weekly basis during the pipeline installation phase to ensure it remains in place and that no intrusion into the avoided wetlands occurs. Soil contours within the pipeline corridor shall be restored to pre-project conditions following installation of the pipeline.

If wetlands on the Ginochio/Nunn property cannot be avoided during pipeline installation, then prior to any grading and excavation activities related to the installation, the topsoil of all

wetland areas to be impacted shall be salvaged and stockpiled, and the configuration of the impacted wetlands shall be mapped so that they can be recontoured to pre-project conditions after the completion of the pipeline installation. Once pipeline installation is completed, the wetlands shall be re-contoured on the site and salvaged topsoils shall be re-deposited in the wetlands.

Mitigation Measure BIO-1d: As an alternative to purchasing land or purchasing habitat credits at a mitigation bank, the project sponsor may negotiate to pay development fees to the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECC HCP/NCCP) Implementing Entity. This individual project buy-in to the HCP/NCCP would provide mitigation fees for the purpose of implementing the ECC HCP/NCCP. Based on the 2008 fee schedule, assuming 154 acres of permanent disturbance and impacts to 0.42 acres of seasonal wetlands, the project would incur development fees and wetland fees of approximately $3,797,000.00. However, as the project site falls outside the area covered by the HCP, the project sponsor would need to negotiate a fee which is mutually agreeable to the Implementing Entity, USFWS, and CDFG.[103] If the project sponsor chooses to pursue this mitigation option, the project sponsor shall provide the City with evidence that the project has been accepted for individual coverage under the ECC HCP/NCCP and evidence of payment of the applicable development and wetland mitigation fees prior to issuance of a grading permit. (LTS)

Implementation of Mitigation Measure BIO-1a would ensure that potential impacts associated with the loss of vernal pool crustacean, and burrowing owl are reduced to a less-than-significant level. Implementation of Mitigation Measure BIO-1b, together with BIO-1a, would reduce potential impacts associated with loss of habitat for the California tiger salamander and San Joaquin kit fox to a less-than-significant level. Implementation of Mitigation Measure BIO-1c, along with Mitigation Measure BIO-1a would reduce temporary impacts to vernal pool crustacean habitat on the Ginochio/Nunn property to a less-than-significant level. Implementation of Mitigation Measure BIO-1d would ensure that potential impacts to the above noted species are reduced to a less-than-significant level in the event that land purchases or habitat credits are not purchased by the project sponsor.

Impact BIO-2: Grading and construction of the proposed project may result in a loss of dispersal habitat for the California red-legged frog. (S)

The California red-legged frog is known to be present on-site within Sand Creek, although breeding habitat for this species is considered absent on the site. This species also may utilize the manmade detention channel on-site as a dispersal corridor, although they have never been observed in the channel. Grading and construction of the project would include placing the detention channel in an underground culvert, resulting in a loss of approximately 0.86 acres of potential dispersal habitat for this species. Although they have not been directly observed, due to the perennial nature of the channel, both M&A and Dr. Jennings believe the channel likely supports predatory, non-native bullfrogs that could be detrimental to local populations of red-legged frogs. Therefore, the benefits to local red-legged frog populations from the removal of the channel could possibly outweigh impacts

[103] Kopchick, John, 2008. Senior Planner, Contra Costa County Conservation and Development Department. Personal communication with Sara Welch, Mark Thomas and Company, Contract Planner to the City of Antioch. September 2.

resulting from the loss of marginal migration habitat for this species.

For the most part, red-legged frog habitat within the aquatic environs of the Sand Creek channel would not be impacted by the project as the channel would be set aside within the Open Space Preserve area. However, the project would include the construction of two outfalls on the northern bank of the creek channel that would drain the proposed detention basins, and this would result in minor impacts to red-legged frog habitat, estimated at less than 0.03 acre. Additionally, while a riparian set-back averaging 100 feet from the top of the northern bank of the creek to the proposed project's detention basins and landscaped park areas is included in the Open Space Preserve, the eastern-most detention basin encroaches to within approximately 75 feet of the bank, and the western-most basin encroaches to within an estimated 10 feet of the dripline of riparian trees occurring along an eroded upland swale (distance of the basin to the main creek channel in this location is approximately 100 feet). Additionally, a 12-foot wide paved trail is proposed along the northern edge of the creek channel just outside the designated riparian buffer. Although the trail will be constructed outside the designated riparian buffer area, portions of the trail will occur within 100 feet of the edge of the northern bank or dripline of riparian vegetation. The trail comes to within 60 feet of the edge of the main channel bank near the eastern detention basin, and to the edge of riparian trees occurring along an eroded swale near the western-most detention basin. The trail has been aligned so that it will not result in the removal of existing riparian trees occurring in this area.

Although the riparian influence does not extend significantly beyond the top of the bank of the creek on the site (i.e., the riparian canopy is sparse and generally limited to the banks of the main creek channel), a minimum of a 100-foot setback from the dripline of riparian vegetation or the edge of the bank, whichever is greater, is generally prescribed to preserve riparian habitat functions and values and would be especially appropriate for riparian habitat known to support the red-legged frog. The proximity of the detention basins, landscaped areas, roads and trail to the riparian channel will result in additional impacts to habitat that has been designated as a preserve for this species. As such, a Riparian Enhancement Plan shall be developed to mitigate impacts on-site. The Plan shall result in an increase in the amount of riparian vegetation along the northern edge of the creek, and will increase cover for native species utilizing the riparian corridor, as well as help buffer the riparian corridor from light and human noise as a result of project development occurring north of the creek.

As indicated in Mitigation Measure BIO-1a, the project sponsor has acquired and plans to preserve in perpetuity 166.6 acres off-site on the Ralph property. While the California red-legged frog is not known to occur on the Ralph property, according to records in the CNDDB it is known from a tributary that terminates on the site.[104] The frog was observed approximately 1,000 feet upstream from the Ralph mitigation site in a drainage that enters the mitigation site on the southwest corner. It is conceivable, therefore, that the frog uses the aquatic habitats on the site during dispersal movements. This tributary drains into an alkali sink on the mitigation site that has created conditions for seasonal wetlands, however, the mitigation site, and lands in the immediate vicinity of the site, currently do not appear to support any wetland ponds with the hydrology necessary to provide breeding habitat for red-legged frogs which is a factor limiting the value of the mitigation site for this species.

[104] Monk & Associates, 2007. op. cit.

Acreages of impacts and mitigations for the loss of habitat for California red-legged frog impacted by the project are provided in Table IV.I-4 and discussed in further detail in the text that follows.

Table IV.I-4: Acreages of Permanent Project Impacts and Mitigations for California Red-legged Frog.

Habitat Type	Acreages Impacted On-site	Acreages Impacted Off-site	Acreages Preserved On-site	Acreages Preserved Off-site (estimated)	Acreages Created Off-site	Total Acreages Preserved or Created	Loss: Preservation and/or Loss: Creation ratio
California Red-legged Frog	0.89	0.00	1.00	0.00	0.91	1.91	1:2

Source: Live Oak Associates, 2007.

Mitigation Measure BIO-2a: To compensate for the loss of 0.86 acres of marginal dispersal habitat for the frog within the detention channel and approximately 0.03 acres of known frog dispersal habitat within the Sand Creek channel, approximately 1.0 acre of such habitat shall be preserved on-site within the Sand Creek riparian buffer area. Additionally, as part of the project sponsor's mitigation for the loss of jurisdictional waters of the U.S. and State on the project site, the project sponsor shall create 0.91 acres of seasonal pond habitat on the Ralph site within and/or adjacent to the seasonal wetland drainage on the site, which would be designed to provide suitable breeding habitat for red-legged frogs. The created pond habitat will be managed to support breeding habitat for red-legged frogs pursuant to the RMP (see Mitigation Measure BIO-1 and Appendix K). Management of the site must include such measures as draining ponds as necessary to control predators such as fish and bullfrogs. This created wetland habitat would provide an opportunity for the red-legged frog to become established on the mitigation site and in its immediate vicinity.

Mitigation Measure BIO-2b: The project proponent shall provide the City with a map showing the extent of encroachment of project development, including the detention basins, landscaped areas, roads and trail, that occur within 100 feet of the dripline of riparian vegetation or the creek bank, whichever is greater, as well as the acreage of such encroachment. To compensate for such encroachment, the project proponent shall enhance riparian habitat on-site within the 4.7 acre riparian set-back area at a 1:1 (loss:enhancement) ratio. A Riparian Enhancement Plan shall be developed by a qualified Plant or Restoration Ecologist in consultation with the USFWS and CDFG. A copy of the Enhancement Plan shall be provided to the City. At a minimum, the Plan shall include:

- A Planting Plan which provides the location of on-site Enhancement Areas within the 4.7 acre designated riparian buffer and the number, location, planting container size, and species of trees and shrubs to be utilized in the enhancement effort.
- A Maintenance Plan which provides details on irrigation, weed abatement and other maintenance activities to be conducted in the Enhancement Area(s) during the monitoring period.
- A Monitoring Plan which provides specific measurable performance and final success criteria, and the methods that will be used to monitor these criteria. Performance criteria shall be monitored on an annual basis for a minimum of five years. The Monitoring Plan

shall also include specific remedial actions to be taken should annual monitoring indicate that the Enhancement Area is not meeting the annual performance criteria during each annual monitoring period, or doesn't meet the final success criteria at the end of the minimum 5-year monitoring period. One of the remedial actions will include an extension of the monitoring period until the final success criteria are met.

Results of the annual monitoring effort and any remedial actions to be taken to rectify situations where the Enhancement is not meeting the annual performance criteria or final success criteria shall be provided to the City via an annual monitoring report. (LTS)

Implementation of Mitigation Measure BIO-2a and 2b would reduce significant impacts to the dispersal habitat for the California red-legged frog to a less-than-significant level.

Impact BIO-3: Grading and construction of the proposed project may result in harm or mortality to individual special-status animals including vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, California red-legged frog, western pond turtle, burrowing owl, American badger and San Joaquin kit fox. (S)

Grading and construction activities within wetlands could result in mortality to vernal pool fairy shrimp and vernal pool tadpole shrimp. Grading and construction activities within grasslands of the site and adjacent properties could result in harm or mortality to California tiger salamanders, to nesting/roosting burrowing owls which are known to be using burrows on the site, to American badgers if they are denning on the site, and/or to San Joaquin kit foxes that may be denning or foraging on the site. Grading and construction activities within or in the immediate vicinity of Sand Creek and the manmade detention channel could result in harm or mortality to California red-legged frogs and/or western pond turtles if they are present in these areas during these activities.

The following eight-part mitigation measure shall be implemented.

Mitigation Measure BIO-3a: The project sponsor shall consult with the USFWS and CDFG regarding impacts to federal and State listed species from the proposed project. The project sponsor shall obtain the appropriate take authorization (Section 7 Biological Opinion and/or 2081 permit) from the USFWS and CDFG prior to initiation of construction activities. The project sponsor shall comply with all terms of the endangered species permits including any mitigation requirements and provide proof of compliance to the City prior to issuance of a grading permit.

Mitigation Measure BIO-3b: Project grading shall only occur during the dry season (April 15 – October 30) and only after a qualified biologist has determined that all wetland areas of the site providing potential habitat for vernal pool crustaceans are dry, and individuals of these species, if present, would be in cyst form. Prior to filling these wetlands, the topsoil of all permanently impacted wetlands shall be salvaged and deposited in appropriate seasonal wetland habitats to be created on the Ralph mitigation property. Additionally, should pipeline installation on the Ginochio/Nunn parcel result in temporary impacts to wetlands on that site, prior to the installation, topsoils in areas of these wetlands to be impacted shall be salvaged and then redeposited in the wetlands of the site once pipeline installation is complete and these wetlands have been re-sculpted on the site pursuant to Mitigation Measure BIO-1c.

Mitigation Measure BIO-3c: California tiger salamanders that are in burrows or soil cracks on the project site would be impacted by ground disturbing activities. California tiger salamanders may also become trapped in trenches excavated during project construction. In order to minimize and avoid mortality of California tiger salamanders on the site, as well as in the vicinity of off-site impacts occurring on the Royal Formosa/Chen and Ginochio/Nunn parcels, the following measures shall be implemented:

- Prior to project-related ground disturbance activities occurring on-site or off-site, an employee training program for operators/contractors shall be conducted by a qualified biologist to explain the endangered species concerns at the project site and the measures being implemented to minimize and avoid mortality to the listed species.
- All project-related grading activities shall be conducted during the summer months after all potential breeding sites on and in the vicinity of the project site have dried and when California tiger salamanders are not be breeding or migrating.
- A qualified biologist shall be present at the locations of all on- and off-site project-related ground disturbance activities to monitor these activities and to salvage California tiger salamanders that may be unearthed during ground disturbing activities. Salvaged California tiger salamander may be turned over to CDFG personnel for relocation, or the relocation of the CTS may be handled by a 10(a)(1)(A) permitted biologist as approved and directed by the USFWS and CDFG. Terms of the salvage shall be established in consultation with USFWS and CDFG prior to initiation of construction activities.
- The sponsor shall develop and implement a plan to prevent salamanders from moving onto the construction areas during grading or construction activities and to monitor the site during construction. The plan shall be approved by the City, USFWS, and CDFG prior to the initiation of construction activities.
- Best Management Practices also shall be implemented to minimize the potential mortality, injury or other impacts to California tiger salamanders. Erosion control materials shall not include small-mesh plastic netting, which could result in entanglement within the material and death of California tiger salamanders. All trash items shall be removed from the project site to reduce the potential for attracting predators of California tiger salamanders, such as crows and ravens which could scavenge uncovered salamanders.

Mitigation Measure BIO-3d: California red-legged frogs are known to be present on-site within Sand Creek and may also occur from time to time in the manmade detention channel. To avoid harm or mortality to California red-legged frogs to the greatest extent practicable, the following measures shall be implemented:

- Any construction-related activity that occurs within either the manmade detention channel or the Sand Creek channel, or within 300 feet of the top of the bank of either of these features, including project-related activities occurring on the Royal Formosa/Chen and Ginochio/Nunn properties, shall only occur during the dry season (April 15 to October 30) when the frog would most likely have moved off-site to deeper pool habitats upstream of the site in Sand Creek.
- No more than 48 hours prior to such construction-related activities described above, a qualified biologist shall survey Sand Creek and the detention channel, including at least 100 feet upstream and downstream of the construction site to determine if frogs are present

and may be impacted by the activities.

- Prior to any ground disturbance occurring within 300 feet of Sand Creek or the manmade detention channel, an employee training program for operators/contractors shall be conducted by a qualified biologist to explain the endangered species concerns at the project site. This education/training program must include a discussion of the general protection measures to be implemented to protect the frog and minimize take, and a delineation of the limits of the work area.
- The project sponsor shall isolate the work area with suitable amphibian exclusion fencing that would block the movement of California red-legged frogs from entering the work area. This fence shall be installed prior to the time any site grading or other construction-related activities are implemented. The fence shall remain in place during site grading or other construction-related activities to prevent frogs from entering the project site work areas. Exclusion fencing shall consist of a 4-foot wall of ¼-inch mesh, galvanized wire (i.e., hardware cloth). Initially, staking would be installed along the route of the exclusion fencing in a 4-inch deep trench. Then, the bottom of the fence shall be firmly seated in the trench. The fencing above the ground shall be anchored to metal staking with wire. Finally, the top 10 inches or less shall be bent over in a semi-circle towards the outside of the fence to ensure that the fence cannot be climbed.
- A qualified biologist possessing the proper authorizations from USFWS and CDFG shall be on-site during all construction and grading activities occurring within 300 feet of Sand Creek or the detention channel to conduct daily inspections of the fencing and to ensure that stranded frogs are relocated back to the stream channel. The biological monitor shall be responsible for ensuring that the frog fencing is not compromised, and shall notify both the on-site contractor and supervisor when fencing needs to be repaired.
- All trash that might attract predators to the project site shall be properly contained and removed from the site and disposed of regularly. All construction debris and trash shall be removed from the site when construction activities are complete. All fueling and maintenance of equipment and vehicles, and staging areas shall be at least 75 feet from the top of the bank of Sand Creek or the detention channel. The construction personnel shall ensure that contamination of California red-legged frog habitat does not occur and shall have a plan to promptly address any accidental spills.

Mitigation Measure BIO-3e: Within 24 hours of ground disturbance occurring within the manmade detention channel or the Sand Creek channel on the project site, or within 50 feet of the top of the banks of either of these areas, a qualified biologist shall survey the work area for western pond turtles. If turtles are found within the work area, they shall be relocated to other suitable habitat at least 300 feet up- or down-stream from the work area by a qualified biologist with the appropriate approvals from CDFG shall conduct all the relocations.

Mitigation Measure BIO-3f: No burrowing owls or their nests shall be disturbed during the breeding season (February 1 through August 31). In the non-breeding season (September 1 to January 31), or at such time as all young owls have been determined by a qualified biologist to have fledged and be foraging independently, owls may be passively evicted from the project site's development area by a qualified biologist. Passive eviction methods shall be implemented pursuant to CDFG guidelines, and all eviction activities shall be coordinated with the CDFG

prior to disturbance of active burrows. Once owls are evicted from the site, a qualified biologist shall develop a plan for management and on-going biological monitoring of the site to be implemented by the project sponsor to preclude owls from becoming re-established on the site.

If construction or ground disturbance activities commence on the site prior to a passive eviction of owls, the CDFG shall be notified and a qualified biologist shall implement a routine monitoring program and establish a fenced exclusion zone around each occupied burrow in which no construction-related activity shall occur until the burrows are confirmed to be unoccupied. No disturbance shall occur within 160 feet (50 meters) of an occupied burrow during the non-breeding season (September 1 through January 31) and within 250 feet (75 meters) of an occupied burrow during the breeding season (February 1 through August 31).

Mitigation Measure BIO-3g: To avoid harm or mortality to American badgers, a qualified biologist shall survey the site for denning badgers on the project site, and in areas of off-site temporary or permanent project impacts. This survey may be conducted at the same time that surveys for denning kit foxes are conducted (see *Mitigation Measure BIO-3h* below). If potential badger dens are found, they shall be monitored by the biologist to determine their status. If an active badger den is identified during pre-construction surveys within or immediately adjacent to the construction envelope, a no disturbance buffer zone consisting of a 300-foot circumference around the den (or distance specified by the CDFG) shall be established. Because badgers are known to use multiple burrows in a breeding burrow complex, a biological monitor shall be present on-site during construction activities to ensure the buffer is adequate to avoid direct impact to individuals or den abandonment. The monitor shall remain on-site until it is determined that young are of an independent age and construction activities would not harm individual badgers.

Mitigation Measure BIO-3h: Pre-construction surveys for kit fox dens shall be conducted no more than 30 days prior to any construction-related activities. A qualified biologist shall conduct pre-construction kit fox surveys on the project site, and in areas of off-site temporary or permanent project impacts. The primary objective is to identify kit fox habitat features (potential dens and refugia) on the project site and evaluate use by kit fox. If an active kit fox den is detected within (or immediately adjacent to) the area of work, the USFWS shall be contacted immediately to determine the best course of action. The project sponsor will implement all measures specified by the USFWS and CDFG in the Biological Opinion and 2081 permit. All potential dens shall be monitored prior to destruction according to the terms of the *Standardized Recommendations for Protection of the Kit Fox Prior to or During Ground Disturbance* (USFWS 1999). If no kit fox activity is detected during den monitoring and destruction then a written report shall be submitted to the USFWS within five days following completion of the surveys.

The project sponsor shall follow the *Standardized Recommendations for Protection of the Kit Fox Prior to or During Ground Disturbance* developed by the U.S. Fish and Wildlife Service (1999).[105] The recommendations include the following:

[105] USFWS. 1999. Standardized Recommendations for Protecting Kit Fox Prior to or During Ground Disturbance Activities.

- Preconstruction surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the San Joaquin kit fox.
- All construction-related activities shall be preceded by a tail-gate session, the primary purpose of which is to describe the importance of implementing construction related activities that would minimize potential construction related impacts to kit foxes.
- Project-related vehicles shall observe a 20-mph speed limit in all project areas, except on city or county roads; this is particularly important at night when kit foxes are most active. To the extent possible, night-time construction and traffic should be avoided. Off-road traffic outside of designated project areas should be prohibited.
- To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of the project, all excavated, steep-walled holes or trenches more than 2-feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. In addition, these structures shall be thoroughly inspected by properly trained construction personnel each morning for kit fox or other species. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals.
- All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected by properly trained construction personnel for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in anyway. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity.
- All food related trash items such as wrappers, cans, bottles, food scraps shall be disposed of in a closed container and removed at least once a week from a construction or project site and signs shall be placed at the construction site that prohibit feeding wildlife.
- No firearms shall be allowed on the project site.
- To prevent harassment, mortality of kit foxes or destruction of dens by dogs or cats, pets shall not be permitted on project sites.
- Use of rodenticides and herbicides in project areas shall be restricted.
- A representative shall be appointed by the project sponsor who would be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped individual (the representative's name and address shall be provided to the USFWS).
- Upon completion of the project, all areas subject to temporary ground disturbance, including storage and staging areas, temporary roads, pipeline corridors, etc., shall be re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions.
- In the case of trapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape, or the USFWS should be contacted for advice.
- Any contractor, employee(s), or agency personnel who inadvertently kills or injures a San

Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045.

- The Sacramento Field Office of the USFWS and CDFG shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal and any other pertinent information. (LTS)

Implementation of Mitigation Measures BIO-3a and -3b would reduce potential impacts to individual vernal pool crustaceans inhabiting on-site wetlands to a less-than-significant level. Although California tiger salamanders inhabiting uplands of the site and areas of off-site project related activities may still be harmed or killed as a result of project activities even with monitoring, implementation of Mitigation Measure BIO-3c would minimize this impact to a less-than-significant level. Implementation of Mitigation Measure BIO-3d, BIO-3e, BIO-3f, BIO-3g, and BIO-3h would reduce potential impacts to individual California red-legged frogs, western pond turtles, on-site burrowing owls, risk of harm or death to American badgers, and risk of harm or death to San Joaquin kit foxes to less-than-significant levels, respectively.

<u>Impact BIO-4</u>: Grading and construction of the proposed project may result in the destruction or abandonment of special-status bird nests including golden eagle, Swainson's hawk, white-tailed kite, northern harrier, loggerhead shrike, and tricolored blackbird. (S)

Although no stick nests were observed during the February 2007 site visit, riparian trees and shrubs occurring along Sand Creek, and oak trees occurring in the southern portion of the site, provide potential nesting habitat for several special-status bird species including the golden eagle, Swainson's hawk, white-tailed kite, and loggerhead shrike. While riparian vegetation would be preserved along Sand Creek within the riparian buffer zone, and trees occurring south of Sand Creek would be preserved in open space, project construction activities occurring in the vicinity of these areas, such as the construction of the detention basins adjacent to the riparian buffer zone, could result in disturbance that causes nest abandonment for these species. Additionally, grading and construction activities would result in the destruction of grasslands that provide potential nesting habitat for the California horned lark, and of cattail stands within the manmade detention channel that provide potential nesting habitat for the tricolored blackbird.

<u>Mitigation Measure BIO-4a</u>: A qualified biologist shall conduct a pre-construction survey for nesting special-status raptors and loggerhead shrikes within 30 days prior to the commencement of tree trimming, site preparation, or construction related activities on the project site or at off-site project areas. The survey shall include all impacted areas within 250 feet of riparian vegetation along Sand Creek or within 250 feet of trees occurring in the area south of the creek, if this disturbance is to occur during the breeding season (February 1 to August 31). If nesting birds are detected, an appropriate fenced construction buffer shall be established around the nest. The actual size of the buffer shall be determined by the biologist in consultation with CDFG and would depend on the species, topography, and type of construction activity that would occur in the vicinity of the nest. The fenced construction buffers shall be monitored weekly by the biologist and shall remain in effect until the young have fledged the nest and are foraging independently or the nest is no longer active. No construction activity, staging, or

parking shall be allowed with the buffer zones until the young have fledged from the nest and are foraging independently or the nest is no longer active. Preconstruction surveys shall be repeated at 30 day intervals until construction activities are initiated.

Mitigation Measure BIO-4b: A qualified biologist shall conduct pre-construction surveys for nesting tricolored blackbirds within the manmade detention channel within 30 days prior to the commencement of any activities occurring within or within 100 feet of the detention channel or within the grasslands of the site, if this disturbance would occur during the passerine (songbird) breeding season, March 1 to August 31. If nesting tricolored blackbirds are detected, an appropriate fenced construction buffer shall be established around the nest. The actual size of the buffer shall be determined by the biologist in consultation with CDFG depending on the species, topography, and type of construction activity that would occur in the vicinity of the nest. The fenced construction buffers shall be monitored weekly by the biologist and shall remain in effect until the young have fledged the nest and are foraging independently or the nest is no longer active. Preconstruction surveys shall be repeated at 30-day intervals until construction activities are initiated.

Mitigation Measure BIO-4c: A qualified biologist shall conduct pre-construction surveys for nesting northern harriers, and nesting or roosting burrowing owls, 30 days prior to the commencement of ground disturbance activities in all grassland habitats occurring within 250 feet of such disturbance. If nesting birds are detected, an appropriate fenced construction buffer shall be established around the nest. The actual size of the buffer shall be determined by the biologist in consultation with CDFG and would depend on the species, topography, and type of construction activity that would occur in the vicinity of the nest. The fenced construction buffers shall be monitored weekly by the biologist and shall remain in effect until the young have fledged the nest and are foraging independently or the nest is no longer active. No construction activity, staging, or parking shall be allowed with the buffer zones until the young have fledged from the nest and are foraging independently or the nest is no longer active. Preconstruction surveys shall be repeated at 30 day intervals until construction activities are initiated. If roosting burrowing owls occur on the site outside the raptor breeding season (i.e. outside of the period from February 1 to August 31), the project proponent may proceed with a passive eviction as discussed in Mitigation Measure BIO-3f.

Mitigation Measure BIO-4d: The project sponsor shall consult with the CDFG regarding impacts to Swainson's hawk from the proposed project. The project sponsor shall obtain the appropriate take authorization (2081 permit) from the CDFG prior to initiation of construction activities. The project sponsor shall comply with all terms of the endangered species permits including any mitigation requirements and provide proof of compliance to the City prior to issuance of a grading permit. Implementation of Mitigation Measures BIO-4a, 4b, 4c, and 4d would reduce impacts as a result of destruction or abandonment of special-status bird nests to a less-than-significant level. (LTS)

Impact BIO-5: Grading and construction of the proposed project would result in fill being placed within jurisdictional waters of the U.S. and State. (S)

A summary of impacts to jurisdictional waters of the U.S. and State is provided in Table IV.I-5 below.

Table IV.I-5: Summary of Acreages of Project Impacts to Waters of the U.S. and State

	Seasonal Wetlands	Other Waters	Sand Creek[a]	Manmade Detention Channel[b]	Total
Waters of the U.S.	0.09	0.05	< 0.03	0.00	0.17
Waters of the State	0.32	0.05	< 0.03	0.00	0.40
CDFG Jurisdictional Waters	0.00	0.00	< 0.03	0.00	0.03

[a] This is an estimate and assumes that the two outfalls to be constructed within the Sand Creek channel would be placed below the OHWM. If placed above OHWM, they would not impact waters under jurisdiction of USACE and RWQCB, but would still impact riparian areas under CDFG jurisdiction.

[b] The manmade detention channel has been formally disclaimed by USACE and is also expected to be disclaimed by RWQCB as a manmade feature created in upland habitat.

Project grading and construction on the north side of Sand Creek would result in the filling of approximately 0.09 acres of seasonal wetlands and 0.05 acres of other waters that have been claimed as jurisdictional Waters of the U.S. by USACE (totaling 0.14 acres).

The 0.14 acres claimed by USACE, along with another 0.23 acres of isolated wetlands not claimed by USACE, would be considered jurisdictional Waters of the State by the RWQCB (totaling 0.37 acres).

The 0.86-acre detention channel that would be filled has been disclaimed as jurisdictional by USACE and is also expected to be disclaimed by the RWQCB as a manmade feature that was constructed in upland habitat.

The channel of Sand Creek would be considered jurisdictional Waters of the U.S. and State to the extent of the Ordinary High Water mark (OHWM) on opposing banks. The creek would also be considered jurisdictional by CDFG to the top of the bank or the dripline of riparian vegetation, whichever is greater. Installation of the two outfalls on the northern bank of the Sand Creek channel would impact areas of the creek under the jurisdiction of CDFG. The outfalls would also impact areas under the jurisdiction of the USACE and RWQCB if installed below the OHWM. However, the extent of the potential impact to jurisdictional waters within the creek channel would be minimal, estimated at approximately 0.03 acres.

> Mitigation Measure BIO-5a: To mitigate for the loss of 0.17 acres of jurisdictional Waters of the U.S., 0.40 acres of jurisdictional Waters of the State, and approximately 0.03 acres of riparian areas under CDFG jurisdiction on the project site, the project sponsor shall preserve approximately 0.61 acres of jurisdictional tributary waters within the Sand Creek channel on-site, as well as preserve and create jurisdictional seasonal wetland habitat off-site on the 166.6-acre Ralph mitigation property. Although no formal delineation has been conducted on the Ralph property, it is estimated that the site supports approximately 30 acres of combined vernal pool, seasonal wetland channel, and seasonal alkali wetland habitats that would be preserved in perpetuity on the site. Additionally, the project sponsor shall create 0.91 acres of seasonal wetland habitat on the Ralph site to mitigate at a 1:2.8 (loss:creation) ratio the loss of 0.32 acres of seasonal wetland habitat on the project site.
>
> Mitigation Measure BIO-5b: Prior to issuing a grading permit, the project sponsor shall obtain the appropriate State and federal permits authorizing the fill of wetlands that are waters of the State and U.S. The project sponsor shall provide proof to the City of compliance with the terms

and conditions of the permits, including all mitigation requirements, prior to issuance of the grading permit. (LTS)

The preservation of 0.61 acres of jurisdictional tributary waters on-site, along with the preservation of approximately 30 acres of wetland habitats and creation of 0.91 acres of wetland habitat off-site on the Ralph property would mitigate the loss of seasonal wetlands and other jurisdictional waters on the project site to a less-than-significant level.

Impact BIO-6: Grading and construction activities associated with the project could harm or disturb other nesting birds or destroy their nests. (S)

All native resident and migratory birds are protected by the Migratory Bird Treaty Act of 1918 (Act; 16 U.S.C. 703-712), which makes it illegal to intentionally take, harm, or harass any migratory bird or their eggs, except under the authority of an appropriate permit. Many common resident and migratory birds may potentially nest in on-site habitats such as within riparian trees and shrubs along Sand Creek, trees occurring south of Sand Creek, grasslands of the site, and the cattail stands occurring within the manmade detention channel. Grading and construction activities during the breeding season would impact those species that are nesting on the site.

Mitigation Measure BIO-6: If grading or construction begins within the breeding season for passerines (songbirds) and other common bird species (March – August), a qualified biologist shall conduct surveys of the grassland, ruderal and riparian habitats on-site and in all off-site impact areas to identify any bird species that are nesting in these areas. These surveys shall be carried out no sooner than two weeks prior to the start of construction. Impacts to active nests shall be avoided by establishing a fenced exclusion zone around all active nests, within which construction-related activities shall be prohibited until nestling birds have been determined to have fledged and be foraging independently or the until the nest is no longer active. Preconstruction surveys shall be repeated at 30-day intervals until construction activities are initiated. (LTS)

Implementation of Mitigation Measure BIO-6 would reduce impacts to resident and migratory breeding birds to a less-than-significant level.

Impact BIO-7: Grading and construction activities on the Aera Energy parcel associated with the installation of the sewer pipeline would result in a loss of trees covered by the City of Antioch's tree ordinance. (S)

Several trees, including a large blue gum (*Eucalyptus globulus*), occur along the southern and eastern boundaries of the Aera Energy property that would be considered either "mature" or "established trees" under the City's tree ordinance. Some of these trees occur within the footprint of the proposed sewer pipeline alignment.

Mitigation Measure BIO-7: A formal tree survey shall be conducted by a qualified arborist or botanist to determine the sizes, locations and species of all trees that would be impacted by the pipeline installation.

Trees covered under the tree ordinance that would be removed as a result of pipeline

construction shall be replaced at a 3:1 mitigation to loss ratio for "mature trees" and at a 2:1 mitigation to loss ratio for "established trees" to offset the temporal loss of these mature trees on the site. All mitigation trees shall consist of native trees indigenous to the region. Trees planted as mitigation can be incorporated into the landscape plans and/or the Riparian Enhancement Plan for the project site. (LTS)

Implementation of Mitigation Measure BIO-7 would reduce impacts to protected trees to a less-than-significant level.

J. PUBLIC SERVICES

This section analyzes the proposed project's potential impacts to public services, including police services, fire and emergency services, parks and recreation, and libraries. School services are not evaluated as the proposed project is not anticipated to utilize these services due to the age restricted composition of project residents. Potential impacts to public services that could result from the proposed project are identified, and mitigation measures are recommended, as appropriate.

1. Setting

This section discusses the existing conditions, including service locations, capacities, and expansion possibilities related to police, fire and emergency, parks and recreation, and library services. The information presented here was gathered from a variety of sources, including direct communication with the agencies and organizations that administer or provide each service.

a. Police Services. The Antioch Police Department (APD) provides crime prevention and law enforcement services within the City's boundaries and maintains a mutual aid agreement with the Contra Costa County Sheriff's Department. The APD headquarters is located at 300 "L" Street, within the Rivertown area, and is less than 6 miles from the project site. A police service center is planned for development within the Prewett Community Park, located less than 1 mile north of the project site. This police service center is expected for completion in approximately 2011. The APD maintains a combination of professional sworn officers and non-sworn positions, along with volunteer positions. Currently, APD is staffed by 125 sworn and 20 non-sworn personnel with 37 active volunteers.[1]

The APD service area is divided into six beats. The project site is located within Beat 6, which encompasses the area south of Highway 4 and east of Deer Valley Road to the southern and eastern City limits. One to two officers are assigned to this beat and conduct regular patrols as call volume and staffing permits. Common law enforcement issues within this beat are generally related to auto theft and residential burglaries.[2]

In 2007, APD received 81,420 calls for service city-wide and approximately 15,271 (19 percent) of those calls were located within the service area of Beat 6. In the year 2007, the average response time for Priority 1 calls within Beat 6 was 8 minutes and 28 seconds from the time the call was received to officer arrival. The city-wide response time for Priority 1 calls during the same year was 7 minutes and 22 seconds.[3] Priority 1 calls consist of crimes in progress or life-threatening situations. Priority 2 calls are those calls that demand immediate attention to prevent the escalation to a Priority 1 situation. The average response time for Priority 2 calls within Beat 6 for the year 2007 was 18 minutes and 24 seconds. The average response time in the same year for Priority 3 calls within Beat 6 was 46 minutes and 35 seconds.[4] Priority 3 calls are those calls that do not require immediate response and can be dealt with as soon as practical.

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[1] Vanderklugt, John, 2008. Lieutenant, City of Antioch Police Department. Written communication with LSA Associates, Inc. April 8.

[2] Antioch, City of, Police Department, 2006. October 2006 Crime Maps. http://www.ci.antioch.ca.us/CityGov/Police/crime-maps/crime-maps.htm.

[3] Vanderklugt, John, 2008 op.

[4] Ibid.

b. Fire and Emergency Services. This section describes existing fire services provided within the City of Antioch, including staffing and facilities and estimated response times.

(1) Services, Staffing, and Facilities. The Contra Costa County Fire Protection District (CCCFPD) provides fire and emergency services to residents of the City as well as to adjacent unincorporated areas, including fire fighting and rescue, fire prevention and training, and emergency medical care. CCCFPD maintains mutual-aid agreements with the East Contra Costa Fire Protection District (ECCFPD), East Bay Regional Park District, and California Department of Forestry. CCCFPD is currently budgeted for a staffing level of 406 fire fighters, including 12 Battalion Chiefs, and approximately 62 civilian personnel.[5] However, there is currently a vacancy of approximately 30 firefighter positions. A minimum of 90 firefighters are on duty at any given time at the 30 engine companies within the service area. Rescue and advanced life support services are delivered through a combined response from CCCFPD and American Medical Response (AMR) ambulance service. All engine companies are staffed with paramedic services.

CCCFPD headquarters are located in Pleasant Hill and the district operates five fire stations within the City of Antioch, each with a minimum of three personnel per engine company on duty at all times. Four of these stations provide service to the project site. Station 88 is nearest to the project site, approximately 3.3 miles to the north at 4288 Folsom Drive and serves as the primary response station to the project area. The station is equipped with a Type 1 Engine Company, a Type 4 Wild Land Unit, and a Breathing Support Unit. The secondary response station to the project site is Station 82, located at 196 Bluerock Drive approximately 4.3 miles northwest of the project site. This station is equipped with a Type 1 Engine Company, a Type 3 Wild Land Unit, and a Mass Casualty Trailer Unit. Additional response for a full alarm fire at the project site would be provided by ECCFPD Fire Station 52 in Brentwood, and CCCFPD Station 81 and Station 83, in Antioch.[6]

In addition, as development within the Sand Creek Focus Area increases, the CCCFPD plans to construct a new fire station within the area near the corner of Deer Valley Road and the extension of Sand Creek Road. The CCCFPD levies a fire protection fee on new development to pay for the construction of new fire stations. In Antioch, this fee is currently set at $591 per residential unit.

(2) Response Times. Based on nationally recognized standards, CCCFPD strives to maintain an emergency response time goal of 8 minutes from the time a call is received, 90 percent of the time. CCCFPD's ability to meet this emergency response time is influenced by the number of emergencies within each fire station's district. As the number of calls increase within each district, the potential for two or more emergencies to occur simultaneously also increases. The overlap of calls, when they occur, can require that a backup station be dispatched in emergencies, resulting in response times greater than the 8 minute standard. Currently, the average response time to the project site from Station 88 is approximately 6½ to 7½ minutes. The average response time from Station 82 is

[5] Keith Richter, Fire Chief, Contra Costa County Fire Protection District, 2007. Personal communication with LSA Associates, Inc., July 12.

[6] Hardage, Ian, 2006. Fire Prevention Technician, Contra Costa County Fire Protection District. Written communication with the City of Antioch. August 7.

approximately 8½ to 9½ minutes. Response times from the remaining three stations range from 10½ to 17 minutes.[7]

The current Insurance Service Office (ISO) rating for the CCCFPD is Class 3 (1 being the highest and 10 being the lowest). The Insurance Service Office is a private organization that surveys fire departments in cities and towns across the United States. This rating considers a community's fire defense capacity versus fire potential, and then uses the score to set property insurance premiums for homeowners and commercial property owners.

c. Parks and Recreation. The City owns and administers 28 neighborhood and community parks, comprising over 300 acres of parkland. The East Bay Regional Park District (EBRPD) operates three regional facilities in the Antioch area. Antioch's Department of Leisure also organizes recreational leisure activities, sports schedules, and senior programs for the City. Parks and recreational services within the City are described below.

(1) Neighborhood and Community Parks. Parks nearest the project site include Chaparral neighborhood park immediately to the north, and 99-acre Prewett Family community park, located less than 1 mile northwest of the project site. The approximately five-acre Chaparral Park includes picnic facilities, sports fields and courts, a tot lot, trails, and open lawn areas. Prewett Family Park has a network of five pools and five water slides open seasonally, an instructional/lap swimming pool open year-round, multi-use rooms available for rent, a preschool offering various classes, two sand volleyball courts and a skate park. The Prewett Park Master Plan was recently updated and includes several new planned facilities, including a community center.

In addition, a seasonal Sports Complex is planned southwest of the project site within the existing Contra Costa County Flood Control and Water Conservation District Sand Creek flood control basin. The Sports Complex would include several adult and youth soccer fields, two ball fields, and a volleyball area within the inundation area. Permanent park amenities located outside of the basin would include a children's play area and basketball and tennis courts.

(2) Regional Parks. Contra Loma Regional Park and Black Diamond Mines Regional Preserve are located approximately 3.5 miles northwest and 5 miles west, respectively, of the project site. The 775-acre Contra Loma Regional Park surrounds the Contra Loma Reservoir, and offers multiple-use trails for hiking, biking, and horseback riding. The reservoir is available for fishing, boating, sailboating, and swimming. The park also provides picnic areas, horseshoe pits, and a food concession stand. Black Diamond Mines Regional Preserve includes 5,386 acres of open space and is the largest EBRPD facility in the Antioch area. Access to the open space area is provided by multiple use trails. The Preserve offers naturalist programs as well as underground tours of the mining museum. Picnic areas and horse staging areas are also available.

(3) Recreational Programs. Senior services in Antioch include recreation, social, information, and specialized service programs. Recreation activities include billiards, bingo, bowling, bridge, cribbage, golf, and pinochle. Social activities consist of trips and potluck gatherings. Classes are given in arts and crafts, computers, dance, exercise, music, Tai Chi, and quilting. Informational

[7] Ibid.

seminars are held on health and financial topics. Special senior services include blood pressure checks, driving, flu clinics, and health insurance. The City's Senior Citizens Center is located at 2nd and E Street, approximately 5.5 miles northwest of the project site.

d. Libraries. Library services in Antioch are provided by Contra Costa County. The Antioch Library is located at 501 West 18th Street and is approximately 7 miles northwest of the project site. Library services include programs for kids, teens, and adults. The recently remodeled 11,000 square foot library houses a large collection of materials including books, DVDs, and audio books. Free internet access is also provided. A new library facility is also planned as part of the current Prewett Park Community Center Project, approximately 1 mile north of the project site.

2. Antioch General Plan

The Growth Management and Public Services and Facilities Elements of the General Plan provide performance objectives and standards related to the proposed project, as listed below.

Growth Management Element

- *Fire Protection Facilities Performance Objective 3.5.2.1:* Maintain competent and efficient fire prevention and emergency fire, medical, and hazardous materials response services with first responder capability in order to minimize risks to life and property.
    - *Fire Protection Facilities Performance Standard 3.5.2.2:* Prior to approval of discretionary development projects, require written verification from the Contra Costa County Fire Protection District that a five minute response time (including three minute running time) can be maintained for 80 percent of emergency fire, medical, and hazardous materials calls on a citywide response area basis.
- *Police Services Performance Objective 3.5.3.1:* Maintain an active police force, while developing programs and police facilities that are designed to enhance public safety and protect the citizens of Antioch by providing an average response time to emergency calls of between seven and eight minutes from the time the call is received to the time an officer arrives.
    - *Police Services Performance Standard 3.5.3.2:* Maintain a force level within a range of 1.2 to 1.5 officers, including community service officers assigned to community policing and prisoner custody details, per 1,000 population. The ratio of community service officers assigned to community policing and prisoner custody details to sworn officers shall not exceed 20 percent of the total number of sworn officers.
- *Parks and Recreational Facilities Performance Objective 3.5.7.1:* A system of park, recreational, and open space lands of sufficient size and in the appropriate locations, including provision of a range of recreational facilities, to serve the needs of Antioch residents of all ages.
    - *Parks and Recreational Facilities Performance Standard 3.5.7.2:* Provide five acres of improved public and/or private neighborhood parks and public community parkland per 1,000 population, including appropriate recreational facilities.

Public Services and Facilities Element

- *Parks and Recreation Objective 8.9.1:* Maintain a system of parks, specialized recreational facilities, and natural open spaces of sufficient size and variety and in the appropriate locations to serve the needs of Antioch residents of all ages.
    - *Parks and Recreation Policy 8.9.2c:* Maintain a minimum size for neighborhood parks of five acres or more, unless there is a specific need for a smaller facility.
    - *Parks and Recreation Policy 8.9.2g:* Encourage the preservation of significant natural features and development of landscaped parkways and trail systems in new developments in addition to required park development.
    - *Parks and Recreation Policy 8.9.2h:* Work with Contra Costa County to establish joint use flood control/recreational facilities, including multi-use trails and open space along channels and creeks, and within detention basins.

- *Parks and Recreation Policy 8.9.2m:* Locate new park facilities so that they are highly visible from adjacent streets and neighborhoods to increase safety and enhance visual quality.
- *Parks and Recreation Policy 8.9.2n:* Require the provision of private play space for children in small lot single family subdivisions and attached residential developments.
- *Parks and Recreation Policy 8.9.2p:* Establish limitations on the amount of private recreational facilities (e.g., swimming pools, tennis courts, and private parks) that can be substituted for public park dedication of payment of fees. Base such limitations on the extent of public access to the facilities and the extent to which such private facilities might serve public recreation needs.

- *Fire Protection Objective 8.10.1:* Provision of an adequate number of fire stations, along with fire fighting personnel and equipment to protect Antioch residents and businesses.
  - *Fire Protection Policy 8.10.2a:* Work with the Contra Costa County Fire Protection District to provide high quality fire protection services to area residents and businesses. The City's role should include, but not be limited to:
    - Determining the appropriateness of station location sites;
    - Enforcement of building codes to reduce fire hazards;
    - Collection of mitigation fees established by the fire district to construct needed additional stations within the Antioch Planning Area;
    - Support the District in providing funding for personnel costs to staff stations within the City;
    - Support the District in establishing fees that are adequate to mitigate the impacts of new development and income to support operation of new stations whose construction is financed with development fees; and
    - Requiring reasonable reservation of appropriate sites for new fire stations as part of new development.
  - *Fire Protection Policy 8.10.2d:* Involve the Fire Protection District in the development review process by referring development requests to the Fire District for review and comment.

- *Police Services Objective 8.11.1:* Reduce the risk of crime and provide security to Antioch residents and businesses through maintenance of an adequate force of police personnel, physical planning strategies, and a high level of public awareness and support for crime prevention.
  - *Police Services Policy 8.11.2b:* Provide sufficient facilities and staffing to ensure the safety of the citizens of Antioch by:
    - Providing expedient response to emergency calls.
    - Maintaining an efficient well-trained and adequately equipped force of police personnel.
    - Providing neighborhood watch and crime prevention programs, and attempting to improve the participation of individual neighborhoods and businesses.
    - Continuing to provide a variety of programs within the Police Department (e.g., traffic crime prevention, REACH, narcotics, investigations) to meet the needs of an active community.
  - *Police Services Policy 8.11.2c:* Provide basic requirements and incentives for the provision of design features in new development to reduce the potential for crime.
    - Provide well-lighted and visible streets and street names, entrances, addresses, recreation areas, and parking areas.
    - Limit access into and between buildings to reduce escape routes and undetected entry is made difficult.
    - Provide landscaping which permits surveillance of open areas and entryways, and does not create places for concealment.
  - *Police Services Policy 8.11.2d:* Involve the Antioch Police Department in the development review process by referring development requests to the Police Department for review and comment.
  - *Police Services Policy 8.11.2e:* Promote community involvement in crime prevention.

        - Promote the establishment and operation of neighborhood watch, park watch, and business watch programs.

- *Financing Expansion of Public Services and Facilities Objective 8.13.1:* Ensure that the expansion of public facilities occurs in an equitable manner such that new development pays for all of the infrastructure and public facilities required to support the development without impacting levels of service provided to existing residents and businesses.
    - *Financing Expansion of Public Services and Facilities Policy 8.13.2a:* Place the ultimate responsibility on the sponsor of proposed development projects for ensuring that the services and facilities needed to support the project and maintains applicable performance standards in the Growth Management Element are available at the time they are needed.
    - *Financing Expansion of Public Services and Facilities Policy 8.13.2b:* Require that new development:
        - Participate in a land-based financing district, construct, and/or pay for the new onsite capital improvements required to meet the applicable performance standards of the Growth Management Element;
        - Be phased so as to ensure the services and capital facilities used by the new development meet the applicable performance standards of the Growth Management Element;
        - Ensure that, in the event public services or off-site capital facilities do not meet the applicable performance standards of the Growth Management Element prior to approval of the project, the level of service provided to existing development will not be further impacted by new development.
    - *Financing Expansion of Public Services and Facilities Policy 8.13.2d:* Where permitted by law, require that special assessments for single-family residential development be paid off at the time of the initial sale of homes to individuals.
    - *Financing Expansion of Public Services and Facilities Policy 8.13.2e:* Continue to apply existing policies and regulations precluding City financial assistance for any on-site capital improvements required by new development.
    - *Financing Expansion of Public Services and Facilities Policy 8.13.2f:* As part of new development proposals, determine whether any service level deficiencies might result, and place needed conditions on the proposed development to ensure that:
        - Service level standards will continue to be met, and
        - New development will not result in any substantial short- or long-term reduction in the level of municipal services provided by the City to existing developed areas.

3. Impacts and Mitigation Measures

This section discusses potential impacts to public services that could result from implementation of the proposed project. The section begins with the criteria of significance, which establish the thresholds used to determine whether an impact is significant. The latter part of this section presents the impacts associated with the proposed project and identifies mitigation measures, as appropriate. Less-than-significant impacts to public services are listed first, followed by significant impacts.

a. Criteria of Significance. The proposed project would have a significant impact on public services if it would:

- Result in substantial adverse physical impacts associated with the provision of or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire and police protection, libraries, or other public facilities;
- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated;

- Create a shortage of parks facilities for new residents, because total park acreage does not meet the General Plan performance standard of 5 acres of improved public and/or private neighborhood parks and public community parkland per 1,000 persons; or
- Require the construction or expansion of off-site recreational facilities that might have an adverse physical effect on the environment.

b. Less-than-Significant Public Services Impacts. The proposed project would result in the following less-than-significant impacts to public services.

(1) Police Services. The proposed project would create a small increase in the demand for police services within Beat 6. Most Priority 1 calls are anticipated to be medically-related due to the age of project residents. Remaining calls are anticipated to be for general services such as lock-outs and checks on resident welfare. Although the number of residents that the project would add is within the anticipated range for Antioch's population growth, the increased demand would require approximately one additional police officer to be hired and assigned to Beat 6. Police services and staffing ratios go through an annual budgeting process during which citywide priorities are established and service levels monitored, allowing adjustments where needed. Funding for the additional officer would be obtained from the General Fund,[8] almost 50 percent of which is delegated to police services. Additional officers needed to meet the Police Department's desired staffing level would be accommodated by existing facilities. With the additional police officer, the proposed project would not cause the current average 8-minute Priority 1 response time to be exceeded.[9] In addition, the planned police service center to be located within Prewett Community Park would improve response times to the project site and provide increased police coverage within the southern portion of the City. The proposed project itself would not require new police facilities and would have a less-than-significant impact on police services in Antioch.

(2) Fire Protection. The proposed project would result in an increased demand for fire protection and emergency medical services to accommodate the proposed residential development. As discussed above, the current average response time to the project site from Station 88 is approximately 6½ to 7½ minutes, which is within the National standard of 8 minutes 80 percent of the time, but does not meet the City's General Plan standard of 5 minutes 90 percent of the time. Also, a full alarm fire at the project site, requiring response from all five fire stations currently exceeds the 8-minute response time by 1 to 10 minutes. The proposed project would place an additional demand on CCCFPD services and contribute to response times within southeast Antioch that would not meet established national or local standards.

However, as development occurs within the Sand Creek Focus Area, the CCCFPD plans to construct a new fire station to serve the area. Construction of a new fire station is required to maintain acceptable response times within this area of the City. Development of the project site with up to 535 residential units would exacerbate the need for this new fire station. As discussed above, the CCCFPD levies a fire protection fee on new development to pay for the construction of new fire stations. The project applicant would be required to pay $591 per residential unit, or approximately $316,185 for development of 535 residential units on the project site. This fee would provide the

[8] Cantando, Allan, 2006. Captain, Support Services Division, City of Antioch Police Department. Written communication with LSA Associates, Inc. November 28.

[9] Ibid.

project's pro-rata fair share towards the construction of the new fire station. Once this fire station is constructed, the CCCFPD would be able to maintain adequate response times to the project site; however the anticipated dates of construction and operation of this station are unknown at this time. The proposed project itself would not require new fire facilities, and with the payment of the required fees, would have a less-than-significant impact on fire services within the City.

(3) Parks and Recreation. Development of the proposed project would result in the construction of up to 535 residential units. Each lot would have a private backyard and front landscaped area, which would be maintained by each individual homeowner. The proposed project would also provide approximately 12 acres of public parks and lawn area and a 4.8-acre area for multiple recreational facilities for on-site residents.

The 12 acres of parkland and lawn area include an approximately 2.5-acre extension of Chaparral Park southward onto the site, a linear greenway utilizing the PG&E easement that bisects the site, and a 0.72-acre park to the west of the linear greenway. The greenway would link Chaparral Park with the open space area and the proposed segment of the Sand Creek regional trail, which would provide a connection to the planned Sports Complex to the south as well as the internal park and recreational facilities on the site. The 4.8-acre on-site recreational area would include an 18,600 square foot facility, tennis courts, a fitness pool, fitness center, lounge, pool and spa, lifelong learning center, billiards area, outdoor entertaining areas, and meeting and multi-purpose rooms. These facilities would be available to residents and their guests and open to the public on a fee basis.

The Antioch General Plan sets a standard of 5 acres of improved public and/or private neighborhood parks and public community parkland including appropriate recreational facilities per 1,000 persons. With over 300 acres of parkland, the City averages approximately 3 acres of parkland per 1,000 residents,[10] below the Antioch General Plan standard. Based on an average household size of 1.6 persons per active adult household,[11] the proposed project would increase the City's population by approximately 856 residents, or less than one percent. However, the proposed project would add 12 acres of public parkland to the City's current supply and would receive a park fee credit for the on-site private recreational facilities. The additional residential population and parkland located on the project site would not substantially increase or decrease the current parkland/population ratio. The proposed project itself would exceed the required 5 acres of parkland per 1,000 residents within the project site.

Residents of the proposed project would be expected to make some use of community and regional parks in the areas surrounding the project site. However, this increase in usage would not be such that physical deterioration of existing facilities would occur or be accelerated, given the abundance and proximity of intensive on-site recreational facilities tailored specifically for active-adult project residents.

(4) Libraries. As discussed above, the proposed project would add approximately 856 new residents to southeast Antioch, thereby increasing demand for library services. However, the demand

[10] Association of Bay Area Governments, 2006. *Projections 2007*. December. Based on a projected 2005 population of 101,500.

[11] The Levander Company, Inc., 1991. Evaluation of Governmental Service Impacts Brentwood Country Club Residential Development. November 22.

for these services would be met by existing and planned library facilities. The proposed project would not itself require the construction of new library facilities and would not cause or accelerate the physical deterioration of existing library facilities.

c. Significant Public Services Impacts. The proposed project would not result in any significant impacts to public services.

K. UTILITIES AND INFRASTRUCTURE

This section describes existing utility systems in the vicinity of the project site, discusses policies relevant to these systems, evaluates potential impacts resulting from implementation of the proposed project, and identifies mitigation measures to reduce the significance of potential impacts. The analysis examines water supply, wastewater, solid waste, energy, and telecommunications. A discussion of storm drainage is provided in Section IV.G, Hydrology and Storm Drainage.

1. Setting

This section describes existing conditions, as they relate to the proposed project, of the water supply, treatment, and distribution system; the wastewater treatment and collection system; solid waste collection and disposal; telecommunications services; and natural gas and electric utilities in the City of Antioch.

a. Water System. The City of Antioch operates and manages water service within the City. This section describes existing water service and supply within the City and is based on information from the City of Antioch *Urban Water Management Plan*[1] and the Water Supply Assessment (WSA)[2] prepared for the proposed project and included as Appendix L of this report.

(1) Water Supply. The City's principal sources of raw water supply are the San Joaquin River and the Contra Costa Canal (Canal). A small amount is also available through the City's Municipal Reservoir. These sources are discussed below. In total, the City has existing agreements/ infrastructure capacity to supply approximately 48,610 acre-feet of water per year.[3]

San Joaquin River. The City satisfies some of its water demand by pumping raw water directly from the San Joaquin River. The City has rights to divert an unlimited amount of river water with a chloride content of less than 250 milligrams per liter (mg/L) at least 208 days per year, subject to an agreement with the California Department of Water Resources (DWR), which expires in 2008. It is anticipated that this agreement will be renewed. Currently, the City can only draw a maximum of 16 million gallons per day (mgd) from the San Joaquin River (water quality permitting) due to the limited capacity of the river pumping station and the raw water pipeline from the river to the municipal reservoir. Over the last five years, the City has pumped an average of 6,438 acre-feet per year (5.75 mgd) from the San Joaquin River. For planning purposes, in normal years, it is assumed that this average will be available in the future, although at 208 days per year at 16 mgd, the City is capable of drawing 10,200 acre-feet per year from the river.

Contra Costa Canal. The Contra Costa Water District (CCWD) supplies water to Antioch from diversions at Rock Slough and Old River in the Sacramento-San Joaquin Delta (Delta) through the Canal. CCWD wholesales water to the City under an annual agreement for a peak demand supply of 36 mgd. CCWD presently draws only 67 percent of its annual 63,500 million gallon allotment from the Delta. Unless constrained by drought conditions, CCWD is capable of serving Antioch's water demand through the year 2025 (the year of General Plan buildout when maximum demand is

[1] Antioch, City of, 2005. *Urban Water Management Plan Update, Draft Report*, prepared by Brown and Caldwell. December.

[2] Brown and Caldwell, 2008. *Final Water Supply Assessment for Aviano Adult Community Project*. February.

[3] Antioch, City of, 2005. op. cit. Table 4-6.

projected to be 48 mgd. Based on recent studies, the existing Canal does not have sufficient capacity to carry Antioch's increased future flow together with those required by other customers; however CCWD has installed a parallel (multipurpose pipeline) to the Canal to satisfy such demands.

(2) Water Storage and Distribution. Water storage and distribution facilities in Antioch are described below.

Storage Reservoirs. Raw water from both the San Joaquin River and the Canal is stored in the Municipal Reservoir, located adjacent to the Lone Tree Golf Course. The Reservoir, which has a capacity of 735 acre-feet, provides supply reliability and volume equalization storage for water pumped from the Canal. The Municipal Reservoir supplies approximately 740 acre-feet of water per year to the City.

In addition to the Municipal Reservoir, the City owns and maintains 11 smaller storage reservoirs, with a combined storage capacity of 21.5 million gallons, six booster pumping stations, and several backup wells.

Distribution. Water distribution within the City is organized by pressure zones. The northern portion of the project site (north of the proposed Sand Creek Road) is located within Zone III East (elevation of less than 235 feet) pressure zone. Zone III East is served by trunk lines that have been sized to serve existing and planned development, including development within the General Plan's Sand Creek Focus Area. Zone III East is currently served from the Lone Tree and Deerfield reservoirs, each with a storage capacity of 2.5 million gallons. The Hillcrest and Lone Tree booster pump stations serve Zone III East and have a firm pumping capacity of 4.3 mgd, and 5.2 mgd, respectively.

The southern portion of the project site (south of the proposed Sand Creek Road) is located within Zone IV East pressure zone, which serves elevations between 235 and 410 feet. Zone IV East is served by a booster pump station on Dallas Ranch Road, with a firm pumping capacity of 4 mgd. The Empire Mine reservoir serves Zone IV East, and has a storage capacity of 3.5 million gallons. Trunk line capacity for Zone IV East has also been sized to serve existing and planned development within the General Plan's Sand Creek Focus Area.

Water service is not currently available to the project site. However, existing water infrastructure is located north of the site, beneath Hillcrest Avenue.

(3) Water Treatment Plant. The City owns and operates its own Water Treatment Plant (WTP) located on Putnam Street. Untreated water from the City's Municipal Reservoir is conveyed to the WTP. The WTP was recently expanded to accommodate a maximum capacity of 52 mgd and is anticipated to serve the City until General Plan buildout.[4]

(4) Recycled Water. Currently, recycled water services are not available within the City. In partnership with the City, the Delta Diablo Sanitation District (DDSD) is exploring the potential to expand its recycled water deliveries to Antioch. A new recycled water pipeline is proposed for

[4] Scott, Pat, 2008. Director of Public Works, City of Antioch. Personal communication with Tina Wehrmeister, City of Antioch Department of Community Development. August 12 and 13.

construction from the existing recycled water pipeline near the DDSD Recycled Water Facility (RWF) to several existing users, including the Lone Tree Golf Course. Recycled water deliveries to a limited number of Antioch customers are expected in 2011.

b. Wastewater (Sanitary Sewer) System. The City is responsible for collection of wastewater and maintenance of the sewer lines within Antioch. Wastewater treatment is provided by DDSD. This section describes the existing conditions of these systems.

(1) Collection System. The City owns and maintains over 300 miles of sewer lines ranging in size from 4 inches to 42 inches in diameter. Wastewater collection is not currently available on the project site. The existing wastewater collection system within the vicinity of the project site consists of one 24-inch main sewer line located approximately 600 feet northeast of the project site, beneath Heidorn Ranch Road.

DDSD is responsible for wastewater conveyance from the point of discharge from City pipes to interceptor stations, which convey wastewater to the Bridgehead, Antioch, and Hillcrest pump stations, located at Bridgehead Road, Fulton Shipyard Road, and Hillcrest Avenue respectively. The Hillcrest Avenue pump station is currently not in service.[5]

(2) Wastewater Treatment Facilities. DDSD provides wastewater treatment service to Antioch, Pittsburg, and Bay Point. The Wastewater Treatment Plant (WWTP) is a regional facility located in northwest Antioch, near the Pittsburg border. The WWTP provides secondary treatment, disinfection, and dechlorination prior to discharging effluent to New York Slough, a section of the San Joaquin River. Prior to chlorination, a portion of the treated effluent is diverted to the DDSD RWF for further treatment.

DDSD uses a wastewater generation rate of 200 gallons per day for residential uses. Average dry weather flow to the WWTP in 2005 was 14.2 mgd.[6] The plant has a capacity of 16.5 mgd and is currently operating at 86 percent of capacity.[7] Sewage flow to the plant does not fluctuate seasonally, as sewer and storm water systems are separate.

DDSD has plans to incrementally expand the capacity of the WWTP to 23.6 mgd. This expansion program is driven by the growth anticipated in the General Plans for the communities within the DDSD service area. On behalf of DDSD, the City collects sewer connection fees, which fund future plant expansion. Future WWTP expansions require approval from the cities of Pittsburg and Bay Point.

c. Solid Waste. The following section describes Antioch's residential solid waste disposal services and landfill capacity, as well as the City's solid waste regulatory context.

(1) Disposal Facilities. Franchised solid waste collection, disposal, recycling, and yard waste services in Antioch are provided by Allied Waste Services of Contra Costa County (formerly

[5] Delta Diablo Sanitation District, 2004. Conveyance System Master Plan Update. February.

[6] Baatrup, Greg, 2006. District Engineer/Engineering Services Director, Delta Diablo Sanitation District. Written communication with LSA Associates, Inc. November 29.

[7] Ibid.

known as Pleasant Hill Bayshore Disposal). Non-hazardous solid waste and recyclables are taken to the Contra Costa Transfer and Recovery Station (Transfer Station) located in Martinez. Recyclables are sorted and stored at the Transfer Station prior to shipment to recycling markets. The Transfer Station has a permitted disposal capacity of 1,900 tons per day.

Solid waste is transferred from the Transfer Station to the Keller Canyon Landfill in unincorporated Pittsburg. The landfill handles construction, demolition and mixed municipal waste. The landfill had a capacity of 68,279,670 cubic yards in 2001 and a permitted throughput[8] of 3,500 tons per day.[9] The landfill is estimated for closure in the year 2030; however this date is subject to future review and revision.

(2) Legislation. The California Integrated Waste Management Act of 1989 (AB 939) requires local cities and counties to adopt an Integrated Waste Management Plan (IWMP) to establish objectives, policies, and programs relative to waste disposal, management, source reduction, and recycling. All solid waste management in Contra Costa County is governed by the adopted County-wide IWMP and Antioch's *Source Reduction and Recycling Element*, which was approved by the California Integrated Waste Management Board (CIWMB) in 1993. As part of AB 939, all California cities and counties were required to divert 50 percent of solid waste from landfills through the implementation of various strategies, including source reduction, composting, recycling, and yard waste programs by the end of the year 2000.

The City's 2005 (the year for which the most recent reporting information was available) diversion rate as submitted to the CIWMB was 50 percent.[10] The City's 2005 diversion rate will be reviewed for compliance during the 2006-2007 biennial review, which will occur in February 2008. In addition, the City has recently implemented a new single stream recycling program along with construction and demolition waste reduction and reporting requirements. It is anticipated that these, along with other waste diversion programs implemented throughout the City, will support the City in achieving the 50 percent diversion rate in future years.[11]

The CIWMB estimates an average waste generation rate of 10 pounds per unit per day for single-family residential uses.[12]

d. Telecommunications. AT&T provides telephone and digital subscriber internet (DSL) services and Comcast Cable provides cable television and internet services to the City. Both of these service providers are privately owned and operated. Costs of operation, maintenance, and capital

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[8] Permitted throughput is the maximum permitted amount of waste a landfill can handle and dispose of in one day. This figure is established in the current solid waste facilities permit issued by the Integrated Waste Management Board.

[9] California Integrated Waste Management Board, 2006. Facility/Site Summary Details Keller Canyon Landfill. http://www.ciwmb.ca.gov/swis/detail.asp. October 10.

[10] Haas-Wajdowicz, Julie, 2006. Environmental Resources Coordinator, City of Antioch. Written Communication with LSA Associates Inc. October 30.

[11] Haas-Wajdowicz, Julie, 2007. Environmental Resources Coordinator, City of Antioch. Written Communication with LSA Associates Inc. May 22.

[12] Integrated Waste Management Board, 2006. *Estimated Solid Waste Generation Rates for Residential Developments*. Website: www.ciwmb.ca.gov/WasteChar/WasteGenRates/Residential.htm. October 30.

improvements are recovered through the collection of connection and uses fees. These services are currently available near the project site.

The California Public Utilities Commission (CPUC), which regulates California's telecommunication industry, requires that local phone service providers anticipate and serve new growth. To meet this requirement, local phone service providers continually upgrade their facilities and infrastructure, adding new facilities and technology to remain in conformance with CPUC tariffs and regulations and to serve customer demand in their service areas.

e. Electricity and Natural Gas. The Pacific Gas and Electric Company (PG&E) provides electricity and natural gas service to customers in the City. The City is located within PG&E's Delta Distribution Planning Area (DPA), which covers the eastern portion of Contra Costa County from Bay Point to Discovery Bay. Electricity distribution facilities are located throughout the DPA, with no one set of facilities dedicated to serving the City. A new PG&E substation is planned to be located in the vicinity of the future intersection of Hillcrest Avenue and Sand Creek Road.[13] This new substation would improve the reliability and safety of electric services to southern Antioch, Brentwood, Oakley, and portions of rural East Contra Costa County.

PG&E charges connection and user fees for all new development, in addition to sliding rates for electrical and natural gas service based on use. These services are currently available near the project site.

Regulatory requirements for efficient use of electricity and gas are contained in Title 24, Part 6, of the California Code of Regulations, entitled "Energy Efficiency Standards for Residential and Nonresidential Buildings." These regulations specify the State's minimum energy efficiency standards and apply to new construction of both residential and nonresidential buildings. The standards regulate energy consumed for heating, cooling, ventilation, water heating and lighting. Compliance with these standards is verified and enforced through the local building permit process.

2. Antioch General Plan

Several elements of the General Plan contain infrastructure performance objectives, policies and standards related to water, wastewater, solid waste, and electricity and gas utilities. Those applicable to the proposed project are listed below.

Growth Management Element

- *Water Storage and Distribution Performance Objective 3.5.4.1:* Maintain a water system that is capable of meeting the daily and peak demands of Antioch residents and businesses, including provision of adequate fire flows and storage for drought and emergency conditions.
    - *Water Storage and Distribution Performance Standard 3.5.4.2:* Adequate fire flow is established by the Contra Costa County Fire Protection District, along with sufficient storage for emergency and drought situations and to maintain adequate service pressures.
- *Sanitary Sewer Collection and Treatment Facilities Performance Objective 3.5.5.1:* A wastewater collection, treatment, and disposal system that is capable of meeting the daily and peak demands of Antioch residents and businesses.

[13] California Public Utilities Commission, 2006. *Delta DPA Capacity Increase Substation Project Initial Study*. November.

- *Sanitary Sewer Collection and Treatment Facilities Performance Standard 3.5.5.2a:* Sanitary sewers (except for force mains) will exhibit unrestricted flow in normal and peak flows.
- *Sanitary Sewer Collection and Treatment Facilities Performance Standard 3.5.5.2b:* Prior to approval of discretionary development projects, require written verification from the Delta Diablo Sanitation District that the proposed project will not cause the rated capacity of treatment facilities to be exceeded during normal or peak flows.

Public Services and Facilities Element

- *Water Facilities Objective 8.4.1:* Ensure a water system capable of providing high quality water to existing and future residences, businesses, institutions, recreational facilities, and other uses within the City of Antioch during peak conditions, with sufficient water storage reservoirs for emergency and fire protection needs.
  - *Water Facilities Policy 8.4.2a:* As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District.
  - *Water Facilities Policy 8.4.2e:* Permit the construction of interim facilities only when it is found that construction of such facilities will not impair the financing or timely construction of master planned facilities.
  - *Water Facilities Policy 8.4.2f:* Periodically evaluate local water consumption patterns, the adequacy of existing facilities, and the need for new facilities, including this information in the comparison of proposed development projects to the performance standards of the Growth Management Element.
- *Wastewater Management Objective 8.5.1:* Ensure a wastewater collection, treatment, and disposal system capable of providing sewer services to existing and future residences, businesses, institutions, recreational facilities, and other uses within the City of Antioch during peak use conditions.
  - *Wastewater Management Policy 8.5.2a:* As part of the design of sewer systems, provide adequate capacity for average and peak conditions.
  - *Wastewater Management Policy 8.5.2b:* Ensure that adequate infrastructure is in place and operational prior to occupancy of new development, such that new development will (1) not negatively impact the performance of sewer facilities serving existing developed areas, and (2) the performance standards set forth in the Growth Management Element will continue to be met.
  - *Wastewater Management Policy 8.5.2e:* Work with Delta Diablo Sanitation District to explore and develop uses for treated wastewater. Where reclaimed wastewater can be economically delivered, require the installation of dual water systems permitting the use of reclaimed water supplies for irrigation purposes and industrial purposes.
- *Solid Waste Management Objective 8.6.1:* Reduce the amount of solid waste requiring disposal at landfills, enhancing the potential for recycling of the City's solid wastes.
  - *Solid Waste Management Policy 8.6.2b:* Require provision of attractive, convenient recycling bins and trash enclosures in new residential and non-residential development.
  - *Solid Waste Management Policy 8.6.2c:* Provide and promote opportunities to reduce solid waste generation at home and in businesses and public facilities, making possible the safe disposal of hazardous materials.
  - *Solid Waste Management Policy 8.6.2h:* The City of Antioch shall follow State regulations in implementing the goals, policies, and programs in order to achieve and maintain a 50 percent reduction in solid waste disposal through source reduction, reuse, recycling, and composting.
  - *Solid Waste Management Policy 8.6.2j:* The City shall require all development projects to coordinate with appropriate departments and/or agencies to ensure that there is adequate waste disposal capacity to meet the waste disposal requirements of the project, and the City shall recommend that all development projects incorporate measures to promote waste reduction, reuse, recycling, and composting.

Resource Management Element

- *Water Resources Objective 10.7.1:* Ensure than an adequate supply of water is available to serve existing and future needs of the City.

- *Water Resources Policy 10.7.2a:* As part of implementing the City's residential growth management program and its development review process for non-residential development, ensure that adequate long-term water supplies are available to serve the development being granted new allocations, including consideration of peak drought and peak fire fighting needs.
- *Water Resources Policy 10.7.2b:* Require new development to be equipped with drought tolerant landscaping and water conservation devices.
- *Water Resources Policy 10.7.2c:* Work with Delta Diablo Sanitation District to make reclaimed wastewater available for irrigation use. Where reclaimed wastewater can be made available at a reasonable cost, require the installation of dual water systems in development projects and public facilities, using reclaimed wastewater for irrigation.

- *Energy Resources Objective 10.8.1:* Reduce reliance on nonrenewable energy sources in existing new commercial, industrial, and public structures.
  - *Energy Resource Policy 10.8.2a:* Continue to implement Title 24 of the State Building Code, and provide incentives to encourage architects and builders to exceed the energy efficiency standards of Title 24 through increased use of passive solar design and day-lighting.
  - *Energy Resource Policy 10.8.2b:* Promote the use of site design, landscaping, and solar orientation to decrease the need for summer cooling and winter heating.
  - *Energy Resource Policy 10.8.2c:* Where feasible, incorporate recycled materials in new construction.
  - *Energy Resource Policy 10.8.2i:* The City shall review all development plans prior to approval to guarantee that energy conservation and efficiency standards of Title 24 are met and are incorporated into the design of the future proposed projects.

3. Impacts and Mitigation Measures

This section discusses potential impacts to utilities and infrastructure systems that could result from construction of the proposed project. The section begins with the criteria of significance, which establish the thresholds used to determine whether an impact is significant. The latter part of this section presents the impacts associated with the proposed project and identifies mitigation measures, as appropriate. Less-than-significant impacts to utilities and infrastructure are discussed first, followed by significant impacts.

a. Significance Criteria. The proposed project would have a significant impact on the City's infrastructure and utility systems if it would:

- Have insufficient water supplies available to serve the project from existing entitlements and resources, such that new or expanded entitlements are needed;
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve project demand in addition to the provider's existing commitments;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Violate applicable federal, State, and local statutes and regulations related to solid waste; or
- Result in determination by the energy or telecommunications provider which serves or may serve the project site that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in the construction of new energy facilities or expansion of existing facilities, construction of which would cause significant environmental effects.

b. Less-than-Significant Utilities and Infrastructure Impacts. The proposed project would result in the following less-than-significant impacts to utilities and infrastructure.

(1) Water. California State Senate Bill 610 (SB 610) requires that water retailers demonstrate whether their water supplies are sufficient to meet the projected demand of certain large development projects (500 plus units). In accordance with SB 610, the City prepared a WSA for the proposed project. The WSA relies in part on information provided by the City's *Urban Water Management Plan*, which anticipates future water demand at the project site at 377 acre feet per year. Using a water demand rate for senior occupancy, the WSA determined that the proposed project, including project residences, recreational facilities, parks and landscaping, water quality features, and open space areas would only require approximately 240 acre feet per year (with the development of 535 units). Table IV.K-1 shows the City's projected water supplies compared to projected demand (including the proposed project) through 2037. As shown in Table IV.K-1, surface water supplies are sufficient to serve existing, approved, and pending development within the City, including the proposed project. In addition, the WSA determined that the City has adequate existing water supply sources to meet the future water supply needs of the City under all conditions, including single and multiple dry years. No new water entitlements would be needed to serve the proposed project.

Table IV.K-1: Projected Water Supply and Demand with Project (Acre-Feet/Year)

	2012	2017	2022	2027	2032	2037
Total Supply	32,970	34,690	36,080	37,010	37,720	38,130
Total Demand	22,380	23,530	24,680	25,830	26,990	29,290
Surplus of Supply	*10,590*	*11,160*	*11,400*	*11,180*	*10,730*	*8,840*

Source: Brown and Caldwell, 2008. *Final Water Supply Assessment for Aviano Adult Community Project*. February.

As shown in Figure III-7, the proposed project would connect to the 16-inch water line that currently terminates at Hillcrest Avenue. This line would continue beneath the proposed extension of Hillcrest Avenue and extend beneath Sand Creek Road to the AUSD Medical High School. Distribution to the residential areas would be through smaller pipelines connected to this main line. This line would be designed to accommodate water delivery demand to the project site as well as the AUSD Medical High School. As previously discussed, the residential portion of the project site is located within the City's Zone III East pressure zone. This zone is served by trunk lines that have been sized to serve existing and planned development, including development within the General Plan's Sand Creek Focus Area. As such, the proposed project would not require expansion of existing water delivery systems north of the site, as these have been sized to adequately serve new development within the Sand Creek Focus Area. In addition, the City's WTP is anticipated to serve the City until General Plan buildout, and the proposed project would not exceed the treatment capacity of this facility.

(2) Wastewater. The DDSD uses a wastewater generation rate of 200 gallons per day per residential unit.[14] At this rate, the proposed project would generate 107,000 gallons (0.11 mgd) of wastewater per day. This represents less than a 1 percent increase in the average dry weather flow to the WWTP and less than 1 percent of the WWTP's existing capacity. The additional wastewater generated by the proposed project would not exceed the capacity of the WWTP. As a result, the proposed project would not cause any wastewater treatment requirements established by the RWQCB

[14] Baatrup, Greg, 2006. op. cit.

to be violated. In addition, the project sponsor would pay a sewer connection fee to DDSD for the proposed project. This fee would contribute to future WWTP expansions, as necessary to serve projected development.

The proposed project would connect to the existing 24-inch main sanitary sewer pipeline located beneath Heidorn Ranch Road. This pipe would be extended south along the future alignment of Heidorn Ranch Road and west along the future alignment of Sand Creek Road, through the Ginochio/Nunn property. This new sanitary sewer line would serve both the project site as well as the AUSD Medical High School. Wastewater would be conveyed from the 24-inch main pipeline to either the Antioch or Bridgehead pump stations, in north Antioch. These pump stations are expected to have the capacity to meet the increased demand. Please refer to the other sections of this chapter (e.g., Biological Resources, Cultural Resources) for discussion of potential impacts associated with construction of the sanitary sewer line.

(3) Solid Waste. According to the CIWMB, the average single-family residence produces 10 pounds of solid waste per day. As such, the proposed 535 residences would produce approximately 5,350 pounds (2.7 tons) of waste per day. The permitted daily throughput for the Contra Costa Transfer and Recovery Station is 1,900 tons per day and the permitted throughput for the Keller Canyon Landfill is 3,500 tons per day. The increase in waste associated with the proposed project would represent approximately one tenth of one percent of the daily permitted throughput for the Transfer Station and less than one tenth of one percent of the daily capacity of the landfill. The increase in solid waste generated by the proposed project would be minimal and would be accommodated by existing landfill capacity. The addition of project waste would not diminish the anticipated life span of the landfill.

In addition, Allied Waste Services would provide recycling services and yard waste collection for the proposed project, thereby reducing the solid waste generated by the proposed project. The proposed project would not cause the solid waste provider to be out of compliance with applicable statutes and regulations related to solid waste, resulting in a less-than-significant impact related to solid waste generation.

(4) Electricity, Natural Gas and Telecommunications. Development of the proposed project would increase demand for electricity, natural gas and telecommunications services in order to serve the additional 535 project residences. However, new construction associated with the proposed project would take place adjacent to developed areas currently serviced by electricity, gas, and telecommunications providers. In addition, the future substation planned by PG&E would improve the reliability and safety of electric services within the project area. Therefore, the extension of utilities to serve new development would result in less-than-significant impacts to these services.

In addition, per City requirements, the City would review project development plans prior to project approval to ensure that Title 24 energy conservation and efficiency standards are met and incorporated into project design.

c. Significant Utilities and Infrastructure Impacts. The proposed project would not result in any significant impacts to utilities and infrastructure.

L. VISUAL RESOURCES

This section evaluates the effects of the proposed project on visual resources, including views in the vicinity of the project site. This analysis also considers the proposed project's consistency with applicable City of Antioch visual resources-related policies. View simulations that show "before" and "after" representations of the proposed project were prepared for four representative vantage points in the vicinity of the site. The view simulations are intended to convey an impression of the location, scale and massing of the buildings that could be constructed at the project site, and to demonstrate potential effects of the proposed project on visual resources.

1. Setting

The following section describes the visual character of the project site and its surroundings, as well as views in the vicinity of the site. Views of and from the project site are provided in Photos IV.L-1 through IV.L-7. These photos correspond to the viewpoint locations (1 through 7) noted on Figure IV.L-1. For a detailed description of the physical characteristics of the project site refer to Section IV.A, Land Use and Planning Policy.

a. Visual Character of the Project Site. The project site is located in the low foothills east of Mount Diablo, within the low-lying valley of Sand Creek. The site's northern terrain is generally flat and the existing topography falls from west to east at approximately 1 percent slope with elevations ranging from 171 to 200 feet above mean sea level. The unchannelized Sand Creek flows in a northeastern direction across the southern portion of the site. A north-south drainage channel flows along the eastern boundary of the project site, emptying into Sand Creek. The drainage channel is characterized by tall, grassy vegetation year-round. A north facing hill slope is located in the southernmost portion of the site, south of Sand Creek. The hill slopes upwards to an elevation of about 328 feet above mean sea level at the southern property boundary. Trees are scattered along the banks of Sand Creek and the southern hillside area of the site. During the dry season, the approximately 189 acre project site is primarily covered in gold and brown non-native grassy vegetation. During the winter and spring months, the site is covered in tall green grasses, while scattered, seasonal wildflowers may appear on the hillside portion of the site.

Four 230-kV electrical transmission line towers run from the southeast hillside portion of the site to approximately the center of the northern property boundary. The project site is surrounded by low barbed-wire fencing at the western and eastern boundaries, and tall wood fencing at the northern boundary.

Photo IV.L-1 depicts the view looking south across the project site, as seen from Chaparral Park. The electrical transmission lines and towers are visible as they cross the project site to the southeast. Trees scattered along the banks of Sand Creek and the hillside above are also visible in the photo. The surrounding foothills can be seen to the left of the transmission line towers and in the distance to the right.

Photo IV.L-1: View south across the project site

The site is used for seasonal cattle grazing, and reflects the existing rural character of the southern-most portion of Antioch. However, the site's visual context is also greatly influenced by surrounding development, creating a mix of both rural and built elements.

b. Visual Character of the Project Site Surroundings. Following is a brief discussion of the visual character of the areas surrounding the project site, including the adjacent off-site impact areas.

(1) North of the Project Site. Two-story single-family residential developments are located north of the project site. Chaparral Park is also located north of the site and is characterized by open lawn areas, play structures, and public pathways. PG&E transmission line towers continue from the project site northwest through the park. Photo IV.L-2 looks northeast from the western boundary of the project site. Residential uses are visible along with associated trees and landscaping. The transmission tower visible in the center of the photo is located within Chaparral Park.

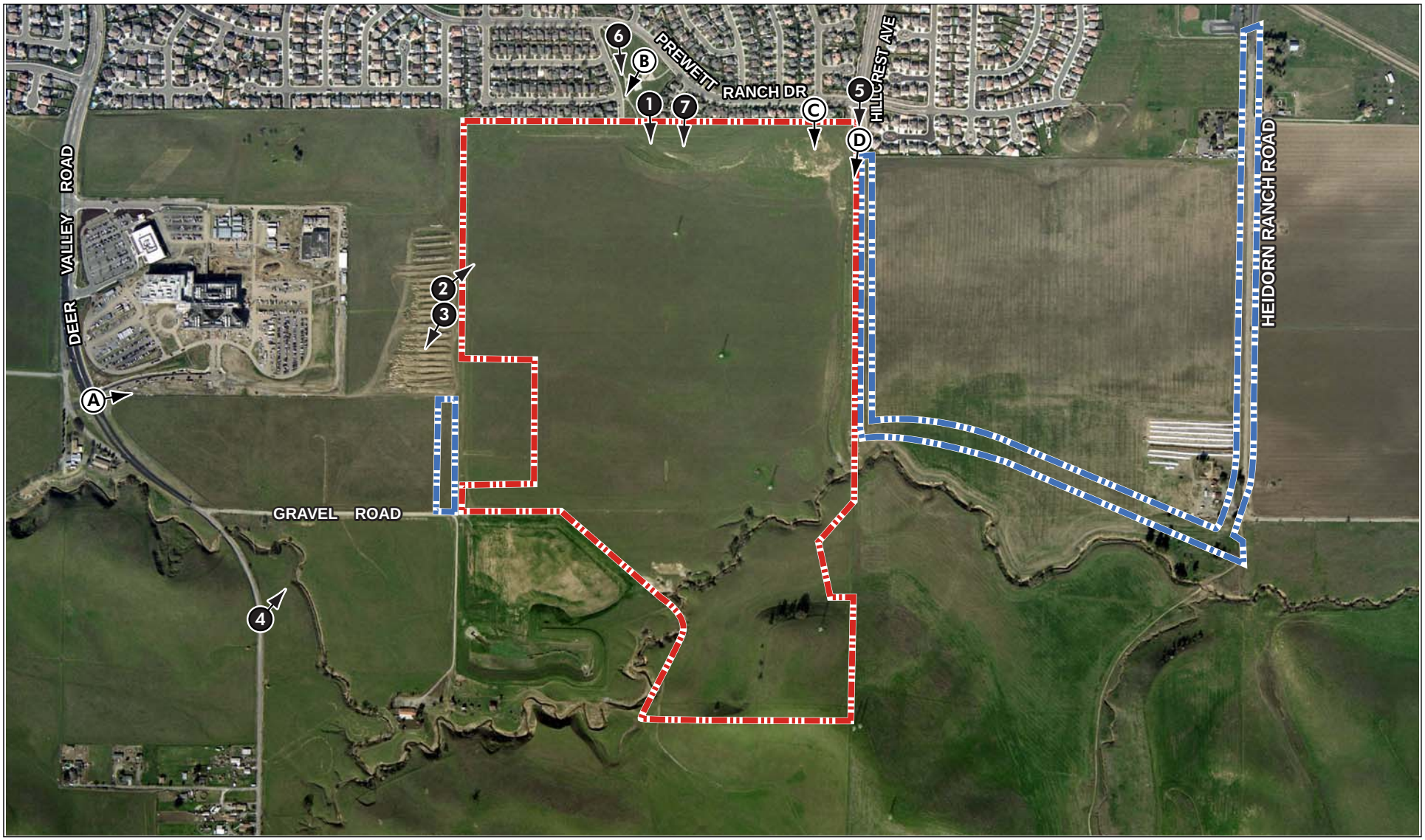
Photo IV.L-2: View of residential development, northeast across the project site

(2) East of the Project Site. Agricultural lands on the Ginochio/Nunn property border the project site to the east. Views east of the site are generally of open agricultural and grasslands, with scattered industrial and residential development. Buildings and mature trees associated with the Aera Energy property can also be seen from the site. Views in this direction are generally open to the horizon.

(3) South of the Project Site. The project site is surrounded by open space to the south. From the level northern portion of the site, views to the south are generally of the southern hillside portion of the site and surrounding foothills. From the southern hillside portion of the site, views to the south are characterized by open grasslands with scattered rural developments and the foothills of Mount Diablo.

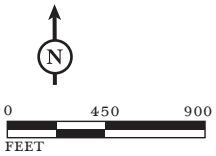
(4) West of the Project Site. Views immediately to the west of the project site are partially obstructed by the four-story Kaiser Medical Facility and associated structures. Unobstructed views of Mount Diablo and the surrounding foothills are visible southwest of the project site, and across the Royal Formosa/Chenn property, as shown in Photo IV.L-3. The surrounding foothills visible from the project site are generally characterized by grasslands with scattered trees and shrubs.

Photo IV.L-3: View of Mount Diablo, southwest of the project site



LSA

FIGURE IV.L-1



PROJECT SITE

OFF-SITE IMPACT AREAS

VIEWPOINT LOCATIONS

PHOTO LOCATIONS

Aviano Adult Community Project EIR

Photo and Visual Simulations
Viewpoint Location Map

SOURCE: Pulte Homes, 2008.

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Back of IV.L-1

c. Views of the Project Site. There are open views of the project site from several of the streets that surround or terminate at the project site, including Deer Valley Road, Prewett Ranch Drive, Equestrian Way, Hillcrest Avenue, and Heidorn Ranch Road. Deer Valley Road and Hillcrest Avenue are noted as important view corridors within the City's General Plan. There are also views of the project site from public areas such as Chaparral Park and private residential neighborhoods adjacent to the northern border of the project site. Key views of the project site are discussed below.

- *Views from Deer Valley Road.* Distant views of the project site are available from numerous points along Deer Valley Road. Views of the site, looking northeast from various locations along Deer Valley Road are generally open and the site blends in with surrounding open space, as shown in Photo IV.L-4. The transmission towers that bisect the site are visible from all vantage points. North of the intersection of Deer Valley Road and Sand Creek Road views of the project site are generally obstructed by the Kaiser Medical Facility buildings. As Deer Valley Road continues through the hilly areas south of the project site, views of the open grasslands on the site are distant and intermittent.

Photo IV.L-4: View Northeast from Deer Valley Road

- *Views from Prewett Ranch Drive and Equestrian Way.* Views of the project site from Prewett Ranch Drive are provided at the intersection with Equestrian Way, which terminates at the project site's northern border. Motorists and pedestrians traveling south on Equestrian Way have direct and open views across the level grassland portion of the site to the hillside portion of the site. Those traveling east or west along Prewett Ranch Drive would also have open views of the site at the intersection with Equestrian Way.
- *Views from Hillcrest Avenue.* Views of the project site from Hillcrest Avenue are generally obstructed by existing development north of the site. Hillcrest Avenue terminates at the northeastern corner of the project site, just south of the intersection with Prewett Ranch Drive. As shown in Photo IV.L-5, motorists and pedestrians traveling south on Hillcrest Avenue have a limited view of the site; however, as they approach the intersection with Prewett Ranch Drive, views across the eastern and southern open grassland and hillside portions of the site are also available.

Photo IV.L-5: View South from Hillcrest Avenue

- *Views from Heidorn Ranch Road.* Views of the project site from various locations along Heidorn Ranch Road are open and blend with surrounding open space and agricultural lands. Views of the hillside portion of the project site generally blend with in with the surrounding hills and foothills of Mount Diablo.

- *Views from Chaparral Park.* Views from Chaparral Park are generally open across the center of the project site. As shown in Photo IV.L-6, from the center of the park, the open grasslands on the project site are slightly obscured by young trees planted within the park. At the southern edge of the park, views of grassland and hillside portions of the site are direct and open.
- *Residential Neighborhoods.* Views of the project site from residential neighborhoods to the north are generally obstructed by two-story residences and fencing bordering the northern portion of the project site, as shown in Photo IV.L-7. Views of the site from these neighborhoods are generally only available from the streets that terminate at the northern border of the project site (such as the intersection of Prewett Ranch Drive and Equestrian Way, described above). Views of the site from private residences are generally only available from the second story, and ground level views are generally obstructed by existing fencing which separates the residences from the project site.

Photo IV.L-6: View South from Chaparral Park

Photo IV.L-7: View South from Blue Sky Court

2. Antioch General Plan

The Community Image and Design Element of the Antioch General Plan contains the following objective and policies related to the visual quality and character of development within the City.

Community Image and Design

- *Community Design Policy 5.4.2c:* Maintain view corridors from public spaces to natural ridgelines and landmarks, such as Mount Diablo and distant hills, local ridgelines, the San Joaquin River, and other water bodies.
    - Recognizing that new development will inevitably result in some loss of existing views, as part of the City's review of development and commercial and industrial landscape plans, minimize the loss of views from public spaces.
    - Important view corridors to be protected include Somersville Road, Lone Tree Way, Hillcrest Avenue, SR 4, SR 160, James Donlon Boulevard, Deer Valley Road, and Empire Mine Road.
- *Community Design Policy 5.4.2d:* Strengthen and emphasize community focal points, visual landmarks, and features contributing to Antioch's identity using design concepts and standards implemented through the zoning ordinance, design guidelines and design review process, and specific plan and planned community documents.
- *Community Design Policy 5.4.2e:* Create a framework of public spaces at the neighborhood, community, and regional scale.
    - Provide for new open space opportunities throughout the City, especially in neighborhoods having minimal access to open space. This includes exploring the potential for creek corridors, bicycle and pedestrian paths, and new small open space and conservation areas.

  - Provide an open space network linked by pedestrian and bicycle paths, which preserves and enhances Antioch's significant visual and natural resources.
  - Provide sitting areas within parks and along pedestrian and bicycle paths.
  - Utilize existing creeks, such as Sand Creek, as linear parks, providing pedestrian and bicycle paths.
  - Views along utility corridors should be retained and enhanced through the use of planting materials to frame and focus views and to provide a sense of orientation.
- *Community Design Policy 5.4.2h:* Wherever feasible, existing above-ground utility lines should be placed underground.
- *Community Design Policy 5.4.2o:* Design onsite lighting to improve the visual identification of adjacent structures.
  - In all projects, lighting fixtures should be attractively designed and of a low profile to complement the overall design theme of the project within which they are located.
  - On-site lighting shall create a safe environment, adhering to established crime prevention standards, but shall not result in nuisance levels of light or glare on adjacent properties. Limit sources of lighting to the minimum required to ensure safe circulation and visibility.
- *Development Transitions and Buffering Policy 5.4.12g:* Uninterrupted fences and walls are to be avoided, unless they are needed for a specific screening, safety, or sound attenuation purpose.
- *Development Transitions and Buffering Policy 5.4.12i:* Fencing and walls should respect existing view corridors to the greatest extent possible.
- *Development Transitions and Buffering Policy 5.4.12j:* Fencing and walls should incorporate landscape elements or changes in materials, color, or texture in order to prevent graffiti, undue glare, heat, or reflecting, or aesthetic inconsistencies.

3. Impacts and Mitigation Measures

This section analyzes impacts related to visual resources that could result from development of the proposed project. The subsection begins with the criteria of significance, which establish the thresholds for determining whether an impact is significant. The latter part of this section presents the impacts associated with the proposed project. Mitigation measures are recommended, as appropriate.

a. Criteria of Significance. Implementation of the proposed project would have a significant effect on visual resources if it would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

b. Less-than-Significant Visual Resources Impacts. Development of the proposed project would result in the following less-than-significant impacts to visual resources.

(1) Scenic Vistas. Important view corridors within the vicinity of the project site include Lone Tree Way, Hillcrest Avenue, Deer Valley Road, and SR 4. These roadways provide views to natural ridgelines and landmarks, such as Mount Diablo and the distant foothills and local ridgelines. Development of the project site with up to 535 single-story residences would not adversely alter the

views from any of the above mentioned scenic view corridors. Views of the developed project site from Deer Valley Road and Hillcrest Avenue are further discussed below.

The General Plan includes policies to preserve public view corridors and seeks to minimize the loss of views from public places. In consultation with City staff, four viewpoint locations were chosen for visual simulations of the project site. These viewpoint locations were chosen based on project site visibility and the locations that provided the most representative views of the project site. Figure IV.L-1 shows the viewpoint locations. Figures IV.L-2 through IV.L-5 show existing views of the project site and visual simulations of the proposed project from each of the four viewpoint locations. The visual simulations were prepared using computer modeling and rendering techniques, and are based on design data provided by the project sponsor, including site layout, grading, landscaping, and conceptual architectural samples. As noted previously, the analysis of impacts to existing views of the project site focus on site views from public locations such as roadways and parks. Each viewpoint shown in the figures is described and evaluated below.

View from Deer Valley Road at Sand Creek Road Looking East. Figure IV.L-2 shows the view from the intersection of Deer Valley Road and Sand Creek Road looking east towards the project site. At the intersection, a portion of the existing view of the project site is partially obstructed by the Kaiser Medical Facility. Remaining views of the project site, although open, are distant and generally blend in with level agricultural areas and scattered developments further east of the site. The visual simulation of the project site shows the one-story residences associated with the proposed development. These residences block a very thin vertical line of views further east of the site; however, these views are distant and generally blend with the project site at the horizon. Although the proposed project would alter the existing view east of Deer Valley Road, a scenic view corridor, the project would not generally block views of important scenic resources. While the proposed project would alter the rural nature of this area as seen from this roadway, it would be visually compatible with the scale of existing development in the area. The proposed project would have a less-than-significant impact on views from Deer Valley Road.

View from Chaparral Park Looking South. Figure IV.L-3 shows the view from Chaparral Park looking south across the project site. The foothills of Mount Diablo are currently visible from the park. Existing immature trees partially obstruct open views of the level grassland portions of the project site. The visual simulation of the project site shows the extension of Chaparral Park onto the project site. One-story project residences are visible to the west. As depicted in the visual simulation, landscaping associated with the proposed greenway, which would cross through the center of the project site, would be of a similar variety and scale as that provided at the existing Chaparral Park. The proposed greenway visually blends with the existing park. Project residences would obstruct views of the open grasslands to the south, and partially obstruct the lower portions of the distant foothills. However, although the proposed project would alter the existing view south of Chaparral Park, the project would not completely block views of the distant foothills. The proposed project residences would blend with existing development north of the site and would not generally alter the visual quality of the area. The proposed project would have a less-than-significant impact on views from Chaparral Park.

View from Prewett Ranch Drive at Equestrian Way Looking South. Figure IV.L-4 shows the view from Prewett Ranch Drive at Equestrian Way, looking south towards the project site. The

Existing view from Deer Valley Road at Sand Creek Road looking east

Visual Simulation of the Proposed Project

LSA

FIGURE IV.L-2

Aviano Adult Community Project EIR

Visual Simulations - A

SOURCE: ENVIRONMENTAL VISION, APRIL 6, 2007.

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Existing view from Chaparral Park looking south

Visual Simulation of the Proposed Project

LSA

FIGURE IV.L-3

Aviano Adult Community Project EIR

Visual Simulations - B

SOURCE: ENVIRONMENTAL VISION, APRIL 6, 2007.

I:/CAN0601 aviano/figures/EIR/figures_IVL2-5.indd (5/21/07)

Existing view from Prewett Ranch Drive at Equestrian Way looking south

Visual Simulation of the Proposed Project

LSA

FIGURE IV.L-4

Aviano Adult Community Project EIR

Visual Simulations - C

SOURCE: ENVIRONMENTAL VISION, APRIL 6, 2007.

I:/CAN0601 aviano/figures/EIR/figures_IVL2-5.indd (5/21/07)

Existing view from Hillcrest Avenue at Prewett Ranch Drive looking southwest

Visual Simulation of the Proposed Project

LSA

FIGURE IV.L-5

Aviano Adult Community Project EIR

Visual Simulations - D

SOURCE: ENVIRONMENTAL VISION, APRIL 6, 2007.

I:/CAN0601 aviano/figures/EIR/figures_IVL2-5.indd (5/21/07)

fence separating the project site from the terminus of Equestrian Way is generally in poor condition and allows a somewhat open view of the grassland portion of the project site for those traveling south on Equestrian Way. Existing trees associated with residences bordering the project site generally block views of the Mount Diablo foothills to the southwest. Views of the hillside portion of the project site are direct and open. As shown in the visual simulation, the proposed project would block views of the upland portion of the site, which would remain undeveloped. The existing view of the distant foothills would also be obstructed, although this view is already largely obstructed by existing development. General Plan Community Design Policy 5.4.2c recognizes that new development will inevitably result in the loss of existing views. Prewett Ranch Drive and Equestrian Way are not considered scenic view corridors in the General Plan. While the proposed project would obstruct views from existing roadways within the residential development located north of the site, the General Plan designates the project site for Low Density Residential development, which allows one-story developments at appropriate densities. The proposed one-story residences would be of similar or even smaller scale than existing one- and two-story residential development to the north, which in turn blocks the potential views of residences further north. As a result, the obstruction of views from Prewett Ranch Drive at Equestrian Way would be less-than-significant.

View from Hillcrest Avenue at Prewett Ranch Drive Looking South. Figure IV.L-5 shows the view from Hillcrest Avenue at Prewett Ranch Drive, looking southwest towards the project site. Hillcrest Avenue currently terminates immediately south of this intersection. Existing views from Hillcrest Avenue southwest towards the project site are direct and open. The foothills of Mount Diablo can be seen in the distance. As shown in the visual simulation, the proposed project would partially obstruct views of the foothills southwest of the project site from Hillcrest Avenue, a scenic view corridor, and for those traveling west on Prewett Ranch Drive. General Plan Community Design Policy 5.4.2c seeks to maintain view corridors from public spaces, including views from Hillcrest Avenue. Existing views north of this viewpoint, southwest towards the project site, are already obstructed by existing development north of the site. The proposed project would extend Hillcrest Avenue south onto the project site, as envisioned in the General Plan. This extension would provide limited views of the foothills for persons traveling along the roadway. Vehicles traveling along this roadway would not have direct and open views as a berm, street trees, and soundwall would likely accompany its development. In addition, these limited views would not exist without the extension of Hillcrest Avenue. As a result, the partial obstruction of views from Hillcrest Avenue would be minimally changed and would be less-than-significant.

(2) Scenic Resources within a State Scenic Highway. The only officially designated scenic highways within Contra Costa County are portions of Highway 24 and Interstate 680.[1] These highways are not located within the vicinity of the project site. The proposed project would not result in the removal of trees, rock outcroppings, of historic resources, nor would it substantially damage scenic resources within a State scenic highway.

(3) Visual Character. The project site currently consists of open grassland and a north facing hillslope. The proposed project would develop the northern, grassland portion of the site with up to 535 one-story residential units, along with associated landscaping and roadway improvements. The visual character of the northern portion of the project site would change from an open rural

[1] California Department of Transportation, 2007. California Scenic Highway Program. Website: www.dot.ca.gov/hq/LandArch/scenic/schwy.html. April 9.

landscape to urban development. In addition, development of the off-site impact areas would result in some permanent roadway improvements immediately adjacent to the project site. Although the majority of the Sand Creek Focus Area is currently rural, the intent of the General Plan is for this area to transition to an urbanized area. The southern portions of the project site, including Sand Creek and the hillside area, would remain as open space. Access would be provided to the area by the proposed Sand Creek trail segment. Landscaping along the trail would consist of native trees that would blend with the natural landscape along the creek. In addition, construction activities associated with the proposed sewer infrastructure on the adjacent Ginochio/Nunn property would only temporarily disturb the agricultural character of this off-site area. Once completed development of this off-site impact area would be returned to its existing condition. As such, the visual character of these areas would remain essentially unchanged.

The proposed project offers three distinct architectural styles: Spanish, Santa Barbara, and Monterey (see Figure III-5). Each of these styles is available in two layout options, for a total of six unit design options. The various architectural styles and layout designs would provide architectural variation within the development. Project landscaping would be visually consistent with residential and park uses which currently exist north of the site. Consistent with General Plan Buffering Policies, the proposed project would be appropriately buffered from adjacent uses at the Kaiser Medical Facility. Soundwalls and fencing would incorporate landscaping along the project boundary. The change in character of the project site, once developed, would be visually compatible with surrounding development, including existing residential neighborhoods to the north, resulting in a less-than-significant impact.

In addition, the proposed project would be subject to the City of Antioch's Design Review process. The Design Review Board utilizes the General Plan's design policies when evaluating building and landscape design. Building permits are not issued until design approval has been obtained. Design review would ensure that the proposed project complies with the City's objectives and policies related to project design.

c. Significant Visual Resources Impacts. Development of the proposed project would result in the following impact to visual resources.

<u>Impact VIS-1</u>: The proposed project would create a new source of light and glare affecting day and nighttime views in the area. (S)

Most homes emit some light and glare during day and evening hours, as is typical in a suburban environment. The proposed residential development would include indoor lighting and outdoor lighting for safety purposes. The proposed recreational facilities, parks and pathways, and parking area would also include outdoor lighting for safety purposes. These new sources of light would be visible from a distance at night; however the addition of new light sources associated with the proposed project would generally blend in with surrounding development. Sun reflecting off of the windows of the proposed development could create daytime glare. Implementation of the following mitigation measure would ensure that light and glare created by the proposed development would be minimized, comparable to that of surrounding residential neighborhoods, and would reduce the impact to a less-than-significant level.

Mitigation Measure VIS-1: Outdoor lighting shall be designed to minimize glare and spillover to surrounding properties. The proposed project shall incorporate non-mirrored glass to minimize daylight glare. Proposed lighting and building materials shall be reviewed and approved by the City as part of the Design Review process prior to issuance of building permits for the proposed project. (LTS)

M. AGRICULTURE AND MINERAL RESOURCES

This section describes the past and present agricultural-related use of the project site and vicinity as well as mining and oil and gas extraction activities within the vicinity of the project site. Regulatory programs applicable to these resources are also discussed. Potential impacts to these resources are evaluated and mitigation measures are recommended, as appropriate. The public health and safety aspects of mining and extraction activities within the vicinity of the project site are discussed in Section IV.H, Public Health and Safety, of this EIR.

1. Setting

The City of Antioch is located in an area of Contra Costa County that has traditionally been used for grazing, orchards, and field and row crops. These uses have steadily declined within in the City; however approximately 5,600 acres (18 percent of total City land) of grazing and former agricultural lands remain within the City. The southern portion of the City, within the Sand Creek Focus Area, remains largely undeveloped. The majority of this area consists of open space, with some cattle grazing occurring on the project site and adjacent lands as well as properties west of Deer Valley Road. Lands immediately to the east of the project site and within the off-site impact area are dryland farmed, most recently for barley. No intensive agricultural activity occurs within or in the vicinity of the project site. Grain cultivation and hay production occurred at the project site from approximately 1957 to the mid 1970s. The project site and surrounding off-site impact areas to the west are currently used for seasonal cattle grazing.

Five individual coal mines are located within the southwestern corner of the City. These mines were part of the Mount Diablo coalfield mining district, from which 4 million tons of coal were extracted between the 1860s and early 1900s. These mines were abandoned at various points in the late 1800s and early 1900s, and there are currently no coal extraction activities occurring in the area.

The project area is located within the outer (western) margin of the Brentwood oil field. Numerous exploratory wells have been drilled within the central and eastern portions of the Sand Creek area; however, exploration and production of oil and gas within the field have declined dramatically within the past 25 years. The Brentwood oil field has not produced any oil or gas within the past 5 years and the field's production is generally considered economically marginal; however, with the recent rise in fuel costs, there has been renewed interest in the viability of oil extraction within the area and requests for oil extraction permits have recently been granted within the vicinity of the site. Seven plugged and abandoned dry holes and oil wells are known to exist on the project site and several others are located nearby.

2. Regulatory Context

The following describes State farmland and mining protection programs applicable to the project site and vicinity. The City's General Plan does not provide specific direction on the use or protection of these resources.

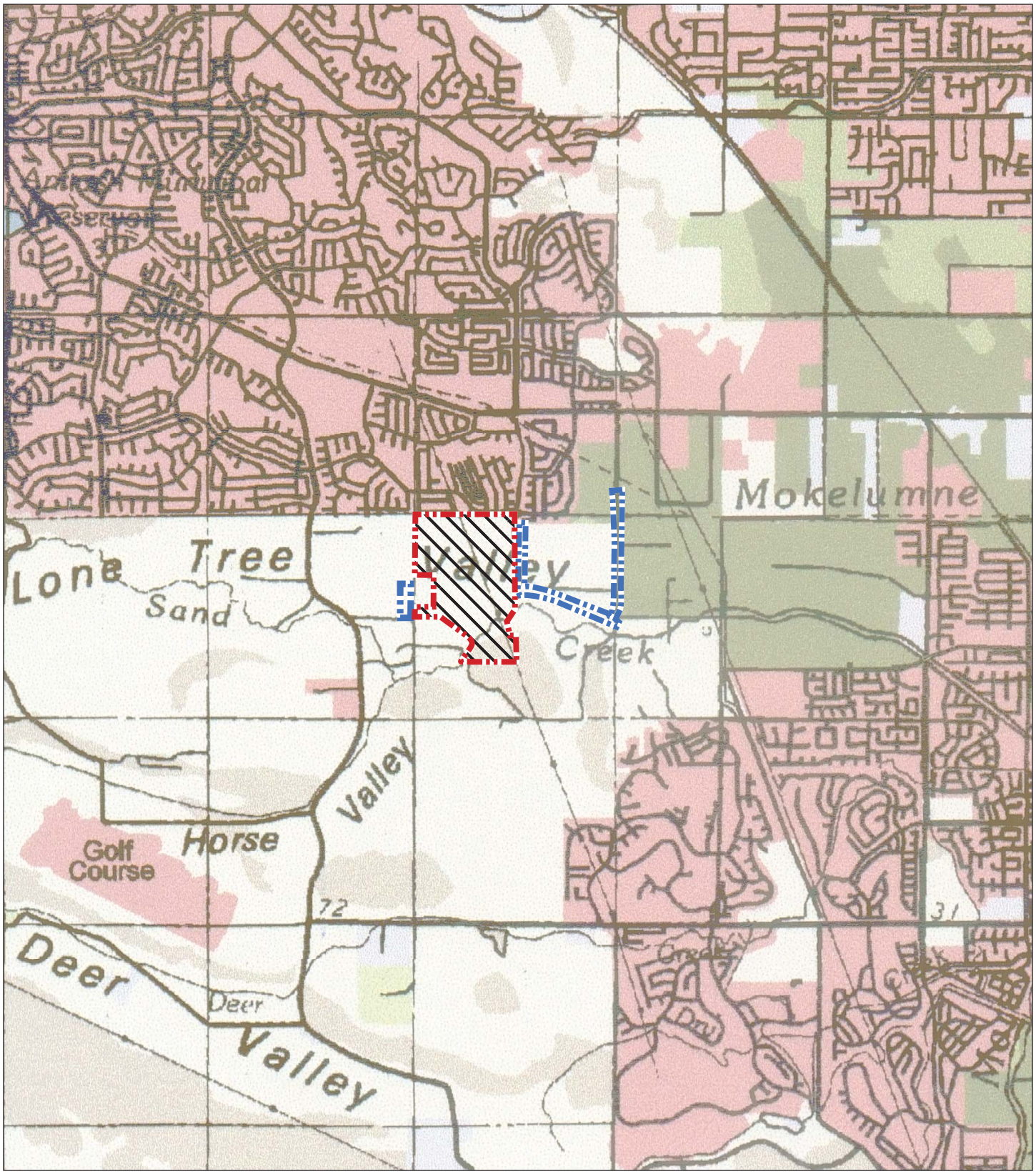
a. California Farmland Mapping and Monitoring Program. The California Department of Conservation's Division of Land Resource Protection established the State Farmland Mapping and Monitoring Program (FMMP) in 1982. The FMMP conducts comprehensive mapping of State farmland. The intent of the FMMP is to provide decision makers with information regarding State agricultural resources, including data on existing farmland, and farmland development trends. The

FMMP compiles maps depicting important farmland, based on United States Department of Agriculture soil surveys and other physical data, such as climate, growing season, and water supply.

(1) FMMP Categories. The FMMP divides land into seven categories, each of which is described below.

- *Prime Farmland*. Prime Farmland includes farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. In order to be classified as Prime Farmland, land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.
- *Farmland of Statewide Importance*. Farmland of Statewide Importance consists of farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. To be classified as Farmland of Statewide Importance, land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.
- *Unique Farmland*. Unique Farmland consists of farmland of lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land in this category must have been cropped at some time during the 4 years prior to the mapping date.
- *Farmland of Local Importance*. Farmland of Local Importance is classified as land of importance to the local agricultural economy, as determined by each county's board of supervisors and a local advisory committee. Contra Costa County Farmland of local importance is defined as: “the lands within the Tassajara area, extending eastward to the County boundary and bordered to the north by the Black Hills, the Deer, Lone Tree, and Briones Valleys, the Antioch area, and the Delta.” These lands are typically used for livestock grazing and are capable of producing dryland grain on a two year summer fallow or longer rotation. These lands typically lack irrigation water.
- *Grazing Land*. Grazing Land consists of land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit for Grazing Land is 40 acres.
- *Urban and Built-Up Land*. This mapping category includes land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.
- *Other Land*. Other Land includes land not included in any other mapping category. Common examples include of “other land” include that used for low density rural development; brush, timber, wetland, and riparian areas not suitable for livestock grazing; vacant and nonagricultural land surrounded on all sides by urban development; confined livestock, poultry or aquaculture facilities; strip mines, borrow pits; and water bodies smaller than 40 acres.

(2) FMMP Designations at and in the Vicinity of the Project Site. Figure IV.M-1 depicts existing farmland designations for the project site, off-site impact areas, and vicinity. The northern



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PRIME FARMLAND
FARMLAND OF STATEWIDE IMPORTANCE
UNIQUE FARMLAND
FARMLAND OF LOCAL IMPORTANCE
GRAZING LAND
URBAN & BUILT-UP LAND
OTHER LAND
WATER
PROJECT SITE
OFF-SITE IMPACT AREAS

FIGURE IV.M-1

Aviano Adult Community Project EIR

Important Farmland

SOURCE: CALIFORNIA DEPT. OF CONSERVATION, DIVISION OF LAND USE PROTECTION, SEPTEMBER 2005.

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Back of Color Figure IV.M-1

portion of the project site is designated as "Farmland of Local Importance" by the FMMP. The southern hillside portion of the project site, south of Sand Creek, is designated "Grazing Land."

Lands immediately to the north of the project site consist of the developed portions of the City and are designated "Urban and Built-up Land" by the FMMP. Lands bordering the site to the east, west, and south, including off-site impact areas are largely designated "Farmland of Local Importance," while hillside areas are designated as "Grazing Land." FMMP designated "Prime Farmlands" are located less than ½ mile east of the project site, west of Heidorn Ranch Road.

b. Williamson Act. The California Land Conservation Act of 1965 (Williamson Act) was passed by the Legislature in response to rapidly increasing agricultural land prices (and, by extension, property taxes) that were making it difficult for many farmers to remain in agriculture, along with a concern that prime agricultural land and open space was being irreplaceably lost to urban sprawl. This voluntary program allows property owners to have their property assessed on the basis of its agricultural production value rather than at the current market value. The property owner is thus relieved of having to pay higher property taxes, as long as the land remains in agricultural production. The purpose of the Act is to encourage property owners to continue to farm their land, and to prevent the premature conversion of farmland to urban uses.

Participation requires that the area consist of 100 contiguous acres of agricultural land under one or more ownerships. Land within an approved preserve is restricted to agricultural and compatible uses for 10 years. Williamson Act contracts are automatically renewed annually for an additional one-year period, unless the property owner applies for non-renewal or early cancellation. There are limited provisions for cancellation of contracts, specific findings regarding the non-viability of the agricultural use must be made, and a substantial penalty is assessed for the cancellation.

Lands under Williamson Act contract are typically concentrated within the County and are not usually located within Cities. The project site and surrounding areas are not currently or recently enrolled under a Williamson Act contract. The Ginochio/Nunn property located east of the project site and within the off-site impact area once held a Williamson Act contract. However, the City of Antioch filed a Notice of Non-Renewal for that property on September 27, 1993, and the contract terminated as of September 27, 2002.[1] Lands south of the project site, outside of the City limits, but within the Planning Area boundary are in non-renewal and will soon enter non-enrolled status.[2]

c. Surface Mining and Reclamation Act. The Surface Mining and Reclamation Act (SMARA) was enacted in 1975 to address the need for a continuing supply of mineral resources, and to prevent or minimize the negative impacts of surface mining to public health, property, and the environment. SMARA includes a process called "classification-designation." The purpose of this process is to provide local agencies with information about the location, need and importance of various mineral resources within their jurisdiction, and to ensure this information is used in local land use decisions.

[1] Mundie & Associates. 2003. Recirculated Draft Environmental Impact Report. Sand Creek Specific Plan, Antioch, California. Prepared by Mundie & Associates and the City of Antioch. September 19.

[2] California, State of, 2002. Department of Conservation, Division of Land Resource Protection. Contra Costa County Williamson Act Lands 2002. March 6.

3. Impacts and Mitigation Measures

The following section presents a discussion of the impacts related to agricultural and mineral resources that could result from implementation of the proposed project. The section begins with the criteria of significance, establishing the thresholds to determine whether an impact is significant. The latter part of this section presents the agricultural and mineral resource impacts from the proposed project and the recommended mitigation measures, if required. Impacts are delineated into separate categories based on their significance according to the criteria listed below: less-than-significant impacts, which do not require mitigation, and significant impacts, which do require mitigation.

a. Criteria of Significance. Development of the proposed project would result in a significant agricultural and mineral resources impact if it would:

- Convert to non-agricultural use Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on maps pursuant to the Farmland Mapping and Monitoring Program;
- Involve other changes in the existing environment that due to their location or nature result in the conversion of farmland to non-agricultural use;
- Conflict with existing zoning for agricultural use or a Williamson Act contract;
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State; or
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

b. Less-than-Significant Agricultural and Mineral Resources Impacts. Less-than-significant agricultural and mineral resource impacts of the proposed project are discussed below.

(1) Conversion of Farmland. The project site and off-site impact areas are not designated by the FMMP as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The FMMP designates the northern portion of the project site as “Farmland of Local Importance” while the southern hillside portion of the project site is designated as “Grazing Land.” The conversion of these lands to non-agricultural uses would not result in significant impacts to FMMP designated farmlands.

The project site is designated as Low Density Residential and Multiple Family Residential in the City’s General Plan. Adjacent off-site impact areas are designated Commercial/Open Space and Business Park in the General Plan. The General Plan anticipates the development of residential uses and associated infrastructure on the site and the loss of grazing area on the project site and the Royal Formosa/Chen property would not result in the conversion of active farmland to non-agricultural use.

The proposed project would provide infrastructure and roadway improvements on the Ginochio/Nunn property, which is currently in active agricultural production. Off-site improvements such as the widening of Hillcrest Avenue would permanently remove a 3-acre 112-foot wide area of farmland from active production. However, development of the future alignment of Hillcrest Avenue is anticipated by the General Plan, which designates this area for Business Park uses. The proposed project would also result in temporary disturbance to approximately 10 additional acres on this parcel.

Potentially significant impacts associated with temporary disturbance to agriculturally productive areas are discussed below, under "Significant Agricultural and Mineral Resources Impacts."

Lands to the south of the project are also in non-renewal status of their Williamson Act contracts and will soon enter non-enrolled status. The conversion of farmland to non-agricultural use has been envisioned for the Sand Creek Focus Area by the General Plan; therefore, the proposed project itself would not result in the permanent unanticipated conversion of adjacent farmland to non-agricultural use.

(2) Conflict with Agricultural Zoning or Williamson Act Contract. The project site and off-site impact areas are zoned (S) Study District on the Antioch Zoning Map and are not under a Williamson Act contract. Development of the proposed project would not conflict with existing zoning for agricultural use or a Williamson Act contract.

(3) Loss of Mineral Resources. Coal mining activities west of the site have been abandoned and no coal has been extracted in the area since the early 1900s. All oil and gas production wells within the vicinity of the project site have been plugged and abandoned and the Brentwood oil field is not currently in active production. The General Plan does not designate the project site as suitable for mineral resource extraction, but rather for residential uses. Development of the proposed project would not result in the loss of availability of a known mineral resource of value to the region or the State.

c. Significant Agricultural and Mineral Resources Impacts. Development of the proposed project would result in the following significant impact to agricultural resources. No significant impacts to mineral resources would occur as part of the proposed project.

<u>Impact AG-1</u>: Construction of sewer extension associated with the proposed project would temporarily disturb approximately 10 acres of agriculturally productive farmland on the Ginochio-Nunn property, within the adjacent off-site impact area. (S)

In addition to the 3 acres of permanently converted land on the Ginochio/Nunn parcel as part of the Hillcrest Road extension, an additional 10 acres of agriculturally productive farmland would be temporarily disturbed due to construction of the sewer extension within the future alignment of Sand Creek Road east across the Ginochio/Nunn property and north along the alignment of Heidorn Ranch Road. Within the Sand Creek Road alignment, an approximately 136-foot wide, 7.6 acre area would be disturbed for trenching and placement of the sewer line. Within the alignment of Heidorn Ranch Road, an approximately 112-foot wide, 2.3-acre area would be temporarily disturbed for these same activities. Upon completion of construction activities associated with the sewer extension agricultural activities may return to the disturbed areas of the project site. Implementation of the following mitigation measure would ensure that these temporary impacts to productive farmland are reduced to a less-than-significant level.

> <u>Mitigation Measure AG-1</u>: Under the direction and approval of the City, the project sponsor shall consult with adjacent property owners regarding construction of the sewer line extension through adjacent agriculturally productive parcels. Upon completion of the sewer line extension, the project sponsor shall re-till disturbed areas to restore the field to previous conditions. This shall occur prior to issuance of a certificate of occupancy for the proposed project. (LTS)

N. GLOBAL CLIMATE CHANGE

Increasing public awareness and general scientific consensus that global climate change is occurring have placed a new focus on the California Environmental Quality Act (CEQA) as a means to address a project's effects on greenhouse gas (GHG) emissions. This section evaluates the proposed project's potential effects on global climate change. CEQA requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects considered for approval. According to a recent letter from California's Office of the Attorney General [1] and other State guidance, global climate change can be considered an "effect on the environment" and an individual project's incremental contribution to global climate change can have a cumulatively considerable impact.

Cumulative impacts are the collective impacts of one or more past, present, or future projects, that when combined, result in adverse changes to the environment. Climate change is a global environmental problem in which: (a) any given development project contributes only a small portion of any net increase in GHGs and (b) global growth is continuing to contribute large amounts of GHGs across the globe. Therefore, this section addresses climate change primarily as a cumulative impact.

This section begins by providing general background information on climate change and meteorology. It then discusses the regulatory framework for global climate change, provides data on the existing global climate setting, and evaluates potential global climate-related emissions associated with the proposed project. Modeled project emissions are estimated based on the land uses proposed as part of the project, vehicle data, and project trip generation, among other variables. The section then evaluates the cumulative impact of the project by analyzing whether the project conflicts with or obstructs the implementation of greenhouse gas reduction measures under AB 32 or other State regulations.

1. Setting

The following discussion provides an overview of global climate change, its causes, and its potential effects. The regulatory framework relating to global climate change is also summarized.

a. Global Climate Change Background. A description of global climate change and its sources are provided below.

(1) Global Climate Change. Global climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans in recent decades. The Earth's average near-surface atmospheric temperature rose 0.6 ± 0.2° Celsius (°C) or 1.1 ± 0.4° Fahrenheit (°F) in the 20th century. The prevailing scientific opinion on climate change is that most of the warming observed over the last 50 years is attributable to human activities. The increased amounts of carbon dioxide (CO_2) and other GHGs are the primary causes of the human-induced component of warming. GHGs are released by the burning of fossil fuels, land clearing, agriculture, and other activities, and lead to an increase in the greenhouse effect.

[1] State of California, Department of Justice, 2008. Comment letter to the City of Concord re "Concord Community Reuse Plan Draft Environmental Impact Report – SCH #2007052094". August 8.

GHGs are present in the atmosphere naturally, are released by natural sources, or formed from secondary reactions taking place in the atmosphere. The six gases that are widely seen as the principal contributors to global climate change as follows:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF_6)

Over the last 200 years, humans have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere, and enhancing the natural greenhouse effect, which is believed to be causing global warming. While manmade GHGs include naturally-occurring GHGs such as CO_2, methane, and N_2O, some gases, like HFCs, PFCs, and SF_6, known collectively as chlorofluorocarbons (CFCs), are completely new to the atmosphere.

Some gases, such as water vapor, are short-lived in the atmosphere. Others remain in the atmosphere for significant periods of time, contributing to climate change in the long term. Water vapor is excluded from the list of GHGs above because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation. For the purposes of this EIR, the term “GHGs” will refer collectively to the above six gases only.

These gases vary considerably in terms of Global Warming Potential (GWP): the relative effectiveness of a gas to absorb infrared radiation, remain in the atmosphere, and contribute towards global warming. The GWP of each gas is measured relative to carbon dioxide, the most abundant GHG; thus, GHG emissions are typically measured in terms of pounds or tons of “CO_2 equivalents” (CO_2eq). Table IV.N-1 shows the GWPs for each type of GHG. For example, sulfur hexafluoride is 22,800 times more potent at contributing to global warming than carbon dioxide.

The following discussion summarizes the characteristics of the six GHGs listed above.

Carbon Dioxide (CO_2). In the atmosphere, carbon generally exists in its oxidized form, as CO_2. Natural sources of CO_2 include the respiration (breathing) of animals and plants, and evaporation from the oceans. Increased CO_2 concentrations in the atmosphere have been primarily linked to increased combustion of fossil fuels. Natural sources release approximately 150 billion tons of CO_2 each year, far outweighing the 7 billion tons of manmade emissions from fossil fuel burning, waste incineration, deforestation, and other manmade sources. Nevertheless, natural removal processes, such as photosynthesis by land- and ocean-dwelling plant species, cannot keep pace with this extra input of manmade CO_2, and consequently, the gas is building up in the atmosphere.

Fossil fuel combustion accounts for 98 percent of gross California CO_2 emissions. California's total CO_2 emissions from fossil fuel combustion in 2002 were 360 million metric tons of CO_2, which accounts for approximately 7 percent of the U.S. emissions from this source. The transportation sector

Table IV.N-1: Global Warming Potentials

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-year Time Horizon)
Carbon Dioxide	50-200	1
Methane	12	25
Nitrous Oxide	114	298
HFC-23	270	14,800
HFC-134a	14	1,430
HFC-152a	1.4	124
PFC: Tetrafluoromethane (CF_4)	50,000	7,390
PFC: Hexafluoromethane (C_2F_6)	10,000	12,200
Sulfur Hexafluoride (SF_6)	3,200	22,800

Source: IPCC, 2007. *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.

accounted for the largest portion of CO_2 emissions, with gasoline consumption making up the greatest portion of these emissions.

Methane (CH_4). Methane is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, termites, and oceans. Decomposition occurring in landfills accounts for the majority of human-generated CH_4 emissions in California and in the United States as a whole. Agricultural processes such as intestinal fermentation, manure management, and rice cultivation are also significant sources of CH_4 in California. Methane accounted for approximately 6 percent of gross climate change emissions (CO_2eq) in California in 2002. Total annual emissions of methane are approximately 500 million tons, with manmade emissions accounting for the majority. As with CO_2, the major removal process of atmospheric methane—chemical breakdown in the atmosphere—cannot keep pace with source emissions, and methane concentrations in the atmosphere are increasing.

Nitrous Oxide (N_2O). Nitrous oxide is a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion emit N_2O, and the quantity emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in California. Nitrous oxide emissions accounted for nearly 7 percent of climate change emissions (CO_2eq) in California in 2002.

Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6). HFCs are primarily used as substitutes for ozone-depleting substances regulated under the Montreal Protocol.[2] PFCs and SF_6 are generally emitted from various industrial processes including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting. There is no aluminum or magnesium production in California; however, the rapid growth in the semiconductor industry leads to greater use of PFCs. HFCs, PFCs, and SF_6 accounted for about 3.5 percent of gross climate change emissions (CO_2eq) in California in 2002.

[2] The Montreal Protocol is an international treaty that was approved on January 1, 1989, and was designated to project the ozone layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for ozone depletion.

As a result of the combined effects of the GHGs described above, climate studies indicate that California is likely to see a temperature increase of 3 to 4°F over the next century. Because primary GHGs have a long lifetime in the atmosphere, accumulate over time, and are generally well-mixed, their impact on the atmosphere is mostly independent of the point of emission.

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun
- Natural processes within the climate system (e.g., changes in ocean circulation and reduction in sunlight from the addition of GHGs and other gases to the atmosphere from volcanic eruptions)
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., from deforestation, reforestation, urbanization, and desertification)

The impact of anthropogenic activities on global climate change is readily apparent in the observational record. For example, surface temperature data show that 11 of the 12 years from 1995 to 2006 rank among the 12 warmest since 1850, the beginning of the instrumental record for global surface temperature. In addition, the atmospheric water vapor content has increased since at least the 1980s over land, sea, and in the upper atmosphere, consistent with the capacity of warmer air to hold more water vapor; ocean temperatures are warmer to depths of 3,000 feet; and a marked decline has occurred in mountain glaciers and snow pack in both hemispheres, and polar ice, and ice sheets in both the Arctic and Antarctic regions.

Air trapped by ice has been extracted from core samples taken from polar ice sheets to determine the global atmospheric variation of CO_2, CH_4 and N_2O, from before the start of industrialization (around 1750) to over 650,000 years ago. For that period, it was found that CO_2 concentrations ranged from 180 parts per million (ppm) to 300 ppm. For the period from around 1750 to the present, global CO_2 concentrations increased from a pre-industrialization period concentration of 280 ppm to 379 ppm in 2005, with the 2005 value far exceeding the upper end of the preindustrial period range.

The primary effect of global climate change has been a rise in the average global tropospheric[3] temperature of 0.2°C per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using 2000 emission rates shows that further warming could occur, which would induce further changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and California would include, but would not be limited to:

- The loss of sea ice and mountain snow pack, resulting in higher sea levels and higher sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures;
- Rise in global average sea level primarily due to thermal expansion and melting of glaciers and ice caps in the Greenland and Antarctic ice sheets;

[3] The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

- Changes in weather that include widespread changes in precipitation, ocean salinity, and wind patterns, and more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones;
- Decline of the Sierra snowpack, which accounts for approximately half of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years;
- Increase in the number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas of Los Angeles and the San Joaquin Valley by the end of the 21st century; and
- High potential for erosion of California's coastlines and seawater intrusion into the Delta and levee systems due to the rise in sea level.

(2) Emissions Inventories. An emissions inventory that identifies and quantifies the primary human-generated sources and sinks of GHGs is essential for addressing climate change. This section summarizes the latest information on global, United States, California, and local human-generated GHG emission inventories.

Global Emissions. Worldwide emissions of GHGs in 2004 were 30 billion tons of CO_2eq per year[4] (including both ongoing emissions from industrial and agricultural sources, but excluding emissions from land-use changes).

U.S. Emissions. In 2004, the United States emitted about 8 billion tons of CO_2eq or about 25 tons/year/person. Of the four major sectors nationwide — residential, commercial, industrial and transportation — transportation accounts for the highest fraction of GHG emissions (approximately 35 to 40 percent); these emissions are entirely generated from direct fossil fuel combustion.[5]

State of California Emissions. In 2004, California emitted approximately 480 million metric tons[6] of CO_2eq, or about 6 percent of the U.S. emissions. This large number is due primarily to the sheer size of California compared to other states. By contrast, California has the fourth lowest per-capita carbon dioxide emission rate from fossil fuel combustion in the country, due to the success of its energy-efficiency and renewable energy programs and commitments that have lowered the State's GHG emissions rate of growth by more than half of what it would have been otherwise.[7] Another factor that has reduced California's fuel use and GHG emissions is its mild climate compared to that of many other states.

[4] United Nations Framework Convention on Climate Change (UNFCCC), 2007. *Sum of Annex I and Non-Annex I Countries Without Counting Land-Use, Land-Use Change and Forestry (LULUCF). Predefined Queries: GHG total without LULUCF* (Annex I Parties). Bonn, Germany, http://unfccc.int/ghg_emissions_data/predefined_queries/items/3814.php, accessed May 2.

[5] US EPA, 2000. op. cit.

[6] A metric ton is equivalent to approximately 1.1 tons.

[7] California Energy Commission (CEC), 2007. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 - Final Staff Report, publication # CEC-600-2006-013-SF, Sacramento, CA, December 22, 2006; and January 23, 2007 update to that report.

The California EPA Climate Action Team stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO_2eq) were as follows:

- Carbon dioxide (CO_2) accounted for 83.3 percent;
- Methane (CH_4) accounted for 6.4 percent;
- Nitrous oxide (N_2O) accounted for 6.8 percent; and
- Fluorinated gases (HFCs, PFC, and SF_6) accounted for 3.5 percent.[8]

The California Air Resources Board estimates that transportation is the source of approximately 38 percent of the State's GHG emissions in 2004, followed by electricity generation (both in-State and out-of-State) at 25 percent, and industrial sources at 20 percent. Agriculture is the source of approximately 6 percent, as are residential and commercial activities.[9]

ARB is responsible for developing the California Greenhouse Gas Emission Inventory. This inventory accounts for all GHG emissions within the state of California and supports the AB 32 Climate Change Program. ARB's current GHG emission inventory is based on State-wide fuel use, processing, and activity data. These estimates are based on the actual amount of all fuels combusted in the State, which accounts for over 85 percent of the greenhouse gas emissions within California.

ARB staff has projected 2020 business-as-usual GHG emissions, which represent the emissions that would be expected to occur in the absence of any GHG reduction actions. ARB staff estimates the State-wide 2020 business-as-usual GHG emissions will be 596 million metric tons (MMT) of CO_2eq. Emission reductions that are projected to result from the recommended measures in the Draft Scoping Plan in support of the AB 32 Climate Change Program[10] total 169 MMT of CO_2eq, which would allow California to attain the 2020 emissions goal of 427 MMT of CO_2eq.

GHG emissions in 2020 from the transportation sector as a whole are expected to increase to 225.4 MMT of CO_2eq. The industrial sector consists of large stationary sources of GHG emissions and includes oil and gas production and refining facilities, cement plants, and large manufacturing facilities. Emissions for this sector are forecast to grow to 100.5 MMT of CO_2eq by 2020, an increase of approximately 5 percent from the average emissions level of 2002-2004. The commercial and residential sectors are expected to contribute 46.7 MMT of CO_2eq, or about 8 percent of the total State-wide GHG emissions in 2020.

Bay Area Emissions. In the Bay Area, fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of the Bay Area's GHG emissions, accounting for just over half of the Bay Area's 85 million tons of GHG emissions in 2002. Industrial and commercial sources were the second largest contributors of GHG emissions with about 25 percent of total emissions. Domestic sources (e.g., home water heaters, furnaces, etc.) account for about 11 percent of the Bay Area's GHG emissions, followed by power

[8] CalEPA, 2006b. op. cit.

[9] ARB. 2008. http://www.climatechange.ca.gov/inventory/index.html. September.

[10] See the regulatory context discussion below for more detail.

plants at 7 percent. Oil refining currently accounts for approximately 6 percent of the total Bay Area GHG emissions.[11]

As of September 2008, GHG emission inventories were not available for the City of Antioch

b. Regulatory Framework. The regulatory framework for GHG emissions and global climate change is discussed in this section.

(1) Federal Regulations. In February 2002, the United States government announced a comprehensive strategy to reduce the GHG intensity of the American economy by 18 percent over the 10-year period from 2002 to 2012. GHG intensity measures the ratio of GHG emissions to economic output. New and refined technologies offer great promise to reduce GHG emissions significantly. The federal government established the multi-agency Climate Change Technology Program (CCTP) in February 2002 to accelerate the development and deployment of key technologies.

In February 2002, the United States government also announced a climate change research initiative to focus on key remaining gaps in climate change science. To meet this goal, the federal multiagency Climate Change Science Program (CCSP) was established to investigate natural and human-induced changes in the Earth's global environmental system; to monitor, understand, and predict global change; and to provide a sound scientific basis for national and international decision-making. The CCTP works closely with CCSP to make further progress in understanding and addressing global climate change. The United States Environmental Protection Agency's (EPA's) primary role in CCSP is evaluating the potential consequences of climate variability and the effects on air quality, water quality, ecosystems, and human health in the United States.

Currently there are no adopted federal regulations to control global climate change. However, recent authority has been granted to the EPA that may change the voluntary approach taken under the current administration to address this issue. On April 2, 2007, the United States Supreme Court ruled that the EPA has the authority to regulate CO_2 emissions under the federal Clean Air Act (CAA).

Over a decade ago, most countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), to begin to consider what can be done to reduce global warming and to cope with the physical and socioeconomic effects of climate change. More recently, a number of nations have approved an addition to the treaty: the Kyoto Protocol, which has more powerful (and legally binding) measures.

Because it will affect virtually all major sectors of the economy, the Kyoto Protocol is considered to be the most far-reaching agreement on environment and sustainable development ever adopted. Most of the world's countries eventually agreed to the Protocol, but some nations (including the United States) chose not to ratify it. Following ratification by Russia, the Kyoto Protocol entered into force on February 16, 2005, for signatory nations.

As of July 2008, 182 countries have ratified the agreement. Participating nations are separated into Annex 1 countries (i.e., industrialized nations) and Non-Annex 1 countries (i.e., developing nations) that have different requirements for GHG reductions. The goal of the Protocol is to achieve overall

[11] BAAQMD, 2006. *Source Inventory of Bay Area Greenhouse Gas Emissions.* November.

emissions reduction targets for six GHGs by 2012. The six GHGs regulated under the Protocol are CO_2, CH_4, N_2O, sulfur hexafluoride, hydrofluorocarbons, and perfluoro-carbons. Each nation must reduce GHG emissions by a certain percentage below 1990 levels (e.g., 8 percent reduction for the European Union, 6 percent reduction for Japan). The average reduction target for nations participating in the Kyoto Protocol is approximately 5 percent below 1990 levels. Although the United States has not ratified the Protocol, on February 14, 2002, it established a goal of an 18 percent reduction in GHG emissions intensity by 2012. GHG intensity is the ratio of GHG emissions to economic output (i.e., gross domestic product).

(2) State Regulations. In 1967, the California Legislature passed the Mulford-Carrell Act, which combined two Department of Health bureaus, the Bureau of Air Sanitation and the Motor Vehicle Pollution Control Board, to establish the Air Resources Board (ARB). Since its formation, the ARB has worked with the public, the business sector, and local governments to find solutions to California's air pollution problems. The resulting State air quality standards set by the ARB continue to outpace the rest of the nation and have prompted the development of new antismog technology for industrial facilities and motor vehicles.

California's major initiatives for reducing GHG emissions are outlined in Assembly Bill 32 (AB 32), the "Global Warming Solutions Act," passed by the California State legislature on August 31, 2006, a 2005 Executive Order, and a 2004 ARB regulation to reduce passenger car GHG emissions. These efforts aim at reducing GHG emissions to 1990 levels by 2020, a reduction of approximately 25 percent, and then an 80 percent reduction below 1990 levels by 2050. The ARB has established the level of GHG emissions in 1990 at 427 million metric tons (MMT) of CO_2eq, therefore requiring a reduction of approximately 173 MMT of CO_2eq by 2020. The main strategies for attaining these reductions are outlined in the Scoping Plan, which when completed will include a range of GHG reduction actions that may include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system.

In June 2005, Governor Schwarzenegger established California's GHG emissions reduction targets in Executive Order S-3-05. The Executive Order established the following goals: GHG emissions should be reduced to 2000 levels by 2010; GHG emissions should be reduced to 1990 levels by 2020; and GHG emissions should be reduced to 80 percent below 1990 levels by 2050. On January 18, 2007, California further solidified its dedication to reducing GHGs by setting a new Low Carbon Fuel Standard for transportation fuels sold within the State. Executive Order S-1-07 sets a declining standard for GHG emissions measured in CO_2 equivalent gram per unit of fuel energy sold in California. The target of the Low Carbon Fuel Standard is to reduce the carbon intensity of California transportation fuels by at least 10 percent by 2020.

Pursuant to the requirements of AB 32, the State's reduction in GHG emissions will be accomplished through an enforceable State-wide cap on GHG emissions that will be phased-in starting in 2012. ARB must prepare a plan demonstrating how the 2020 deadline can be met by January 1, 2009, or earlier. However, as immediate progress in reducing GHGs can and should be made, AB 32 directed ARB and the newly created Climate Action Team (CAT) to identify a list of "discrete early action GHG reduction measures" that can be adopted and made enforceable by January 1, 2010. CAT is a consortium of representatives from State agencies who have been charged with coordinating and implementing GHG emission reduction programs that fall outside of ARB's jurisdiction.

In June 2007 ARB approved a list of 37 early action measures, including three discrete early action measures (Low Carbon Fuel Standard, Restrictions on High Global Warming Potential Refrigerants, and Landfill Methane Capture).[12] The ARB adopted additional early action measures in October 2007 that tripled the number of discrete early action measures, including truck efficiency, Port electrification, reduction of perfluorocarbons from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and sulfur hexafluoride (SF6) reductions from the non-electricity sector. The combination of early action measures is estimated to reduce State-wide GHG emissions by nearly 16 MMT.[13]

Specific policies included in the ARB's October 2007 Early Action Measure report that are relevant to the proposed project include[14]:

- *Cool Communities Program*. This program would develop research and real-world experience-based guidelines on actions that could be taken to reduce energy used for cooling, documenting options, costs, and benefits. The Cool Communities Program would be a non-regulatory voluntary program with a set of guidelines to be adopted to foster the establishment or transition to cool communities in California. Programs for cool roofs, cool pavements, and shade trees and urban forests would be considered by ARB for implementation.
- *Anti-Idling Enforcement*. ARB adopted a diesel particulate air toxic control measure in June 2004 to control idling of diesel-fueled commercial motor vehicles. Enforcement commenced the following year. This rule prohibits, with some exceptions, the idling of diesel-fueled commercial motor vehicles for more than 5 minutes, and applies to both trucks and buses greater than 10,000 lbs. gross vehicle weight.

As noted above, AB 32 requires ARB to prepare a Scoping Plan that contains the main strategies California will use to reduce the GHGs that cause climate change. In June 2008 ARB released an initial draft of the Scoping Plan, including energy efficiency measures.[15] According to the Draft Scoping Plan, reductions in GHGs could be achieved through enhancements to existing programs such as increased incentives, and even more stringent building codes and appliance efficiency standards. In addition, the use of solar water heaters can reduce natural gas use in homes and businesses. Buildings are the second largest contributor to California's GHG emissions. Green buildings offer a comprehensive approach to reducing GHG emissions that take into account multiple economic sectors including energy, water, waste, and transportation. Green buildings exceed minimum energy efficiency standards, decrease consumption of potable water, reduce solid waste during construction and operation, and incorporate sustainable and low-emitting materials that contribute to healthy indoor air quality.

To address GHG emission and global climate change in General Plans and CEQA documents, Senate Bill 97 (Chapter 185, 2007) requires the Governor's Office of Planning and Research (OPR) to develop CEQA guidelines on how to address global warming emissions and mitigate project-specific

[12] California Air Resources Board. 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. October.

[13] California Air Resources Board. 2007. "ARB approves tripling of early action measures required under AB 32". New Release 07-46. http://www.arb.ca.gov/newsrel/nr102507.htm. October 25.

[14] California Air Resources Board. 2007. Op. Cit.

[15] California Air Resources Board. 2008. *Climate Change Draft Scoping Plan: a framework for change*. June.

GHG. OPR is required to prepare, develop, and transmit these guidelines on or before July 1, 2009. Preliminary guidance released by OPR in June 2008 suggests that global climate change analyses in CEQA documents should be conducted for all projects that release GHGs, and that mitigation measures to reduce emissions should be incorporated into projects, to the extent feasible.

In a response to the transportation sector's significant contribution to California's CO_2 emissions, Assembly Bill 1493 (AB 1493, Pavley) was enacted on July 22, 2002. AB 1493 requires ARB to set GHG emission standards for passenger vehicles, light duty trucks, and other vehicles whose primary use is noncommercial personal transportation in the State manufactured in 2009 and all subsequent model years. In setting these standards, the ARB considered cost effectiveness, technological feasibility, and economic impacts. ARB adopted the standards in September 2004. When fully phased in, the near-term (2009 to 2012) standards would result in a reduction of approximately 22 percent in GHG emissions compared to the emissions from the 2002 fleet, while the midterm (2013 to 2016) standards would result in a reduction of approximately 30 percent. Some currently used technologies that achieve GHG reductions include small engines with superchargers, continuously variable transmissions, and hybrid electric drive. To set its own GHG emissions limits on motor vehicles, California must receive a waiver from the EPA. However, in December 2007, the EPA denied the request from California for the waiver. In January 2008, the California Attorney General filed a petition for review of the EPA's decision in the Ninth Circuit Court of Appeals; however, no decision on that petition has been published as of September 2008. Thus, California is at least temporarily frustrated in its attempt to implement AB 1493 at this time.

(3) Local Policies. The City's General Plan includes the following policies that relate to the topic of global climate change:

Resource Management Element

- *Air Quality Policy 10.6.2*: *Mobile Emissions (b)*: Require developers of large residential and non-residential projects to participate in programs and to take measures to improve traffic flow and/or reduce vehicle trips resulting in decreased vehicular emissions. Examples of such efforts may include, but are not limited to the following.
    - Development of mixed use projects, facilitating pedestrian and bicycle transportation and permitting consolidation of vehicular trips.
    - Installation of transit improvements and amenities, including dedicated bus turnouts and sufficient rights-of-way for transit movement, bus shelters, and pedestrian easy access to transit.
    - Provision of bicycle and pedestrian facilities, including bicycle lanes and pedestrian walkways connecting residential areas with neighborhood commercial centers, recreational facilities, schools, and other public areas.
    - Contributions for off-site mitigation for transit use.
    - Provision of charging stations for electric vehicles within large employment-generating and retail developments.
- *Air Quality Policy 10.6.2*: *Mobile Emissions (c)*: Budget for purchase of clean fuel vehicles, including electrical and hybrid vehicles where appropriate, and, if feasible, purchasing natural gas vehicles as diesel powered vehicles are replaced.
- *Air Quality Policy 10.6.2*: *Mobile Emissions (d)*: Support and facilitate employer-based trip reduction programs by recognizing such programs in environmental mitigation measures for traffic and air quality impacts where their ongoing implementation can be ensured, and their effectiveness can be monitored.

2. Impacts and Mitigation Measures

This section evaluates impacts to global climate change that could result from implementation of the proposed project. The evaluation of environmental effects presented in this section focuses on potential climate change impacts associated with the project's increase in GHG emissions. Mitigation measures are proposed as appropriate.

There is no CEQA statute, regulation, or judicial decision that requires an EIR to analyze the GHG emissions of a project, or whether a project will have a significant impact on global warming. Senate Bill 97 directs OPR to develop CEQA Guidelines to address GHG emissions, and to adopt these Guidelines by January 1, 2010. OPR has not issued any formal regulations as of September 2008.

However, OPR did issue informal guidance in the form of a Technical Advisory in June 2008 on how to address climate change through CEQA review. The recommended approach for GHG analysis included in OPR's June 2008 release is to (1) identify and quantify GHG emissions, (2) assess the significance of the impact on climate change, and (3) if significant, identify alternatives and/or mitigation measures to reduce the impact below significance.[16] Neither the CEQA statute nor Guidelines prescribe thresholds of significance or a particular methodology for performing an impact analysis, and no State agency or local air quality management district has issued any regulations or standards of significance for the analysis of GHGs under CEQA; as with most environmental topics, significance criteria are left to the judgment and discretion of the lead agency.

a. Criteria of Significance. Land use projects may contribute to the phenomenon of global climate change in ways that would be experienced worldwide, and with some specific effects felt in California. However, no scientific study has established a direct causal link between individual land use project impacts and global warming. AB 32 requires State-wide GHG emissions to be reduced to 1990 levels by 2020. Although these State-wide reductions are now mandated by law, no generally applicable GHG emission threshold has yet been established, nor is formal regulatory agency guidance on global climate change analysis in CEQA documents anticipated to be available until mid-2009.

CEQA Guidelines Section 15064(b) provides that the "determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data," and further, states that an "ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

Some policy makers and regulators suggest that a zero emissions threshold would be appropriate when evaluating GHGs and their potential effect on climate change. However, most feel that such an absolute threshold would be analytically impractical and would interfere with the ability of the economy to function. Further, prior CEQA case law makes clear that the "one additional molecule" rule is not consistent with CEQA.[17] Such a rule also appears inconsistent with the State's approach to mitigation of climate change impacts. AB 32 does not prohibit all new GHG emissions; rather, it requires a

[16] California, State of, 2008. Governor's Office of Planning and Research. *CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*. June 19.

[17] Communities for a Better Environment v. California Resources Agency, 103 Cal. App. 4th 98. 2002

reduction in State-wide emissions to a given level. Thus, AB 32 recognizes that GHG emissions will continue to occur; increases will result from certain activities, but reductions must occur elsewhere.

Bearing in mind that CEQA does not require "perfection" but instead "adequacy, completeness, and a good faith effort at full disclosure," the analysis below is based on methodologies and information available to the City at the time the study was prepared. Estimation of GHG emissions in the future does not account for all changes in technology that may reduce such emissions; therefore, the estimates are based on past performance and represent a scenario that is worse than that which is likely to be encountered (after energy-efficient technologies have been implemented). Additionally, as explained in greater detail below, many uncertainties exist regarding the precise relationship between specific levels of GHG emissions and the ultimate impact on the global climate. Significant uncertainties also exist regarding potential mitigation strategies. Thus, while information is presented below to assist the public and the City's decision makers in understanding the project's potential contribution to global climate change impacts, the information available to the City is not sufficiently detailed to allow a direct comparison between particular project characteristics and particular climate change impacts, nor between any particular proposed mitigation measure and any reduction in climate change impacts.

Because no applicable numeric thresholds have yet been defined, and because the precise causal link between an individual project's emissions and global climate change has not been developed, it is reasonable to conclude that an individual development project cannot generate a high enough quantity of GHG emissions to affect global climate change. However, individual projects incrementally contribute toward the potential for global climate change on a cumulative basis in concert with all other past, present, and reasonably foreseeable future projects. This analysis identifies qualitative factors to determine whether the project's emissions should be considered cumulatively significant. Until the City or other regulatory agency devises a generally applicable climate change threshold, the analysis used in this study may or may not be applicable to other City projects.

This report analyzes whether the project would make a cumulatively significant contribution to the impact of global climate change under the following qualitative standard:

- The proposed project would result in a significant global climate change impact if it would conflict with or obstruct the implementation of GHG reduction goals under AB 32 or other State regulations.

If a project implements reduction strategies identified in AB 32, the Governor's Executive Order S-3-05, or other strategies to assist in reducing GHGs to the level proposed by the Governor, it could reasonably follow that the project would not result in a significant contribution to the cumulative impact of global climate change.

b. Less-than-Significant Global Climate Change Impacts. The project would result in the following less-than-significant global climate change impacts.

(1) Impacts to the Proposed Project from Global Climate Change. Local temperatures could increase in time as a result of global climate change, with or without development as envisioned by the project. This increase in temperature could lead to other climate effects including, but not limited to, increased flooding due to increased precipitation and runoff, and a reduction in the Sierra snowpack. Based on the analysis contained in Section IV.G Hydrology and Storm Drainage of this

report, the project site is not located in an area that would be subject to coastal or other flooding resulting from climate change, therefore the potential effects of climate change (e.g., effects of flooding on the project site due to sea level rise) on the proposed project would not be significant.

c. Significant Global Climate Change Impacts. The project would result in the following significant global climate change impacts.

Impact GCC-1: Implementation of the project could result in greenhouse gas emission levels that would conflict with implementation of the greenhouse gas reduction goals under AB 32 or other State regulations. (S)

(1) Project-Related Greenhouse Gas Emissions Sources. GHG emissions estimates are provided herein for informational purposes only, as there is no established quantified GHG emissions threshold. Construction and operation of project development would generate GHG emissions, with the majority of energy consumption (and associated generation of GHG emissions) occurring during the project's operation (as opposed to its construction). Typically, more than 80 percent of the total energy consumption takes place during the use of buildings and less than 20 percent is consumed during construction.[18] As of yet, there is no study that quantitatively assesses all of the GHG emissions associated with each phase of the construction and use of an individual development.

Overall, the following activities associated with the proposed project could contribute to the generation of GHG emissions:

- **Removal of Vegetation:** The net removal of vegetation for construction results in a loss of the carbon sequestration in plants. However, planting of additional vegetation would result in additional carbon sequestration and lower the carbon footprint of the project.
- **Construction Activities:** Construction equipment typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as CO_2, CH_4, and N_2O. Furthermore, CH_4 is emitted during the fueling of heavy equipment.
- **Gas, Electric and Water Use:** Natural gas use results in the emissions of two GHGs: CH_4 (the major component of natural gas) and CO_2 from the combustion of natural gas. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy intensive. Preliminary estimates indicate that the total energy used to pump and treat this water exceeds 6.5 percent of the total electricity used in the State per year.[19]
- **Solid Waste Disposal:** Solid waste disposal contributes to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the waste and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is 21 times more potent a GHG than CO_2. However, landfill CH_4 can also be a source of energy. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere.

[18] United Nations Environment Programme (UNEP), 2007. *Buildings and Climate Change: Status, Challenges and Opportunities*, Paris, France.

[19] California Energy Commission (CEC), 2004. *Water Energy Use in California* (online information sheet) Sacramento, CA, August 24, http://energy.ca.gov/pier/iaw/industry/water.html, accessed July 24, 2007.

- **Motor Vehicle Use:** Transportation associated with the proposed project would result in GHG emissions from the combustion of fossil fuels in daily automobile and truck trips.

GHG emissions associated with the project would occur over the short term from construction activities, consisting primarily of emissions from equipment exhaust. There would also be long-term regional emissions associated with project-related vehicular trips and stationary source emissions such as natural gas used for heating. Preliminary guidance from OPR and recent letters from the Attorney General critical of CEQA documents that have taken different approaches indicate that lead agencies should calculate, or estimate, emissions from vehicular traffic, energy consumption, water conveyance and treatment, waste generation, and construction activities. The calculation presented below includes construction emissions in terms of CO_2, and annual CO_2eq GHG emissions from increased energy consumption, water usage, solid waste disposal, as well as estimated GHG emissions from vehicular traffic that would result from implementation of the project.

GHG emissions generated by the proposed project would predominantly consist of CO_2. In comparison to criteria air pollutants (see Section IV.C. Air Quality), such as ozone and PM_{10}, CO_2 emissions persist in the atmosphere for a substantially longer period of time. While emissions of other GHGs, such as CH_4, are important with respect to global climate change, emission levels of other GHGs are less dependent on the land use and circulation patterns associated with the proposed land use development project than are levels of CO_2.

(2) Construction Impacts. Construction activities produce combustion emissions from various sources such as site grading, utility engines, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, asphalt paving, and motor vehicles transporting the construction crew. Exhaust emissions from on-site construction activities would vary daily as construction activity levels change.

It is anticipated that development of the project site would require site grading and preparation. Construction is anticipated to begin in 2010 and be completed in 2012. The only GHG with well-studied emissions characteristics and published emissions factors for construction equipment is CO_2. Using the URBEMIS 2007 model, it is estimated the average daily CO_2 emissions associated with construction equipment exhaust for the proposed project would be approximately 900 tons per year, with total project construction-related CO_2 emissions of 1,821 tons. Model output sheets are included in Appendix C.

The project would be required to implement the construction exhaust control measures listed in Mitigation Measure AIR-1 of Section IV.C, including minimization of construction equipment idling, proper engine tuning and exhaust controls, and the use of alternatively powered construction equipment when feasible. All of these measures would reduce GHG emissions during the construction period. To further reduce GHG emissions impacts, specifically those associated with construction waste generation and vehicle miles traveled for delivery of materials and products to the project site, the following mitigation measure shall be implemented:

> Mitigation Measure GCC-1a: To the extent feasible and to the satisfaction of the City, the following measures shall be incorporated into the design and construction of the project:

- Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled;
- Reuse and/or recycle at least 50 percent (as calculated by weight or volume) of non-hazardous construction debris (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard);
- Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site, unless use of such products are demonstrated to the satisfaction of the City to be infeasible. (LTS)

Implementation of this mitigation measure, and Mitigation Measure AIR-1, would reduce construction period GHG emissions impacts to a less-than-significant level.

Architectural coatings used in construction of the specific project projects may contain volatile organic compounds (VOCs) that are similar to reactive organic gases (ROG) and are part of ozone precursors. However, there are no significant emissions of GHGs from architectural coatings.

(3) Operational Impacts. Long-term operation of the proposed project would generate GHG emissions from area and mobile sources, and indirect emissions from stationary sources associated with energy consumption. Mobile-source emissions of GHGs would include project-generated vehicle trips associated with residential trips, and visitor and delivery vehicle trips to the project site. Area-source emissions would be associated with activities such as landscaping and maintenance of proposed land uses, natural gas for heating, and other sources. Increases in stationary source emissions would also occur at off-site utility providers as a result of demand for electricity, natural gas, and water by the proposed uses.

The project GHG emission estimates are presented in Table IV.N-2. Each of the project GHG emission calculation assumptions and generation rates are described below.

Table IV.N-2: Long-Term Project Operational Emissions of GHGs

Emission Source	Emissions (tons per year)			
	CO_2	CH_4	N_2O	CO_2eq
Vehicles	4,345	0.23	0.42	4,500
Electricity Production	1,900	0.02	0.011	1,900
Natural Gas Combustion	1,568	0.011	0.01	1,600
Solid Waste	N/A	N/A	N/A	117
Total Annual Emissions	7,800	0.26	0.44	8,100

Source: LSA Associates, Inc., September 2008.

Energy and Natural Gas Use. Buildings represent 39 percent of U.S. primary energy use and 70 percent of electricity consumption.[20] The proposed project would increase the demand for electricity and natural gas due to the construction of up to 535 new single-family residences and a 4-acre recreational facility. The project's electricity usage rates are based on the Energy Information

[20] United States Department of Energy. 2003. *Buildings Energy Data Book.*

Administration, Office of Energy Markets and End Use, Forms EIA-457 A-G of the 2001 Residential Energy Consumption Survey. The electricity production GHG emissions factors are based on the Energy Information Administration, Updated State-level Greenhouse Gas Emission Coefficients for Electricity Generation.[21] The project would indirectly result in increased GHG emissions from off-site electricity generation at power plants (approximately 1,900 tons of CO_2eq/year).

project natural gas usage rates were calculated based on the Energy Information Administration database for average household use.[22] The natural gas combustion GHG emissions factors are based on the EPA's Compilation of Air Pollutant Emission Factors Volume I.[23] The project would result in increased GHG emissions from on-site natural gas combustion of approximately 1,600 tons of CO_2eq/year.

Water Use. Water-related energy use consumes 19 percent of California's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year.[24] Energy use and related GHG emissions are based on water supply and conveyance, water treatment, water distribution, and wastewater treatment. project-related estimates of water usage are based on the water supply assessment report prepared for the project.[25] Water use is projected to be approximately 22,499 acre-feet per year.

Solid Waste Disposal. The proposed project would also generate solid waste during the operation phase of the project. As previously described in Chapter IV.K Utilities and Infrastructure, the California Integrated Waste Management Board (CIWMB) estimates an average single-family residence produces approximately 10 pounds of solid waste per day. The new residential land uses of up to 535 units would generate approximately 2.7 tons per day of solid waste. To determine the net GHG emissions from landfilling, the CO_2eq emissions from CH_4 generation, carbon storage (treated as negative emissions), and transportation CO_2 emissions were considered.

Mobile Sources. Mobile sources (vehicle trips and associated miles traveled) would be the largest emission source of GHGs associated with the proposed project. Transportation is also the largest source of GHG emissions in California and represents approximately 38 percent of annual CO_2 emissions generated in the State. Like most land use development projects, vehicle miles traveled (VMT) is the most direct indicator of CO_2 emissions from the proposed project and associated CO_2 emissions function as the best indicator of total GHG emissions. The proposed project would generate an estimated 2,975 daily trips.

As shown in Table IV.N-2, the proposed project would generate up to 8,100 tons of CO_2eq per year of new emissions. This is less than 0.0015 percent of the State's total emissions in 2004. The emissions from vehicle exhaust comprise approximately 56 percent of the project's total CO_2eq emissions. The emissions from vehicle exhaust are controlled by the State and federal governments and

[21] Energy Information Administration, 2002. Updated State-level Greenhouse Gas Emission Coefficients for Electricity Generation. April. http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/e-supdoc.pdf

[22] Energy Information Administration, 2001. Table CE1-12c. Total Energy Consumption in U.S. Households by West Census Region. http://www.eia.doe.gov/emeu/recs/recs2001/detailcetbls.html

[23] EPA, 1998. AP-42 Volume I, Chapter 1.4, Table 1.4-2. http://www.epa.gov/ttn/chief/ap42/ch01/index.html

[24] California, State of, 2005. California Energy Commission. California's Water-Energy Relationship. November.

[25] Brown and Caldwell, 2008. Final Water Supply Assessment for Aviano Adult Community project. February.

are outside the control of the City. However, the emissions from project-related vehicles would be reduced by implementation of the strategies summarized in Table IV.N-3 and Mitigation Measure GCC-1b including the Transportation Demand Management (TDM) program strategies.

The remaining 44 percent of the CO_2eq emissions are primarily associated with building heating systems and increased regional power plant electricity generation due to the project's electrical demands. The project would comply with existing State and federal regulations regarding the energy efficiency of buildings, appliances, and lighting, which would reduce the project's electricity demand. However, in the absence of supplementary mitigation measures, the project would still obstruct the implementation of GHG reduction goals under AB 32.

The California Environmental Protection Agency Climate Action Team (CAT) and the California Air Resources Board (ARB) have developed several reports to achieve the Governor's GHG targets that rely on voluntary actions of California businesses, local government and community groups, and State incentive and regulatory programs. These include the CAT's 2006 "*Report to Governor Schwarzenegger and the Legislature*," ARB's 2007 "*Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California*," and ARB's "*Climate Change Draft Scoping Plan: a Framework for Change.*" These reports identify strategies to reduce California's emissions to the levels proposed in Executive Order S-3-05 and AB 32 that are applicable to proposed project. The strategies that apply to the project are contained in Table IV.N-3, which summarizes the extent to which the project complies with the strategies to help California reach the emission reduction targets.

The strategies listed in Table IV.N-3 are either part of the project, required mitigation measures, or requirements under local or State ordinances. In order to ensure that the proposed project complies and would not conflict with or impede implementation of reduction goals identified in AB 32, the Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor, the following mitigation measure shall be implemented as part of the project. Many of the individual elements of this measure are already included as part of the proposed project or are required as part of project-specific mitigation measures recommended throughout this EIR.

> Mitigation Measure GCC-1b: To the extent feasible and to the satisfaction of the City, the following measures shall be incorporated into the design and construction of the project:
>
> ***Energy Efficiency Measures***
>
> - Design all project buildings to exceed California Building Code's Title 24 energy standard, including, but not limited to any combination of the following:
> - Increase insulation to exceed minimum code requirements so that heat transfer and thermal bridging is minimized;
> - Construct all units to achieve the Home Energy Rating System (HERS)[26] certification to minimize energy consumption by constructing "tight" building envelopes and HVAC systems;
> - Install only *EnergyStar*™ or better rated space heating and cooling equipment, appliances or other applicable electrical equipment;

[26] For more information see the California Energy Commission website: http://www.energy.ca.gov/HERS/.

- Install *EnergyStar*™ approved lighting and lighting control systems and use daylight as an integral part of lighting systems in buildings; and
- Install only *EnergyStar*™ approved or better Low-E windows.

- Provide a landscape and development plan for the project that takes advantage of shade, prevailing winds, and landscaping;
- Install light colored "cool" roofs and pavements;
- Install solar powered or light emitting diodes (LED) outdoor lighting systems.

Water Conservation and Efficiency Measures

- Devise a comprehensive water conservation strategy appropriate for the project and location. The strategy may include the following, plus other appropriate innovative measures:
  - Create water-efficient landscapes within the development (i.e., through the use of drought tolerant vegetation);
  - Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls;
  - Use reclaimed water for landscape irrigation within the project. Install the infrastructure to deliver and use reclaimed water;
  - Install water-efficient fixtures and appliances including low-flow faucets and shower heads and dual-flush toilets in all buildings; and
  - Restrict watering methods (e.g., prohibit systems that apply water to non-vegetated surfaces) and control runoff.

Solid Waste Measures

- Provide adequate recycling containers in all public areas of the project.

Transportation and Motor Vehicle Measures

- Provide transit facilities (e.g., bus bulbs/turnouts, benches, shelters);
- Provide bicycle lanes and/or paths, incorporated into the proposed street systems and connected to a community-wide network;
- Provide sidewalks and/or paths, connected to adjacent land uses, transit stops, and/or community-wide network;
- Size parking capacity to not exceed the City's zoning requirements; and
- To the extent feasible, provide infrastructure and support programs to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle service to mass transit.[27] (LTS)

[27] Based on U.S. Green Building Council, LEED, 2005. *Green Building Rating System for New Construction & Major Renovations. Version 2.2.* October.

Table IV.N-3: Project Compliance with Greenhouse Gas Emission Reduction Strategies

Strategy	Project Compliance
Energy Efficiency Measures	
Building Energy Efficiency Standards in Place and in Progress.[28] Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing buildings). **Energy Efficiency**.[29] Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts. Reductions could be achieved through enhancements to existing programs such as increased incentives and even more stringent building codes and appliance efficiency standards.	**Compliant with Mitigation Incorporated.** The proposed project would not only comply with but would exceed the updated Title 24 standards for building construction through installation of low-emittance (Low-E) coated windows; *EnergyStar*™ rated appliances, and high efficiency air conditioners, water heaters, and furnaces. In addition, the project would be required to comply with the requirements of Mitigation Measure GCC-1b, identified below, including measures to incorporate additional energy efficient building design features.
Appliance Energy Efficiency Standards in Place and in Progress.[30] Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its appliance energy efficiency standards (that apply to devices and equipment using energy that are sold or offered for sale in California).	**Compliant.** All appliances installed as part of the project will be *EnergyStar*™ rated appliances.
Water Conservation and Efficiency Measures	
Water Use Efficiency.[31] Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce GHG emissions.	**Compliant with Mitigation Incorporated.** All landscaping within the project will be irrigated with automatic sprinklers; and a majority of landscaping vegetation will be drought tolerant. Low-flow water fixtures will be used for all shower heads, toilets, and faucets. In addition, the project would be required to comply with the requirements of Mitigation Measure GCC-1b, identified below, including measures to increase water use efficiency.
Solid Waste Reduction Measures	
Increase Waste Diversion, Composting, and Commercial Recycling, and Move Toward Zero-Waste. Increase waste diversion from landfills beyond the 50 percent mandate to provide for additional recovery of recyclable materials. Composting and commercial recycling could have substantial GHG reduction benefits. In the long term, zero-waste policies that would require manufacturers to design products to be fully recyclable may be necessary.	**Compliant with Mitigation Incorporated.** The proposed project would be required to comply with Mitigation Measure GCC-1, identified above, and Mitigation Measure GCC-1b identified below, including measures to increase solid waste diversion, composting, and recycling.

[28] California Environmental Protection Agency. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

[29] California Air Resources Board. 2008. *Climate Change Draft Scoping Plan: a framework for change.* June.

[30] California Environmental Protection Agency. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

[31] Ibid.

Table IV.N-3 *Continued*

Strategy	Project Compliance
Transportation and Motor Vehicle Measures	
Vehicle Climate Change Standards.[32] AB 1493 (Pavley) required the State to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles and light duty trucks. Regulations were adopted by the ARB in September 2004. **Light-Duty Vehicle Efficiency Measures.** Implement additional measures that could reduce light-duty GHG emissions. For example, measures to ensure that tires are properly inflated can both reduce GHG emissions and improve fuel efficiency. **Adopt Heavy- and Medium-Duty Fuel and Engine Efficiency Measures**. Regulations to require retrofits to improve the fuel efficiency of heavy-duty trucks that could include devices that reduce aerodynamic drag and rolling resistance. This measure could also include hybridization of and increased engine efficiency of vehicles. **Low Carbon Fuel Standard.**[33] ARB identified this measure as a Discrete Early Action Measure. This measure would reduce the carbon intensity of California's transportation fuels by at least 10% by 2020.	**Compliant.** The project does not involve the manufacture, sale, or purchase of vehicles. However, vehicles that operate within and access the project site would comply with any vehicle and fuel standards that the ARB adopts.
Measures to Improve Transportation Energy Efficiency.[34] Builds on current efforts to provide a framework for expanded and new initiatives, including incentives, tools, and information that advance cleaner transportation and reduce greenhouse gas emissions.	**Compliant with Mitigation Incorporated.** The proposed project would be required to comply with Mitigation Measure GCC-1, indicated above, and Mitigation Measure GCC-1b, indicated below, including measures to reduce vehicle miles traveled during construction and operation of the project.
Measures to Reduce High Global Warming Potential (GWP) Gases. ARB has identified Discrete Early Action measures to reduce GHG emissions from the refrigerants used in car air conditioners, semiconductor manufacturing, and consumer products. ARB has also identified potential reduction opportunities for future commercial and industrial refrigeration, changing the refrigerants used in auto air conditioning systems, and ensuring that existing car air conditioning systems do not leak**.**	**Compliant.** Products used, sold, or serviced in the project site would be comply with current and future ARB rules and regulations.

[32] Ibid.

[33] California Air Resources Board. 2008. Op. Cit.

[34] Ibid.

Table IV.N-3 *Continued*

Strategy	Project Compliance
Anti-Idling Enforcement.[35] ARB adopted a diesel particulate air toxic control measure in June 2004 to control idling of diesel-fueled commercial motor vehicles. Enforcement commenced the following year. This rule prohibits, with some exceptions, the idling of diesel-fueled commercial motor vehicles for more than 5 minutes, and applies to both trucks and buses greater than 10,000 lbs. gross vehicle weight.	**Compliant.** Vehicles that access the site would comply with all anti-idling regulations, including ARB's limits on diesel-fueled commercial motor vehicle idling. In addition, the proposed project must comply with Mitigation Measure AIR-1, of Section IV.C of this report, which limits idling of construction equipment, requires exhaust control measures and the use of alternative powered construction equipment.

Source: LSA Associates, Inc., 2008.

With implementation of these strategies/measures, the project's contribution to cumulative GHG emissions would be reduced to a less-than-significant level. In addition, the project would also be subject to all applicable regulatory requirements, which would also reduce the GHG emissions of the project. After implementation of Mitigation Measures GCC-1 and GCC-1b, and application of regulatory requirements, the project would implement appropriate GHG reduction strategies and not conflict with or impede implementation of reduction goals identified in AB 32, the Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor. Therefore, the project's incremental contribution to global climate change impacts would be less than significant.

[35] Ibid.

IV. SETTING, IMPACTS AND MITIGATION MEASURES

This chapter contains an analysis of each issue that has been identified through preliminary environmental analysis for the Aviano Adult Community Project, and, as such, comprises the major portion of the Draft EIR. Sections A through N of this chapter describe the environmental setting of the project as it relates to each specific environmental issue evaluated in the EIR and the impacts resulting from implementation of the project. Proposed mitigation measures to reduce potential impacts are recommended where appropriate.

DETERMINATION OF SIGNIFICANCE

Under CEQA, a significant effect is defined as a substantial, or potentially substantial, adverse change in the environment.[1] The guidelines implementing CEQA direct that this determination be based on best available scientific and factual data. Each impact and mitigation measure section of this chapter is prefaced by a summary of criteria of significance.

1. Issues Addressed In the Draft EIR

The following environmental issues are addressed in this chapter:

A. Land Use and Planning Policy
B. Transportation and Circulation
C. Air Quality
D. Noise
E. Cultural and Paleontological Resources
F. Geology, Soils and Seismicity
G. Hydrology and Storm Drainage
H. Public Health and Safety
I. Biological Resources
J. Public Services
K. Utilities and Infrastructure
L. Visual Resources
M. Agriculture and Mineral Resources
N. Global Climate Change

2. Format of Issue Sections

Each environmental topic considered in this chapter is comprised of two primary sections: (1) setting, and (2) impacts and mitigation measures. An overview of the general organization and the information provided in the two sections is provided below:

[1] Public Resources Code 21068.

- *Setting*. The setting section for each environmental topic generally provides a description of the existing physical conditions on for the project site and its surroundings at the beginning of the environmental review process (e.g., existing land uses, existing soil conditions, existing traffic conditions). An overview of regulatory considerations that are applicable to each specific environmental topic is also provided.
- *Impacts and Mitigation Measures*. The impacts and mitigation measures section for each environmental topic presents a discussion of the impacts that could result from implementation of the proposed project. The section begins with the criteria of significance, establishing the thresholds to determine whether an impact is significant. The latter part of the section presents the impacts from the proposed project and mitigation measures, if required. The impacts of the proposed project are organized into separate categories based on their significance according to the criteria listed in each topical section: less-than-significant impacts, which do not require mitigation measures, and significant impacts, which do require mitigation measures.

Significant impacts are numbered and shown in bold type, and the corresponding mitigation measures are numbered and indented. Impacts and mitigation measures are numbered consecutively within each topic and begin with an acronymic reference to the impact section (e.g., LU, for Land Use). The following acronyms are used for individual topics:

LU:	Land Use and Planning Policy
TRANS:	Transportation and Circulation
AIR:	Air Quality
NOISE:	Noise
CULT:	Cultural and Paleontological Resources
GEO:	Geology, Soils and Seismicity
HYD:	Hydrology and Storm Drainage
HAZ:	Public Health and Safety
BIO:	Biological Resources
PUB:	Public Services
UTIL:	Utilities and Infrastructure
VIS:	Visual Resources
AG:	Agriculture and Mineral Resources
GCC:	Global Climate Change

As discussed above, all impacts are evaluated according to the significance criteria: less-than-significant impacts (LTS), which do not require mitigation measures; significant impacts (S), which do require mitigation measures; and significant and unavoidable (SU) which cannot be mitigated. These notations are provided following each impact and each mitigation measure to identify their significance before and after mitigation.

V. ALTERNATIVES

The *CEQA Guidelines* require the analysis of a range of reasonable alternatives to the project, or its location, which would feasibly attain most of the project's basic objectives and avoid or substantially lessen any of the significant effects of the project. The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice.[1] CEQA states that an EIR should not consider alternatives "whose effect cannot be ascertained and whose implementation is remote and speculative."

This chapter is divided into three sections. The first section briefly describes the principal characteristics of the two alternatives considered in this section (i.e., the CEQA-required No Project alternative and the Reduced Density alternative) and provides a qualitative comparison to the project. The second section provides a brief discussion concerning alternatives that were considered but rejected. The last section discusses the environmentally-superior alternative as required by CEQA.

The proposed project and the project objectives are described in detail in Chapter III, Project Description, and the potential environmental effects of implementing the proposed project are analyzed in Chapter IV, Settings, Impacts and Mitigation Measures. The analysis concludes that while no significant impacts from the project alone remain after implementation of the recommended mitigation measures, the project would result in one cumulative, significant unavoidable impact. The one cumulative significant unavoidable impact is loss of habitat for the burrowing owl (refer to discussion of cumulative impacts in Section VI, CEQA-Required Assessment Conclusions).

The alternatives discussion is provided to meet the requirements of the *CEQA Guidelines* and provide the public and decision makers with information that will help them understand the adverse impacts and benefits associated with two potential alternatives to the proposed project.

The following project objectives are listed in Chapter III, Project Description, and are repeated here to set the framework for the Alternatives discussion.

- To maximize the opportunity for development of housing for a regionally under-supplied market segment, allowing active adults to appropriately size their homes to suit their life-stage needs.
- To increase the City of Antioch's available housing stock to address regional needs while creating minimal new burdens on existing roadways and circulation systems and school facilities.
- To construct temporary and permanent infrastructure and utilities to the new medically-focused Dozier Libbey Medical High School.
- To provide for various infrastructure improvements that would benefit the community, including public roadway improvements to serve the new Dozier Libbey Medical High School as well as other portions of the Sand Creek Focus Area, utilities within those roadways, and drainage facilities to appropriately collect and convey storm water runoff to new detention basins.

[1] *CEQA Guidelines*, 2008, Section 15126.6.

- To create, preserve, and maintain open space and critical biological habitat on- and off-site so as to responsibly address the environmental sensitivity of the site.
- To expand existing public park facilities, including extending such facilities into the new community, thus providing expanded recreational opportunities for both existing and new residents.
- To extend public pedestrian trails through the site with connections between existing residential communities, new open space amenities including preserved areas of Sand Creek, and planned City facilities, including the Sports Complex.
- To contribute to the economic and social viability of the region by adding residents that tend to shop locally, maintain high volunteerism, and travel less frequently during peak traffic hours.
- To create an economically viable project that provides a fair share contribution of infrastructure to the community through payment of fees, and/or land based financing, and/or construction of required capital improvements, while providing a well-designed community of the type and style desired by current and future active adult citizens of Antioch and the greater Bay Area.

A. ALTERNATIVES TO THE PROJECT

This section analyzes the following two alternatives:

- The **No Project alternative** assumes the proposed project would not be built, but that another project would be built in accordance with the existing General Plan land use designations for the project site.
- The **Reduced Density alternative** assumes the number of units in the proposed project would be reduced to avoid wetland habitat areas north of Sand Creek.

A comparison of the build out characteristics of each alternative to the proposed project is provided in Table V-1. A description and an analysis of the anticipated environmental impacts of each alternative are provided in the following paragraphs. The emphasis of the analysis is on the alternative's relative adverse effects compared to the proposed project and a determination of whether or not the alternative would reduce, eliminate, create similar, or create new significant impacts.

Table V-1: Alternative Buildout Scenarios

	Development (Units/Sq. ft.)
Proposed Project	Up to 535 units
Alternative #1 - No Project	802 units 130,680 sq. ft.
Alternative #2 – Reduced Density	356 units

Source: LSA Associates, 2008.

1. No Project Alternative

The principal characteristics of the No Project alternative and analysis of the potential environmental impacts associated with this alternative, as compared to the proposed project, are provided in this section.

a. Principal Characteristics. Under the No Project alternative, the existing General Plan designations would apply to the project site and it would not develop as an age-restricted adult community. Table V-2 shows the existing General Plan land use designations for the site, the on-site acreage for each designation, and permitted uses.

Table V-2: No Project Alternative Buildout

General Plan Land Use Category/DU per Acre	Acres on Project Site/ Buildout (units or square feet)	Permitted Uses
Hillside, Estate and Executive Residential Open Space (1-2 du/acre)	36 acres/54 units	Large lot residential (minimum .50 acre), semi-rural in character, clustered on flat portions in hillside areas
Low Density Residential (4 du/acre)	137 acres/548 units	Single-family homes in traditional subdivisions
Multi-Family Residential (up to 20 du/acre)	10 acres/200 units	Small lot single family, mobile homes, townhouses, garden apartments, multi-story apartments, condominiums, mixed use with ground floor commercial
Public/Quasi-Public (max FAR of 50 percent)	6 acres/130,680 sq. ft.	Public/private schools and colleges, public corporation yards, libraries, fire stations, police stations, water treatment facilities, animal shelters, public and private museums churches, and governmental offices
Total Buildout	**802 units/130,680 sq. ft.**	

Source: LSA Associates, Inc., 2008; Pulte Homes, 2008.

The site is zoned (S) Study District, which is intended as an interim designation until all necessary detailed land use studies are completed for a given area. Assuming the buildout ratios of the General Plan designations, and no open space set aside, 802 units and 130,680 square feet of non-residential development could be constructed on the project site under the No Project alternative. This development scenario would result in a higher intensity of development than the proposed project. However, if the area south of Sand Creek were set aside as open space, as in the proposed project, 548 units and no nonresidential square footage would result. However, the 'worst case' scenario was examined for the No Project alternative in this EIR. Access to the No Project alternative is assumed to be the same as the proposed project (i.e. from the future extension of both Hillcrest Avenue and Sand Creek Road).

The No Project alternative would result in a higher level of development on the site than the proposed project. It would permit development in areas of the site that under the proposed project are set aside as open space. These additional development areas are between the proposed Sand Creek Road and Sand Creek, and south of Sand Creek.

The No Project alternative would not achieve the following three (of nine) stated project objectives:

- To maximize the opportunity for development of housing for active adults.
- To contribute to the economic and social viability of the region by adding residents that tend to shop locally, maintain high volunteerism, and travel less frequently during peak traffic hours.
- To create, preserve, and maintain open space and critical biological habitat on- and off-site so as to responsibly address the environmental sensitivity of the site.

The Development Agreement would also need to be amended to reflect the additional units allowed under this alternative.

b. Analysis of the No Project Alternative. The potential impacts of the No Project alternative are described below.

(1) Land Use and Planning Policy. Implementation of the No Project alternative assumes the site would develop according to its General Plan designations, resulting in a mix of residential and public/institutional uses. This alternative could place development in areas set aside as open space under the proposed project, namely the area between the proposed Sand Creek Road and Sand Creek, and south of Sand Creek. Depending on the placement of development in these areas it could conflict with General Plan policies related to protection of sensitive habitat areas. Unless mitigated, this would result in a significant land use/planning impact. Mitigation would likely consist of reducing development in these areas to ensure protection of habitat along Sand Creek, thus reducing the potentially significant impact to less-than-significant. Similar to the proposed project, the No Project alternative would not have a significant effect on population and housing in that it would not induce substantial population growth in an area not planned for such growth, or displace persons as none presently reside on the site.

(2) Transportation and Circulation. Implementation of this alternative would increase traffic above levels generated by the proposed project. Trip generation rates for typical residential development are substantially higher than that for adult communities. As discussed in Section IV.B of this EIR, AM and PM peak hour trip generation rates for the proposed project are 0.29 and 0.34, respectively. For typical single-family development it is 0.75 and 1.01 respectively, for multi-family development it is 0.51 and 0.62 respectively and for public/quasi-public uses it varies based on the use.[2] Given assumed generation rates, it is estimated that the No Project alternative would generate about 1,298 AM peak hour trips and 2,153 PM peak hour trips, versus the proposed project, which would generate 155 AM peak hour trips and 182 PM peak hour trips. The No Project Alternative would have 737 percent more trips during the AM peak and 1,080 percent more trips during the PM peak than the proposed project. Given the higher trip generation rates, the No Project alternative would have a significantly greater impact on the area's roadway network versus the proposed project.

The traffic analysis for the proposed project indicates that under the Near-Term (2011) scenario without the project all study intersections will operate at acceptable levels. Under the Cumulative 2025 scenario without the proposed project, six intersections would not operate at acceptable levels. The addition of project traffic would cause no intersections in the Near Term and no additional intersections under Cumulative conditions to not operate at acceptable levels. It is expected that the No Project alternative would have a greater impact to the overall street network, and potentially cause a significant impact to the following intersections:

- Lone Tree Way/Deer Valley Road
- Hillcrest Avenue/Lone Tree Way
- Heidorn Ranch Road/Lone Tree Way
- CanadaValley Road/Lone Tree Way

[2] For purposes of calculating trip generation for the No Project alternative specific land uses within the overall category of public/quasi-public were identified. A satellite library and government office were selected as conservative yet reasonable land uses to expect within the context of existing and future residential development in the project area. The AM and PM peak hour trip generation is 1.06 and 7.09 for the library and 5.88 and 11.03 for the government office building, respectively.

- SR-4 Bypass SB Ramps/Lone Tree Way
- SR-4 Bypass NB Ramps/Lone Tree Way
- SR-4 Bypass SB Ramps/Sand Creek Road

This could create impacts in both the near-term and long-term since the No Project alternative generates substantially more trips than the proposed project. The mitigations identified for the proposed project would partially offset the impacts but additional mitigations would likely be required to fully mitigate the additional impacts.

(3) Air Quality. Implementation of the No Project alternative would result in increased construction activity on the project site and as such, would require mitigation for dust, exhaust and organic emissions. As with the proposed project, this impact would be mitigated to a less-than-significant level by implementation of measures to control dust production and fugitive dust. The No Project alternative would generate substantially more vehicular trips than the proposed project. As shown in Table V-3, the resulting regional emissions (CO, ROG, NOx and PM_{10}) would exceed the Bay Area Air Quality Management District's significance criteria and result in a significant and unavoidable (SU) impact. The model results summaries are provided in Appendix D. The No Project alternative would be consistent with the existing General Plan, and therefore would not conflict with the Bay Area 2005 Ozone Strategy.

Table V-3: Project Regional Emissions in Pounds Per Day

	Reactive Organic Gases	Nitrogen Oxides	PM_{10}
Regional Emissions	269.34	187.44	285.15
BAAQMD Significance Threshold	80	80	80
Exceed?	**Yes**	**Yes**	**Yes**

Source: LSA Associates, Inc., October 2008.

(4) Noise. Construction activity would take place as part of the No Project alternative and existing residents to the north would be exposed to short-term increases in noise levels. However, construction noise impacts would be similar to those under the proposed project, and could be mitigated to a less-than-significant level with implementation of the mitigation measure identified in Section IV.D, Noise. Given the substantially greater number of vehicle trips generated by the No Project alternative it would contribute a greater increase to off-site noise impacts than the proposed project. However, as discussed in the Section IV.D, Noise, existing and future residents would be exposed to excessive roadway noise generated by near-term and cumulative development without development of the project site. The mitigation measure proposed in Section IV.D would reduce this impact to a less-than-significant level.

(5) Cultural and Paleontological Resources. As with the proposed project, the No Project alternative could disrupt known and undiscovered archeological or paleontological resources, and/or human remains. The mitigation measures recommended in Section IV.E for the proposed project would reduce these potentially significant impacts to a less-than-significant level.

(6) Geology, Soils and Seismicity. The potential adverse effects related to geology and seismicity would generally be similar for the No Project alternative. Development under the No Project alternative would not be subject to or contribute to on- or off-site fault rupture, liquefaction or lateral spreading, nor would it result in the loss of a known mineral resource. As with most development in the San Francisco Bay Area, it would be subject to seismically induced ground shaking. Given project site soils, it would also be subject to differential settlement, expansive/

corrosive soils or unstable soils due to improperly abandoned oil or gas wells. These potential impacts would be mitigated to a less-than-significant level with the mitigation measures contained in Section IV.F, Geology, Soils and Seismicity.

(7) Hydrology and Storm Drainage. Similar to the proposed project, the No Project alternative is not within any mapped dam failure inundation zones, or subject to coastal hazards such as extreme high tides, tsunami, or sea level rise. It also would not deplete groundwater supplies. Based on the General Plan designations, the No Project alternative could locate development within the 100-year flood plain along Sand Creek. However, this potential impact could be mitigated to a less-than-significant level by avoiding this area and/or designing any structures to accommodate 100-year flows. The No Project alternative would generate more impervious surface runoff than the proposed project but would have similar construction-related water quality impacts. Implementation of the mitigation measures recommended in Section IV.G, Hydrology and Storm Drainage, would reduce these impacts to a less-than-significant level.

(8) Public Health and Safety. Similar to the proposed project, the No Project alternative could result in several potential hazardous situations: exposure of construction workers and future residents to hazardous materials from historic oil and gas exploration; exposure of future open space recreational users to hazardous materials and corrosives that may be present in Sand Creek; creation of safety hazards for construction workers during development of the project; and exposure of construction workers, the public, and the environment to inadvertent releases of hazardous materials used during construction. As with the proposed project, implementation of the mitigations recommended in Section IV.H, Public Health and Safety would reduce these potential impacts to a less-than-significant level.

(9) Biological Resources. The No Project alternative could have greater effects on biological resources than the proposed project because the physical extent of urban development could be larger than the proposed building envelope. As discussed under Land Use, the General Plan designates areas of the project site north of Sand Creek (but south of Sand Creek Road) and south of Sand Creek for development, but the proposed project designates those areas for detention basins and open space. According to the biological analysis, the area north of Sand Creek supports approximately 149 acres of suitable habitat for listed grassland and vernal pool species (vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamanders, and San Joaquin kit fox). The buffer area north of Sand Creek and the open space area south of Sand Creek support another approximately 37 acres[3] of grassland as well as ordinance-size trees. If development were to occur in these areas, it could result in additional impacts to ordinance-size trees and to grassland habitats, which under the proposed project would be avoided. The grassland habitat south of Sand Creek is known to support at least one special status animal species, the burrowing owl, and one special-status plant species, the round-leaved filaree.

The mitigation measures proposed in Section IV.I Biological Resources, which are designed to reduce potential impacts under the proposed project, would need to be expanded to address additional impacts to biological resources that would occur as a result of the No Project alternative. Full development of the project site under this scenario would result in elimination of an additional

[3] Includes open space (29.7 acres), creek buffer area (4.7 acres) and south access road temporary impact area (2.5 acres).

37acres of open space immediately surrounding and south of Sand Creek, with commensurate elimination of additional burrowing owl habitat and possible destruction of a special-status plant species. Mitigation for this additional loss could include reducing or excluding development from the open space area south of Sand Creek and purchasing additional off-site mitigation lands. Implementation of such measures would reduce potential impacts to a less-than-significant level. However cumulative loss of burrowing owl habitat would remain as a significant unavoidable impact.

(10) Public Services. The No Project alternative would have greater public service demands than the proposed project including an increased demand on parks/recreation facilities. The current ratio of parkland to residents in Antioch is 3 acres per 1,000 residents, which is below the General Plan objective of 5 acres per 1,000 residents. However the No Project alternative would be required to either provide additional on-site park facilities or pay a larger in-lieu park fee, which would mitigate potential significant impacts to a less-than-significant level. The mitigation measure in Section IV.J, Public Services that addresses adequate fire protection would also be required for the No Project alternative, resulting in a less-than-significant impact.

(11) Utilities and Infrastructure. The No Project alternative would generate greater demands on the urban infrastructure (wastewater, water, electricity, gas and telecommunications). No serious deficiencies were found in any of these systems under the proposed project, and adequate capacity would be available to serve the No Project alternative. As with the proposed project, the No Project alternative would not result in any significant impacts related to utilities and no mitigation measures would be required.

(12) Visual Resources. Under the No Project alternative, additional areas of the site could be developed, versus being left in their natural state under the proposed project. The visual impact of developing the proposed project was found to have a less-than-significant effect. Expanding development south of Sand Creek Road would alter the view shown in Figure IV.L-2 by extending development (with associated light and glare) further south and on both sides of Sand Creek. This would substantially diminish the rural character of this portion of the project site, which would remain in its natural state under the proposed project. However, given that the surrounding areas are designated for development in the Antioch General Plan, this would be a short-term visual impact. With appropriate site design, the impact could be mitigated to a less-than-significant level.

(13) Agricultural and Mineral Resources. The No Project alternative, like the proposed project, would not cause the conversion of any farmland of significance, would not conflict with agricultural zoning or Williamson Act Contracts, and would not result in the loss of any mineral resources. As with the proposed project, the No Project alternative would not result in any significant impacts related to agricultural/mineral resources and no mitigation measures would be required.

(14) Global Climate Change. Similar to the proposed project, the No Project alternative would generate greenhouse gas emissions, although to a slightly greater extent than the proposed project. The No Project alternative would result in the removal of vegetation; construction activities; gas, electric, and water usage; solid waste disposal; and increased vehicle trips. Both construction and operational emissions associated with the No Project alternative could be reduced to a less-than-significant level with implementation of the mitigation measures recommended in Section IV.N, Global Climate Change.

2. Reduced Density Alternative

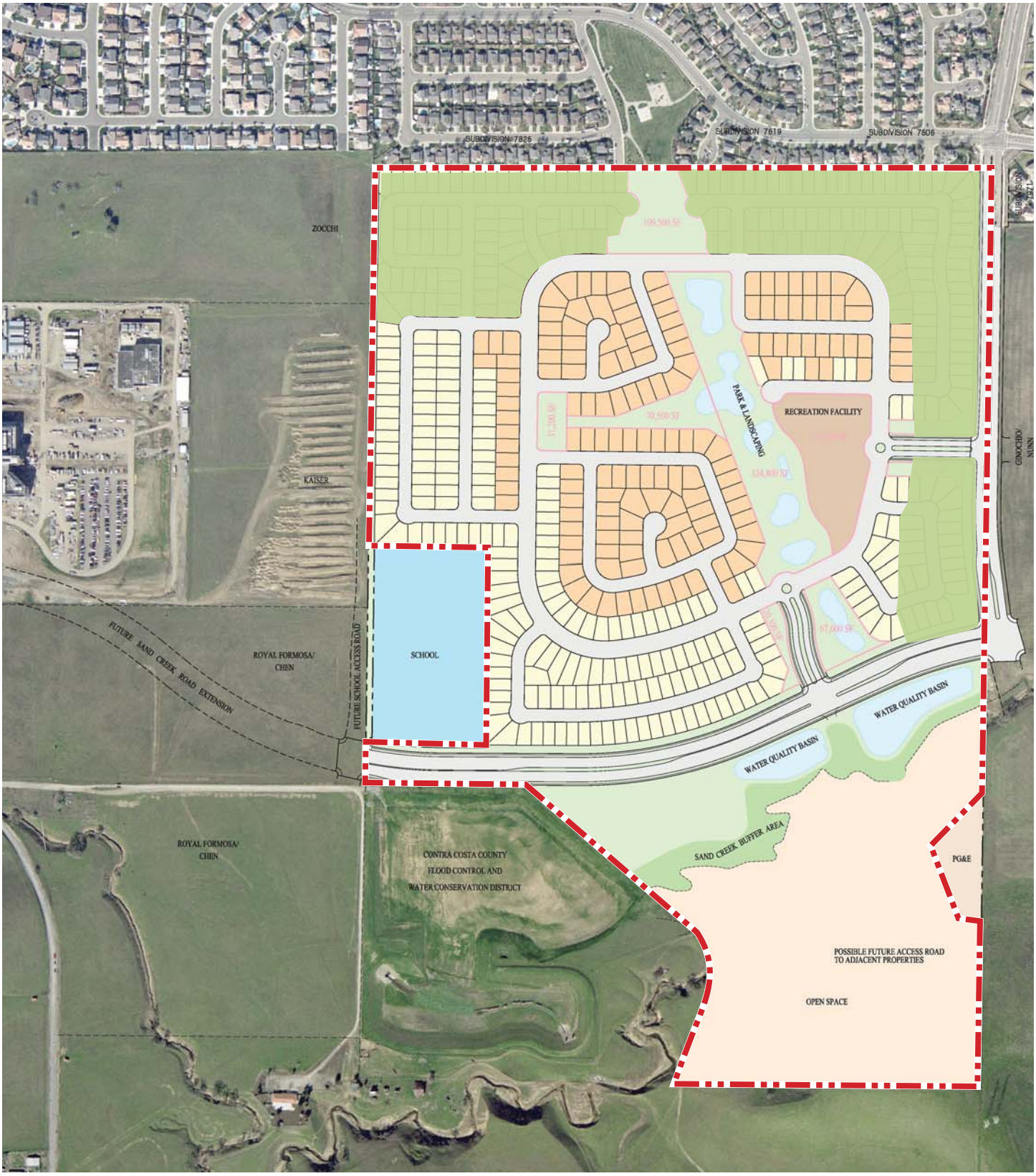
The principal characteristics of the Reduced Density alternative and analysis of the potential environmental impacts associated with this alternative, as compared to the proposed project, are provided in this section.

a. Principal Characteristics. Under the Reduced Density alternative, three of the four seasonal wetlands and the detention channel in the northern half of the site, which potentially could be inhabited/used by special-status species, would be preserved as open space, rather than developed as part of the project. This would result in retention of approximately 1.1 acres of on-site seasonal wetlands and the detention channel. The southernmost wetland area under this scenario would not be preserved and off-site mitigation would be required for this loss (refer to Figure IV.I-1 for location of the wetlands and detention channel). To facilitate the function of the preserved areas biologically and hydrologically, additional acreage would be preserved so that the four areas (the three seasonal wetlands and the detention channel) would be interconnected. Similar to the proposed project, the southern half of the site would be preserved as open space/habitat except for the north/south access road and the two detention basins. The net effect of the Reduced Density alternative would be a reduction in the total number of units by 179 units (from 535 units to 356 units). Refer to Figure V-1 for the conceptual site layout.

The Reduced Density alternative would develop at approximately 2 dwelling units per gross acre versus the project at 2.8 units per gross acre. Similar to the proposed project, lots would range from 5,000 to 6,000 square feet in size, houses would be one story in height, and most of the project amenities would be retained including the 4.8-acre recreation center, the 2.5 acre park extension, the greenway/detention basins within the PG&E easement, as well as landscaping and pathways. As with the proposed project, the remainder of the site south of Sand Creek Road (approximately 37 acres) would be preserved as open space. Although this alternative would generally meet the most of the objectives listed for the proposed project it would not fulfill some of the objectives to the same extent as the proposed project. With respect to the first two project objectives, the reduced number of units would not increase the City's housing stock or maximize the development potential of the site to the same extent as the proposed project, and as such, this alternative would only partially fulfill the economic and social objectives of the project. In addition, the existing Development Agreement would need to be amended to reflect the reduced number of units allowed under this alternative.

b. Analysis of the Reduced Density Alternative. The potential impacts of the Reduced Density alternative are described below.

(1) Land Use and Planning Policy. Implementation of the Reduced Density alternative assumes the site would develop with fewer units than the proposed project (356 versus up to 535), would be age-restricted, and would result in more open space on the northern half of the site, which would preserve potential habitat for special-status species. Similar to the proposed project, this alternative would not divide or disrupt an established community and would be compatible with adjacent land uses. The alternative would provide additional buffering between existing homes to the north and a greater setback from Hillcrest Avenue. The alternative would have similar conflicts with the General Plan in that the development would be exclusively residential versus the General Plan vision for a mix of residential and non-residential uses. General Plan goals to preserve and maintain sensitive habitat areas would be met to a greater degree with the Reduced Density alternative



LSA

FIGURE V-1

N

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FEET

PROJECT SITE

WETLAND HABITAT
PRESERVATION AREA

Aviano Adult Community Project EIR

Reduced Density Alternative

SOURCE: PULTE HOMES, APRIL 9, 2008; LSA ASSOCIATES, INC., 2008.

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Back of V-1

compared to the proposed project. However, overall this alternative would be subject to the same General Plan policy inconsistencies as the proposed project.

(2) Transportation and Circulation. Implementation of this alternative would decrease traffic below levels generated by the proposed project. This assumes the reduced project would build out as an age-restricted/adult community. These types of developments have a lower trip generation rate than a typical single family project. As discussed in Section IV.B, Transportation and Circulation AM and PM peak hour trip generation rates for the proposed project are 0.29 and 0.34, respectively. Given these generation rates, it is estimated that the Reduced Density alternative would generate about 104 AM peak hour trips and 121 PM peak hour trips, versus the proposed project, which would generate 155 AM peak hour trips and 182 PM peak hour trips. The Reduced Density alternative would have 33 percent fewer trips during the AM and PM peak than the proposed project. Given similar driving characteristics between the project and the Reduced Density alternative, it is expected that the latter would have slightly less impact on the area's roadway network versus the proposed project.

All of the study intersections would operate at acceptable levels of service in the Near-Term Condition with implementation of either the proposed project or Reduced Density alternative. As indicated in Table IV.B-7, the proposed project would generally have a small incremental effect on v/c ratio but would not change the level of service at any intersection. The analysis also found that all of the proposed project traffic could be accommodated at the Lone Tree Way/Hillcrest Avenue intersection before Sand Creek is extended west from the AUSD Medical High School to Deer Valley Road. The Reduced Density alternative would, therefore, have a less-than-significant effect on all of the study intersections in the Near Term (2011) condition.

In the Cumulative scenario, six study intersections would operate at an unacceptable level of service whether the project site developed or not. The proposed project would have an impact at two of those study intersections (Hillcrest Avenue/Lone Tree Way and SR-4 Bypass SB Ramps/Lone Tree Way) by increasing the volume-to-capacity ratio. Although the Reduced Density alternative would result in 33 percent fewer AM and PM peak hour trips, that reduction would not be sufficient to eliminate this impact. However, the mitigations called for in Section IV.B, Transportation and Circulation would fully mitigate those impacts to a less-than-significant level.

(3) Air Quality. Implementation of the Reduced Density alternative would result in similar construction activity on the project site as the proposed project, and as such, would require mitigation for dust, exhaust and organic emissions. As with the proposed project, this impact would be mitigated to a less-than-significant level by implementation of measures to control exhaust emissions and fugitive dust. The Reduced Density alternative would generate fewer vehicular trips than the proposed project, which was found to not exceed the Bay Area Air Quality Management District's significance criteria. Although the Reduced Density alternative would not be consistent with the existing General Plan, given that it will generate less traffic than the proposed project, is not expected to conflict with the Bay Area 2005 Ozone Strategy.

(4) Noise. Construction activity would take place as part of the Reduced Density alternative and existing residents to the north would be exposed to short-term increases in noise levels. Construction noise impacts would be similar to those under the proposed project, and could be mitigated to a less-than-significant level with implementation of the mitigation measure identified in Section IV.D,

Noise. Under the Reduced Density alternative the first row of homes would be setback approximately 250 feet west of Hillcrest Avenue. However the increased distance would not avoid the need for a sound-barrier wall, similar to that required for the proposed project, though it might be lower in height. As with the proposed project, this impact would be mitigated to a less-than-significant level with installation of a sound-barrier wall along Hillcrest Avenue.

(5) Cultural and Paleontological Resources. As with the proposed project, the Reduced Density alternative could disrupt known and undiscovered archeological or paleontological resources, and/or human remains. The mitigation measures recommended in Section IV.E, Cultural and Paleontological Resources for the proposed project would reduce these potentially significant impacts to a less-than-significant level.

(6) Geology, Soils and Seismicity. The potential adverse effects related to geology and seismicity would generally be similar for the Reduced Density alternative. Development under the Reduced Density alternative would not be subject to or contribute to on- or off-site fault rupture, liquefaction or lateral spreading, nor would it result in the loss of a known mineral resource. As with most development in the San Francisco Bay Area, it would be subject to seismically induced ground shaking. Given project site soils, it would also be subject to differential settlement, expansive/ corrosive soils or unstable soils due to improperly abandoned oil or gas wells. These potential impacts would be mitigated to a less-than-significant level with the mitigation measures contained in Section IV.F, Geology, Soils and Seismicity.

(7) Hydrology and Storm Drainage. Similar to the proposed project, the Reduced Density alternative is not within any mapped dam failure inundation zones, or subject to coastal hazards such as extreme high tides, tsunami, or sea level rise. It also would not deplete groundwater supplies. The Reduced Density alternative would generate less impervious surface runoff than the proposed project but would have similar construction-related water quality impacts. Implementation of the recommended mitigation measures in Section IV.G, Hydrology and Storm Drainage, would reduce these impacts to a less-than-significant level.

(8) Public Health and Safety. Similar to the proposed project, the Reduced Density alternative could result in several potential hazardous situations: exposure of construction workers and future residents to hazardous materials from historic oil and gas exploration; exposure of future open space recreational users to hazardous materials and corrosives that may be present in Sand Creek; creation of safety hazards for construction workers during development of the project; and exposure of construction workers, the public, and the environment to inadvertent releases of hazardous materials used during construction. As with the proposed project, implementation of the mitigations recommended in Section IV.H, Public Health and Safety would reduce these potential impacts to a less-than-significant level.

(9) Biological Resources. Compared to the proposed project, the Reduced Density alternative would cause fewer impacts to on-site wetland resources. This alternative reconfigures the project layout to avoid the three seasonal wetlands in the northern portion of the site and the detention channel on the eastern side of the site. Additional lands are also preserved so that these four areas are interconnected biologically and hydrologically, thus increasing their viability as habitat for special status species.

Under the Reduced Density alternative, impacts to the area south of Sand Creek Road would be the same as the proposed project. This area would continue to be retained as open space with the exception of the north/south access road and the two detention basins. Given the reduced number of units, the size of the basins may be smaller, which could result in more of this area being left undisturbed. The mitigation measures proposed in Section IV.I, Biological Resources related to compensation for lost wetland habitat would be reduced, given that three of the four seasonal wetlands would be preserved and enhanced on-site. However off-site mitigation would still be required for loss of the southern seasonal wetland, which is not preserved under this alternative. Project mitigations related to compensation for the California red-legged frog may be reduced, given that the detention channel, which could provide dispersal habitat for the frog, would remain on the site. Mitigations related to lost habitat for the California Tiger Salamander, burrowing owl, and kit fox would remain similar to that proposed for the project. Similarly, the cumulative loss of burrowing owl habitat would remain a significant unavoidable impact.

(10) Public Services. The Reduced Density alternative would have similar public service demands as the proposed project. The current ratio of parkland to residents in Antioch is 3 acres per 1,000 residents, which is below the General Plan objective of 5 acres per 1,000 residents. However the Reduced Density alternative would be required to either provide on-site park facilities or pay an in-lieu park fee, which would mitigate potential significant impacts to a less-than-significant level. The mitigation measure in Section IV.J, Public Services that addresses adequate fire protection would also be required for the Reduced Density alternative, resulting in a less-than-significant impact.

(11) Utilities and Infrastructure. The Reduced Density alternative would generate less demand on the urban infrastructure (wastewater, water, electricity, gas and telecommunications). No serious deficiencies were found in any of these systems under the proposed project, and adequate capacity would be available to serve the Reduced Density alternative. As with the proposed project, the Reduced Density alternative would not result in any significant impacts related to utilities and no mitigation measures would be required.

(12) Visual Resources. Under the Reduced Density alternative, homes would be located further away from Hillcrest Avenue and existing residences to the north, creating a visual and physical buffer between these uses. Homes would be approximately 250 feet west of Hillcrest and approximately 500 feet south of existing residences to the north. Depending on the type of habitat enhancement the buffer may include taller vegetation which would create a greening of the area between the homes to the north and the project, as well as along Hillcrest Avenue. Given that the total number of homes would be reduced to 356 units, and they would be further away from existing development to the north and Hillcrest Avenue, the project would appear somewhat less dense and suburban than the proposed project. This would slightly reduce the overall visual impact of this alternative from Chaparral Park, Prewett Ranch Drive and Hillcrest Avenue (see existing views and project simulations in Photos IV.L-1, -2, -5, -6, and -7 and Figures IV.L-3, -4, and -5). The Reduced Density alternative would have a less-than-significant effect on visual resources, as would the proposed project. It would create a similar impact to nighttime views in the area, due to new sources of light and glare. However, implementation of the mitigation measure recommended in Section IV.L, Visual Resources, would reduce this impact to a less-than-significant level.

(13) Agricultural and Mineral Resources. The Reduced Density alternative, like the proposed project, would not cause the conversion of any farmland of significance, would not conflict

with agricultural zoning or Williamson Act Contracts, and would not result in the loss of any mineral resources. As with the proposed project, the Reduced Density alternative would not result in any significant impacts related to agricultural/mineral resources and no mitigation measures would be required.

(14) Global Climate Change. Similar to the proposed project, the Reduced Density alternative would generate greenhouse gas emissions, although to a slightly lesser extent than the proposed project. The Reduced Density alternative would result in the removal of vegetation; construction activities; gas, electric, and water usage; solid waste disposal; and increased vehicle trips. Both construction and operational emissions associated with the Reduced Density alternative could be reduced to a less-than-significant level with implementation of the mitigation measures recommended in Section IV.N, Global Climate Change.

B. ALTERNATIVES THAT WERE CONSIDERED BUT REJECTED

The following section summarizes two alternatives to the proposed project that were considered but rejected from further analysis for the reasons provided.

1. No Build Alternative

Under the No Build alternative, the existing conditions of the project would remain as they are. The site would not be developed and would remain in use for grazing. The existing conditions on the project site have been described in the setting sections for each topic in this EIR. Under this alternative the entire project site would be set aside as a preservation area, conservation area, or as agricultural land. This alternative focuses primarily on open space preservation and habitat protection and, as such, would meet three of the project objectives. However, it does not meet the intent of the Antioch General Plan, which designates the site for residential development at various densities and public/quasi-public uses. Also it does not meet the remaining six project-sponsor objectives to provide needed housing and associated infrastructure in the Antioch area. For these reasons, the No Build alternative was considered but rejected from further evaluation.

2. Off-Site Alternative

Alternative locations for construction of the proposed project were not considered in this analysis because there are no other available individual parcels that would accommodate this type, size and density of development within the City's urban growth boundary (UGB) and under the adopted land use designations in the City of Antioch General Plan. Based on discussions with City staff [4] there is one potential parcel that could accommodate the project. The parcel is approximately 234 acres and is located on the west side of the Sand Creek Focus Area adjacent to the east side of Empire Mine Road. The site is designated by the General Plan for golf course/senior housing/open space and is zoned Study District. It is presently owned by an investment group that was previously interested in developing the site for residential uses but has currently suspended that planning process. Sand Creek transects the site to the north, the middle portion of the site is relatively flat though somewhat 'bowled' and the southern portion of the site is hilly. There are a number of natural constraints to developing the site including the creek, the hilly southern portion and potential water quality issues.

[4] Wehrmeister, Tina, 2008. Deputy Community Development Director, City of Antioch. Personal Communication with LSA, Associates, Inc. October 28.

While the site is potentially developable, the impacts would likely be similar to or slightly greater than those associated with the proposed project,. For these reasons, this alternative site was not considered a viable option, nor would it likely result in significantly fewer or less severe impacts than the proposed project.

C. ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the identification of the environmentally superior alternative in an EIR. Based on the analysis and discussion provided in this chapter, the environmentally superior alternative would be the Reduced Density alternative. Although development of this alternative would result in many similar impacts as the proposed project, it would have reduced impacts on several resources. The most significant difference is impacts on biological resources. The Reduced Density alternative would preserve and enhance on-site wetland habitat, thereby reducing one of the key impacts associated with the proposed project. However it would have similar impacts in terms of lost habitat for California tiger salamander, burrowing owl and kit fox. It would also not avoid the cumulative, significant unavoidable impact associated with loss of burrowing owl habitat. Impacts on visual resources would be slightly reduced given that the project would be set back further from adjacent residential uses and Hillcrest Avenue. While impacts on public services and utilities would be less than the proposed project, the need for an additional fire station would not be eliminated and an impact fee would still be required. Impacts associated with traffic, while reduced, would still require the applicant to contribute their fair share to several transportation projects. Impacts associated with greenhouse gas emissions would be less than the proposed project, but implementation of recommended construction and operation-period mitigation measures would still be required. Impacts related to cultural and paleontological resources; geology, soils and seismicity; and agricultural and mineral resources would be similar to the proposed project. Impacts on hydrology and storm drainage, while reduced, would still require the same mitigations as the project.

It should be noted that although the Reduced Density alternative is considered the environmentally superior alternative, it would partially fail to meet a number of the project objectives. Although this alternative would generally meet the first two project objectives, the reduced number of units would not increase the City's housing stock or maximize the development potential of the site to the same extent as the proposed project. As such, this alternative would also not contribute as much to the economic and social viability of the region and could result in an economically unviable project, given the reduced number of units.

VI. CEQA-REQUIRED ASSESSMENT CONCLUSIONS

As required by the California Environmental Quality Act (CEQA), this chapter discusses the following types of impacts that could result from implementation of the proposed project: growth-inducing impacts; significant irreversible changes; cumulative impacts effects found not to be significant; and significant unavoidable environmental impacts.

A. GROWTH-INDUCING IMPACTS

This section summarizes the project's growth-inducing impacts on the surrounding community. According to CEQA, a project is typically considered growth-inducing if it would foster economic or population growth. Examples of projects likely to have significant growth-inducing impacts include extensions or expansions of infrastructure systems beyond what is needed to serve project-specific demand, and development of new residential subdivisions or industrial parks in areas that are currently only sparsely developed or are undeveloped.

The proposed project would build up to 535 single-family houses in an age-restricted adult development. While the project site is currently undeveloped, there is an existing residential development immediately adjacent to the north, and a high school and Kaiser Hospital facility directly to the west. Implementation of the proposed project would not induce future development adjacent to the proposed site as the adjacent lands are developed, or planned for development, as is the case with the parcel directly to the east and parcels to the south. As previously stated, the City of Antioch General Plan designates the project area as a future planned community so development is expected and anticipated to occur in this vicinity during the General Plan horizon (2025).

As part of the project, a 24-inch main sewer line would be extended from the existing line near the AUSD Medical High School east across the project site to the existing 24-inch line beneath Heidorn Road. The alignment of the sewer line would follow the planned extension of Sand Creek Road. This connection is being sized in response to the City of Antioch's request that the larger sized line be installed to accommodate future planned growth in the area. The installation of this pipeline, is therefore, responding to anticipated growth in the area, and is not inducing growth in an area not already planned for urban expansion.

B. SIGNIFICANT IRREVERSIBLE CHANGES

CEQA requires that EIRs assess whether the proposed project would result in significant irreversible changes to the physical environment. The *CEQA Guidelines* discuss three categories of significant irreversible changes that should be considered. Each is discussed below.

1. Changes In Land Use Which Commit Future Generations

The proposed project would commit future generations to suburban development on approximately 149 acres of the project site (the remainder of the 189-acre site would generally remain as

undeveloped open space). While it is possible that the site at some point in the future could be redeveloped, for the foreseeable future it would be committed to residential uses. However, this is the type of development that is envisioned for the site and surrounding area, as expressed in the City's General Plan.

2. Irreversible Damage From Environmental Accidents

No significant environmental damage, such as accidental spills or explosion of a hazardous material, is anticipated with implementation of the proposed residential project. The use of hazardous materials (beyond standard construction supplies and household hazardous waste) is not proposed. Potential hazards associated with on-site historic oil and gas exploration, construction in the vicinity of oil and gas pipelines, and exposure to corrosives in Sand Creek would be mitigated to a less-than-significant level with implementation of the mitigation measures recommended in this EIR. No other potential environmental effects of the project (e.g., traffic, air quality) would reach the point of creating irreversible damage from foreseeable accidents given the land uses proposed.

3. Consumption of Nonrenewable Resources

Consumption of nonrenewable resources includes increased energy consumption, conversion of agricultural lands, and lost access to mining reserves. Although historic oil and gas exploration did occur on the site between 1963 and 1983, the wells have been plugged and abandoned. Loss of access to these potential mineral resources would not result in a significant project impact (see Section IV.M, Agricultural and Mineral Resources). The project would require additional electricity and natural gas. However, the scale of such consumption for the proposed project would be typical for a residential development of this size.

The project would convert land previously used for agriculture and presently used for grazing to residential development. This would result in the consumption of a nonrenewable resource, as agricultural and grazing land would be permanently taken out of production. However, the quality of these lands for this purpose is not unique and their removal would not constitute a significant impact.

C. CUMULATIVE IMPACTS

CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable, or which can compound or increase other environmental impacts." Section 15130 of the *CEQA Guidelines* requires that an EIR evaluate potential environmental impacts that are individually limited, but cumulatively significant. These impacts can result from the proposed project alone or together with other projects.

1. Methodology

When evaluating cumulative impacts, CEQA allows the use of either a list of past, present, or reasonably anticipated relevant projects, including projects outside the control of the lead agency, or a summary of the projections in an adopted planning document. This cumulative impacts analysis uses information provided by the City of Antioch. Cumulative development considered for this analysis is listed in Table IV.B-3 (located in Section IV.B, Transportation and Circulation). The time frame for the analysis in the cumulative impacts section is through the year 2025. Each of the environmental

topic areas and their significance criteria analyzed in Chapter IV are considered below for cumulative impacts.

2. Cumulative Effects of the Proposed Project

The following analysis examines the cumulative effects of the proposed project. The potential cumulative effects of the proposed project are summarized below for each of the topics that are analyzed in Chapter IV of the EIR.

a. Land Use and Planning Policy. The proposed project would develop a parcel of land that is currently open space and used for livestock grazing. However the project site is located in an area intended for substantial urban growth – the Sand Creek Focus Area. This area encompasses approximately 2,712 acres and is intended to function as a large-scale planned community, providing needed employment and housing opportunities in the southern portion of the City. The General Plan anticipates a maximum build out within the Sand Creek Focus Area of 3,537 single-family residential units, 500 multi-family residential units, 1,240,000 square feet of commercial/office uses, and 2,600,000 square feet of business park uses. Development of the project site would be part of implementing the planned vision for this quadrant of the City, and as such, would not contribute to any significant cumulative land use impacts.

b. Transportation and Circulation. Section IV.B, Transportation and Circulation, includes a detailed analysis of the cumulative conditions related to transportation. As shown in Table IV.B-8, the project would cause two of six intersections already operating at an unsatisfactory level of service in the Cumulative condition without the project to further degrade. The project would also cause a turn lane already operating at an unsatisfactory level in the Cumulative condition without the project to further degrade. Mitigations are recommended that reduce all impacts to a less-than-significant level. Please refer to Section IV.B for further discussion of cumulative transportation impacts.

c. Air Quality. A number of the individual projects listed in Table IV.B-3 are expected to be under construction within the same time frame for the proposed project (2010 – 2012). Depending on construction schedules and actual implementation of projects in the area, generation of fugitive dust and pollutant emissions during construction may result in substantial short-term increases in air pollutants. This condition would be a contribution to short-term cumulative air quality impacts. However, each individual project would be subject to the BAAQMD rules and regulations regarding feasible control measures for construction emission of particulate matter or dust (PM_{10}), and other mitigation requirements during their respective construction processes, as described in section IV.C, Air Quality. Therefore, implementation of the project would not make a considerable contribution to a significant cumulative impact associated with PM_{10} emissions from short term construction activities.

Currently, the Bay Area air basin is in non-attainment for Ozone (O_3) (state 1-hour standard and Federal 8-hour standard) and for PM_{10} (state standard). Generally, if a project results in an increase in ROG, NO_x, or PM_{10} of more than 80 pounds per day, it would be considered to contribute to a significant cumulative effect. ROG (reactive organic gases) and NO_x, (nitrogen oxides) are ozone precursors. Table IV.C-7 in Section IV.C, Air Quality indicates that proposed project emissions would not exceed the significance thresholds for ROG, NO_x, and PM_{10}. Therefore, the proposed project would not have a significant effect on cumulative regional air quality.

d. Noise. Depending on the phasing, scheduling and location of other proposed development in the project area, the proposed project could lead to cumulative increases in construction noise, including noise associated with on-site construction activities as well as trucking and vehicular traffic along local roadways. However, no known development projects are likely to occur concurrently with the proposed project within ½ mile of the project site and construction noise impacts would be short-lived. For these reasons, implementation of the proposed project is not expected to result in a significant cumulative impact related to construction noise.

As discussed in section IV.D, Noise of this EIR, roadway segments under the cumulative (2025) without the project condition would experience traffic noise levels above 60 dBA CNEL, the accepted threshold in residential areas. The addition of project-related traffic causes very little change in these traffic noise levels. Therefore, the project would not have a considerable contribution to a significant cumulative impact associated with traffic-related noise.

e. Cultural and Paleontological Resources. The area for analysis of cumulative impacts on cultural resources is very localized. Generally, cumulative cultural resource concerns should focus on lands that are physically proximate to the project site because the effects of development on cultural resources (both project-specific and cumulative) are physical in nature. As described in Section IV.E, Cultural Resources of this EIR, no cultural or paleontological resources were found on the project site. However, one cultural resource was reported adjacent to the boundaries of the off-site infrastructural improvements on the Ginocchio/Nunn parcel. Implementation of the mitigation measures recommended in this EIR would ensure protection of this resource as well as any unknown resources should they be discovered during the construction phase of the project. Per CEQA and local City policies, similar measures would be required of any project that develops in Antioch. The proposed project, in conjunction with nearby cumulative projects, would not contribute to cumulative impacts on cultural or paleontological resources.

f. Geology, Soils and Seismicity. The potential cumulative impacts for geology do not extend far beyond a project's boundaries, since geological impacts are confined to discrete spatial locations and do not combine to create an extensive cumulative impact condition. The exception to this generalization would occur where a large geologic feature (e.g., fault zone, massive landslide) might affect an extensive area, or where the development effects from the project could affect the geology of an off-site location. These circumstances are not present on the project site, including off-site areas, as the nearest active or potentially active faults are the Greenville fault zone, approximately 6.1 miles to the southwest, and the Concord-Green Valley fault, approximately 12.6 miles west of the project. The mitigation measures identified in section IV.F, Geology, Soils and Seismicity would mitigate potential significant effects associated with seismically-induced groundshaking to an acceptable level. Therefore, implementation of the project would not contribute to a significant cumulative geologic impact.

g. Hydrology and Storm Drainage. Development of the project site would contribute to an increase in the amount of impervious surfaces relative to existing conditions, which results in increased runoff volumes and rates of delivery to Sand Creek. This could exacerbate flooding downstream, both presently and cumulatively, given that downstream flooding already occurs along the creek. Also, alteration of drainage patterns from the site could result in cumulative contributions to the hydromodification of downstream creeks (Sand Creek and Marsh Creek). During project construction, grading and excavation activities would potentially contribute to increased

sedimentation and pollutants in stormwater. This in turn could result in degradation of water quality in the San Joaquin River (the ultimate receiving waters of stormwater discharges). Section IV.G, Hydrology and Water Quality, discusses these impacts and identifies appropriate mitigation measures to reduce potential impacts to a less-than-significant level. With full implementation of the recommended mitigation measures, no cumulative hydrology or water quality impacts would result.

h. Public Health and Safety. As with most residential projects, the project itself does not create significant public health and safety impacts. However, on-site construction workers and future residents could be exposed to hazardous materials from historic oil and gas exploration that occurred on the site, future open space recreational users could be exposed to hazardous materials and corrosives that may be present in Sand Creek, and oil and natural gas pipelines may create safety hazards for construction workers during site development. These impacts are more site-specific rather than cumulative, with the exception of additional access to Sand Creek. Mitigation measures contained in Section IV.H, Public Health and Safety, of this EIR reduce all potential impacts associated with public health and safety to a less-than-significant level. Therefore, implementation of the project would not contribute to a significant cumulative public health and safety impact.

i. Biological Resources. Development of the proposed project would contribute to the cumulative regional loss of upland grassland habitat, wetlands and other waters that are considered jurisdictional waters of the U.S. and/or State. The loss of these habitats would result in the loss of or harm to several identified special status grassland and vernal pool animal species either found on the site, presumed to exist on the site, or potentially occurring on the site. Section IV.I, Biological Resources, of this EIR fully evaluates these impacts and recommends mitigation measures, which to the maximum extent feasible reduce the impacts to a less-than-significant level.

With one exception (burrowing owl) the overall cumulative loss of wildlife and plant habitats as a result of the project is considered less-than-significant under CEQA for most sensitive species occurring, or presumed to occur, on the site (including vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, red-legged frog, and San Joaquin kit fox). This conclusion is based on the fact that grasslands in the southern portion of the site (approximately 18 percent of the site) will remain undeveloped open space, as will the creek and associated buffer along the creek (approximately 2 percent of the site). Retention of these areas in a natural state will off set some, but not all, of the impacts to special status species. Additional off sets will be provided by in-kind mitigation off site on a parcel of land in eastern Contra Costa County with higher quality habitat, as described in Section IV.I, Biological Resources, and the purchase of additional qualified acreage to off-set impacts to California tiger salamander and San Joaquin kit fox.

The loss of on-site burrowing owl habitat constitutes a significant unavoidable cumulative impact. Cumulative impacts to this special status species are created by recent development (i.e. development in the past five years on vacant parcels in the southern portion of the City and in the Sand Creek Specific Plan Area) and by foreseeable future planned development in these areas.

Virtually all parcels within the Sand Creek Specific Plan Area, are dominated by grassland habitat that provides suitable nesting and foraging habitat for the burrowing owl, and vacant parcels supporting ruderal vegetation in the more urbanized areas in the southern portion of the City also support habitat for this species. Between the 1940s and 1970s the species was almost completely eradicated from the region due to the County-sanctioned rodent-poisoning programs that eliminated

ground squirrels (and therefore, habitat for burrowing owls). However, since 2002 it has been observed that burrowing owls are recolonizing the area and are occupying vacant parcels in the southern portion of the urbanized areas of the City, as well as at least four parcels within the Sand Creek Specific Plan Area, These later four parcels have either been developed, are in the process of being developed, or are designated for development under the City's General Plan. Even assuming that future projects set aside some on-site grassland habitat for this species, it is likely that at least 80 percent of the habitat for this species occurring in the Sand Creek vicinity will be lost to development.

j. Public Services. Development of the proposed project, in conjunction with planned future development would cumulatively increase the demand on public facilities and services in the project area. As described in Section IV.J, Public Services, the proposed project would result in a significant effect on service levels for fire and emergency medical services. This impact would be mitigated to a less-than-significant level by the project's fair share contribution to construction and operation of a new fire station in the southeast Antioch area. The City recently adopted new fire facility impact fees to generate adequate funds for construction of new fire facilities. The proposed project and other development in the southeast Antioch area would participate in the funding of the new station via collection of the mandated fees. Therefore, the proposed project would not result in a cumulatively significant impact to public services.

k. Utilities and Infrastructure. Development of the proposed project, in addition to other future development in the area would cumulatively increase the demand on the utility providers and infrastructure in the project area (water, sewer, solid waste, electricity and telecommunications). There are adequate provisions for water supply, wastewater treatment capacity and storm drainage facilities to serve projected growth in the City. The City-owned wastewater collection system in the project area requires an expansion to serve new development, and ultimately the area will be part of a Benefit Assessment District. The project applicant would install a 24-inch mainline sewer trunk line from the AUSD Medical High School east to Heidorn Road, which would serve the proposed project and other development occurring in southeast Antioch. The project would contribute to the mitigation of cumulative impacts on wastewater treatment plant capacity through payment of Delta Diablo Sanitation District sewer connection fees. Therefore, the project's contribution to cumulative infrastructure impacts would be less-than-significant.

l. Visual Resources. The visual character of the northern portion of the project site would change from an open rural landscape to urban development. This would continue the pattern of existing single-family residential development located to the north of the site. The southern portion of the project site, including Sand Creek and the hillside area, would remain as open space as part of the proposed project. The site is currently a rural landscape; however the intent of the General Plan is for this area to transition to an urbanized area. The visual analysis contained in Section IV.L, Visual Resources found that the project itself would not result in significant visual impacts. The proposed project would contribute to the intended change from rural to urban that is expressed in the City's General Plan. The project would implement that vision and, as such, would not have a significant cumulative impact on visual resources.

m. Agriculture and Mineral Resources. The project site is not designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, nor is it under a Williamson Act contract. Impacts to adjacent off-site agricultural areas would be temporary and would occur on land planned for urban development. The site also has no known mineral resource value to the region or the State.

Conversion of the site to urban development would not result in a cumulative loss of agricultural or mineral resources.

n. Global Climate Change. Refer to Section IV.N, Global Climate Change for a detailed discussion of cumulative global climate change impacts. As described in that section, climate change is a global environmental problem in which: (a) any given development project contributes only a small portion of any net increase in greenhouse gases (GHGs) and (b) global growth is continuing to contribute large amounts of GHGs across the globe. Therefore, that section addresses climate change primarily as a cumulative impact. Implementation of the recommended mitigation measures would ensure that cumulatively considerable global climate change impacts are reduced to a less-than-significant level.

D. EFFECTS FOUND NOT TO BE SIGNIFICANT

The scope of this EIR was determined in consultation with City of Antioch staff. A Notice of Preparation (NOP) was circulated on July 7, 2006 to solicit comments from the public about the scope of this EIR. Written comments received on the NOP were considered in the preparation of this document and evaluation of the proposed project.

The environmental topics analyzed in Chapter IV of this EIR represent those topics that generated the greatest potential concern by agencies and the public and expectation of adverse impacts by staff and the consultants. The following topics typically considered in an EIR of this type and scale were determined to be less-than-significant during the scoping phase: population/housing and schools. Given that the City's General Plan designates the project site for urban development, and the proposed project is an age-restricted adult community, it was determined that no significant impacts would occur with respect to population or schools.

E. SIGNIFICANT UNAVOIDABLE ENVIRONMENTAL IMPACTS

With mitigation of the recommended measures discussed in Section IV.I, Biological Resources, the proposed project would result in a significant unavoidable cumulative impact on burrowing owl habitat in the vicinity of the site due to 1) recent development (i.e., development occurring in the past five years on vacant parcels in the southern portion of the City and in the Sand Creek Specific Plan Area) and 2) foreseeable future planned development in these areas. All other environmental impacts discussed in this EIR would be reduced to a less-than-significant level with implementation of the recommended mitigation measures.

VII. REPORT PREPARATION

A. REPORT PREPARATION

LSA Associates, Inc., Prime Consultant: *Project Management and Report Production; Land Use and Planning Policy; Air Quality; Noise; Public Services; Utilities and Infrastructure; Visual Resources; Agriculture and Mineral Resources; Global Climate Change; Alternatives;* and *CEQA Required Assessment Conclusions*

2215 Fifth Street
Berkeley, CA 94710

David Clore, AICP, Principal-in-Charge
Brenda Gillarde, Project Manager
Theresa Bravo, Project Planner
Amy Fischer, Senior Planner
Jason Paukovits, Air Quality Specialist
Phil Ault, Analyst
Patty Linder, Graphics Manager
Jennifer Morris, Word Processing

LSA Associates, Inc.: *Biological Resources*

157 Park Place
Point Richmond, CA 94801

Steve Foreman, Principal, Wildlife Biologist
Tim Lacy, Associate, Wildlife Biologist

Live Oak Associates: *Biological Resources*

6830 Via del Oro, Suite 205
San Jose, CA 95119

Rick Hopkins, PhD., Principal, Senior Conservation Biologist
Pam Peterson, Associate Plant and Wetland Ecologist

Baseline Environmental Consulting: *Geology, Soils, and Seismicity; Hydrology and Storm Drainage;* and *Public Health and Safety*

5900 Hollis Street, Suite D
Emeryville, CA 94608

Yane Nordhav, RG, Principal
Bruce Abelli-Amen, CHG, Certified Hydrologist
Todd Taylor, REA, Environmental Associate
Ralph Russell, Environmental Specialist

William Self Associates, Inc.: *Cultural and Paleontological Resources*
61-D Avenida de Orinda
Orinda, CA 94563
James Allan, PhD., RPA, Principal
Angela Cook, Staff Archaeologist

Kimley-Horn Associates: *Traffic and Circulation*
2000 Crow Canyon Place, Suite 410
San Ramon, CA 94583
James West, P.E., Project Manager
Mike Mowry, P.E., QA/QC Manager
Erica McKinnon, EIT, Analyst

Environmental Vision: *Visual Simulations*
2550 Ninth Street, Suite 205
Berkeley, CA 94710
Marsha Gale, Principal
Chuck Cornwall, Principal

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