FIGURE **4.4-11b**

Photosimulation of Proposed Landscape Bern from I-80

Not to Scale

10794-00

Source: William Kanemoto & Associates, 2003

City of Vacaville

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hills in the background. However, because of the major view corridor from I-80 into Lower Lagoon Valley and from parts of the valley floor and hill areas to Upper Lagoon Valley, there would be height restrictions on the buildings in the business village. In general, buildings would be limited to two and three stories tall and would not exceed 60 feet in height, measured from the average first floor elevation. This includes 42 feet to the top of the structural roof and 15 feet for mechanical equipment or roof treatment. Taller buildings would be sited to areas where they would be visually buffered by the hillside backdrop. The maximum height for buildings within 100 feet of residential property would be 35 feet.

Building design and materials in the business village would be of high quality and of similar, compatible design and materials to create a strong visual relationship among buildings. No highly reflective finishes would be used on surfaces other than hardware. Prefabricated metal buildings would not be allowed. Code-required elements such as parapet walls and screen walls would be treated as an integral part of the architecture. Screening would be provided for both ground- and roof-mounted equipment. Building elevations facing I-80, major streets, and adjacent properties would be designed to minimize the appearance of a rear elevation. Loading doors and other service areas would be screened by architectural and landscape elements. Architectural designs would be reviewed by the City prior to the issuance of building permits.

The Lower Lagoon Valley Specific Plan includes policies to preserve the scenic quality of the valley with open space and view corridors to the hills along with the establishment of a permanent view corridor to protect views of Lagoon Valley Lake and the hills. Specifically, the Specific Plan would not allow for alterations within the Lagoon Valley Regional Park, except in conformance with an adopted Park Master Plan. There would be no change to Lagoon Valley Lake as a part of the Proposed Project. Figures 4.4-12a and 4.4-12b present the view of the proposed residential development from Lower Lagoon Regional Park. Finally, development of urban uses would not be permitted on hillside open space areas. The Specific Plan also calls for a primary view corridor for travelers eastbound on I-80 over the berm to Lagoon Valley Regional park and Lagoon Lake to the hills in the background.[1] Smaller view corridors are also proposed from I-80 over the proposed business village to views of the hills in the background. Buildings are to be limited in location and height in order to provide a view of a substantial portion of the rolling hills and ridgelines lying to the east.[2] Undergrounding of utilities along the I-80 frontage would also aid in enhancing this view corridor.

Overall, future residential and commercial development within the Specific Plan area would alter the existing, unobstructed scenic vista of the Lower Lagoon Valley that travelers along I-80 currently see. A view corridor would be maintained for eastbound travelers; however, even with the proposed view corridor, the unobstructed view of the valley would be permanently changed due to the project. Existing views for both east and westbound travelers on I-80 would no longer include the open vistas of Lower Lagoon Valley. Therefore, because the project would result in a permanent change to the existing scenic vista, this is considered a ***significant impact.***

Mitigation Measure

Although the Specific Plan includes measures to maintain attractive views, there are no feasible mitigation measures available to mitigate the alteration of a scenic vista, or the visual character of a scenic resource; therefore, the impact remains *significant and unavoidable*.

4.4-1 *None available.*

FIGURE 4.4-12a
Existing View of Proposed Residential Development Areas from Lower Lagoon Valley Regional Park

Not to Scale

10794-00

Source: William Kanemoto & Associates, 2003

City of Vacaville

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FIGURE 4.4-12b
Photosimulation of Proposed Residential Development Areas from Lower Lagoon Valley Regional Park

Not to Scale

10794-00

Source: William Kanemoto & Associates, 2003

City of Vacaville

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4.4-2 Implementation of the Proposed Project would alter the existing visual character of the Lower Lagoon Valley.

Implementation of the Proposed Project would introduce approximately 1,325 homes, an eighteen-hole golf course, open space, neighborhood commercial uses, and a business village in an area that is essentially undeveloped. A total of 879 acres would be developed leaving the 388-acre Lagoon Valley Regional Park and 1,066 acres of undeveloped open space.

The visual character of the Specific Plan area is dominated by open, rolling grasslands with areas of native trees and other vegetation surrounded by rolling hills. The plan area is visible from I-80 and a variety of short-and long-range viewpoints. Existing development within the Specific Plan area includes the Hine's Nursery, a cluster of small commercial businesses, the 388-acre Lagoon Valley Regional Park, and a few rural residences. Development of the Proposed Project would substantially and permanently alter the existing visual character of the project site by introducing developed uses into an area that is essentially undeveloped.

The Proposed Project would convert approximately 826 acres of the approximately 2,354-acre Specific Plan area into urban uses, including parks. Of the 826 acres slated for development, approximately 213 acres would be developed as a golf course. The Specific Plan area also includes the 388-acre Lagoon Valley Regional Park. A total of 1,066 acres would remain as open space/agricultural hillside areas. Therefore, approximately 70 percent of the Specific Plan area would be park, open space, agricultural hillside or golf course. However, conversion of the privately-owned valley floor from essentially an undeveloped area, with scattered residential and commercial uses, to a more urban developed environment would result in changes to the natural topography and natural landscaping.

As shown in Figure 4.4-12b, views of the Specific Plan area would be visible the hillside and hiking trails within Lagoon Valley Regional Park. The plan area is currently within water pressure zones 2 and 3 and would require the development of additional water storage tanks and related infrastructure which would be visible. Zones 2 and 3 are located near the southern boundaries of the project site. The Zone 2 system would consist of a looped system of 12- to 18-inch main lines connecting the Butcher Reservoirs to a new proposed 2.8 million-gallon (mg) water tank near the southwest corner of the residential development at an elevation of approximately 395 feet (see Figure 3-5 in Chapter 3, Project Description). The water tank would be approximately 30 feet high and 100 feet in diameter and partially buried as typically required by the City.

Three options for the Zone 3 area are currently being considered. A 0.25 mg water tank, which would be smaller in size than the tank being proposed for Zone 2, could be constructed in an open space area the project applicant is dedicating to the City at the south end of the site between Village I and Village II. As an alternative to the additional tank, a pneumatic booster pump could be installed. The pneumatic booster pump would be located within the dedicated open space between Village II and Village III. The third alternative would be to construct one water tank at the higher elevation to serve the entire development. Construction of the landscaped berm along I-80 would serve as a visual buffer from some portion of I-80 to these water tanks, or possible pneumatic booster pump station. However, the water tanks or pump station would still likely be seen from various other locations both on- and off-site.

Grading would also be required within the hillside areas to repair slide hazard areas. The Specific Plan includes policies requiring that grading within the hillside areas be finished in a

naturalized or contoured format that would result in a naturalized appearance to hillside open space area. The golf course would include grading in portions of existing hillsides and would be designed to incorporate landscape features as part of golf course design.

The Proposed Project would require the undergrounding of all electrical lines which would help to reduce the visual impact of the project. In addition, General Plan policy 2.2-G9 requires that scenic features and view corridors to the hills and other significant natural areas be preserved. Policy 8.2-G1 requires that natural environments be preserved in recognition of their importance as visual amenities. The Lower Lagoon Valley Specific Plan also includes specific policies that address the need to preserve the scenic quality of the valley with areas of open space and views of the surrounding hills. These Specific Plan policies along with the Lower Lagoon Valley Design Guidelines help minimize the visual impacts associated with the project. However, the change in visual character associated with the project would remain a ***significant impact.***

Mitigation Measure

Although the Specific Plan includes measures to maintain an attractive view, there are no feasible mitigation measures available to mitigate the alteration of the existing visual character of Lower Lagoon Valley; therefore, the impact remains *significant and unavoidable*.

4.4-2 *None available.*

4.4-3 The Proposed Project would create new sources of light which could adversely affect nighttime views of the Specific Plan area.

The introduction of artificial light into a rural area contributes to the change in that area's character. Development of the Proposed Project would result in light from urban development such as residences and commercial uses, as well as recreational facilities, streetlights, and vehicles, thus increasing the ambient nighttime illumination level and resulting in a substantial change in the amount of light generated in the plan area. This would also alter nighttime views to the site, which are currently uninterrupted by light pollution from the area and would become views of a developed, lit environment.

A majority of the plan area is currently undeveloped and contains very few light sources (primarily a few residences and commercial facilities (e.g., Hines Nursery). Development of the Proposed Project would result in a substantial change in the amount of light generated on the site and would alter nighttime views of the site. There would be light from residences, businesses, streetlights, and vehicles, all which would increase the ambient nighttime illumination level. With development of the Proposed Project, views of the Specific Plan area that are currently uninterrupted by light pollution from the site would change to views of a developed, lit environment. The berm along I-80 would help to shield portions of the golf course and Village 1. However, light from the entire project as well as the business village would contribute to an increase in night lighting over existing conditions.

The best way to reduce impacts associated with lights is to use light fixtures that are screened to direct light into specific areas and prevent light from spilling over into areas where it is not required.

Glare occurs when light reflects off of pavement, vehicles and building materials such as reflective glass and polished surfaces. During daylight hours, the amount of existing glare depends on the intensity and direction of sunlight. At night, artificial light can create glare.

Glare can be distracting and interfere with vision, which could be considered a safety hazard for motorists. Particularly in commercial and business/professional areas, windows comprise a large proportion of building surfaces, creating a potential for glare that would increase with the use of reflective coatings and reflective building materials. The problem is most noticeable with large buildings that have reflective surfaces. Residential buildings are not generally considered sources of substantial glare. Daytime glare could result from the proposed business village uses adjacent to I-80. Although buildings associated with the business village uses would be no taller than 2 to 3 stories there is the potential for glare to occur.

The increase in nighttime lighting as well as the potential for lights to disturb residents within the project site and the potential for glare to occur would be considered a ***potentially significant impact***.

Mitigation Measure

Implementation of the following mitigation measures would reduce impacts associated with glare and light disturbance to residents to a less-than-significant level. However, impacts associated with the increase in night lighting and changes in the existing night environment would be *significant and unavoidable*.

4.4-3 (a) *The use of reflective materials shall be limited and when feasible, exterior-building surfaces in the business village shall include the installation of low-glare materials.*

(b) *Any outdoor incandescent lighting fixture or more than 160 watts shall be constructed so that no more than 10 percent of the light rays from the fixture shall be emitted at angles above the horizontal plane.*

(c) *Streetlights with any high-intensity discharge lamp, including, but not limited to, mercury, metal halide and high-pressure sodium lamps, are prohibited on private roads.*

(d) *Streetlights shall use low-pressure sodium lamps, so that no light rays are emitted from the fixture at angles above the horizontal plan. Streetlights shall use "cut off" fixtures.*

(e) *Outdoor metal halide and high-pressure sodium lighting shall be permitted only for the purpose of illuminating recreational facilities and all figures shall be fully shielded.*

(f) *Outdoor lighting with any mercury vapor, quartz-halogen or fluorescent fixture is prohibited. Except as permitted by Mitigation Measure 4.4-3(e), outdoor lighting with any high-intensity discharge lamp, including but not limited to, mercury vapor, metal halide or high-pressure sodium lamp, is prohibited.*

ENDNOTES

1. Lower Lagoon Valley Specific Plan, Figure 13: Primary Views.

2. Lagoon Valley Design Guidelines, An Amendment to the Policy Plan for Lagoon Valley, p. 16, Adopted March 1992.

4.5 TRANSPORTATION AND CIRCULATION

4.5 TRANSPORTATION AND CIRCULATION

4.5.1 INTRODUCTION

This section describes existing traffic and circulation conditions in the Lower Lagoon Valley Specific Plan area and along Interstate 80 (I-80) in the vicinity of the Proposed Project, and evaluates the impacts to intersections, roadway and freeway segments, freeway ramps, and freeway merge/diverge operations from traffic generated by the Proposed Project and under cumulative conditions with assumed future growth to the year 2025. The section summarizes the results of the *Lower Lagoon Valley Mixed-Use Development Traffic Impact Analysis,* January 28, 2004, prepared for the project by Korve Engineering, which is incorporated by reference in the Draft EIR. A copy of the text of the *Traffic Impact Analysis* is found in Appendix D to this Draft EIR.

4.5.2 ENVIRONMENTAL SETTING

The project site is in Lagoon Valley, on the east side of Interstate 80 in the City of Vacaville. The major access point to the Lower Lagoon Valley site is the Lagoon Valley Road Interchange with I-80. Access is possible along Rivera Road (Vacaville) to the Cherry Glen/Peña Adobe interchange with I-80. Nelson Road (Fairfield) does not connect to North Texas Street, and does not provide through access from Fairfield. There are no fixed transit routes in Lagoon Valley; dial-a-ride paratransit service is available throughout Vacaville. There are bicycle and pedestrian trails in Lagoon Valley Regional Park; no bicycle or pedestrian facilities are located on the project site.

Existing Transportation Facilities

Roadways

Interstate 80 (I-80) is a major east-west freeway, and the central link between Sacramento and the Bay Area (see Figure 4.5-1). It is also a primary commuter route linking residents of Solano County and employment centers in the cities of Richmond, Oakland, and San Francisco and in Contra Costa County. I-80 is typically six to eight lanes wide, divided by a landscaped median 36 feet wide with 2-foot paved inside shoulders. The roadway has 10 foot wide outside shoulders. The posted speed limit is 65 miles per hour in the study area. In the morning peak hour, volumes in the project study area on I-80 eastbound are about 4,000 vehicles per hour and westbound volumes range from 5,000 to 6,500 vehicles per hour. Evening peak hour volumes are about 7,000 vehicles eastbound and 4,500-5,000 vehicles westbound. Weekend travel on I-80 tends to be heavier eastbound on Fridays and Saturdays and heavier westbound on Sundays in this area. Freeway mainline and ramp traffic volumes for existing conditions are taken from Caltrans counts dated March 1997 to January 2002.

Lagoon Valley Road is a two-lane east-west roadway connecting agricultural land in Lagoon Valley to I-80 and Cherry Glen Road. Lagoon Valley Road provides access to the Lagoon Valley Regional Park, including Lagoon Lake.

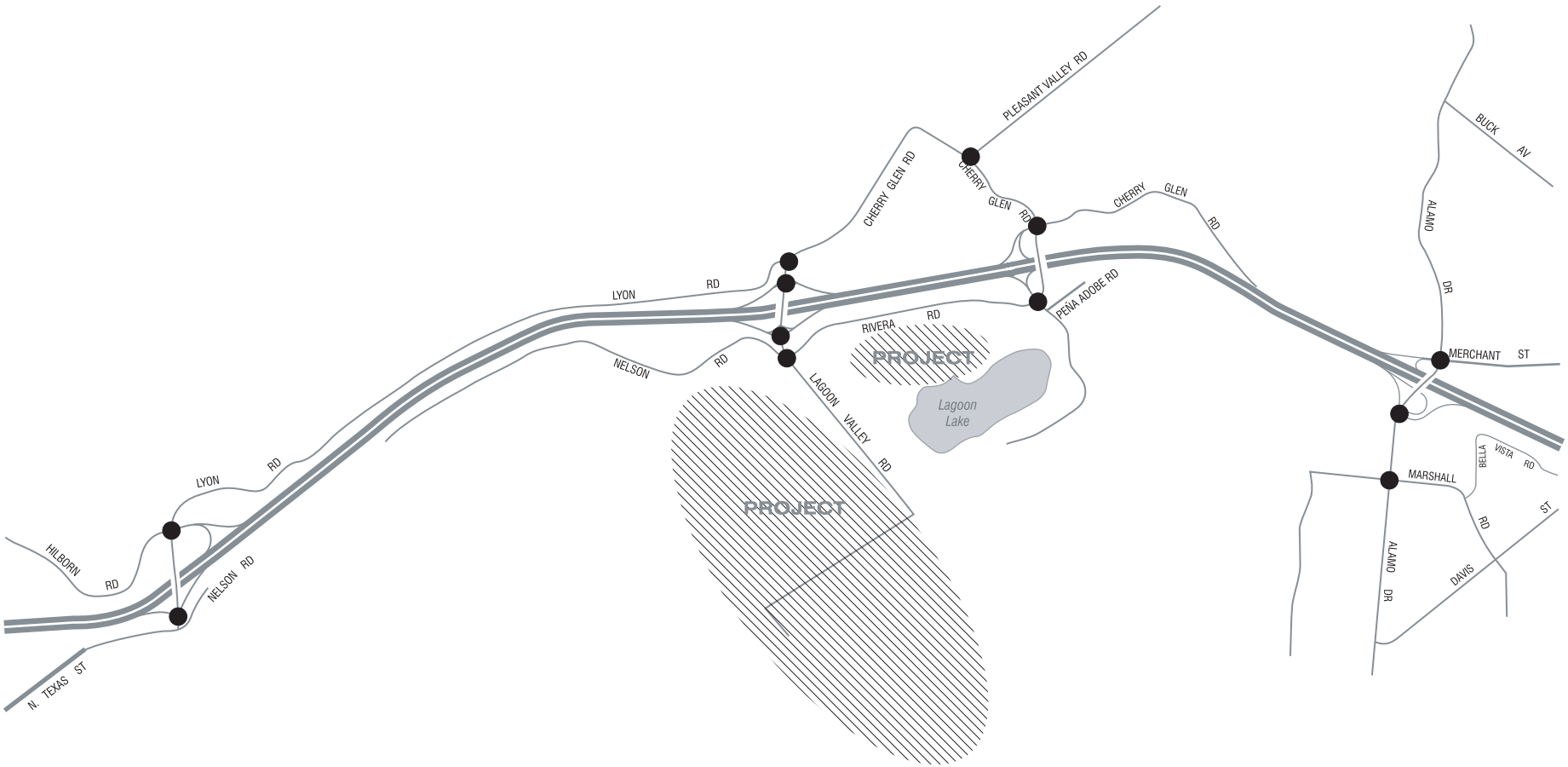

FIGURE **4.5-1**
Project Area

Not to Scale

10794-00

Source: Korve Engineering

City of Vacaville

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Cherry Glen Road is a north-south roadway that extends from Lyon Road in the Lagoon Valley to the I-80 westbound freeway off ramps on the south/east edge of Vacaville. Cherry Glen Road acts as a frontage road along I-80, also branching off to the hills in the northeast. The speed limit on Cherry Glen Road is 45 mph.

Alamo Drive is a major east-west arterial roadway running through the western edge of Vacaville and providing a connection to I-80. Alamo Drive has marked bike lanes in the vicinity of I-80. Alamo Drive provides two to three travel lanes in each direction with left turn pockets.

North Texas Street is a four-lane north-south arterial roadway as it runs from downtown Fairfield to I-80 at the northern end of the city. It provides access to Air Base Parkway (Travis Air Force Base) approximately two miles south of its junction with I-80.

Merchant Street is a four-lane north-south roadway, extending from Downtown Vacaville through the city to the I-80 westbound ramps in south/east Vacaville. Merchant Street connects with Alamo Drive in a large intersection adjacent to the I-80 on-/off-ramps.

Hilborn Road is a four-lane east-west residential roadway, divided by a landscaped median. Hilborn Road connects the City of Fairfield to Interstate 80 at North Texas Street and with new developments at Lyon Road.

Lyon Road is a four-lane residential roadway at North Texas Street/Hilborn Road that functions as a frontage road to I-80 extending north to Cherry Glen Road. Lyon Road narrows to two lanes approximately 1/2 mile north of the North Texas Street intersection. The speed limit on Lyon Road is 45 mph.

Nelson Road is a two-lane north-south discontinuous roadway which runs along eastbound I-80. The southern portion of the roadway terminates at North Texas Street; the longer segment of the road extends about 1.3 miles south from Lagoon Valley Road towards North Texas Street. The two roadway segments do not connect for automobile traffic; however, a short bicycle/ pedestrian pathway joins the ends of both segments to allow through traffic for cyclists and hikers.

Rivera Road connects Nelson Road/Lagoon Valley Road to Cherry Glen Road/Peña Adobe at the northern end of Lagoon Valley Regional Park. It is a wide two-lane frontage roadway along eastbound I-80. The Ranchotel facility is located approximately halfway between the two intersections.

Peña Adobe is a two-lane north-south roadway connecting to Cherry Glen Road and Rivera Road, just north of and leading to Lagoon Valley Regional Park and Lake.

Pleasant Valley Road connects with Cherry Glen Road near I-80 and leads inland into the western hills of Vacaville. One lane of traffic runs in each direction, with no shoulder on either side of the roadway. A narrow bridge over Laguna Creek is located one-half mile from the intersection with Cherry Glen Road. Pleasant Valley Road is a “share the road” bicycle facility as well as a school bus route. The speed limit on Pleasant Valley Road is 45 mph. As Pleasant Valley Road is a two-lane road with no shoulder, an increase of traffic volume on this roadway could affect the relative safety of the area given the limited availability for improvements. A bridge crossing Laguna creek causes the roadway to narrow approximately one-half mile from Cherry Glen Road.

Transit System

The City of Vacaville contracts with Coach U.S.A. Transit Services, Inc. for City Coach fixed route and Dial-a-ride paratransit services within the City limits. There are three (two bi-directional and one uni-directional) local fixed-route bus routes and three regional bus routes. The area is also served by rail transit, with a train station in Suisun City. An additional train station is presently being planned in Fairfield near the southern border of Vacaville. Commuter bus service to the El Cerrito del Norte Bay Area Rapid Transit (BART) Station is provided on Vacaville Transit Route #91. This route begins and ends at the Davis Street Park-and-Ride Lot in Vacaville, and passes through Fairfield before traveling on I-80 to the BART station.

No fixed-route bus service is currently provided to the Proposed Project area. The vehicle by which provision of future transit services, would be this areas inclusion of this area in Short Range Transit Plan (SRTP) updates should area develop and citizen interest warrant. SRTP updates are required to be accomplished biennially.

Bicycle and Pedestrian Facilities

There are designated bicycle routes in the Specific Plan area and between Vacaville and Fairfield. There is a bike route north of I-80 along a segment of Cherry Glen Road. Pleasant Valley Road posts signs with “Share The Road” to inform both vehicles and cyclists. Class II bicycle lanes (designated “Bike Lanes” in the Transportation Element of the General Plan, are separate striped bicycle lanes in the roadway) run along Alamo Drive from Merchant Street to south of Marshall Road, and continue south as Class III lanes (“Bicycle Routes,” on-street signed bicycle lanes shared with automobile traffic) into the City. According to the *Solano Countywide Bicycle Plan*, Figure B, proposed Class III bicycle facilities would run eastbound along I-80 from Nelson Road in Fairfield to Rivera Road and Butcher Road in Vacaville. Proposed Class III bicycle facilities would also be located on Lyon Road adjacent to westbound I-80 from Cherry Glen Road to Hilborn Road in Fairfield.

There are existing pedestrian and bicycle trails in the Lagoon Valley Regional Park.

Existing Traffic Conditions

Existing traffic conditions were analyzed separately at local intersections, along local roadway and freeway segments, on freeway ramps, and in the areas along the freeway where traffic merges (enters the freeway from an on-ramp) and diverges (leaves the freeway via an off-ramp). In the study area, the largest traffic volumes are expected on adjacent streets during the midweek PM peak hour between 4:00 and 6:00 PM, which is the study analysis period. Because the project is located directly adjacent to Interstate 80, the morning commute movements may have an impact on local and regional roadways, so the AM peak hour, between 7:00 and 9:00 AM, is also analyzed at the freeway interchange intersections and on overcrossings.

Existing Intersection Operations

Twelve existing intersections have been identified as those where the Proposed Project may have an impact. These intersections were analyzed to describe existing conditions; four new intersections on the Proposed Project site are analyzed in the impacts discussion, as well as a new intersection planned in the City of Fairfield (see pp. 4.5-19 to 4.5-20, below). The existing study intersection locations are shown in Appendix D, Figure 2, p. 13. Following are the

intersections analyzed to establish existing traffic conditions at intersections (the control at the existing intersections is shown in parentheses):

1. North Texas Street / I-80 Eastbound Ramps (signalized);
2. North Texas Street / Hilborn Road / Lyon Road / I-80 Westbound Ramps (four-way STOP control);
3. Lagoon Valley Road / I-80 Eastbound Ramps (two-way STOP control);
4. Lagoon Valley Road / Nelson Road / Rivera Road (two-way STOP control);
5. Cherry Glen Road / I-80 Westbound Ramps (two-way STOP control);
6. Cherry Glen Road / Lyon Road (Tee intersection, STOP control on Lyon);
7. I-80 Eastbound Ramps / Pena Adobe / Rivera Road (two-way STOP control);
8. Cherry Glen Road / I-80 Westbound Ramps / North Cherry Glen Off Ramp (two-way STOP control);
9. Cherry Glen Road / Pleasant Valley Road (Tee intersection, two-way STOP control);
10. Alamo Drive / I-80 Eastbound Ramps (signalized);
11. Alamo Drive / Merchant Street (signalized); and
12. Alamo Drive / Marshall Road (signalized).

Traffic conditions are assessed through the evaluation of peak hour Levels of Service (LOS). The LOS concept qualitatively characterizes traffic conditions associated with varying levels of traffic. An LOS determination is a measure of congestion, which is the principle measure of roadway service. These range from LOS A, which indicates a free-flow condition, to LOS F, which indicates a jammed condition. LOS A, B and C are generally considered to be satisfactory service levels while LOS D is marginally acceptable; LOS E and LOS F conditions are unacceptable (see Table 4.5-1).

Traffic conditions at study intersections were evaluated for morning and evening peak hours using the methodology of the Transportation Research Board's Intersection Capacity Utilization (ICU) Method from Transportation Research Circular 212, 1980, analyzed through use of the City of Vacaville's approved LOS program. The program is used for both signalized and unsignalized intersections. With this methodology, a level of service is assigned based on the capacity of the intersection as a whole. The LOS corresponds to the ratio of total traffic volume on the facility to the maximum capacity of volume allowable on that facility. The volume-to-capacity (V/C) ratios are presented in Table 4.5-1, with the LOS values associated with each range of traffic congestion.

TABLE 4.5-1

INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Volume-to-Capacity (V/C) Ratio
A	Very slight or no delay – Stable flow	$\leq$ 0.60
B	Slight delay – Stable flow	> 0.61 and $\leq$ 0.70
C	Acceptable delay – Stable flow	> 0.71 and $\leq$ 0.80
D	Tolerable delay – Approaching unstable flow	> 0.81 and $\leq$ 0.90
E	Intolerable delay – Unstable flow	> 0.91 and $\leq$ 1.00
F	Excessive delay – Forced flow	> 1.00

Source: Korve Engineering, January 2004; Highway Capacity Manual, Special Report No. 209, Transportation Research Board, 1985.

The existing conditions analysis at study intersections is based on traffic counts conducted specifically for this study in summer 2003. The results of the intersection existing conditions

analysis are shown in Table 4.5-2. Traffic counts were conducted at each of the existing study intersections during the morning and evening peak hours on Tuesday-Wednesday June 3-4, 2003 and reviewed against counts on record with the City of Vacaville. Additional morning and evening traffic counts for the intersections of Alamo Drive/I-80 Eastbound Ramps and Alamo Drive/Merchant Street were taken on October 1, 2003.

TABLE 4.5-2

EXISTING INTERSECTION LEVELS OF SERVICE

	Intersection	Peak Hour	Level of Service (Volume-to-Capacity Ratio) [2]
1.[1]	North Texas St / I-80 Eastbound Ramps	AM	C (0.74)
		PM	**E (0.94)**
2.	Hilborn Rd / Lyon Rd / North Texas St / I-80 Westbound Ramps	AM	C (0.78)
		PM	C (0.74)
3.	Lagoon Valley Road/ I-80 Eastbound Ramps	AM	A (0.17)
		PM	A (0.27)
4.	Lagoon Valley Road / Rivera Road / Nelson Road	PM	A (0.17)
5.	Cherry Glen Road / I-80 Westbound Ramps	AM	A (0.23)
		PM	A (0.21)
6.	Cherry Glen Rd / Lyon Rd	PM	A (0.24)
7.	I-80 Eastbound Ramps / Cherry Glen / Pena Adobe / Rivera Road	AM	A (0.14)
		PM	A (0.16)
8.	North Cherry Glen Road / I-80 Westbound Ramps/Cherry Glen	AM	A (0.14)
		PM	A (0.16)
9.	Cherry Glen Road / Pleasant Valley Road	PM	A (0.28)
10.	Alamo Drive / I-80 Eastbound Ramps	AM	B (0.69)
		PM	D (0.81)
11.	Alamo Drive / Merchant St	AM	C (0.80)
		PM	C (0.77)
12.	Alamo Drive / Marshall Rd	PM	B (0.70)

Notes:
1. See Figure 2, p. 13 in **Appendix D** for locations of intersections, identified by number.
2. Intersections with LOS E or LOS F are shown in bold.
Source: Korve Engineering, January 2004.

As illustrated in Table 4.5-2, most of the study intersections were identified as operating at LOS A, B, or C. LOS A and B are indicative of good traffic conditions with low or moderate vehicular delay; LOS C shows average traffic delay remaining in a satisfactory condition. The intersection of Alamo Drive/I-80 Eastbound Ramps operates at LOS D in the PM peak hour, with a volume-to-capacity (V/C) ratio of 0.81. North Texas Street/I-80 Eastbound Ramps operates at LOS E (0.94) in the PM peak hour.

Existing Roadway Segments

Ten roadway segments were selected for analysis, based on an estimate of which segments the Proposed Project may cause a traffic impact. The roadway segment locations are shown by number in Appendix D in Figure 4, p. 17. The roadway segments analyzed are:

1. Lagoon Valley Road @ I-80 EB Ramps, Rivera Road;
2. Lagoon Valley Road @ I-80 Overcrossing;

3. Cherry Glen Road @ I-80 WB Off Ramp, North Cherry Glen Road;
4. Rivera Road @ Lagoon Valley Road, Cherry Glen Road;
5. Cherry Glen Road @ I-80 WB Ramps (W), Lyon Road;
6. Cherry Glen Road @ Pleasant Valley Road, Lyon Road;
7. Cherry Glen Road @ Pleasant Valley Road, I-80 WB Ramps (E);
8. Pleasant Valley Road north of Cherry Glen Road;
9. Cherry Glen Road @ I-80 Overcrossing; and
10. Alamo Drive @ I-80 Overcrossing.

Table 4.5-3 illustrates the Level of Service criteria for roadway segments, as well as for freeway segments and freeway ramps. As for intersections, service levels are assigned based on a ratio of traffic volume to total facility capacity, the volume-to-capacity (V/C) Ratio. A V/C ratio of 0.60 or less represents excellent traffic conditions while a V/C ratio equal to 1.0 represents a facility operating at capacity.

TABLE 4.5-3

ROADWAY SEGMENT LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Volume-to-Capacity Ratio (v/c)
A	Little or no delay	$\leq$ 0.60
B	Short traffic delay	> 0.61 and $\leq$ 0.70
C	Average traffic delay	> 0.71 and $\leq$ 0.80
D	Long traffic delay	> 0.81 and $\leq$ 0.90
E	Very long traffic delay	> 0.91 and $\leq$ 1.0
F	Extreme traffic delay	> 1.0

Source: Korve Engineering, January 2004; Highway Capacity Manual, Special Report No. 209, Transportation Research Board, 1985.

Table 4.5-4 shows existing roadway segment LOS during the AM and PM peak hours (segments are listed from west to east in the table). In both the AM and PM peak hours, each roadway segment evaluated functions at a rating of LOS A.

Existing Freeway Segments

Five freeway segments along I-80 in the vicinity of the project site were selected for analysis, based on an estimate of which segments the Proposed Project may cause a traffic impact. I-80 has four travel lanes in each direction from Fairfield through Vacaville, allowing a capacity of approximately 8,000 vehicles per hour per direction. The predominant morning commute is westbound; the evening commute is in the eastbound direction. The five freeway segments analyzed are:

Alamo Drive Overcrossing eastward, EB/WB;
Alamo Drive Overcrossing to Cherry Glen/Peña Adobe Overcrossing, EB; North Cherry Glen Off-Ramp to Cherry Glen/Peña Adobe Overcrossing, WB;
Alamo Drive Overcrossing to North Cherry Glen Off-Ramp, WB;
Cherry Glen/Peña Adobe Overcrossing to C=Lagoon Valley Overcrossing EB/WB; and
Lagoon Valley Overcrossing to North Texas Overcrossing, EB/WB.

TABLE 4.5-4

EXISTING ROADWAY SEGMENT LEVELS OF SERVICE

	Segments	Peak Hour	Level of Service	Segment Volume	Volume-to-Capacity Ratio
1.	Lagoon Valley Road *(I-80 EB Ramps to Rivera Road)*	PM	A	113	0.06
2.	Lagoon Valley Road *(I-80 Overcrossing)*	AM	A	107	0.05
		PM	A	224	0.11
3.	North Cherry Glen Road *(I-80 WB Off Ramp to Cherry Glen Rd)*	PM	A	89	0.07
4.	Rivera Road *(Lagoon Valley to Cherry Glen/Pena Adobe)*	PM	A	16	0.01
5.	Cherry Glen Road *(I-80 WB Ramps (W) to Lyon Road)*	PM	A	249	0.12
6.	Cherry Glen Road *(Lyon Road to Pleasant Valley Road)*	PM	A	209	0.16
7.	Cherry Glen Road *(Pleasant Valley Rd to I-80 WB Ramps(E))*	PM	A	76	0.06
8.	Pleasant Valley Road *(North of Cherry Glen Road)*	PM	A	239	0.12
9.	Cherry Glen / Pena Adobe *(I-80 Overcrossing)*	AM	A	55	0.03
		PM	A	95	0.05
10.	Alamo Drive *(I-80 Overcrossing)*	AM	A	2,372	0.47
		PM	A	2,445	0.49

Source: Korve Engineering, January 2004.

Table 4.5-5, presents existing freeway segment LOS during the AM and PM peak hours on I-80 near the project site. These existing conditions are based on most current Caltrans counts on record, performed between March 1997 and January 2002.

Level of Service criteria are the same as those for roadway segments, shown in Table 4.5-3. The LOS under existing conditions are satisfactory, ranging from LOS A to LOS D in both the AM and PM peak hours.

Existing Freeway Ramps

The Interstate 80 ramps in both directions are analyzed along the same portion of the freeway and the freeway segments analysis. The capacity for each of the ramps was assumed to be 1,500 vehicles for a one-lane ramp. Ramp capacity analyses were performed for the following ramps:

Lagoon Valley I-80 Westbound On;
Lagoon Valley I-80 Westbound Off;
Lagoon Valley I-80 Eastbound On;
Lagoon Valley I-80 Eastbound Off;
Cherry Glen I-80 Westbound On;
Cherry Glen I-80 Westbound Off;
North Cherry Glen I-80 Westbound Off;
Pena Adobe I-80 Eastbound On;
Pena Adobe I-80 Eastbound Off;
Alamo / Merchant I-80 Eastbound Off;
Alamo / Merchant I-80 Westbound On;

TABLE 4.5-5

EXISTING FREEWAY SEGMENT LEVELS OF SERVICE

Interstate I-80 Freeway Segments		Peak Hour	Level of Service	Volume-to-Capacity Ratio
East of Alamo Drive Overcrossing	EB	AM	A	0.49
		PM	C	0.77
	WB	AM	B	0.62
		PM	A	0.54
Alamo Drive Overcrossing – Cherry Glen/Pena Adobe Overcrossing	EB	AM	A	0.52
		PM	D	0.87
North Cherry Glen Off Ramp – Cherry Glen/Pena Adobe Overcrossing	WB	AM	C	0.79
		PM	B	0.60
Alamo Drive Overcrossing – North Cherry Glen Off Ramp	WB	AM	D	0.80
		PM	B	0.61
Cherry Glen/Pena Adobe Overcrossing – Lagoon Valley Overcrossing	EB	AM	A	0.52
		PM	D	0.87
	WB	AM	C	0.80
		PM	A	0.60
Lagoon Valley Overcrossing – North Texas Overcrossing	EB	AM	A	0.52
		PM	D	0.89
	WB	AM	C	0.80
		PM	A	0.60

Source: Korve Engineering, January 2004

North Texas Street I-80 Eastbound Off;
North Texas Street I-80 Eastbound On;
North Texas Street I-80 Westbound Off; and
North Texas Street I-80 Westbound On.

The analysis of the freeway ramps is based on a ratio of traffic volumes to the available capacity for each ramp (volume-to-capacity ratio, or V/C). The V/C ratios correspond to levels of service that represent congestion on the ramp. Table 4.5-6 presents freeway ramp LOS during the AM and PM peak hours for I-80 in both directions. Two locations were found to currently operate at unacceptable conditions: the Alamo/I-80 eastbound off ramp in the PM peak hour, and the Alamo/Merchant westbound on ramp in the AM peak hour. Congestion at both of these freeway ramps can be attributed to local commute traffic in the respective directions and peak hours. All other study ramps currently operate at LOS A or B.

Existing Freeway Ramp Merge/Diverge Conditions

The freeway ramp merge / diverge analysis was conducted using the Transportation Research Board's *2000 Highway Capacity Manual* for ramp junction merge and diverge areas. The analysis was based on the typical weekday AM and PM peak hour traffic volumes. A ramp junction is formed when an on-ramp or off-ramp joins a freeway. The junction formed at this point is an area of turbulence due to the concentration of merging vehicles entering the freeway or diverging vehicles leaving the freeway. The level of service for ramp-freeway junctions is based on the density of the area affected by the ramp.

TABLE 4.5-6

EXISTING FREEWAY RAMP LOS

Freeway Ramps	Peak Hour	Level of Service	Volume-to-Capacity Ratio
Lagoon Valley I-80 Westbound On Ramp	AM	A	0.01
	PM	A	0.02
Lagoon Valley I-80 Westbound Off Ramp	AM	A	0.02
	PM	A	0.03
Lagoon Valley I-80 Eastbound On Ramp	AM	A	0.03
	PM	A	0.03
Lagoon Valley I-80 Eastbound Off Ramp	AM	A	0.04
	PM	A	0.16
Cherry Glen I-80 Westbound On Ramp	AM	A	0.01
	PM	A	0.01
Cherry Glen I-80 Westbound Off Ramp	AM	A	0.02
	PM	A	0.02
North Cherry Glen I-80 Westbound Off Ramp	AM	A	0.01
	PM	A	0.01
Pena Adobe I-80 Eastbound On Ramp	AM	A	0.01
	PM	A	0.03
Pena Adobe I-80 Eastbound Off Ramp	AM	A	0.01
	PM	A	0.02
Alamo I-80 Eastbound Off Ramp	AM	A	0.45
	PM	**E**	**0.96**
Alamo / Merchant Westbound On Ramp	AM	**F**	**1.27**
	PM	B	0.67
North Texas Street I-80 Eastbound Off Ramp	AM	A	0.31
	PM	A	0.37
North Texas Street I-80 Eastbound On Ramp	AM	A	0.12
	PM	A	0.31
North Texas Street I-80 Westbound Off Ramp	AM	A	0.28
	PM	A	0.14
North Texas Street I-80 Westbound On Ramp	AM	A	0.32
	PM	A	0.36

Note: Ramps with LOS E or LOS F shown in bold.
Source: Korve Engineering, January 2004.

Service levels in areas affected by merge and diverge activities are determined based on density of passenger cars per mile per lane (pc/mi/ln), as calculated using the freeway volumes and the merging or diverging ramp volumes at each study location. The performance rating for each location is represented by LOS A through E, with LOS F indicating a demand that exceeds the capacity at the analyzed merge or diverge area (see Table 4.5-7).

TABLE 4.5-7

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10 - 20
C	> 20 - 28
D	> 28 - 35
E	> 35
F	Demand exceeds capacity

Source: Korve Engineering, January 2004; Exhibit 25-4: LOS Criteria for Merge and Diverge Areas, 2000 Highway Capacity Manual.

The merge / diverge locations analyzed are the same as the on and off ramps analyzed above. Table 4.5-8 presents the existing levels of service for the freeway merge and diverge study locations. The locations generally operate at LOS B or C for both the AM and PM peak periods of traffic on I-80. In the PM peak hour, four locations operate at LOS D. All four of these congested locations are in the eastbound direction. Corresponding to local commute patterns, westbound ramp / freeway junction areas are more congested in the morning hours. No merge / diverge locations operate at unacceptable LOS E or F under existing conditions in the AM or PM peak hours.

TABLE 4.5-8

EXISTING FREEWAY RAMP MERGE/DIVERGE LOS

Freeway Merge-Diverge Locations	Peak Hour	Level of Service	Density
Lagoon Valley I-80 Westbound On (M)	AM	C	23
	PM	B	18
Lagoon Valley I-80 Westbound Off (D)	AM	C	24
	PM	B	17
Lagoon Valley I-80 Eastbound On (M)	AM	B	16
	PM	C	25
Lagoon Valley I-80 Eastbound Off (D)	AM	B	15
	PM	C	27
Cherry Glen I-80 Westbound On (M)	AM	B	19
	PM	B	15
Cherry Glen I-80 Westbound Off (D)	AM	C	28
	PM	C	22
North Cherry Glen I-80 Westbound Off (D)	AM	C	26
	PM	B	19
Pena Adobe I-80 Eastbound On (M)	AM	B	14
	PM	C	21
Pena Adobe I-80 Eastbound Off (D)	AM	B	17
	PM	D	29
Alamo / Merchant Eastbound Off (D)	AM	B	19
	PM	D	32
Alamo / Merchant Westbound On (M)	AM	C	20
	PM	B	17
North Texas Street I-80 Eastbound Off (D)	AM	B	18
	PM	D	32
North Texas Street I-80 Eastbound On (M)	AM	B	19
	PM	D	30
North Texas Street I-80 Westbound Off (D)	AM	C	23
	PM	B	17
North Texas Street I-80 Westbound On (M)	AM	C	22
	PM	B	17

Source: Korve Engineering, January 2004

4.5.3 REGULATORY SETTING

The City of Vacaville has ordinances and General Plan policies that govern traffic impact analyses, establish significance thresholds, and ensure that adequate circulation facilities are available to serve new development. The City's Land Use and Development Code, Title 14 of

the Municipal Code, includes a division on traffic impact. The City's General Plan includes a Circulation Element in Chapter 6. Both have provisions relevant to the proposed Lower Lagoon Valley Specific Plan.

Local Ordinances

The City's Land Use and Development Code contains, in Division 14.13, the Traffic Impact Mitigation Ordinance. This ordinance establishes traffic impact analysis procedures and impact standards to be used in the City. The impact standards in Section 14.13.180.070 are applied when a traffic impact analysis is required by Section 14.13.180.040, as for the Proposed Project. Section 14.13.180.070, Traffic Impact Standards and Section 14.13.180.030 Definitions (particularly "Roadway Network Affected by Project) provides the basis for determining thresholds of significance for network under control of local jurisdiction. (Add reference to these and add to appendix?)

Local General Plan

The City's Transportation Element is in Chapter 6 of the Vacaville General Plan. This Element includes Guiding Policies and Implementing Policies that relate to traffic, transit and pedestrian/bicycle operations in the City. These policies establish acceptable Levels of Service for roadways in the City, recommend street improvements throughout the City, define and encourage "Transportation Systems Management" programs, establish bikeways throughout the City, and encourage development of safe and convenient pedestrian sidewalks and trails.

The Standards for Traffic Service and Street Improvements, in Guiding Policies 6.1-G1 through 6.1-G3 reflect the provisions of the Traffic Impacts Standards section of the Traffic Impact Mitigation Ordinance, and therefore are not repeated here. Implementing Policies for Traffic Service and Street Improvements include implementation of improvements summarized in Table 6-1 of the Element (policy 6.1-I 2); this table lists "Various roadways in the Lagoon Valley sector" and recommends two and four lanes as ultimate improvements. The Proposed Project would provide four-lane roadways on the major entrance roadway (Lagoon Valley Road) connecting to the Cherry Glen interchange with I-80 and on the commercial roadway connecting the main entrance road to Peña Adobe Road, consistent with the Transportation Element provisions for this area. Other relevant Implementing Policies include 6.1-I 3 and I 4 to maintain acceptable traffic levels of service and I 6 requiring all new development to provide appropriate right-of-way improvements. The Proposed Project would include appropriate right-of-way improvements for arterials and local streets, as well as bicycle and pedestrian walkways in conformity with Policies 6.5-I 1, 6.5-I 4 and 6.5-I 6. A General Plan amendment is proposed to modify the proposed transportation network identified in the City's General Plan. The project's effects on traffic levels of service are discussed below in Section 4.5.4, Impacts and Mitigation Measures.

The City has an adopted transportation impact fee. Development with the Specific Plan area would pay a Lower Lagoon Valley transportation impact fee that is proposed to be equivalent to the city's current transportation fee in accordance with the policies identified in the Specific Plan. The Specific Plan establishes this transportation mitigation fee for the purpose of funding the project's fair share of off-site area-wide improvements, as identified in the Traffic Impact Analysis (Appendix D) for this EIR, including fair share contributions toward improvements that are under the control of other jurisdictions, such as Caltrans.

4.5.4 IMPACTS AND MITIGATION MEASURES

Methods of Analysis

Traffic conditions are assessed for weekday morning and evening peak hours of travel. As explained in the Environmental Setting, existing conditions are based on existing traffic counts. Future scenarios analyzed include the following:

Existing + Approved Projects, providing a baseline for the analysis
Existing + Approved Projects with Proposed Project
Year 2025 without Proposed Project (future baseline)
Year 2025 with Proposed Project

The Existing + Approved Projects scenario is based on a list of 43 development projects in the City of Vacaville that have been approved but have not yet constructed and occupied as of spring 2003 (see Appendix D, Table 1, p. 5). This list includes approximately 1,500 residential units, plus new office and industrial space.

Traffic conditions for future year 2025 scenarios were assessed using forecasts from the City of Vacaville's MINUTP Travel Demand Forecast Model, which assumes the City's historical growth rates, including construction of approximately 500 new residential units per year, and is consistent with buildout of the City's General Plan and the City's land use database. The 20-year time horizon also corresponds to Caltrans specifications for future analyses. Various modifications were made to more accurately reflect traffic conditions, as described in the Traffic Impact Analysis in Appendix D, pp. 21-23. The Model was run for the PM peak hour condition and all analysis locations were studied in the PM peak hour. As explained above in the Environmental Setting under "Existing Traffic Conditions," morning peak hour conditions were studied for locations on and near I-80, because morning commute conditions on and near the freeway could affect local traffic. AM peak hour volumes were calculated as a percent of the PM peak hour Model volumes (approximately 89 percent. The Proposed Project would reduce overall development potential compared with existing General Plan and zoning designations for the project site.

Future Roadway Improvements

The City of Fairfield is planning to extend Manuel Campos Parkway from its current terminus to interchange with I-80. This interchange would replace the existing North Texas Street interchange, and North Texas Street would tee into Manuel Campos Parkway east of the freeway. The intersection of North Texas Street and Manual Campos Parkway is assumed to be signalized. These facilities are located outside of the City of Vacaville and are not included in the City's travel demand model. The intersection of Manuel Campos Parkway and North Texas Street was analyzed based on information from the Solano County Travel Demand Model and future geometric plans for the new interchange. (The intersection of Manuel Campos Parkway and North Texas Street is identified in tables as Intersection 13, and is shown in Figure 2 in Appendix D.)

In addition, the Proposed Project would create new intersections throughout the Specific Plan area. Four of these new intersections were analyzed to determine impacts within the Specific Plan site (the type of traffic control proposed is shown in parentheses):

14. Lagoon Valley Road / Commercial Access Road (two-way STOP controlled)

15. Lagoon Valley Road / Arterial # 1 (two-way STOP controlled)
16. Lagoon Valley Road / Arterial # 2 (two-way STOP controlled)
17. Internal Collector Intersection (two-way STOP controlled)

As with the existing analysis intersections listed above, the numbers correspond to intersection locations shown on Figure 2 in Appendix D.

The Vacaville General Plan includes construction of an overcrossing of I-80 to connect California Drive to the North Cherry Glen Road westbound off-ramp as a planned roadway improvement. The Transportation portion of the Development Improvement Fee program provides the nexus and funding mechanism to provide for this improvement. Development projections consistent with those used to project the Year 2025 traffic conditions used in this study are part of the nexus that lead to the inclusion of California Drive Overcrossing in the Transportation portion of the Development Impact fee Program. Transportation portion of Development Impact Fees would and generate the funding to accomplish this improvement. The California Drive Overcrossing was included as a variant, and is assumed in both a 2025 future baseline scenario without the Proposed Project and a 2025 future scenario with the project, to identify the change in impacts that would result with the project if the overcrossing is built in the future. By providing analysis without the California Drive Overcrossing provides for analysis of Project impacts prior to this improvement being in place, and validates the nexus for it.

Existing Plus Approved Projects Scenario

The Proposed Project was analyzed in the context of existing conditions that also account for approved projects that have not yet been constructed or are under construction but are not yet fully occupied. Providing Existing Plus Approved Project analysis allows the increment of traffic expected from approved projects over and above the existing traffic counts collected and discussed in the Environmental Setting to be analyzed with and without the Project. Therefore, traffic from the approved projects is added to existing conditions to provide an appropriate baseline against which to measure the proposed Specific Plan. The results of the Existing + Approved Projects baseline scenario are not presented separately in the EIR, but are evaluated as part of the discussion of project impacts for each traffic impact analysis, to provide the appropriate comparison. The Existing + Approved Projects baseline is separately identified in Appendix D.

Project Trip Generation and Distribution

The number of vehicle trips that would be generated by the Proposed Project was estimated through a trip generation analysis. Trip generation rates for the land uses under consideration were taken from the City of Vacaville's rates. The trip rates were developed in the 1995 calibration of the 1990 Citywide Traffic Model, and are summarized in Appendix D in Table 5 on p. 18.

The Proposed Project was found to generate approximately 3,118 PM peak hour trips in the analysis of Existing + Approved Projects + Project scenario and approximately 2,871 trips in the Year 2025 + Project scenario. The decrease in project-generated trips between the existing and future year 2025 scenarios occurs in part because of variations in the origin and destination assignments in the model runs drive variations in amounts and types of new development forecast to be present in the City of Vacaville for each of the scenario time periods and the traffic model balances resulting attractions against productions. A practical example of how this

occurs is larger mixed commercial developments in the future may generate proportionally fewer trips per residential unit because the resident is traveling to a variety of stores in a single trip rather than making several trips.

Vehicle trips generated by the Proposed Project were assigned to the surrounding transportation network using the City's Travel Demand Model. This pattern is based on existing traffic flows on I-80 and local streets, the locations of potential origins and destinations, and logical circulation patterns on the area's roadway network. The AM peak hour trip distribution projection was developed as a percentage of PM peak hour trip distribution from the model, assigned in the reverse direction.

Using the trip generation and trip distribution information described above, trips generated by Proposed Project land uses were assigned to the local roadway network for morning and evening peak hour conditions. Approximately 20 percent of project-generated trips would be internal to the project site, because residents would be able to shop at the commercial uses included in the project. Thus, the mixed-use nature of the project encourages travel among the residential and commercial uses in Lower Lagoon Valley. Travel is assigned in part based on whether a local roadway or freeway segment is shown to be congested. For example, under Existing + Approved Project + Project conditions, trips to Downtown Vacaville were assigned to I-80. In 2025 future scenarios, when freeways are expected to be more congested, some trips are redistributed in the model and approximately 17 percent of outbound project trips were assumed to travel northbound on Pleasant Valley Road to reach Vacaville without using the freeway. Trip distribution in 2025 is shown on Figure 5, p. 20 in Appendix D.

Thresholds of Significance

The City of Vacaville has adopted thresholds of significance for traffic impact analyses, identified in the General Plan Transportation Element and in the Land Use and Development Ordinance. Traffic impacts would be considered significant if:

- Levels of Service would be degraded from an acceptable LOS A, B, C, or D to unacceptable E or F by traffic from the project; or
- Volume to Capacity ratios at an intersection already operating at LOS E or F in the baseline condition would be reduced by 0.02 or greater by traffic from the project.

Effects Determined to Have Less-Than-Significant Impacts

The analysis of roadway segments in the project vicinity showed that the Proposed Project would not cause levels of service to degrade below LOS D, an acceptable level, under existing, Existing + Approved Projects, or future 2025 conditions. Therefore, although the segment on Rivera Road between Lagoon Valley Road and Cherry Glen/Peña Adobe would degrade from LOS A under both existing conditions scenarios to LOS D with project-generated traffic, this would be considered a less-than-significant impact and mitigation measures would not be needed.

The analysis of freeway segments in the project vicinity showed that the Proposed Project would not cause existing acceptable LOS to degrade to unacceptable levels or cause unacceptable V/C ratios to degrade by 0.02 or more compared with Existing + Approved Project conditions. The eastbound freeway segment between the Alamo Drive overcrossing and the Cherry Glen/Peña Adobe overcrossing would degrade from LOS D to LOS E in the PM peak hour with the addition of traffic from already approved projects. Traffic from the Proposed

Project would not cause LOS to degrade further and would cause the V/C to change from 0.95 to 0.96, a less-than-significant impact. Project impacts to freeway segments in 2025 are discussed below.

Freeway ramps at the Alamo Drive /Merchant Street interchange already operate at LOS E or F in the AM or PM, depending on the direction (the westbound on-ramp operates at LOS F in the morning, and the eastbound off-ramp operates at LOS E in the evening). With the addition of traffic from approved projects, both on- and off-ramps would operate at unacceptable LOS E or F in the AM and PM peak hours. With the addition of project-generated trips, the Model redistributed trips throughout the area, resulting in a different trip distribution than the baseline conditions. This trip balancing assigned fewer trips to the eastbound off-ramps and westbound on-ramps, thus indicating an improved V/C ratio with the Proposed Project, although LOS would remain E or F. The project, therefore would not cause significant traffic impacts at freeway ramps under Existing + Approved Projects + Project conditions. Project impacts to freeway ramps in 2025 are discussed below.

The freeway merge/diverge analysis showed that with traffic from approved projects, the Alamo Drive/Merchant Street eastbound off-ramp area would experience LOS E conditions in the PM peak hour. The project would contribute traffic to this diverge condition; however, as with the freeway ramp analysis, the model redistributed traffic and the project was not shown to result in worse levels of service at this location. Therefore the project would not cause significant impacts at freeway/ramp junctions. Project impacts in 2025 are discussed below.

Project Impacts and Mitigation Measures

4.5-1 Traffic generated by the Proposed Project would cause LOS to degrade to unacceptable levels at one intersection under Existing + Approved Projects + Project conditions.

The study intersections, including the 12 existing analysis intersections and the 4 new intersections that would be built as part of the project, were analyzed under Existing + Approved Project and Existing + Approved Project + Project conditions. The results of the analysis are shown in Table 4.5-9.

As shown in the table, the North Texas Street / I-80 eastbound ramps intersection already operates at LOS E (V/C 0.94) under existing conditions, and would remain at LOS E with a worse V/C ratio with traffic from the Approved Projects. Adding traffic from the Proposed Project would not result in further degradation in level of service, and would not cause a reduction in the V/C ratio compared with existing conditions. Note that the V/C ratio for the Existing + Approved Projects + Project scenario is slightly less than for the Existing + Approved Projects because the analysis model redistributes trips when different traffic generators and attractors are added. Thus, this would not be a significant environmental impact. The intersection of the I-80 eastbound ramps with Cherry Glen Road / Peña Adobe Road / Rivera Road would degrade from LOS A under existing conditions and existing conditions with Approved Projects to LOS E with project-generated traffic in both the AM and PM peak hours. The project would contribute a substantial proportion of the total traffic at this intersection and would result in a ***significant impact***.

TABLE 4.5-9

EXISTING + PROJECT INTERSECTION LOS

	Intersection	Peak Hour	Existing	Existing + Approved Projects	Existing + AP + PROJECT
			LOS (Volume to Capacity Ratio)[2]		
1.[1]	North Texas Street / I-80 Eastbound Ramps	AM	C (0.74)	C (0.78)	D (0.85)
		PM	**E (0.94)**	**E (0.96)**	**E (0.93)**
2.	Hilborn Rd / Lyon Rd / North Texas St / I-80 WB Ramps	AM	C (0.78)	C (0.80)	C (0.76)
		PM	C (0.74)	D (0.81)	D (0.83)
3.	Lagoon Valley Road/ I-80 Eastbound Ramps	AM	A (0.17)	A (0.12)	A (0.57)
		PM	A (0.27)	A (0.14)	A (0.55)
4.	Lagoon Valley Road / Rivera Road / Nelson Road	PM	A (0.17)	A (0.11)	A (0.48)
5.	Cherry Glen Road / I-80 Westbound Ramps	AM	A (0.23)	A (0.15)	A (0.42)
		PM	A (0.21)	A (0.14)	A (0.53)
6.	Cherry Glen Rd / Lyon Rd	PM	A (0.24)	A (0.20)	A (0.17)
7.	I-80 EB Ramps / Cherry Glen / Pena Adobe / Rivera Road	AM	A (0.14)	A (0.19)	**E (0.92)**
		PM	A (0.16)	A (0.19)	**E (0.95)**
8.	North Cherry Glen Road / I-80 WB Ramps/Cherry Glen	AM	A (0.14)	A (0.16)	C (0.77)
		PM	A (0.16)	A (0.16)	A (0.37)
9.	Cherry Glen Road / Pleasant Valley Road	PM	A (0.28)	A (0.20)	A (0.19)
10.	Alamo Drive / I-80 Eastbound Ramps	AM	B (0.63)	B (0.67)	A (0.57)
		PM	A (0.53)	A (0.55)	A (0.54)
11.	Alamo Drive / Merchant St	AM	C (0.80)	D (0.88)	D (0.82)
		PM	B (0.61)	C (0.76)	C (0.75)
12.	Alamo Drive / Marshall Rd	PM	B (0.70)	C (0.76)	B (0.64)
14.	Lagoon Valley Road / Commercial Access Road	PM	-	-	A (0.32)
15.	Lagoon Valley Road / Arterial #1	PM	-	-	A (0.51)
16.	Lagoon Valley Road / Arterial #2	PM	-	-	A (0.24)
17.	Internal Collector Intersection	PM	-	-	A (0.11)

Notes:
1. Intersection numbers shown in **Appendix D** in Figure 2.
2. Intersections with LOS E or LOS F are shown in bold.

Source: Korve Engineering, January 2004.

Mitigation Measures

Implementation of either of the following mitigation measures would reduce traffic intersection impacts with the project to a *less-than-significant level.*

4.5-1 (a) *Convert the northbound approach at the intersection of I-80 eastbound ramps / Cherry Glen / Peña Adobe / Rivera Road to two left turn lanes and 1 shared-through-right turn lane, using a design approved by the City of Vacaville with review and approval of CALTRANS.*

The geometry at the intersection of I-80 eastbound ramps / Cherry Glen / Peña Adobe / Rivera Road is currently one approach lane in each direction with shared left-through-right operation. This mitigation measure would add two left turn lanes and convert the existing lane to a shared through-right turn lane. Level of service would improve to LOS D (V/C ratio 0.87) in the AM

peak hour with this mitigation. Level of service would improve to LOS C (V/C ratio 0.75) in the PM peak hour with this mitigation.

The existing width of Rivera Road at this intersection would need to be widened to accommodate the additional left turn lanes, as the roadway currently is one lane in each direction. Also, the eastbound I-80 on-ramp would need to be widened to accept the two turning lanes, and would merge into one lane as it reached the merge location. Right-of-way would need to be obtained from either side of Rivera Road.

An alternative, if right of way could not be obtained for Rivera Road or if the on-ramp could not be widened, would be the following mitigation measure. This measure would reduce the impact at the intersection to a less-than-significant level.

(b) *Redesign project access intersections to shift motorists from the commercial portion of the Proposed Project from the Peña Adobe Road / Cherry Glen Road interchange to the Lagoon Valley Road access to I-80. The redesign shall include installation of traffic controls and design of circulation patterns to discourage travel to Peña Adobe Road. The redesign shall encourage visitors to the commercial portion of the Proposed Project to use Lagoon Valley Road by appropriate placement of parking lot entrances, using a loop road and/or other features. Convert the northbound shared through-right lane at the intersection of Lagoon Valley Road/I-80 eastbound ramps into two separate lanes, one through lane and one right turn lane. Implement Mitigation Measure 4.5-4(a) to add an auxiliary freeway lane between Lagoon Valley Road and Peña Adobe/Cherry Glen.*

Two freeway interchanges provide access to the project's residential and commercial areas – Lagoon Valley and Pena Adobe/Cherry Glen. With this mitigation measure, the commercial portion of the project site would be configured so as to focus the roadway access points and driveways and the vehicle parking lots to direct traffic to Lagoon Valley Road and away from Rivera Road and the I-80 / Cherry Glen / Peña Adobe interchange. The current traffic distribution assigns all commercial outbound project trips to the I-80 eastbound freeway on ramp at Pena Adobe. By redistributing a majority of the assigned commercial traffic (85 percent, or 867 vehicles) from this freeway interchange to the interchange at Lagoon Valley Road, the service level at Pena Adobe would improve to LOS A. In turn, the intersection of Lagoon Valley Road/Nelson Road/Rivera Road would operate at LOS C and the intersection of Lagoon Valley Road/I-80 eastbound ramps would operate at LOS F, resulting in a ***secondary significant impact*** without the additional mitigation feature to convert the northbound shared through-right lane into two separate lanes. The project intersection at Lagoon Valley Road/Commercial Access Road would operate at LOS A.

This change in trip assignment would also affect the study area roadways. The freeway segment between Lagoon Valley and Pena Adobe eastbound would operate at LOS E, resulting in a ***secondary significant impact*** without the additional measure feature to add an auxiliary lane, as in Mitigation Measure 4.5.4(a). The roadway segment on Lagoon Valley between the I-80 Eastbound Ramps and Rivera Road would operate at LOS A. The Rivera Road segment would operate at LOS A. The I-80 freeway ramps would operate at LOS B at the Lagoon Valley eastbound on ramp and at LOS A at the Pena Adobe eastbound on ramp. The corresponding freeway merge locations would both operate at LOS C.

The secondary significant impacts at the intersection of Lagoon Valley Road / I-80 Eastbound Ramps would be mitigated by converting the northbound shared through-right lane into two separate lanes, one through lane and one right turn lane. With this mitigation, the intersection would operate at LOS D. The impact to the freeway segment between Lagoon Valley and Pena Adobe eastbound would be mitigated by the addition of an auxiliary lane between Lagoon Valley Road and Pena Adobe/Cherry Glen in the eastbound direction (see Mitigation Measure 4.5-4(a)).

4.5-2 Traffic generated by the Proposed Project would cause intersection LOS to degrade to unacceptable levels in 2025.

The 2025 baseline conditions were established using the City's MINUTP Travel Demand Model, assuming that the project site remains in park/open space and agricultural uses as it is now. Traffic generated by the Proposed Project was added to the 2025 baseline scenario to identify impacts resulting from project-generated traffic. Results of the intersection levels of service analysis are presented in Table 4.5-10. As shown there, about one-half of the intersections analyzed would operate at unacceptable levels of service in the future with the Proposed Project. The project would cause three (3) intersections to degrade from acceptable LOS under future baseline conditions to unacceptable levels. The intersections of Lagoon Valley Road / I-80 eastbound ramps, Cherry Glen Road/Peña Adobe Road/Rivera Road / I-80 eastbound ramps, and Alamo Drive / Marshall Road would degrade from acceptable levels of service to LOS E or F with traffic from the Proposed Project. This would be a ***significant impact.*** The project would also contribute to significant cumulative impacts, as discussed in Impact 5.1-5, in Chapter 5.1, Cumulative Impacts.

Mitigation Measures

Implementation of the following mitigation measures would reduce future project-specific intersection impacts to *less-than-significant* levels.

4.5-2 (a) *At the intersection of Lagoon Valley Road / I-80 eastbound ramps, signalize the intersection and add a northbound right-turn lane.*

Development of the Proposed Project would warrant installation of at traffic signal at this intersection in 2025. Adding a northbound right-turn lane would require acquiring right-of-way to widen Lagoon Valley Road at the base of the overcrossing. The eastbound I-80 on-ramp would also need to be widened to accept the additional turning lane, and then merged back into one lane before reaching the freeway merge location. Level of service would improve to LOS D (V/C 0.85 in the PM peak hour with this mitigation measure.

(b.1) *At the intersection of the I-80 eastbound ramps with Cherry Glen Road / Peña Adobe Road / Rivera Road, convert northbound approach to two left-turn lanes and one shared through-right-turn lane.*

Level of service would improve to LOS D (V/C 0.86) in the PM peak hour with this mitigation measure. In the alternative, the following mitigation measure would also reduce impacts at the intersection of the I-80 eastbound ramps with Cherry Glen/Peña Adobe/Rivera.

(b.2) *Implement Mitigation Measure 4.5-1(b).*

TABLE 4.5-10

YEAR 2025 INTERSECTION LOS (FUTURE BASELINE PLUS PROJECT)

	Intersection	Peak Hour	Future Baseline	Future Baseline with Project
			LOS (V/C ratio)	
1.	North Texas Street / I-80 Eastbound Ramps	AM	D (0.84)	D (0.85)
		PM	**F (1.03)**	**F (1.02)**
2.	Hilborn Rd / Lyon Rd / North Texas St / I-80 Westbound Ramps	AM	D (0.84)	D (0.84)
		PM	D (0.81)	D (0.84)
3.	Lagoon Valley Road / I-80 Eastbound Ramps	AM	A (0.13)	C (0.72)
		PM	A (0.14)	**E (0.93)**
4.	Lagoon Valley Road / Rivera Road / Nelson Road	PM	A (0.11)	A (0.54)
5.	Cherry Glen Road / I-80 Westbound Ramps	AM	A (0.17)	B (0.67)
		PM	A (0.14)	B (0.66)
6.	Cherry Glen Rd / Lyon Rd	PM	A (0.27)	A (0.47)
7.	I-80 Eastbound Ramps / Cherry Glen / Pena Adobe / Rivera Road	AM	A (0.21)	C (0.79)
		PM	A (0.22)	**F (1.21)**
8.	North Cherry Glen Road / I-80 Westbound Ramps/Cherry Glen	AM	A (0.17)	A (0.56)
		PM	A (0.18)	A (0.38)
9.	Cherry Glen Rd/Pleasant Valley Rd	PM	A (0.31)	A (0.51)
10.	Alamo Drive / I-80 Eastbound Ramps	AM	C (0.76)	C (0.78)
		PM	B (0.63)	B (0.66)
11.	Alamo Drive / Merchant St	AM	**E (0.93)**	**E (0.96)**
		PM	D (0.87)	D (0.90)
12.	Alamo Drive / Marshall Rd	PM	D (0.89)	**E (0.91)**
13.	North Texas St / Manuel Campos Parkway	AM	**F (1.19)**	**F (1.21)**
		PM	**F (1.37)**	**F (1.40)**
14.	Lagoon Valley Rd/Commercial Access Rd	PM	-	A (0.29)
15.	Lagoon Valley Road / Arterial #1	PM	-	A (0.51)
16.	Lagoon Valley Road / Arterial #2	PM	-	A (0.25)
17.	Internal Collector Intersection	PM	-	A (0.10)

Note: Intersections operating at LOS E or F shown in bold.
Source: Korve Engineering, January 2004.

This measure would involve redesigning project access intersections to shift focus to the Lagoon Valley Road ramps to I-80 eastbound, converting the northbound shared through-right lane at the ramp intersection into two separate lanes, and adding an auxiliary lane to the freeway between Lagoon Valley Road and Peña Adobe Road/Cherry Glen Road in the eastbound direction (Mitigation Measure 4.5-1(b)). With these measures the affected intersection at the Peña Adobe Road intersection with I-80 eastbound ramps would operate at LOS D; the project intersection at Lagoon Valley Road/ Commercial Access Road would operate at LOS A; the intersection of Lagoon Valley Road / I-80 eastbound ramps would operate at LOS D; and the freeway segment would operate at LOS C.

(c) *Convert southbound right-turn lane to shared through-right-turn lane at the intersection of Alamo Drive / Marshall Road.*

This mitigation measure would allow for both through movements and right turns. Marshall Road would need to be widened at this intersection to provide for restriping on the north side of the intersection to redesignate the southbound right-turn lane and on the south side of the intersection to provide for a merge for the new through traffic. Level of service would improve to LOS C in the PM peak hour.

4.5-3 Project-generated traffic would cause freeway segment LOS to degrade to unacceptable levels on Interstate 80 in 2025.

Traffic from the Proposed Project would cause four freeway segments to degrade from LOS E under 2025 future baseline conditions to LOS F in the westbound direction in the AM peak hour, resulting in ***significant impacts***. The affected segments are between the North Cherry Glen Road off-ramp and the Cherry Glen Road/Peña Adobe Road overcrossing; between the Alamo Drive overcrossing and the North Cherry Glen Road off-ramp; between the Cherry Glen Road/Peña Adobe Road overcrossing to the Lagoon Valley Road overcrossing; and between the Lagoon Valley Road overcrossing and the North Texas Street overcrossing. As shown on Table 4.5-11, the V/C ratios along these four freeway segments would increase by 0.02 or more as a result of project traffic. The project would contribute 10 percent or less of total traffic to these freeway segments. Cumulative contributions to segments operating at LOS F without the project are discussed in Impact 5.1-6, in Chapter 5.1, Cumulative Impacts.

TABLE 4.5-11

YEAR 2025 FREEWAY SEGMENTS LOS

Interstate 80 Freeway Segments		Peak Hour	2025 Future Baseline LOS (Volume/Capacity Ratio)		2025 With Project LOS (Volume/Capacity Ratio)	
East of Alamo Drive Overcrossing	EB	AM	A	(0.56)	B	(0.61)
		PM	C	(0.78)	D	(0.83)
	WB	AM	C	(0.77)	D	(0.87)
		PM	B	(0.63)	B	(0.68)
Alamo Drive Overcrossing – Cherry Glen/Pena Adobe Overcrossing	EB	AM	B	(0.68)	C	(0.76)
		PM	**F**	**(1.11)**	**F**	**(1.19)**
North Cherry Glen Off Ramp – Cherry Glen/Pena Adobe Overcrossing	WB	AM	**E**	**(0.99)**	**F**	**(1.07)**
		PM	C	(0.76)	D	(0.84)
Alamo Drive Overcrossing – North Cherry Glen Off Ramp	WB	AM	**E**	**(1.00)**	**F**	**(1.10)**
		PM	C	(0.76)	D	(0.84)
Cherry Glen/Pena Adobe Overcrossing – Lagoon Valley Overcrossing	EB	AM	B	(0.67)	C	(0.71)
		PM	**F**	**(1.09)**	**F**	**(1.01)**
	WB	AM	**E**	**(0.98)**	**F**	**(1.02)**
		PM	C	(0.75)	C	(0.80)
Lagoon Valley Overcrossing – North Texas Overcrossing	EB	AM	B	(0.67)	C	(0.73)
		PM	**F**	**(1.10)**	**F**	**(1.09)**
	WB	AM	**E**	**(0.99)**	**F**	**(1.01)**
		PM	C	(0.75)	D	(0.82)

Note: Segments with LOS E or LOS F shown in bold.
Source: Korve Engineering, January 2004

Mitigation Measures

Implementation of the following mitigation measures would reduce project impacts to less-than-significant levels. All measures would involve improvements to the I-80 freeway, which is under the jurisdiction of the California Department of Transportation (Caltrans). Because implementation is not within the jurisdiction of the City of Vacaville, the impacts would remain *significant and unavoidable*.

4.5-3 (a) *Widen the I-80 freeway by 12 feet on the west side to add a fifth westbound lane to I-80 from the North Cherry Glen off-ramp to Cherry Glen/Peña Adobe, relocating the shoulder and using the existing shoulder area for the new lane.*

Implementation of this measure would not require acquisition of new property for additional freeway right-of-way, and would improve the LOS along this segment from F to D (V/C 0.90).

(b) *Widen the I-80 freeway by 12 feet and construct a retaining wall on the west side to add a fifth (auxiliary) westbound lane between the Alamo Drive overcrossing and the North Cherry Glen off-ramp, and construct a retaining wall west of the relocated shoulder.*

This measure would not require acquisition of property, and would improve the LOS along this segment from F to E (V/C 0.93).

(c) *Widen the I-80 freeway by 12 feet on the west side to add a fifth westbound lane to I-80 from the Cherry Glen / Peña Adobe overcrossing to the Lagoon Valley Road overcrossing, relocating the shoulder and using the existing shoulder area for the new lane.*

This measure would not require acquisition of property, and would improve the LOS along this segment from F to D (V/C 0.86).

(d) *Widen the I-80 freeway by 12 feet on the west side to add a fifth westbound lane between Lagoon Valley Road and North Texas Street, relocating the shoulder and using the existing shoulder area for the new lane. Install a retaining wall along the edge of the widened freeway.*

The retaining wall would be needed to retain the cut slope in the hill adjacent to the freeway. This measure would result in an acceptable LOS of D (V/C 0.85).

4.5-4 Project-generated traffic would cause one freeway ramp to degrade from acceptable to unacceptable LOS in 2025.

Project-generated traffic would cause the Peña Adobe I-80 eastbound on-ramp to degrade from LOS A under future 2025 baseline conditions to LOS E in the PM peak hour in 2025, as shown in Table 4.5-12. This would be a ***significant impact.*** Most other freeway ramps would continue to operate at acceptable LOS in the future with the addition of project traffic. The project's contribution to freeway ramps already operating at LOS F in 2025 is discussed under cumulative impacts, in Impact 5.1-7, in Chapter 5.1, Cumulative Impacts.

Mitigation Measures

Implementation of the following mitigation measures would reduce project impacts to less-than-significant levels. However, because implementation of these measures is not within the jurisdiction of the City of Vacaville, this impact would remain *significant and unavoidable.*

4.5-4 (a) *Widen the freeway by 12 feet on the east side to add a fifth eastbound lane on I-80 between Lagoon Valley Road and Cherry Glen Road / Peña Adobe Road, in coordination with Rivera Road reconstruction that is proposed as part of the project.*

TABLE 4.5-12

YEAR 2025 FREEWAY RAMP LOS

Freeway Ramps	Peak Hour	2025 Future Baseline		2025 With Project	
		LOS (Volume to Capacity)			
Lagoon Valley I-80 Westbound On Ramp	AM	A	(0.07)	A	(0.27)
	PM	A	(0.04)	A	(0.35)
Lagoon Valley I-80 Westbound Off Ramp	AM	A	(0.00)	A	(0.29)
	PM	A	(0.00)	A	(0.21)
Lagoon Valley I-80 Eastbound On Ramp	AM	A	(0.00)	A	(0.21)
	PM	A	(0.00)	A	(0.13)
Lagoon Valley I-80 Eastbound Off Ramp	AM	A	(0.02)	A	(0.30)
	PM	A	(0.03)	A	(0.56)
Cherry Glen I-80 Westbound On Ramp	AM	A	(0.00)	A	(0.00)
	PM	A	(0.00)	A	(0.00)
Cherry Glen I-80 Westbound Off Ramp	AM	A	(0.05)	A	(0.26)
	PM	A	(0.05)	A	(0.23)
North Cherry Glen I-80 Westbound Off Ramp	AM	A	(0.02)	A	(0.19)
	PM	A	(0.01)	A	(0.02)
Pena Adobe I-80 Eastbound On Ramp	AM	A	(0.06)	A	(0.24)
	PM	A	(0.07)	**E**	**(0.96)**
Pena Adobe I-80 Eastbound Off Ramp	AM	A	(0.01)	A	(0.00)
	PM	A	(0.00)	A	(0.00)
Alamo / Merchant Eastbound Off Ramp	AM	**F**	**(1.11)**	**F**	**(1.26)**
	PM	**F**	**(2.26)**	**F**	**(2.40)**
Alamo / Merchant Westbound On Ramp	AM	**F**	**(1.52)**	**F**	**(1.57)**
	PM	**F**	**(1.12)**	**F**	**(1.26)**
Manuel Campos Parkway I-80 Eastbound Off Ramp	AM	A	(0.12)	A	(0.12)
	PM	A	(0.31)	A	(0.31)
Manuel Campos Parkway I-80 Eastbound On Ramp	AM	A	(0.40)	A	(0.44)
	PM	A	(0.46)	A	(0.46)
Manuel Campos Parkway I-80 Westbound Off Ramp	AM	A	(0.40)	A	(0.41)
	PM	A	(0.45)	A	(0.50)
Manuel Campos Parkway I-80 Westbound On Ramp	AM	A	(0.28)	A	(0.28)
	PM	A	(0.14)	A	(0.14)

Note: Ramps operating at LOS E or LOS F shown in bold.
Source: Korve Engineering, January 2004.

This measure would construct a new auxiliary lane in the existing shoulder and relocate the shoulder into the adjacent right-of-way. Rivera Road is less than 50 feet from the existing shoulder of the freeway and serves as a frontage road. Rivera Road is proposed to be relocated to provide access to the commercial portion of the Proposed Project; construction of the additional eastbound land should be coordinated with relocation of the frontage road. Implementation of this measure would improve LOS from E to C (V/C 0.80) in the PM peak hour.

The freeway is under the jurisdiction of Caltrans. Therefore, while the City could cooperate with Caltrans and could require that the project sponsor cooperate with Caltrans in relocating Rivera Road, potentially retaining existing right-of-way for use by Caltrans as part of freeway widening,

implementation of the measure is outside the jurisdiction of the City. Therefore, the impact would remain significant and unavoidable.

(b) *In the alternative, implement Mitigation Measure 4.5-1(b), to redesign project access intersections to shift traffic to the Lagoon Valley Road freeway interchange.*

Implementation of this measure would improve LOS on the Peña Adobe eastbound on-ramp from LOS E to LOS A. The measure alone would result in secondary significant impacts that could be mitigated by implementation of Mitigation Measure 4.5-4(a).

4.5-5 Traffic generated by the Proposed Project would cause LOS at diverge locations near freeway off-ramps to degrade to unacceptable levels in 2025.

The Proposed Project would result in additional traffic on the I-80 freeway that would affect freeway operations at three off-ramps in the vicinity of the project site. The diverge operations at these three locations would degrade from LOS D to LOS E with the project, as shown on Table 4.5-13. The affected locations are the Lagoon Valley Road/I-80 eastbound off-ramp in the AM peak hour, the Cherry Glen/I-80 westbound off-ramp in the PM peak hour, and the North Cherry Glen/I-80 westbound off-ramp in the AM peak hour. The project would contribute 80 percent or more to total traffic volumes at each location. This is a ***significant impact***. Significant cumulative effects are discussed under Impact 5.1-8, in Chapter 5.1, Cumulative Impacts.

Mitigation Measures

Implementation of the following mitigation measures would reduce project impacts to less-than-significant levels. However, because implementation of these measures is not within the jurisdiction of the City of Vacaville, this impact would remain *significant and unavoidable.*

4.5-5 (a) *Widen the freeway by 12 feet on the east side to add a new eastbound lane along I-80 from North Texas Street to Lagoon Valley Road.*

This measure would eliminate merge/diverge conflicts near the Lagoon Valley Road off-ramp. It would be under the jurisdiction of Caltrans, and could not be implemented by the City of Vacaville. Therefore, the impact would remain significant and unavoidable.

(b) *Implement Mitigation Measure 4.5-3(a) to add a westbound lane to I-80 between North Cherry Glen off-ramp and Cherry Glen/Peña Adobe.*

The addition of an auxiliary lane along I-80 westbound from the North Cherry Glen off-ramp to the Cherry Glen / Peña Adobe off-ramp would add capacity to the freeway, creating a fifth traffic lane and eliminating the merge/diverge conflict.

(c) *Implement Mitigation Measure 4.5-3(b) to add a westbound lane between Alamo Drive and the North Cherry Glen off-ramp and construct a retaining wall adjacent to the freeway shoulder.*

Variant with California Drive Overcrossing

The Vacaville General Plan includes a series of recommended future roadway improvements in the Transportation Element, in Table 6-1. Among them is construction of an extension of

TABLE 4.5-13

YEAR 2025 FREEWAY RAMP MERGE-DIVERGE LOS

Freeway Merge – Diverge Locations	Peak Hour	2025 Future Baseline		2025 With Project	
		LOS (density in pc/mi/ln)			
Lagoon Valley I-80 Westbound On (M)	AM	D	28	C	28
	PM	C	22	C	23
Lagoon Valley I-80 Westbound Off (D)	AM	D	30	D	33
	PM	C	22	C	25
Lagoon Valley I-80 Eastbound On (M)	AM	B	19	C	20
	PM	D	29	D	28
Lagoon Valley I-80 Eastbound Off (D)	AM	B	20	C	24
	PM	D	34	**E**	**37**
Cherry Glen I-80 Westbound On (M)	AM	C	23	C	23
	PM	B	18	B	19
Cherry Glen I-80 Westbound Off (D)	AM	D	35	**E**	**39**
	PM	C	27	D	31
North Cherry Glen I-80 Westbound Off (D)	AM	D	32	**E**	**37**
	PM	C	24	C	27
Pena Adobe I-80 Eastbound On (M)	AM	B	17	B	18
	PM	C	25	C	23
Pena Adobe I-80 Eastbound Off (D)	AM	C	22	C	24
	PM	**E**	**36**	D	33
Alamo / Merchant Eastbound Off (D)	AM	D	30	D	34
	PM	**F**	**53**	**F**	**57**
Alamo / Merchant Westbound On (M)	AM	C	22	C	22
	PM	B	19	C	20
Manuel Campos Parkway I-80 Eastbound Off (D)	AM	C	23	C	25
	PM	**E**	**39**	**E**	**38**
Manuel Campos Parkway I-80 Eastbound On (M)	AM	C	24	C	26
	PM	**E**	**37**	**E**	**36**
Manuel Campos Parkway I-80 Westbound Off (D)	AM	D	30	D	31
	PM	C	23	C	25
Manuel Campos Parkway I-80 Westbound On (M)	AM	C	26	C	26
	PM	C	20	C	22

Note: Ramps operating at LOS E or LOS F shown in bold.
Source: Korve Engineering, January 2004.

California Drive between Marshall Road and Cherry Glen Road, including an overcrossing over the I-80 freeway. If this improvement were implemented, a number of the significant traffic impacts identified as resulting from the proposed development project in Lagoon Valley would be reduced or eliminated. Extending California Drive could result in new significant traffic impacts that would be different from those identified with the Proposed Project. Therefore, two scenarios including a new California Drive Overcrossing were developed and analyzed in the future 2025 context, without and with the Proposed Project. The results of the analysis of the California Drive Overcrossing with development of the Proposed Project are presented briefly in this section as the "California Drive Overcrossing Variant," based on the detailed analysis

provided in the *Lower Lagoon Valley Mixed-Use Development Traffic Impact Analysis* prepared by Korve Engineering.

The California Drive Overcrossing Variant assumed that the overcrossing would be constructed as a two-lane roadway by 2025. The westbound off-ramp from I-80 at North Cherry Glen Road would be closed. The extension of Manuel Campos Parkway to North Texas Street and I-80 was assumed, as for the 2025 baseline and 2025 baseline plus project scenarios. The results of the analysis of the California Drive Overcrossing with the Proposed Project are presented together with the future baseline scenario and the 2025 baseline plus project scenario to provide a comparison. The California Drive Overcrossing would be funded with Transportation Portion of Development Impact Fees. Only initial planning has taken place to support the nexus that development is creating transportation demand that warrants the construction of this improvement, no mitigation measures have been identified for potentially significant impacts that could result from its construction. At the time further planning and design are initiated for this project, environmental review would need to be accomplished.

As shown in Table 4.5-14, the California Drive Overcrossing would reduce project-specific impacts at three intersections, but would result in similar or worse significant impacts at other study intersections. The Variant would cause the intersection of North Cherry Glen Road/I-80/WB Ramps/Cherry Glen Road to degrade from LOS A in 2025 with the project to LOS F with the project and the overcrossing, causing a new significant environmental impact that would not result with the Proposed Project. The Variant would also result in LOS F at the new intersection of California Drive with Butcher Road; resulting in a new significant impact. The subsequent design of these intersections, due to the impacts resulting form California Drive Overcrossing, would be addressed in the environmental assessment for this planned project. The Variant would result in the same significant impacts at the intersections of Alamo Drive with Marshall Road and North Texas Street with Manuel Campos Parkway. The Variant would improve LOS from E to B at the intersection of Lagoon Valley Road with the I-80 eastbound ramps, and would slightly improve V/C ratios in the PM peak hour at the intersections of North Texas Street with the I-80 eastbound ramp and Cherry Glen/Peña Adobe Drive/Rivera Road with the I-80 eastbound ramp, although both intersections would continue to operate at unacceptable levels.

The California Drive Overcrossing Variant would not cause substantial changes in the LOS on the roadway segments analyzed compared with the Proposed Project, but would result in LOS F in the PM peak hour on the newly-created roadway on the overcrossing, a new significant traffic impact based on the assumption overcrossing would be one lane in each direction. This analysis would provide evidence California Drive needs to be provided with two (2) lanes in each direction. Traffic analysis used for the deign of this overcrossing should be the basis for the construction of overcrossing with two (20 or four (4) lanes.

The California Drive Overcrossing Variant would result in slight improvements along two of the freeway segments identified as operating at LOS F in 2025 with the Proposed Project: on the westbound segments between the North Cherry Glen off-ramp and the Cherry Glen/Peña Adobe overcrossing and between the Alamo Drive overcrossing and the North Cherry Glen off-ramp, the project would cause the LOS to degrade from LOS E to LOS F in the AM peak hour, while the Variant would return the segments to LOS E with an improved V/C ratio. Other segments would remain essentially the same in 2025 with or without the California Drive overcrossing, as shown in Table 4.5-15.

Two freeway ramps would improve from LOS E or F in 2025 with the Proposed Project to LOS A with the California Drive overcrossing in the PM peak hour: the eastbound on-ramp at Peña

Adobe Road and the westbound on-ramp at Alamo Drive and Merchant Street. Other freeway ramps would remain essentially the same with or without the new overcrossing. The California Drive overcrossing would not cause unacceptable LOS at any new freeway ramp locations in 2025 compared with the Proposed Project alone.

TABLE 4.5-14

YEAR 2025 INTERSECTION LOS WITH CALIFORNIA DRIVE OVERCROSSING VARIANT

Intersection		Peak Hour	2025 Future Baseline	2025 with Project	California Dr Overcrossing w/ Project
			Level of Service (Volume-to-Capacity Ratio)		
1.	North Texas Street / I-80 Eastbound Ramps	AM	D (0.84)	D (0.85)	D (0.85)
		PM	**F (1.03)**	**F (1.02)**	**E (1.00)**
2.	Hilborn Rd / Lyon Rd / North Texas St / I-80 Westbound Ramps	AM	D (0.84)	D (0.84)	D (0.84)
		PM	D (0.81)	D (0.84)	D (0.83)
3.	Lagoon Valley Road / I-80 Eastbound Ramps	AM	A (0.13)	C (0.72)	C (0.73)
		PM	A (0.14)	**E (0.93)**	B (0.70)
4.	Lagoon Valley Road / Rivera Road / Nelson Road	PM	A (0.11)	A (0.54)	A (0.53)
5.	Cherry Glen Road / I-80 Westbound Ramps	AM	A (0.17)	B (0.67)	B (0.64)
		PM	A (0.14)	B (0.66)	B (0.64)
6.	Cherry Glen Rd / Lyon Rd	PM	A (0.27)	A (0.47)	C (0.78)
7.	I-80 Eastbound Ramps / Cherry Glen / Pena Adobe / Rivera Road	AM	A (0.21)	C (0.79)	C (0.79)
		PM	A (0.22)	**F (1.21)**	**F (1.06)**
8.	North Cherry Glen Road / I-80 Westbound Ramps/Cherry Glen	AM	A (0.17)	A (0.56)	**F (1.06)**
		PM	A (0.18)	A (0.38)	**F (1.77)**
9.	Cherry Glen Road / Pleasant Valley Road	PM	A (0.31)	A (0.51)	D (0.81)
10.	Alamo Drive / I-80 Eastbound Ramps	AM	C (0.76)	C (0.78)	A (0.55)
		PM	B (0.63)	B (0.66)	A (0.39)
11.	Alamo Drive / Merchant St	AM	**E (0.93)**	**E (0.96)**	D (0.84)
		PM	D (0.87)	D (0.90)	D (0.88)
12.	Alamo Drive / Marshall Rd	PM	D (0.89)	**E (0.91)**	**E (0.92)**
13.	North Texas St / Manuel Campos Parkway	AM	**F (1.19)**	**F (1.21)**	**F (1.21)**
		PM	**F (1.37)**	**F (1.40)**	**F (1.39)**
14.	Lagoon Valley Road/Commercial Access Road	PM	-	A (0.29)	A (0.31)
15.	Lagoon Valley Road / Arterial #1	PM	-	A (0.51)	A (0.52)
16.	Lagoon Valley Road / Arterial #2	PM	-	A (0.25)	A (0.25)
17.	Internal Collector Intersection	PM	-	A (0.10)	A (0.11)
21.	California / Marshall	PM		-	A (0.49)
22.	California / Butcher	PM		-	**F (1.02)**

Notes:
See Figure 2 in Appendix D for locations of intersections.
Intersections with LOS E or LOS F in bold.
Source: Korve Engineering, 2004

TABLE 4.5-15

YEAR 2025 FREEWAY SEGMENTS LOS CA DRIVE OVERCROSSING VARIANT

Interstate 80 Freeway Segments		Peak Hour	2025 future baseline		2025 baseline w/ Project		Project w/ CA Drive	
			Level of Service (V/C ratio)					
East of Alamo Drive Overcrossing	EB	AM	A	(0.56)	B	(0.61)	B	(0.61)
		PM	C	(0.78)	D	(0.83)	D	(0.81)
	WB	AM	C	(0.77)	D	(0.87)	C	(0.75)
		PM	B	(0.63)	B	(0.68)	B	(0.66)
Alamo Dr Overcrossing – Cherry Glen / Pena Adobe Overcrossing	EB	AM	B	(0.68)	C	(0.76)	C	(0.75)
		PM	**F**	**(1.11)**	**F**	**(1.19)**	**F**	**(1.05)**
North Cherry Glen Off Ramp – Cherry Glen / Pena Adobe Overcrossing	WB	AM	**E**	**(0.99)**	**F**	**(1.07)**	**E**	**(0.92)**
		PM	C	(0.76)	D	(0.84)	B	(0.69)
Alamo Dr Overcrossing – North Cherry Glen Off Ramp	WB	AM	**E**	**(1.00)**	**F**	**(1.10)**	**E**	**(0.92)**
		PM	C	(0.76)	D	(0.84)	B	(0.69)
Cherry Glen / Pena Adobe Overcrossing – Lagoon Valley Overcrossing	EB	AM	B	(0.67)	C	(0.71)	C	(0.71)
		PM	**F**	**(1.09)**	**F**	**(1.01)**	**F**	**(1.01)**
	WB	AM	**E**	**(0.98)**	**F**	**(1.02)**	**F**	**(1.03)**
		PM	C	(0.75)	C	(0.80)	C	(0.79)
Lagoon Valley Overcrossing – North Texas Overcrossing	EB	AM	B	(0.67)	C	(0.73)	C	(0.73)
		PM	**F**	**(1.10)**	**F**	**(1.09)**	**F**	**(1.03)**
	WB	AM	**E**	**(0.99)**	**F**	**(1.01)**	**F**	**(1.02)**
		PM	C	(0.75)	D	(0.82)	D	(0.82)

Note: Segments with LOS E or LOS F in bold.
Source: Korve Engineering, January 2004

Table 4.5-16 shows the freeway ramp merge-diverge operations in 2025 with the Proposed Project and with the California Drive overcrossing. Freeway ramp merge-diverge operations would change with the addition of the California Drive overcrossing in 2025. The locations at the Lagoon Valley eastbound off- ramp, the Alamo/Merchant eastbound off-ramp and the Manuel Campos Parkway eastbound on-ramp would improve form LOS E with the project to LOS D in the PM peak hour. The merge/diverge location at the Cherry Glen westbound off-ramp would improve from LOS E to LOS D in the AM peak hour. The North Cherry Glen westbound off-ramp would be closed, removing merge/diverge movements at that location. The Manuel Campos eastbound off-ramp would remain the same with or without the California Drive overcrossing, at LOS E in the PM peak hour. The Peña Adobe eastbound off-ramp would degrade from LOS D with the Proposed Project back to LOS E with the California Drive overcrossing, the same as the 2025 future baseline condition, in the PM peak hour.

TABLE 4.5-16

YEAR 2025 FREEWAY RAMP MERGE-DIVERGE LOS WITH CA DRIVE OVERCROSSING

Freeway Merge – Diverge Locations	Peak Hour	2025 future baseline		2025 baseline with Project		Project w/ CA Drive	
		Level of Service / Density (pc/mi/ln)					
Lagoon Valley I-80 Westbound On (M)	AM	D	28	C	28	C	28
	PM	C	22	C	23	C	23
Lagoon Valley I-80 Westbound Off (D)	AM	D	30	D	33	D	33
	PM	C	22	C	25	C	25
Lagoon Valley I-80 Eastbound On (M)	AM	B	19	C	20	C	20
	PM	D	29	D	28	D	28
Lagoon Valley I-80 Eastbound Off (D)	AM	B	20	C	24	C	24
	PM	D	34	**E**	**37**	D	33
Cherry Glen I-80 Westbound On (M)	AM	C	23	C	23	C	21
	PM	B	18	B	19	B	19
Cherry Glen I-80 Westbound Off (D)	AM	D	35	**E**	**39**	D	34
	PM	C	27	D	31	C	26
North Cherry Glen I-80 Westbound Off (D)	AM	D	32	**E**	**37**	**NA**	
	PM	C	24	C	27	**NA**	
Pena Adobe I-80 Eastbound On (M)	AM	B	17	B	18	B	18
	PM	C	25	C	23	C	22
Pena Adobe I-80 Eastbound Off (D)	AM	C	22	C	24	C	24
	PM	**E**	**36**	D	33	**E**	**35**
Alamo / Merchant Eastbound Off (D)	AM	D	30	D	34	D	34
	PM	**F**	**53**	**F**	**57**	**E**	**50**
Alamo / Merchant Westbound On (M)	AM	C	22	C	22	C	21
	PM	B	19	C	20	B	17
Manuel Campos Parkway I-80 Eastbound Off (D)	AM	C	23	C	25	C	25
	PM	**E**	**39**	**E**	**38**	**E**	**36**
Manuel Campos Parkway I-80 Eastbound On (M)	AM	C	24	C	26	C	25
	PM	**E**	**37**	**E**	**36**	D	35
Manuel Campos Parkway I-80 Westbound Off (D)	AM	D	30	D	31	D	31
	PM	C	23	C	25	C	25
Manuel Campos Parkway I-80 Westbound On (M)	AM	C	26	C	26	C	26
	PM	C	20	C	22	C	22

Notes: Locations with LOS E or LOS F shown in bold.
NA = North Cherry Glen Westbound Off Ramp would be closed with extension of the California Drive Overcrossing.
Source: Korve Engineers, January 2004.

4.6 AIR QUALITY

4.6 AIR QUALITY

4.6.1 INTRODUCTION

This section evaluates the potential impacts on air quality resulting from implementation of the Proposed Project. This includes the potential for the project to conflict with or obstruct implementation of the applicable air quality plan, to violate an air quality standard or contribute substantially to an existing or projected air quality violation, to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment, to expose sensitive receptors to substantial pollutant concentrations or result in the release of toxic air contaminants (TACs).

A comment letter was received in response to the NOP (see Appendix B) circulated for the project from the Yolo-Solano Air Quality Management District (YSAQMD). This comment letter outlined the topics for which this Air Quality section should analyze. Comments made at the public hearing raised concerns over air pollution and are also incorporated in this analysis.

4.6.2 ENVIRONMENTAL SETTING

Air quality is determined from a combination of weather, topography, and the quantity and type of pollutants released in an area. Air quality in the Vacaville area is affected by local and regional sources of pollution.

Regional Meteorology

The Specific Plan area is located west of the City of Vacaville in western Solano County, within the Sacramento Valley Air Basin (SVAB). The climate in the Sacramento Valley area is classified as Mediterranean, with mild, wet winters and warm dry summers. The major climatic controls are the Pacific High Pressure system over the eastern Pacific Ocean, the local topography, and the Pacific Ocean itself. The formation of a high-pressure area over the Great Basin Region to the east of the Sierra Nevada also affects the meteorology of the Sacramento Valley area, primarily during the winter months. The Pacific High is a semi-permanent, subtropical high-pressure system located off the Pacific Coast. The size and strength of the Pacific High varies seasonally. During the summer, the size and strength is at a maximum and the regional climate is dominated by its influence. As a result, clear skies with intense solar heating occur over California's interior, forming a thermal trough of low pressure. This low-pressure trough intensifies the prevailing northwesterly flow over the area. Very little precipitation occurs during summer because migrating the Pacific High blocks extra-tropical weather systems.

Site Meteorology

Lower Lagoon Valley's climate includes primarily hot, dry summers and cool, rainy winters. Approximately 35 percent of the time winds are from the south, with calm winds occurring about 12 percent of the time. Atmospheric temperature inversions occur frequently in the region and

limit the vertical dispersion of pollutants. These inversions may result in high levels of carbon monoxide (CO) during the winter months and high ozone levels during summer and fall.

Proximity to the Pacific Ocean and the San Francisco Bay, as well as the local topography, are the greatest influences on temperature variability in the Valley. Average daytime temperatures are in the mid-70s with nighttime temperatures averaging 48 degrees Fahrenheit (F). The annual average monthly temperature is 61 degrees F. Hot spells can occur, with temperatures exceeding 100 degrees F, and is typically caused by airflow from sub-tropical high pressure area that brings light to nearly calm wind and humidity below 20 percent.

Annual average rainfall is approximately 17 inches with a majority of rain falling between the months of October and April. Rainfall during these months is primarily due to winter storms. Thunderstorms are few in number, usually mild in character, and occur mainly in the spring. An occasional thunderstorm may drift over the valley from the Sierra Nevada in the summer. Snow falls so rarely, and in such small amounts that its occurrence may be disregarded as a climatic feature. Heavy fog occurs mostly in midwinter, rarely in summer, and seldom in spring or fall. The fog may last several days if stagnant atmospheric conditions are present.

The prevailing wind in the Lower Lagoon Valley is southerly every month but November, when it is northerly. Topographic effects, the north-south alignment of the valley, the coast range, and the Sierra Nevada strongly influence the wind flow in the project area. A sea level gap in the Coast Range occasionally allows cool, oceanic air to flow into the valley during the summer season with a marked lowering of temperature. In the spring and fall, a large north to south pressure gradient develops over the northern part of the state.

Criteria Air Quality Standards

Much of the effort to improve air quality in the United States and California is directed toward the control of five “criteria” air pollutants: ozone (O_3), CO, particulate matter less than ten microns in diameter (PM_{10}), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). Pollutants subject to federal ambient standards are referred to as “criteria” pollutants because the U.S. Environmental Protection Agency (U.S. EPA) publishes criteria documents to justify the choice of standards. Table 4.6-1 identifies the national and state ambient air quality standards for relevant air pollutants along with the ambient pollutant concentrations that have been measured at the Vacaville monitoring station through the period of 2000 to 2002.

Air quality standards have been created to protect people who are most sensitive to the adverse health effects of air pollution, termed “sensitive receptors.” The term "sensitive receptors" refers to specific population groups as well as the land uses where they would reside for long periods. Children, the elderly, the acutely ill, and the chronically ill are commonly identified sensitive population groups. Residences, schools, playgrounds, childcare centers, retirement homes or convalescent homes, hospitals, and clinics are commonly identified sensitive land uses.

The criteria pollutants for which federal and State standards have been promulgated and that are most relevant to air quality planning and regulation in the SVAB are ozone, carbon monoxide, fine suspended particulate matter, and sulfur dioxide. In addition, toxic air contaminants are of concern in the SVAB. Each of these is briefly described below:

TABLE 4.6-1

SUMMARY OF AMBIENT AIR QUALITY IN THE PROJECT VICINITY

Air Pollutants Monitored Within the City of Vacaville	Year		
	2000	2001	2002
Ozone			
Maximum 1-hour concentration measured	0.100 ppm[2]	0.104 ppm	0.100 ppm
Number of days exceeding national 0.12 ppm 1-hour standard	0	0	0
Number of days exceeding state 0.09 ppm 1-hour standard	2	2	1
Maximum 8-hour concentration measured	0.081 ppm	0.081 ppm	0.077 ppm
Number of days exceeding national 0.08 ppm 8-hour standard	0	0	0
Respirable Particulate Matter (PM_{10})			
Maximum 24-hour concentration	47.0 ppm	77.0 ppm	63.0 ppm
Number of days exceeding national 150.0 ppm standard	0	2	1
Number of days exceeding state 50.0 ppm standard	0	0	0

1. Ambient concentrations of CO are not monitored within the project vicinity
2. ppm = parts by volume per million of air.

Source: ARB 2003

- *Ozone* is a gas that is formed when reactive organic gases (ROG) and nitrogen oxides (NO_x), both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.

- *Carbon Monoxide* (CO) is a colorless, odorless gas produced by the incomplete combustion of fuels. CO concentrations tend to be the highest during the winter morning, with little to no wind, when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone; motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.

- *Respirable Particulate Matter* (PM_{10}) consists of extremely small, suspended particles or droplets 10 microns or smaller in diameter. Some sources of PM_{10}, like pollen and windstorms, occur naturally. However, in populated areas, most PM_{10} is caused by road dust, diesel soot, combustion products, abrasion of tires and brakes, and construction activities.

- *Sulfur dioxide* (SO_2) is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When sulfur dioxide oxidizes in the atmosphere, it forms sulfates (SO_4). Together, these pollutants are referred to as sulfur oxides (So_x).

- *Toxic Air Contaminants* are known to be highly hazardous to health, even in small quantities. TACs are airborne substances capable of causing short-term (acute) and/or long-term (chronic or carcinogenic) adverse human health effects (i.e., injury or illness). Although there are hundreds of substances that can be toxic when inhaled, air quality standards have not been set for most of them. TACs can be emitted from a variety of common sources, including gasoline

stations, automobiles, dry cleaners, industrial operations, and painting operations. Natural source emissions include windblown dust and wildfires. TACs include both organic and inorganic chemical substances. Examples include certain chlorinated hydrocarbons such as solvents, certain metals, and asbestos. In 1998, the State identified particulate matter from diesel-fueled engines as a TAC. Compared to other air toxics the State has identified and controlled, diesel particulate emissions are estimated to be responsible for approximately 70 percent of the total ambient air toxics risk throughout California.

In addition to the criteria pollutant discussed above, odors are also considered when determining a projects impact. However, there are currently no federal or State guidelines or thresholds, which pertain to the emission or delectability of odors. However, air quality management districts generally keep a record of the number and type of complaint made concerning any one-particular odor emission source. In order to understand the analysis of odor emissions, four major elements are involved: deductibility, recognition, intensity, and hedonic tone. Deductibility is the lowest concentration of an odor emission that will elicit a sensory response; at this concentration there is an awareness of the presence of an added substance, but not necessarily an odor sensation. Recognition, however, is the minimum concentration that is recognized as having a characteristic odor quality noticeable to a segment of the population. Odor intensity refers to the perceived strength of the odor sensation, and odorant character is what the substance smells like (e.g. fishy, rancid, hay, sewer). Hedonic tone is a judgment of the relative pleasantness or unpleasantness of the odor, and is influenced by factors, such as subjective experience and frequency of occurrence. The apparent presence of an odor in ambient air depends on the properties of the substance emitted, its concentration in facility emissions, and the dilution of emission between the mission point and the receptor.

Existing Regional Air Quality

There are many types of air pollutant sources in the portion of Solano County located within the SVAB. These sources can be divided into two categories: mobile and stationary sources. The California Air Resources Board (ARB) maintains an emission inventory of air pollutants within the state's air basins and counties inside those air basins. Exhaust emissions from on-road motor vehicles are the primary source of reactive organic gases, nitrogen oxides, and carbon monoxide in the western portion of Solano County. Mobile sources account for high carbon monoxide concentrations at some congested traffic intersections. Area-wide sources -- particularly entrained road dust, agricultural activities, construction activities and demolition activities -- are the primary sources of particulate matter in western Solano County.

Existing Local Air Quality

The Specific Plan area is located west of the City of Vacaville. Adjacent land uses include sporadic residential units, limited commercial uses, as well as a significantly developed recreational area. Local emissions sources include stationary activities, such as space and water heating, landscape maintenance from leaf blowers and lawn mowers, consumer products, and mobile sources, primarily automobile and truck traffic. Motor vehicles are the primary source of pollutants in the local vicinity. A summary of ambient air quality in the project vicinity is summarized in Table 4.6-1.

Traffic-congested roadways and intersections have the potential to generate localized high levels of CO. Localized areas where ambient concentrations exceed federal and/or State standards for CO are termed CO "hotspots." The YSAQMD recommends the use of CALINE4,

a dispersion model for predicting CO concentrations, as the preferred method of estimating pollutant concentrations at sensitive receptors near congested roadways and intersections. For each intersection analyzed, CALINE4 adds roadway-specific CO emissions calculated from peak-hour turning volumes to the existing ambient CO air concentrations. For this analysis, CO concentrations were calculated based on a simplified CALINE4 screening procedure developed by the Bay Area Air Quality Management District. The simplified model is intended as a screening analysis in order to identify a potential CO hotspot. This methodology assumes worst-case conditions and provides a screening of maximum, worst-case CO concentrations.

Maximum existing CO concentrations were calculated for the intersections evaluated in the project traffic impact analysis (see Section 4.5) that have receptors in close proximity to the roadways. For the purpose of this analysis, receptors are any of the sensitive receptor types identified previously, as well as any location where people would be required (as in a work site) to be located for one to eight hours. The results of these calculations are presented in Table 4.6-2 for representative receptor locations at 25, 50, and 100 feet from each roadway. These distances were selected because they represent locations where a person may be living or working for one to eight hours at a time. The National 1-hour standard is 35.0 parts per million (ppm), and the State 1-hour standard is 20.0 ppm. The 8-hour National and State standards are 9.5 ppm and 9.1 ppm, respectively.

TABLE 4.6-2

EXISTING LOCALIZED CARBON MONOXIDE CONCENTRATIONS

	CO Concentrations in Parts per Million[1, 2]					
	25 Feet		50 Feet		100 Feet	
Intersection	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
Lagoon Valley Rd. & Nelson Rd.	3.2	3.1	3.1	3.1	3.1	3.1
Cherry Glen Rd. & Lyon Rd.	3.3	3.2	3.2	3.1	3.2	3.1
Cherry Glen Rd. & Pleasant Valley Rd.	3.4	3.3	3.3	3.2	3.2	3.1
Cherry Glen Rd. & Little Cherry Glen Rd.	3.1	3.1	3.1	3.1	3.1	3.0
Rivera Rd. & Cherry Glen Rd.	3.1	3.1	3.1	3.1	3.1	3.0
Marshall Rd. & Alamo Dr.	6.5	5.1	5.6	4.6	4.9	4.1

1. National 1-hour standard is 35.0 parts per million. State 1-hour standard is 20.0 parts per million.
2. National 8-hour standard is 9.5 parts per million. State 8-hour standard is 9.1 parts per million.

Source: EIP Associates 2003. Calculation sheets are provided in AppendixE.

As shown, under worst-case conditions, existing CO concentrations near the study-area do not exceed national or State 1-hour and 8-hour ambient air quality standards. Therefore, CO hotspots do not exist near these intersections.

The land uses in the vicinity of the Specific Plan area are not sources of substantial TAC concentrations.

Existing Site Emissions

The Specific Plan area currently supports uses such as agriculture, residential, small commercial and a wholesale nursery facility. Low amounts of the criteria pollutants would be generated by these uses on a daily basis from stationary sources, such as landscape maintenance equipment, agricultural operations, and mobile sources, primarily automobile and truck traffic. In addition, agricultural uses generate a small amount of odors, but due to the

small size of the existing agricultural operations, odor emissions were not detected during a site visit. In addition, the existing uses at within the Specific Plan do not generate levels of TACs that are subject to the permitting authority of the YSAQMD.

4.6.3 REGULATORY SETTING

Federal

The U.S. Environmental Protection Agency (U.S. EPA) is responsible for setting and enforcing the federal ambient air quality standards for atmospheric pollutants with the Basin. It regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain locomotives. The U.S. EPA also has jurisdiction over emissions sources outside state waters (outer continental shelf), and establishes various emissions standards for vehicles sold in states other than California.

As part of its enforcement responsibilities, the U.S. EPA requires each state with nonattainment areas to prepare and submit a state implementation plan (SIP) that demonstrates the means to attain the federal standards. The SIP must integrate federal, State, and local plan components and regulations to identify specific measures to reduce pollution, using a combination of performance standards and market-based programs within the timeframe identified in the SIP.

Clean Air Act

The Federal Clean Air Act (FCAA), as amended, establishes air quality standards for several pollutants. These standards are divided into primary standards and secondary standards. Primary standards are designed to protect public health, and secondary standards are intended to protect public welfare from effects such as visibility reduction, soiling, nuisance, and other forms of damage. The FCAA requires that regional plans be prepared for non-attainment areas illustrating how the federal air quality standards could be met. The CARB approved the most recent revision of the State Implementation Plan in 1994, and submitted it to the U.S. EPA. The State Implementation Plan was approved by the U.S. EPA in 1996. The State Implementation Plan consists of a list of reactive organic gas and nitrogen oxide control measures for demonstrating future attainment of ozone standards. The steps to achieve attainment will continue to require significant emissions reductions in both stationary and mobile sources.

Eight-Hour Ozone Standard

The federal eight-hour ozone standard was established in response to human health studies indicating that longer ozone exposures at lower levels also resulted in adverse health effects, including coughing, increased asthma attacks, chronic lung inflammation, decreased lung function, and decreased lung defenses against bacterial infections. The eight-hour standard was established in order to complement, not replace, the existing one-hour standard. Both federal ozone standards now apply, along with California's own one-hour ozone standard.

Federal Ozone Attainment Plan

The SVAB is subject to a Federal Ozone Attainment Plan (Clean Air Plan). This plan was adopted by five air districts in the Sacramento area (including YSAQMD) in order to build upon existing state and local air quality programs and is a component of the SIP. The Clean Air Plan contains adopted measures, implementation and adoption schedules for new measures,

emission inventories, modeling results, contingency measures, and emissions reduction demonstrations that guide reduction of emissions in the Sacramento Region.

Toxic Air Contaminants

Air toxics have been regulated at the federal level since the CAA of 1977. Following the passage of this law, regulations for seven hazardous air pollutants (Haps) were promulgated as National Emission Standards for Hazardous Air Pollutants (NESHAPS) over a 13-year period. The federal Clean Air Act Amendments of 1990 revamped the NESHAPS program to offer a technology-based approach for reducing the emissions of a greater number of toxic air compounds. Under the 1990 CAAA, 189 substances were identified as HAPs and slated for regulation. The program requires certain facilities to control air toxic emissions by the installation of Maximum Achievable Control Technology (MACT), which is implemented and enforced in the YSAQMD through Rule 3.8, Federal Operating Permits, which administers the federal operating permits program established by the 1990 CAAA.

State

California Air Resources Board

The ARB, a part of the California Environmental Protection Agency, is responsible for the coordination and administration of both federal and State air pollution control programs within California. In this capacity, the ARB conducts research, sets California Ambient Air Quality Standards, compiles emission inventories, develops suggested control measures, provides oversight of local programs, and prepares the SIP. The ARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hair spray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

California Clean Air Act

The State of California air quality standards are generally more stringent than the corresponding federal standards for the criteria air pollutants. The California Clean Air Act (CCAA) requires non-attainment areas to plan for the eventual attainment of the standards. Areas have been designated as attainment or non-attainment with respect to the ambient air quality standards. The timeframe given to meet state air quality standards would depend upon the severity of air quality problems. California Health and Safety Code Section 40914(A) requires that air districts design a plan to achieve an annual reduction in district-wide emissions of five percent or more for each non-attainment criteria pollutant or its precursor, averaged every consecutive three-year period, beginning at base year 1987.

The ARB regulates mobile emissions sources, and oversees the activities of county air pollution control districts and regional air quality management districts. The ARB regulates local air quality indirectly by establishing vehicle emission standards, by conducting research activities, and through planning and coordination activities.

Toxic Air Contaminants

California's air toxics control program began in 1983 with the passage of the Toxic Air Contaminant Identification and Control Act, better known as Assembly Bill 1807 (AB 1807) or the Tanner Bill. The Tanner Bill established a regulatory process for the scientific and public

review of individual toxic compounds. When a compound becomes listed as a TAC under the Tanner process, the ARB normally establishes minimum statewide emission control measures to be adopted by local air districts. By 1992, 18 of the 189 federal HAPs had been listed by the ARB as state TACs. Later legislative amendments (AB 2728, Tanner 1992) required the ARB to incorporate all 189 federal HAPs into the state list of TACs. In April 1993, the ARB added 171 substances to the state program to make the state TAC list equivalent to the federal HAP list.

The second major component of California's air toxics program, supplementing the Tanner process, was provided by the passage of AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987. AB 2588 currently regulates over 600 air compounds, including all of the Tanner-designated TACs. Under AB 2588, specified facilities must quantify emissions of regulated air toxics and report them to the local air district. If the air district determines that a potentially significant public health risk is posed by a given facility, the facility is required to perform a health risk assessment and notify the public in the affected area if the calculated risks exceed specified criteria. The YSAQMD's implementation of AB 2588 is discussed below.

In addition to the above, Proposition 65 was passed by California voters in 1986, which required that a list of carcinogenic and reproductive toxicants found in the environment be compiled, the discharge of these toxicants into drinking water be prohibited, and warnings of public exposure by air, land, or water be posted if a potential public health risk is posed. The handling of any of these substances by a facility would require a public warning unless health risks could be demonstrated to be insignificant. For carcinogens, Proposition 65 defines the "no significant risk level" as the level of exposure that would result in an increased cancer risk of greater than 10 in one million over a 70-year lifetime. The Office of Environmental Health Hazard Assessment currently administers this program.

On August 27, 1998, the ARB formally identified particulate matter emitted by diesel-fueled engines as a TAC. Diesel engines emit TACs in both gaseous and particulate forms. The particles emitted by diesel engines are coated with chemicals, many of which have been identified by the EPA as HAPs and by the ARB as TACs. Since by weight, the vast majority of diesel exhaust particles are very small (94 percent of their combined mass consists of particles less than 2.5 microns in diameter), both the particles and their coating of TACs are inhaled into the lung. While the gaseous portion of diesel exhaust also contains TACs, the ARB's August 1998 action was specific to diesel particulate emissions, which, according to supporting ARB studies, represent 50 to 90 percent of the mutagenicity of diesel exhaust (ARB 1998).

The ARB action was taken at the end of a lengthy process that considered dozens of health studies, extensive analysis of health effects and exposure data, and public input collected over the previous 9 years. ARB's Scientific Advisory Committee has recommended a unit risk factor of 300 in one million for diesel particulate. The ARB action will lead to additional control of diesel engine emissions in coming years by the ARB. The EPA has also begun an evaluation of both the cancer and no cancer health effects of diesel exhaust.

The ARB's 1998 ruling prompted the ARB to begin searching for means to reduce diesel particulate matter emissions. In September 2000, the ARB approved the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan). The Diesel Risk Reduction Plan outlines a comprehensive and ambitious program that includes the development of numerous new control measures over the next several years aimed at substantially reducing emissions from new and existing on-road vehicles (e.g., heavy-duty trucks and buses), off-road equipment (e.g., graders, tractors, forklifts,

sweepers, and boats), portable equipment (e.g., pumps), and stationary engines (e.g., stand-by power generators).

Local

The project site is located in the SVAB portion of Solano County, which is currently designated "nonattainment" for state and national ozone standards and for the state PM_{10} standard (Air Resources Board, 2000). The SVAB portion of Solano County forms part of a subregion within Sacramento Valley that is designated as a "severe" nonattainment area with respect to the national one-hour ozone standard; this subregion includes all or portions of Sacramento, Yolo, Solano, El Dorado, Placer, and Sutter counties. This area is also designated as a "serious" nonattainment area with respect to the state ozone standard. The project area is "attainment" or "unclassified" with respect to all other state and federal ambient air quality standards.

As noted earlier, the FCAA and the state CCAA require plans to be developed for areas designated as nonattainment (with the exception of areas designated as nonattainment for the state PM_{10} standard). Plans are also required under federal law for areas designated as "maintenance" for national standards. Such plans are to include strategies for attaining the standards. YSAQMD is part of the federal Sacramento Metropolitan Ozone Nonattainment Area. The 1994 Clean Air Plan, is the current federal ozone plan for the project area, and it predicts attainment of the national one-hour ozone standard by 2005 (Sacramento Metropolitan Air Quality Management District, 1994). To attain the standard by 2005, the 1994 Clean Air Plan relies heavily on local air district-administered, stationary-source control programs and on statewide mobile-source control programs. U.S. EPA defines the Sacramento ozone nonattainment area to include Sacramento, Yolo, Solano (northeastern portion that includes the project area), Placer and El Dorado Counties (except mountain portions), and part of Sutter County adjacent to Sacramento County.

In compliance with the requirements of the CCAA, the 1991 Air Quality Attainment Plan (State Plan) was adopted by the Yolo-Solano Air Quality Management District Board of Directors and approved by the ARB in 1992. The 1991 State Plan was designed to make expeditious progress towards attaining the state ozone standards. The CCAA requirement for the first triennial progress report and Plan revision of the State Plan was fulfilled with the preparation and adoption of the 1994 Clean Air Plan. This document was prepared to fulfill the requirements of the FCAA and construed by the ARB to also fulfill the 1994 requirements of the CCAA. The 1994 Clean Air Plan superseded the 1991 State Plan and predicted attainment of the federal ozone standards by the year 2005. The U.S. EPA approved the Clean Air Plan on September 26, 1996. The Clean Air Plan represents substantive progress toward the attainment of the state ozone standard through emission reductions. These reductions occurred from 1995 through 1997 and were primarily derived from statewide regulations such as consumer products, low emission vehicles programs and the regulation of the formulation of gasoline. Additionally, some of the control measures adopted by the District prior to the adoption of the Clean Air Plan were also starting to achieve emission reductions by 1997. The region committed to adopting and implementing all of the control measures by the end of 1999. The most recent, 1997 Triennial Progress Report was prepared and adopted by the YSAQMD Board in 1998.

Yolo–Solano Air Quality Management District

The YSAQMD has jurisdiction over air quality in the Davis area, including all of Yolo County and the northeastern portion of Solano County. The YSAQMD is one of five air districts located in

the SVAB. The YSAQMD regulates most air pollutant sources (stationary sources), with the exception of motor vehicles, aircraft, and agricultural equipment, which are regulated by the ARB or EPA. State and local government projects, as well as projects proposed by the private sector, are subject to requirements of the local air district and the state CCAA if the sources are regulated by the YSAQMD. In addition, the air districts located in the SVAB, along with the ARB, maintain ambient air quality monitoring stations at numerous locations throughout the SVAB. These stations are used to measure and monitor criteria and toxic air pollutant levels in the ambient air.

Before the passage of the CCAA, the YSAQMD's primary role was stationary source control of industrial processes and equipment. After passage of the CCAA and the CAAA, air districts were directed to implement transportation control measures and were encouraged to employ indirect source control programs to reduce mobile source emissions.

The YSAQMD and the four other air districts in the SVAB prepared the 1994 Clean Air Plan, which set the strategy for compliance with the federal ozone standard. The strategy includes numerous measures that require YSAQMD rulemaking and program development for their implementation. The Clean Air Plan is being updated by the five air districts in the SVAB. The update is not projected to be completed and adopted until late 2004.

The YSAQMD provides guidance for analysis of the impacts on air quality of land development projects. This guidance is the YSAQMD Air Quality Handbook (1996). This handbook contains thresholds of significance for criteria pollutant emissions.

Toxic Air Contaminants

In compliance with federal law, YSAQMD Rule 3.8, as described above, implements federal NESHAPS and MACT requirements through the federal operating permit program. The YSAQMD has also developed various rules for specific source categories pursuant to the Tanner process under YSAQMD Regulation IX, State Designated Toxics Sources. Among these rules, Rule 9.9, Asbestos, applies to UC Davis. This rule governs the airborne emissions of asbestos, including from demolition and renovation activities. Prior to any demolition and renovation, except for single-family residential dwellings and activities involving defined small amounts of regulated asbestos-containing material (RACM), the rule requires surveys for the presence of RACM. Then, during demolition, the rule requires wetting, physical barriers to outside air, signage, collection of RACM, proper waste handling and disposal of RACM, and record keeping. Other dust from construction and demolition activities is addressed by YSAQMD Rule 2.5, Nuisance, which states that sources cannot emit air contaminants that cause nuisances to "any considerable number of persons or the public."

The YSAQMD's permitting program also includes a "Best Available Control Technology for Toxics" (T-BACT) review under YSAQMD Rule 3.13, Toxics New Source Review. This rule covers proposed new or reconstructed major sources of federal HAPs. It implements Section 112(g) of the federal 1990 CAAA, which addresses new or reconstructed major sources of federal HAPs included in the specific source categories for which EPA promulgates MACT standards (as described above). If a source falls under this rule, a case-by-case T-BACT determination must be made, unless the source is specifically exempt (research and development activities as defined in 40 CFR 63.41). A major HAP source is one that emits 10 tons per year or more of a single federal HAP, or 25 tons per year or more of any combination of federal HAPs.

In compliance with state law, the YSAQMD also administers the AB 2588 Air Toxics "Hot Spots" Program. Facilities must report their TAC emissions and if the YSAQMD determines the facility poses a potential public health risk, the facility must perform a health risk assessment (HRA). An HRA includes an analysis of TAC emissions and characterizes human health risks as a result of the estimated TAC exposures. If the estimated health risks exceed threshold levels, the public in the affected area must be notified and steps taken to reduce emissions. For carcinogens, the YSAQMD uses a 70-year cancer risk level of 10 in one million as the AB 2588 public notification level, which matches the "no significant risk level" used by Proposition 65. For noncarcinogens, public health risk is assessed by the "hazard index" for both long-term (chronic) and short-term (acute) exposures. A "hazard index" is the sum of the ratios of each chemical's actual exposures to acceptable exposures. Hazard index values less than 1.0 indicate an acceptable non-cancer health risk. The YSAQMD uses a hazard index threshold of 1.0 as the AB 2588 public notification level for non-cancer toxicants.

City of Vacaville

General Plan

Consistency of the Proposed Project with relevant City of Vacaville General Plan goals and policies is presented in Appendix C. As shown in Appendix C, the Proposed Project is consistent with applicable air quality goals and policies.

4.6.4 IMPACTS AND MITIGATION MEASURES

Methods of Analysis

The analysis in this section focuses on the nature and magnitude of the change in the air quality environment due to implementation of the Proposed Project. Air pollutant emissions associated with the Proposed Project would result from construction activities, increased building space, residential population, and increased traffic volumes. The net increase in Proposed Project area emissions generated by these activities and other secondary sources have been quantitatively estimated and compared to thresholds of significance recommended by the YSAQMD.

Construction Emissions

Construction emissions were calculated by estimating the types and number of pieces of equipment that would be used to clear the development area, excavate, and construct proposed uses and associated support facilities. The average daily emissions associated with these activities were estimated using emission factors from the URBEMIS 2002 emissions model developed for ARB.

Stationary Source Emissions

Stationary source emissions would be generated by the consumption of natural gas for space and water heating devices, and the operation of landscape maintenance equipment. The average daily emissions associated with these activities was estimated using emission factors from the URBEMIS 2002 emissions model developed for ARB.

Landscape Maintenance Emissions

The Proposed Project would increase the amount of landscape area over current conditions. This would increase the demand for landscape maintenance operations. The average daily emissions associated with these activities are estimated using emission factors from the URBEMIS 2002 emissions model.

Mobile Emissions

Changes in the amount of air pollutant emissions generated on a daily basis in association with the Proposed Project would primarily occur as a result of an increase in population and resulting changes in motor vehicle trips. The emissions associated with these motor vehicle trips are calculated using the URBEMIS 2002 emissions model and the traffic volumes predicted for the project in *Traffic Impact Analysis Report* summarized in Section 4.5, Transportation and Circulation.

Localized CO Concentrations

Localized CO concentrations are calculated based on a simplified CALINE4 screening procedure developed by the Bay Area Air Quality Management District. The simplified model is intended as a screening analysis, which identifies a potential CO hotspot. This methodology assumes worst-case conditions and provides a screening of maximum, worst-case CO concentrations. The resulting emissions were compared with adopted national and State ambient air quality standards.

Standards of Significance

For the purposes of this EIR, impacts to air quality are considered significant if the Proposed Project would:

- Conflict with or obstruct implementation of the 1994 Sacramento Area Regional Ozone Attainment Plan;
- Violate or contribute substantially to an existing or projected air quality violation;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

As the agency principally responsible for comprehensive air pollution control in the SVAB portion of Solano County, the YSAQMD recommends that projects should be evaluated in terms of air pollution impact significance thresholds established by the YSAQMD. These thresholds were developed by the YSAQMD to provide quantifiable levels that projects can be compared to. The City of Vacaville utilizes the YSAQMD's thresholds that are recommended at the time that development projects are proposed to assess the significance of quantifiable impacts. The following quantifiable thresholds are currently recommended by the YSAQMD and are used to determine the significance of air quality impacts associated with the Proposed Project.

Development projects are considered to be consistent with the 1994 Sacramento Area Regional Ozone Attainment Plan if they do not require a change in the existing land use designations (i.e., general plan and zoning) for the project site or if projected emissions for the Proposed Project are not greater than emissions anticipated for the site if developed under the existing land use designations. This same threshold is also used by the YSAQMD to determine the cumulative air quality impacts of new development projects.

The YSAQMD currently recommends that projects with construction-related or operational emissions that exceed any of the following thresholds be considered significant. These thresholds apply to individual projects only; they do not apply to cumulative development:

- 82 pounds per day of ROG
- 82 pounds per day of NOx
- 150 pounds per day of PM_{10}

The YSAQMD also recommends that projects that could emit carcinogenic or toxic air contaminants that exceed the maximum individual cancer risk of 10 in one million be considered significant.

Project Impacts and Mitigation Measures

4.6-1 Construction activities associated with the Proposed Project could generate substantial air pollutant emissions.

During construction, two basic types of activities would be expected to occur and generate emissions. First, the development sites would be prepared, excavated, and graded to accommodate the new building foundations, the golf course, and related infrastructure. Second, the Proposed Project would be constructed.

Because of the construction time frame and the normal day-to-day variability in construction activities, it is difficult to precisely quantify the daily emissions associated with each phase of the proposed construction activities. Nonetheless, Table 4.6-3 identifies daily emissions that are estimated to occur on peak construction days, such as when the entire site is being graded and when residential and commercial construction is occurring simultaneously. As shown, construction related daily emissions would exceed YSAQMD significance thresholds for NO_x and PM_{10} during the site excavation and grading phase, and ROG, NO_x, and PM_{10} during the peak construction phase. Therefore, this impact would be ***short-term and significant***.

TABLE 4.6-3

ESTIMATED PEAK DAILY CONSTRUCTION EMISSIONS

	Peak Day Emissions in Pounds per Day		
Emissions Source	**ROG**	**NO_x**	**PM_{10}**
Site Excavation and Grading Phase			
Fugitive Dust	-	-	155.00
Off-Road Diesel	25.53	199.67	9.44
Worker Trips	0.51	0.85	0.05
Total Emissions	***26.04***	***200.52***	***164.49***
YSAQMD Thresholds	82.00	82.00	82.00
Significant Impact?	No	Yes	Yes
Construction Phase			
Building Construction Off-Road Diesel	32.23	271.59	12.96
Building Construction Worker Trips	2.23	1.30	0.48
Arch. Coatings Off-Gas	78.05	-	-
Arch. Coatings Worker Trips	2.23	1.30	0.48
Asphalt Off-Gas	0.10	-	-
Asphalt On-Road Diesel	0.04	0.75	0.02
Total Emissions	***114.89***	***274.94***	***168.05***
YSAQMD Thresholds	82.00	82.00	82.00
Significant Impact?	Yes	Yes	Yes

Source: EIP Associates, 2003. Calculation sheets are provided in Appendix E.

Mitigation Measures

Implementation of the following mitigation measures would reduce the magnitude of this impact. At the present time, it is not possible to quantify the specific amount that these measures would reduce the construction-related emissions associated with the Proposed Project. The reduction potentials or efficiencies of these measures are not currently available. Because it is not possible to quantify the effectiveness of these measures, this analysis concludes that the impacts of the Proposed Project would remain *significant and unavoidable*.

4.6-1 (a) *Prior to all phases of project construction, the applicant and City shall ensure that construction contracts include the following specifications:*

- *After review and approval by the YSAQMD, the developer, if required, shall apply approved chemical soil stabilizers according to manufacturers specifications, to all inactive construction areas (previously graded areas which remain inactive for 96 hours), including the soil that would be used for construction of the earthen berm.*
- *Reduce traffic speeds on all unpaved surfaces to 15 miles per hour or less.*
- *Creation of a dust control plan for approval by YSAQMD*
- *No open burning of vegetation during project construction.*
- *Reestablishment of ground cover as soon as possible after construction.*
- *Suspension of grading activities when winds exceed 25 mph.*
- *Enclose, cover or water at least twice daily all soil piles and exposed surfaces.*
- *Keep all designated haul routes clean of any loose soil associated with soil transportation.*
- *Cover loads of all haul/dump trucks securely.*

(b) *Prior to all phases of project construction, the applicant and City shall ensure that construction contracts include the following specifications:*

- *The prime contractor shall submit to the YSAQMD a comprehensive inventory (i.e., make, model, year, emission rating) of all the heavy-duty off-road equipment (50 horsepower or greater) that will be used an aggregate of 40 or more hours for the construction project. District personnel, with assistance from the California Air Resources Board, will conduct initial Visible Emission Evaluations of all heavy-duty equipment on the inventory list.*
- *An enforcement plan shall be established to weekly evaluate project-related on-and-off- road heavy-duty vehicle engine emission opacities, using standards as defined in California Code of Regulations, Title 13, Sections 2180 - 2194. An Environmental Coordinator, CARB-certified to perform Visible Emissions Evaluations (VEE), shall routinely evaluate project related off-road and heavy-duty on-road equipment emissions for compliance with this requirement. Operators of vehicles and equipment found to exceed opacity limits will be notified and the equipment must be repaired within 72 hours.*
- *Contractors shall provide a plan for approval by the YSAQMD demonstrating that the heavy-duty (>50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and*

subcontractor vehicles, would achieve a project-wide fleet average 30 percent NO_x reduction and 45 percent particulate reduction compared to the most recent CARB fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.

- *Minimize idling time to 10 minutes.*
- *Use low sulfur fuel for stationary construction equipment, if feasible.*
- *Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.*
- *Use low emission on-site stationary equipment.*

4.6-2 Daily operation of the project could generate substantial air pollutant emissions.

Operational emissions generated by both stationary and mobile sources would result from normal day-to-day activities on the project site after occupation. Stationary area source emissions would be generated by the consumption of natural gas for space and water heating devices, the operation of landscape maintenance equipment, and the use of consumer products. Mobile emissions would be generated by the motor vehicles traveling to and from the project site.

The Specific Plan incorporates a number of design characteristics that would help to reduce the operational emissions that would otherwise be generated by the project. These characteristics of the Proposed Project include the following:

- Provide a mix of residential and nonresidential uses that encourage pedestrian and bicycle activity between the uses and surrounding environment;
- Provide wide sidewalks and/or pedestrian paths, and pedestrian facilities such as benches and attractive settings;
- Provide direct pedestrian connections;
- Provide a safe pedestrian and bicycling environment;
- Provide street lighting to provide safety along pedestrian and bicycle paths;
- Provide shade trees to shade sidewalks to encourage pedestrian activity on hot days;
- Provide pedestrian signalization and safety at street and driveway crossings;
- Provide bicycle lanes/paths that connect to an existing bikeway system;
- Design business village and commercial development to accommodate employee-service commercial uses;
- Provide an “orchards” style of tree planting to create a well-shaded, canopy effect in parking lots to help shade buildings and parked cars and, therefore, reduce energy demand and ozone generation; and
- Maximize landscaping with native, drought-resistant species (plants, trees and bushes) to reduce the demand for gas powered landscape maintenance equipment.

The analysis of daily operational emissions has been prepared utilizing the URBEMIS 2002 computer model recommended by the YSAQMD. The results of these calculations, and associated YSAQMD thresholds, are presented in Table 4.6-4 and take into consideration the

TABLE 4.6-4

PROJECT DAILY OPERATIONAL EMISSIONS

Emissions Source	Emissions in Pounds per Day		
	ROG	NOx	PM_{10}
Water and Space Heating	1.69	22.35	0.04
Landscape Maintenance	0.67	0.16	0.01
Consumer Products	64.82	-	-
Motor Vehicles	220.92	245.04	361.79
Total Emissions	***288.11***	***267.55***	***361.83***
Thresholds (lb/day)	82.00	82.00	82.00
Significant Impact	Yes	Yes	Yes

Source: EIP Associates 2003. Computer sheets are provided in Appendix E.

internal trip reduction and mode-shift reduction characteristics of the mixed-use interaction of the Proposed Project and the surrounding land uses, and the design features of the Proposed Project discussed above. As shown, the Proposed Project would generate daily emissions of ROG, NO_x, and PM_{10} that exceed the thresholds of significance recommended by the YSAQMD (emissions in pounds per day). Therefore, this is considered a ***significant impact***.

Mitigation Measures

Implementation of the following mitigation measures would reduce the magnitude of this impact. At the present time, it is not possible to quantify the specific amount that these measures would reduce the operational emissions associated with the Proposed Project. The reduction potentials or efficiencies of these measures are not currently available. Most are expected to have very little overall effect, although the comprehensive use of these measures would reduce the daily emissions that would otherwise be generated after buildout of the Proposed Project. Because it is not possible to quantify the effectiveness of these measures, this analysis concludes that the impacts of the Proposed Project would remain *significant and unavoidable*.

4.6-2 *Prior to building permit, the applicant shall implement these, or equally effective measures, in consultation with the YSAQMD.*

- *Improve the thermal integrity of nonresidential buildings, and reduce the thermal load with automated time clocks or automated sensors.*
- *Provide efficient heating and other appliances, such as water heaters, cooking equipment, refrigerators, furnaces, and boiler units.*
- *Electrical outlets shall be installed on the exterior walls of both the front and back of a residence or all commercial buildings to promote the use of electric landscape maintenance equipment.*
- *Install a gas outlet in the backyard of residential buildings for use with outdoor cooking appliances, such as gas burning barbeques.*
- *If feasible, install a gas outlet with ceramic logs in any proposed fireplaces, including outdoor recreational fireplaces or pits.*
- *Install low nitrogen oxide (NO_x) hot water heaters. (Beyond YSAQMD Rule Requirements)*
- *HVAC units shall be equipped with PremAir (or other manufacturer) catalyst system if available and economically feasible at the time building permits are issued. The PremAir catalyst can convert up to 70 percent of ground level ozone*

that passes over the condenser coils into oxygen. The PremAir system is considered feasible if the additional cost is less than 10 percent of the base HVAC unit cost.

- *Require all flat roofs in the nonresidential land use areas to have a white or silver cap sheet to reduce energy demand.*
- *If feasible, purchase battery powered or electric landscape maintenance equipment for new residences.*
- *Configure parking to minimize traffic interference and delays.*
- *Include wide parking spaces or vanpool only spaces to accommodate vanpool vehicles in employment areas (e.g., community commercial, business-professional, industrial) as determined by YSAQMD.*
- *Provide preferential parking for carpools and vanpools in employment areas (e.g., community commercial, business-professional, and industrial areas).*
- *Equip all truck loading and unloading docks with one 110/208 volt power outlet for every two dock doors. Diesel trucks shall be prohibited from idling more than five minutes and shall be required to connect to the 110/208 volt power to run any auxiliary equipment. Signage addressing these requirements shall be provided at the loading docks.*
- *Vehicle and bicycle all day parking lots near transit stops, and freeway access points.*
- *Permit park & ride lots in business village area.*
- *Provide ridesharing information in a homeowners association package.*
- *Contribute to an area transit fund to help build, maintain, and enhance transit services/facilities/amenities.*
- *Subsidized school bus service.*
- *A subsidy for added transit services.*
- *Class II and III on-street bikeway system.*
- *Class I bikeway system that connects residential, commercial and park uses of the Specific Plan.*
- *Design streets to maximize pedestrian access to transit stops.*
- *Site design to maximize access to transit lines.*
- *Site design to accommodate bus travel.*
- *Site design to provide lighted shelters at transit access points.*
- *Preparation of a Transportation System Management Plan for employers with 50 or more employees.*
- *Provide secure bicycle storage at public parking facilities.*
- *Only U.S. EPA Phase II certified woodburning devices should be allowed in single-family residences. The emission potential from each residence shall not exceed 7.5 grams per hour.*
- *Woodburning or Pellet appliances shall not be permitted in multi-family developments. Only natural gas or propane fired fireplace appliances are permitted.*

4.6-3 The Proposed Project would generate increased local traffic volumes that could expose sensitive receptors near roadway intersections to substantial pollutant concentrations.

As was done to assess existing localized CO concentrations, the simplified CALINE4 screening procedure was used to predict future CO concentrations at the study-area intersections in 2025 when the project is expected to be completed. The results of these calculations are presented in Table 4.6-5. As shown, future CO concentrations near these intersections would not exceed national or State ambient air quality standards. Therefore, CO hotspots would not occur near these intersections in the future, no sensitive receptors would be exposes to substantial pollutant concentrations, and the contribution of project traffic-related CO at these intersections would be ***less than significant***.

TABLE 4.6-5

FUTURE PLUS PROJECT LOCALIZED CARBON MONOXIDE CONCENTRATIONS

	CO Concentrations in Parts per Million[1, 2]					
	25 Feet		50 Feet		100 Feet	
Intersection	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
Lagoon Valley Rd. & Nelson Rd.	4.7	4.0	4.3	3.8	3.9	3.6
Cherry Glen Rd. & Lyon Rd.	3.6	3.4	3.5	3.3	3.3	3.2
Cherry Glen Rd. & Pleasant Valley Rd.	3.7	3.4	3.5	3.3	3.4	3.2
Cherry Glen Rd. & Little Cherry Glen Rd.	3.4	3.4	3.3	3.3	3.2	3.2
Rivera Rd. & Cherry Glen Rd.	4.9	4.1	4.5	3.9	4.0	3.6
Marshall Rd. & Alamo Dr.	6.9	5.3	5.9	4.7	5.0	4.2
Lagoon Valley Rd. & Arterial #1	3.9	3.6	3.7	3.4	3.5	3.3
Lagoon Valley Rd. & Arterial #2	3.3	3.2	3.2	3.1	3.2	3.1

1. National 1-hour standard is 35.0 parts per million. State 1-hour standard is 20.0 parts per million.
2. National 8-hour standard is 9.5 parts per million. State 8-hour standard is 9.1 parts per million.

Source: EIP Associates 2003. Calculation sheets are provided in Appendix E.

Mitigation Measure

4.6-3 *None required.*

4.6-4 Implementation of the Proposed Project would result in new sources of air emissions that could impair implementation of the Clean Air Plan.

The 1994 Clean Air Plan, discussed previously, was prepared to accommodate growth, to reduce the high levels of pollutants within the areas under the jurisdiction of YSAQMD, to return clean air to the region, and to minimize the impact on the economy. Projects that are considered to be consistent with the Clean Air Plan would not interfere with attainment, because this growth is included in the projections used to formulate the Clean Air Plan. In the case of the YSAQMD, development projects are considered to be consistent with the Clean Air Plan if they do not require a change in the existing land use designations (i.e., general plan and zoning) for the project site or if projected emissions for the Proposed Project are not greater than emissions anticipated for the site if developed under the existing land use designations. Therefore, projects, uses, and activities that are consistent with the applicable assumptions used in the development of the Clean Air Plan would not jeopardize attainment of the air quality levels identified in the Clean Air Plan, even if they exceed the YSAQMD's recommended thresholds of significance for daily operational emissions.

The General Plan for the City of Vacaville currently designates the Specific Plan area as a mix of uses, including Highway Commercial, Office Business Park, Golf Course Residential, Public

Park, and Urban Open Space. Under the existing land use designations, fewer residential dwelling units (595) and over 3 million more sf of office/business village/commercial highway uses would be developed in comparison to the Proposed Project. These land uses would generate more motor vehicle trips and, therefore, air pollutant emissions, than would occur under the Proposed Project. Therefore, the Proposed Project has been accommodated in Clean Air Plan growth projections and it would not impair implementation of the Clean Air Plan. This impact would be ***less than significant***.

Mitigation Measures

4.6-4 *None Required.*

4.6-5 Implementation of the Proposed Project could expose sensitive receptors on or off site to substantial pollutant concentrations due to project-generated toxic air contaminants.

TACs can be emitted from a variety of common sources, including gasoline stations, automobiles, dry cleaners, and painting operations. Sources such as these would likely be developed in the Proposed Project area. Another primary source of TACs would be industrial and R & D sources that could be developed within the Proposed Project area. Because no specific land uses or types of uses have been identified for the industrial areas, it is not possible to determine or assess the level of risk that could be generated.

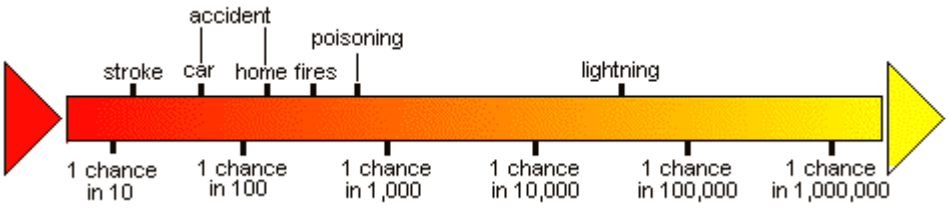
Risk characterization of TACs combines the results of the exposure and dose-response assessments to estimate the potential for adverse health effects as represented by the probability for an individual to contract cancer beyond the normal background likelihood. Risk analysts describe risks numerically in scientific notation; for example 1×10^{-6} means that there is one chance in 1,000,000 of an event occurring. The California Air Pollution Control Officers Association (CAPCOA) Risk Assessment Guidelines establish an upper threshold of 10 in one million for acceptable cancer health risk. The YSAQMD also recommends the use of this threshold to determine acceptable cancer heath risk for individual sources of toxic air pollutants. Cancer risk is defined as the worst-case probability of an individual developing cancer over a lifetime as a result of an exposure to potential carcinogens. The cancer risk level is intended to ensure a sufficient safety margin to prevent a single facility or source from causing a substantial contribution to the overall number of cancer cases in an area. It is not intended or designed to serve as a means to evaluate cumulative risk associated with multiple sources or activities not associated with the facility in question or to assess risk posed by ambient background conditions.

The conclusions of health risk assessments must be considered in context. As a general matter, the background probability of an individual contracting cancer in one's lifetime is 333,000 in one million; that is, one in three people will contract cancer in their lifetime. This overall probability of contracting cancer can be influenced by diet, smoking, heredity, chemicals in the environment and the workplace, and other factors. An individual source of TACs that would result in less than 10 excess cancer cases in one million is unlikely to cause a substantial increase in the overall number of cancer cases that would otherwise occur.

It should be recognized that when small populations are exposed, population risk estimates may be very small. For example, if 100 people are exposed to an individual lifetime cancer risk of one in 100,000 or 1×10^{-5}, the expected number of cases is 0.001. For risk assessment purposes, a lifetime of exposure is considered to be 70 years, 365 days a year, 24 hours per

day. It should further be recognized that health risk assessments do not calculate the exact risk for all individuals, but a hypothetical risk assuming that all of a series of "worst-case scenario" exposure assumptions apply, such as the maximally exposed individual does not move from the specific worst-case location and worst-case wind conditions do not change. The chance that an individual would be exposed to any one of these exposure assumptions is small, and is even smaller for all assumptions to occur simultaneously (e.g., 70 years of continuously breathing air at the location of maximum impact). Thus, an individual's actual risk is likely to be substantially over-estimated by the recommended methodology for health risk assessments.

It is also important to place health risk and the assessment of probability in the context of daily activity. To provide an idea of the size of risks from environmental hazards, the continuum below provides risk statistics for some familiar events (U.S. EPA 1991).



Comparative Risk Probabilities

Health risk evaluations will be conducted for each individual source of toxic air contaminants that is subject to the permitting authority of the YSAQMD. Depending on the source of emissions, the YSAQMD may use a screening analysis to determine that the potential risks are less than significant. Other sources of emissions will require detailed health risk assessments in order to evaluate the potential impact and obtain a permit to operate from the YSAQMD. It is necessary to know the exact model of equipment, its exact location, and its intended operating characteristics to conduct the health risk evaluation. Because none of this information is known along with the exact uses that would occupy the proposed buildings and the details of how each business would operate, it is completely speculative to evaluate the potential toxic air contaminant risks associated with development under the proposed Specific Plan. The permitting procedures of the YSAQMD would ensure that facilities within the Specific Plan area do not exceed the risk standard of 10 in one million and, therefore, expose sensitive receptors on or off site to substantial pollutant concentrations due to project-generated TACs. Therefore, this impact would be ***less than significant***.

Mitigation Measure

4.6-5 *None required.*

4.6-6 Implementation of the Proposed Project could release objectionable odors at the proposed manholes along the sewer main downstream of the pump station.

The Lagoon Valley area does not currently have a sanitary sewer connection point to the City of Vacaville sanitary sewer system. However, two alternative alignments to convey wastewater from the project site to an existing off-site point of connection have been identified. One alternative would require constructing a pump station at the north end of the valley near Pena

Adobe Road, and a force main to the top of the ridge. Wastewater would be held in the pump station wet well where biological activity would tend to produce odor-causing compounds. This pump station would be completely enclosed using concrete building techniques and therefore would not emit odors. However, due to the slope of the ground surface, the gravity sewer portion of this line may require about six drop manholes. In this case, odors are likely to be generated due to increased turbulence. The proposed route for this sewer follows an existing bicycle/pedestrian trail. The presence of slow moving pedestrian traffic and a relatively natural environment increase the risk of odor detection. This is considered a ***potentially significant impact***.

Mitigation Measures

Implementation of the following mitigation measures would reduce the magnitude of this impact but it would remain *significant and unavoidable* because odors levels are difficult to quantify due to the fact that odor detection is highly subjective from person to person.

4.6-6 (a) *The Applicant shall include odor and corrosion control features in the manhole design where turbulence is anticipated. These may include vortex tube manhole inserts; manhole seals and ventilation tubes vented at least 20 feet from pedestrian path with carbon filters; or some other system. All proposed odor control systems (including those listed herein) shall be demonstrated to be effective to the satisfaction of the City Utilities Division and Community Services Department through pilot testing or other means prior to design approval.*

(b) *The Applicant shall include in the manhole design where turbulence is anticipated, corrosion protection features approved by the City Utilities Division.*

(c) *Separate the trail and any vents from each other, to the maximum feasible distance needed to reduce odor detection by pedestrians, based on final analysis of specific facility.*

4.7 NOISE

4.7 NOISE

4.7.1 INTRODUCTION

This section of the EIR analyzes the potential for adverse impacts on noise and groundborne vibration resulting from implementation of the specific plan. The NOP (Appendix B) identified the potential for impacts associated with a substantial temporary and/or permanent increase in ambient noise levels within or around the project site or exposure of people to excessive noise levels, groundborne vibration, or groundborne noise levels and whether this exposure is in excess of standards established in the local general plan or noise ordinance. The Specific Plan area is not located within the study-area noise contours of any airport or airstrip. Nut Tree Airport and Travis Air Force Base are the closest airstrips to the specific plan location; however, no part of specific plan site falls within the 60-dBA noise contour from noise generated by the airport or Air Force Base and therefore does not exceed the threshold of 65 dBA for any exterior living space of the specific plan area. Therefore, the issue of aircraft noise is not addressed in this analysis. In response to the NOP (see Appendix B), comments were raised requesting an analysis of noise sources that could affect outside areas and park uses as well as traffic noise along I-80. These issues have all been addressed within this section. Data used to prepare this analysis were obtained by measuring and modeling existing and future noise levels at the project site and in the surrounding area.

4.7.2 ENVIRONMENTAL SETTING

Fundamentals of Sound and Environmental Noise

Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Because the human ear is not equally sensitive to a given sound level at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Noise, on the other hand, is typically defined as unwanted sound. A typical noise environment consists of a base of steady “background” noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway. Table 4.7-1 lists representative noise levels for the environment.

Several rating scales have been developed to analyze the adverse effect of community noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise upon people is largely dependent upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. Those that are applicable to this analysis are as follows:

TABLE 4.7-1

REPRESENTATIVE ENVIRONMENTAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock Band
Jet Fly-over at 100 feet		
	—100—	
Gas Lawnmower at 3 feet		
	—90—	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	
		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	—30—	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

Source: California Department of Transportation 1998

- L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

- L_{dn}, the Day Night Average Level, is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime.

- L_{min}, the minimum instantaneous noise level experienced during a given period of time.

- L_{max}, the maximum instantaneous noise level experienced during a given period of time.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day, night, or over a 24-hour period. Environmental noise levels are generally considered low when the L_{eq} is below 60 dBA, moderate in the 60-to 70-dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings that can provide noise levels as low as 20 dBA and quiet, suburban, residential streets that can provide noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with more noisy

urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA).

When evaluating changes in community noise levels, or L_{dn}, a difference of 3 dBA is a barely perceptible increase to most people. A 5 dBA increase is readily noticeable, while a difference of 10 dBA would be perceived as a doubling of loudness.

Noise levels from a particular source decline as distance to the receptor increases. Other factors, such as the weather and reflecting or shielding, also help intensify or reduce the noise level at any given location. A commonly used rule of thumb for roadway noise is that for every doubling of distance from the source, the noise level is reduced by about 3 dBA at acoustically "hard" locations (i.e., the area between the noise source and the receptor is nearly complete asphalt, concrete, hard-packed soil, or other solid materials) and 4.5 dBA at acoustically "soft" locations (i.e., the area between the source and receptor is normal earth or has vegetation, including grass). Noise from stationary or point sources is reduced by about 6 to 7.5 dBA for every doubling of distance at acoustically hard and soft locations, respectively. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Fundamentals of Environmental Groundborne Vibration

Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and, in the U.S., is referenced as vibration decibels (VdB).

The background vibration velocity level in residential and educational areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

The general human response to different levels of groundborne vibration velocity levels is described in Table 4.7-2.

Existing Ambient Daytime Noise Levels

Existing ambient daytime noise levels were measured at seven selected locations around the Specific Plan area on September 2, 2003. These locations are identified in Figure 4.7-1. The noise levels were measured using a Larson-Davis Model 814 precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental

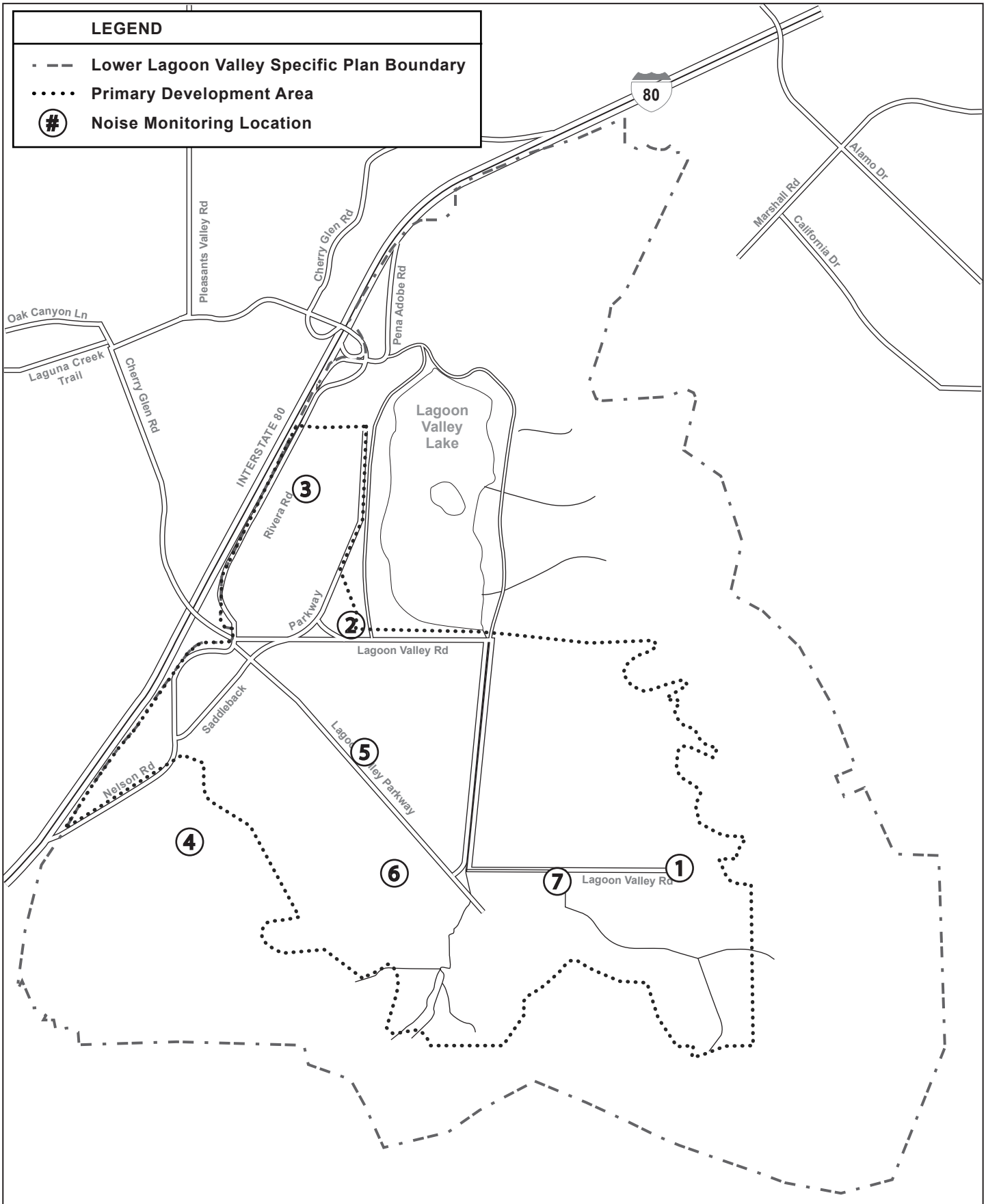


FIGURE **4.7-1**
Noise Monitoring Locations

Not to Scale

10794-00

Source: EIP Associates, 2003

City of Vacaville

TABLE 4.7-2

HUMAN RESPONSE TO DIFFERENT LEVELS OF GROUNDBORNE VIBRATION

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: Federal Railroad Administration 1998

noise measurement instrumentation. The average noise levels and sources of noise measured at each location are identified in Table 4.7-3. These daytime noise levels are characteristic of an agricultural/semi-urban environment.

TABLE 4.7-3

EXISTING DAYTIME NOISE LEVELS AT SELECTED ON- AND OFF-SITE LOCATIONS

Noise Measurement Location	Primary Noise Sources	Noise Level Statistics		
		L_{eq}	L_{min}	L_{max}
1. Southeast corner of nursery facility	Traffic on I-80	52.7	32.9	74.7
2. 300' east of Lagoon Valley Rd. and I-80 Interchange	Traffic on I-80	50.9	41.8	66.9
3. 150' east of I-80, 300' north of Lagoon Valley Rd.	Traffic on I-80	51.9	48.5	56.0
4. Western portion of site approx. 400' east of I-80	Traffic on I-80	50.3	46.4	58.6
5.Northwest portion of site approx. 200' south of Lagoon Valley Rd.	Traffic on I-80	47.1	42.3	61.4
6.Central portion of site.	Traffic on I-80	44.7	39.4	58.1
7. Eastern portion of site adjacent to existing residential unit.	Traffic on I-80	62.9	42.0	78.8

Source: EIP Associates 2004

Existing Roadway Noise Levels On-Site

The Specific Plan area currently contains scattered single-family residences, open space, agricultural uses, the Lagoon Valley Regional Park, grazing land, and commercial uses including the 168-acre Hines Nursery facility (a wholesale nursery which does not create large volumes of traffic) as well as a small automobile wrecking yard and an auto repair shop at the northeast corner of Lagoon Valley Road and Rivera Road. However, the primary source of noise in the Specific Plan area is vehicular traffic on I-80. Due to the lack of buildings or other obstructions, the noise generated by traffic on I-80 is able to travel large distances and can be heard throughout the Specific Plan area.

Existing 24-hour noise levels have been calculated for the segments of I-80 and Lagoon Valley Road adjacent to the Specific Plan area. This task was accomplished using the Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108) and traffic volumes from the project traffic analysis (included as Appendix C). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) utilized in the FHWA Model have been modified to reflect average vehicle noise rates identified for California by Caltrans. The Caltrans data show that California automobile noise is 0.8 to 1.0

dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. The calculated noise levels are presented in Table 4.7-4 along with the distances to various noise level contours.

TABLE 4.7-4

EXISTING ROADWAY NOISE LEVELS ON SITE

Roadway Segment	Reference L_{dn} at 100 Feet[1]	Distance to Noise Contour		
		70 L_{dn}	65 L_{dn}	60 L_{dn}
Interstate 80, north Texas to Lagoon Valley Road	76.4	269	580	1,249
Lagoon Valley Road, east of Nelson/Rivera	49.3	--[2]	--	--

1. Distances are in feet from roadway centerline. The identified noise level at 100 feet from the roadway centerline is for reference purposes only as a point from which to calculate the noise contour distances. It does not reflect an actual building location or potential impact location.
2. Noise contour is located within the roadway lanes.

Source: EIP Associates 2004. Calculation data and results are provided in Appendix C.

Existing Roadway Noise Levels Off-Site

Existing roadway noise levels were also calculated for the roadway links and Interstate segments in the vicinity of the project area that has noise sensitive uses fronting the roadways. As with on site noise levels, this was accomplished using the FHWA Highway Noise Prediction Model and traffic volumes from the project traffic analysis (included as Appendix C). The average daily noise levels along these roadway segments are presented in Table 4.7-5.

TABLE 4.7-5

EXISTING ROADWAY NOISE LEVELS OFF SITE

Roadway Segment	Land Uses (distance[1])	dBA L_{dn}
Interstate 80, east of Alamo	Agricultural (100)	75.9
Interstate 80, Pena Adobe Rd. to Alamo	Commercial/Agricultural (100)	76.4
Interstate 80, Lagoon Valley Rd. to Pena Adobe Rd.	Residential/Motel (500)	65.6
Interstate 80, N. Texas to Lagoon Valley Rd.	Residential (100)	76.4
Interstate 80, Cherry Glen Rd. to Alamo/Merchant Rd.	Recreational/Agricultural (100)	75.5
Cherry Glen Rd., Lyon Rd. to WB I-80 Ramps	Residential (50)	55.0
Cherry Glen Rd., Lyon Rd. to Pleasant Valley Rd.	Residential (50)	55.3
Cherry Glen Rd., Pleasant Valley Rd. to EB I-80 Ramps	Residential (75)	46.9
Pleasant Valley Rd., North of Cherry Glen Rd.	Residential (75)	53.0
Alamo Dr., Merchant St. to EB I-80 Ramps	Recreational/Agricultural (50)	64.7

1. Distances are in feet from roadway centerline.

Source: EIP Associates 2004. Calculation data and results are provided in Appendix C.

Existing Groundborne Vibration

Aside from seismic events, the greatest regular sources of groundborne vibration at the proposed site and immediate vicinity are roadway truck and bus traffic. These trucks and buses typically generate groundborne vibration velocity levels of around 63 VdB. These levels could reach 72 VdB where trucks and buses pass over bumps in the road.

4.7.3 REGULATORY SETTING

Federal

The Federal Railway Administration has developed vibration impact thresholds for sensitive buildings, residences, and institutional land uses. These thresholds are 80 VdB at residences and buildings where people normally sleep (e.g., nearby residences and day care facility) and 83 VdB at institutional buildings;

State

Title 24 of the California Code of Regulations codifies Sound Transmission Control requirements, which establishes uniform minimum noise insulation performance standards for new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings. Specifically, Title 24 states that interior noise levels attributable to exterior sources shall not exceed 45 dBA L_{eq} in any habitable room of new multi-family dwellings. Dwellings are to be designed so that interior noise levels will meet this standard for at least 10 years from the time of building permit application.

Local

City of Vacaville

General Plan

The California Government Code requires that a noise element be included in the general plan of each county and city in the state. The Noise Element of the City of Vacaville General Plan is a comprehensive program for including noise control in the planning process. It is a tool that City planners use to achieve and maintain compatible land uses with environmental noise levels. The noise standards adopted by the City are identified in Table 4.7-6 and Table 4.7-7 for roadway and non-roadway noise sources, respectively.

TABLE 4.7-6

CITY OF VACAVILLE NOISE/LAND USE COMPATIBILITY POLICY FOR TRANSPORTATION SOURCES

Land Use	Noise Standard (L_{dn})		Unmitigated Outdoor Noise Levels of Acceptability (L_{dn}) [a]		
	Interior	Exterior	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable
Residential	45	60 [b]	Below 60	60 to 75	Above 75
Transient Lodging	45	-- [c]	Below 60	60 to 75	Above 75
Hospitals, Nursing Homes	45	60 [d]	Below 60	60 to 75	Above 75
Other Uses[e]	--	--	--	--	--

a Levels of Acceptability are defined as follows:
Normally Acceptable: Specified land use is normally acceptable with typical conditions of approval (setbacks, fences and standard building practices).
Conditionally Acceptable: Specified land uses is subject to noise study to demonstrate noise can be reduced to normally acceptable levels with acceptable mitigation.
Normally Unacceptable: Specified land use is normally unacceptable regardless of measures implemented to reduce noise.
b In multi-family/attached unit projects, this standard applies to courtyards, patios, private areas and activity areas.
c Areas designated for outdoor activity should be located away from noise sources.
d Applies to courtyards, patios, private areas and activity areas.
e other uses are subject to applicable federal and state OSHA noise exposure standards.
SOURCE: City of Vacaville, *General Plan, Volume I: Policy Document, Chapter 10 - Noise Element,* 1999a.

TABLE 4.7-7

CITY OF VACAVILLE NOISE/LAND USE COMPATIBILITY POLICY FOR NON-TRANSPORTATION SOURCES [A]

Land Use	Noise Level Descriptor	Noise Level Standards (in dBA) [b,c,d]			
		Exterior		Interior	
		Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Residential	Hourly (L_{eq})	50 [e]	45 [e]	45	35
	Maximum Level (L_{max})	70 [e]	65 [e]	--	--
Transient Lodging	Hourly (L_{eq})	-- [f]	-- [f]	45	35
HospitaL, Nursing Homes	Hourly (L_{eq})	50 [g]	45 [g]	45	35
Other [h]	Hourly (L_{eq})	--	--	--	--
	Maximum Level (L_{max})	--	--	--	--

a Non-transportation sources may include industrial operations, outdoor recreation facilities, HVAC units, loading docks, construction equipment, etc.
b Compliance with the noise level standards is to be measured at the affected location of the land use category.
c If the existing noise levels exceed that of a proposed noise source, these standards would not be applied to the new noise source unless the additional noise generated would increase the projected, combined noise levels a minimum of three decibels.
d These standards are applicable to land use determinations and entitlements.
e In multi-family/attached unit projects, applies to courtyards, patios, private areas, and activity areas.
f Areas designed for outdoor activity should be located away from noise sources.
g Applies to courtyards, patios, private areas and activity areas.
h Other uses are subject to applicable federal and state OSHA noise exposure standards.
SOURCE: City of Vacaville, *General Plan, Volume I: Policy Document, Chapter 10 - Noise Element,* 1999a.

Municipal Code—Noise Ordinance

The City of Vacaville's Noise Ordinance, Vacaville Land Use & Development Code Section 14.09.127.120 (City of Vacaville, 1995), establishes standards designed to implement the General Plan Noise Element policies and establishes maximum noise exposure standards for sensitive land uses. The standards contained in the Noise Ordinance are consistent with those from the General Plan Noise Element (Tables 4.7-6 and 4.7-7). Construction equipment operation is considered a non-transportation noise source and is subject to the property line hourly (L_{eq}) and maximum level (L_{max}) standards contained in Table 4.7-7.

In addition, Vacaville Land Use & Development Code Section 8.10.030-19 limits construction equipment operation and outdoor construction or repair work within 500 feet of occupied residences to between the hours of 6:00 a.m. and 10:00 p.m. on Mondays through Saturdays, and from 8:00 a.m. and 10:00 p.m. on Sundays. Interior construction work is exempt from these hourly restrictions provided noise from such work would not "create noise or disturbance noticeable to a reasonable person of normal sensitivity in the surrounding neighborhood."

4.7.4 IMPACTS AND MITIGATION MEASURES

Methods of Analysis

The analysis in this section focuses on the nature and magnitude of the change in the noise environment associated with implementation of the Proposed Project. This implementation would result in an increase in the on-site population of residents, employees, and visitors. The

primary sources of noise associated with the Proposed Project would be construction activities throughout the site development phases and increased traffic volumes associated with the on-site population. Secondary sources of noise would include new stationary sources (such as heating, ventilation, and air conditioning units) and increased human activity throughout the Specific Plan area. The net increase in noise levels associated with these activities and sources have been quantitatively estimated and compared to applicable noise standards and thresholds of significance.

Construction Noise

Construction noise levels were estimated by data published by the U.S. EPA. Potential noise levels are identified for existing noise sensitive uses and future uses within the Specific Plan area.

Stationary Sources

Noise levels associated with industrial, public service and commercial facilities were determined using noise level data collected for similar facilities and standard noise modeling techniques. The noise level criteria shown in Table 4.7-7 are used to determine land use compatibility with residential uses. At the specific plan level, detailed site and grading plans associated with these types of noise sources have not yet been developed. As a result, specific noise impacts associated with these sources cannot be identified at this time. Instead, the potential for these sources to generate excessive or annoying noise levels is evaluated, and measures are identified that could ensure that City standards are achieved.

Traffic Noise

Traffic noise levels were determined using the FHWA Traffic Noise Prediction Model and traffic volumes from the *Lower Lagoon Valley Traffic Impact Analysis Report*. The average vehicle noise rates (energy rates) utilized in the FHWA model have been modified to reflect vehicle noise rates identified for California by Caltrans.

Standards of Significance

The following thresholds of significance are based on Appendix G of the 2003 *CEQA Guidelines*. For purposes of this EIR, impacts are considered significant if the Proposed Project would:

- Generate or expose people to noise levels in excess of the standards established in the local general plan or noise ordinance;
- Generate or expose people to excessive groundborne vibration levels; or
- Cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

The noise standards adopted by the City are identified in Table 4.7-6 and Table 4.7-7 for roadway and non-roadway noise sources, respectively.

The CEQA Guidelines do not define the levels at which groundborne vibration is considered "excessive." This analysis uses the Federal Railway Administration's vibration impact thresholds for sensitive buildings, residences, and institutional land uses. These thresholds are

80 VdB at residences and buildings where people normally sleep (e.g., nearby residences and day care facility) and 83 VdB at institutional buildings.

The CEQA Guidelines also do not define the levels at which a permanent increase in ambient noise is considered "substantial." For the purpose of this analysis, a permanent increase of 3.0 dBA L_{dn} over ambient noise levels without the project is considered to be substantial and, therefore, significant.

Project Impacts and Mitigation Measures

4.7-1 Construction activities associated with the Proposed Project development could generate temporary or periodic noise levels that exceed City standards.

Project development would require the use of heavy equipment for site grading and excavation, installation of utilities, paving, and building fabrication. Development activities would also involve the use of smaller power tools, generators, and other sources of noise. During each stage of development there would be a different mix of equipment operating and noise levels would vary based on the amount of equipment in operation and the location of the activity. The various project components would be developed in stages with each village being constructed individually. However, the grading plan for each of these project components calls for the simultaneous grading, hauling, and construction of the earthen berm, the residential villages and the golf course layout. The berm is proposed for the western boundary of the proposed residential project site.

The U.S. EPA has compiled data regarding the noise generating characteristics of specific types of construction equipment and typical construction activities. These data are presented in Table 4.7-8 and Table 4.7-9 for a reference distance of 50 feet. These noise levels would diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 84 dBA measured at 50 feet from the noise source to the receptor would reduce to 78 dBA at 100 feet from the source to the receptor, and reduce by another 6 dBA to 72 dBA at 200 feet from the source to the receptor.

During construction, three basic types of activities would be expected to occur and generate noise. The existing commercial buildings, including Hines nursery, would be demolished and parking surfaces cleared; the development sites would be prepared, excavated, and graded to accommodate building foundations, and roadways; and the buildings and roadways would be constructed and readied for use. Each of these activities would occur in phases as the overall project is developed.

The nearest existing sensitive receptors, which would be subject to impacts, are the existing residences located in the Specific Plan area. Noise levels at these residences would reach a maximum of 89 dBA L_{eq} during siting grading, excavation, and finishing. In addition, as discussed earlier, the Specific Plan would be completed in phases with a large portion of each residential phase being completed and readied for occupancy before construction would commence on the subsequent phases. With the placement of sensitive receptors within close proximity to active construction of the Specific Plan area, the potential for exposure of new residents to excessive ambient noise levels would increase with the completion of each residential village and commercial area. However, even though the construction activities may exceed noise thresholds outlined in the City's General Plan Noise Element, they would be limited to between the hours of 6:00 A.M. and 10:00 P.M. on Monday through Saturdays and

TABLE 4.7-8

NOISE RANGES OF TYPICAL CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Levels in dBA L_{eq} at 50 feet[1]
Front Loader	73–86
Trucks	82–95
Cranes (moveable)	75–88
Cranes (derrick)	86–89
Vibrator	68–82
Saws	72–82
Pneumatic Impact Equipment	83–88
Jackhammers	81–98
Pumps	68–72
Generators	71–83
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Back Hoe	73–95
Pile Driving (peaks)	95–107
Tractor	77–98
Scraper/Grader	80–93
Paver	85–88

1. Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table.

Source: U.S. EPA 1971

TABLE 4.7-9

TYPICAL OUTDOOR CONSTRUCTION NOISE LEVELS

Construction Phase	Noise Levels at 50 Feet (dBA L_{eq})	Noise Levels at 50 Feet with Mufflers (dBA L_{eq})
Ground Clearing	84	82
Excavation, Grading	89	86
Foundations	78	77
Structural	85	83
Finishing	89	86

Source: U.S. EPA 1971

from 8:00 a.m. and 10:00 p.m. on Sundays in accordance with the City of Vacaville Municipal Code and are temporary in nature. However, because one phase may begin prior to the completion of the prior phase, sensitive noise receptors may be in close proximity to active construction. Therefore, this is considered a ***potentially significant impact***.

Mitigation Measure

Implementation of the following mitigation measure would reduce the magnitude of this impact but it would remain *significant and unavoidable*.

4.7-1 (a) *Construction activities shall be limited to the hours of 7:00 A.M. to 6:00 P.M. Monday through Saturday.*

(b) *All construction equipment engines shall be properly tuned and muffled according to manufacturers' specifications.*

(c) *Noise construction activities whose specific location on the site may be flexible (e.g., operation of compressors and generators, cement mixing, general truck idling) shall be conducted as far as possible from the nearest noise-sensitive land uses, and natural and/or manmade barriers (e.g., intervening construction trailers) shall be used to screen propagation of noise from such activities towards these land uses to the extent possible.*

(d) *The use of those pieces of construction equipment or construction methods with the greatest peak noise generation potential shall be minimized. Examples include the use of drills, jackhammers, and pile drivers.*

4.7-2 Construction activities associated with the Proposed Project development could generate and expose persons to excessive groundborne vibration levels.

Construction activities that would occur under the specific plan have the potential to generate low levels of groundborne vibration. Table 4.7-10 identifies various vibration velocity levels for the types of construction equipment that would operate at the project site during construction.

TABLE 4.7-10

VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Construction Equipment	Approximate VdB				
	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet
Large Bulldozer	87	81	79	77	75
Loaded Trucks	86	80	78	76	74
Jackhammer	79	73	71	69	67
Small Bulldozer	58	52	50	48	46

Source: Federal Railroad Administration 1998; EIP Associates 2004

Construction activities would have the potential to primarily impact the existing residences. Based on the information presented in Table 4.7-10, vibration levels could reach up to 87 VdB at these properties. This would exceed the Federal Railway Administrations 80 VdB threshold for residences and buildings where people normally sleep.

In addition, as discussed earlier, the specific plan would be completed in phases with a large portion of each residential phase being completed and readied for occupation before construction would commence on the subsequent phases. With the addition of sensitive receptors within close proximity to active construction of the specific plan site, the potential for exposure to excessive vibration levels would increase with the completion of each residential village and commercial area. However, even though the construction activities may exceed the Federal Railway Administration 80 VdB thresholds, they would be limited to between the hours of 6:00 A.M. and 10:00 P.M. on Monday through Saturdays in accordance with the City of Vacaville Municipal Code and Mitigation Measure 4.7-1(a), and therefore, would not occur during recognized sleep hours for residences. However, because one phase may begin prior to the completion of the prior phase, sensitive noise receptors may be in close proximity to active construction. Therefore, this is considered a ***potentially significant impact***.

Mitigation Measure

As discussed under Impact 4.7-1, compliance with the City's Noise Ordinance would required for construction. The following measures are recommended to further reduce the effects of construction noise on residents; however, the impact would remain *significant and unavoidable*.

4.7-2 (a) *Equipment warm-up areas, water tanks, and equipment storage areas shall be located a minimum of 150 feet from occupied residences, where feasible.*

(b) *Flexible sound control curtains shall be placed around drilling apparatus and drill rigs, if sensitive receptors are located nearby.*

4.7-3 Implementation of the Proposed Project development could expose existing and proposed residential or other sensitive land uses to noise in excess of City standards.

Future (Year 2025) noise levels within the project site would be dominated by vehicular traffic on I-80 and the new internal arterial roadways. The nearest point of residential development to I-80 would be located approximately 1,600 feet from the freeway and approximately 85 feet from the new internal roadway referred to in the *Lower Lagoon Valley Traffic Impact Analysis Report* as Arterial #1. Two of the proposed golf course fairways would be located between I-80 and the residential area. Under existing topographic conditions, the future noise levels attributable to I-80 traffic would be approximately 59.2 dBA L_{dn}, which just barely exceeds the City's 60 dBA L_{dn} exterior noise standard for residential uses. However, as part of this project, an earthen-berm, approximately 30 to 50 feet in height, is proposed to be constructed and is planned to run parallel between the proposed residential uses and I-80. This proposed earthen-berm would act as a substantial noise attenuation structure and may reduce noise from the freeway by as much as 20 dBA. At the specific plan level, detailed site and grading plans associated with these features have not yet been developed. As a result, the actual effectiveness of this berm cannot be identified at this time and would be based on the final design and placement.

Table 4.7-11 presents future average daily exterior and interior noise levels associated with I-80 and the internal arterial roadways at the residential locations within the site. These noise levels assume a reduction of only 10 dBA by the proposed berm. As shown, future exterior noise levels at the residential units planned at the nearest point to I-80 could exceed the City's 60 dBA L_{dn} standard for outdoor activity areas if there was no berm between these uses and I-80. However, if a very conservative value to 10 dBA reduction is applied to the proposed berm, the future exterior noise level at these residential uses would be less than 60 dBA L_{dn}. Expected reduction of approximately 20 dBA from the berm would reduce noise levels even more to the point that new Arterial #1 would be the primary source of noise at this location. Noise levels at the other residential uses located along Lagoon Valley Road and new Arterial #1 would also be less than 60 dBA L_{dn}. Due to the distance from I-80 and the practice of placing any exterior activity space behind a particular structure rather that in front, noise levels at other uses such as the schools, golf courses, business village and associated uses would be even lower than those identified in Table 4.7-11 and, therefore, would also not exceed the City's 60 dBA L_{dn} standard for outdoor activity areas.

In addition, as previously discussed, exterior-to-interior reduction of newer residential units is generally 30 dBA or more. With this assumption, Table 4.7-11indicates that future interior noise levels associated with the surrounding roadways would not exceed the City's 45 dBA L_{dn} interior noise standard for residential uses.

TABLE 4.7-11

PREDICTED FUTURE ROADWAY NOISE LEVELS ON SITE

Analysis Location	Noise Levels in dBA L_{dn}				
	Future[1] Exterior Noise Levels[2]	City Exterior Noise Standards	Assumed Exterior to Interior Noise Reduction	Future Interior Noise Levels	City Interior Noise Standards
Residential uses located closest to I-80 (includes noise from new Arterial #1) – Analysis Without Proposed Berm	62.1	60.0	30	<40.0	45.0
Residential uses located closest to I-80 (includes noise from new Arterial #1) – Analysis With Proposed Berm[3]	59.4	60.0	30	<40.0	45.0
Residential uses along Lagoon Valley Road	56.9	60.0	30	<40.0	45.0
Residential uses along new Arterial #1	58.9	60.0	30	<40.0	45.0

1 Future traffic condition is the Year 2025 With Proposed Project Traffic volumes identified in the *Lower Lagoon Valley Traffic Impact Analysis Report*, 2004.
2 Noise levels are calculated for the edge of the building nearest the roadway noise source.
3 Assumes only 10 dBA noise reduction from the proposed berm, although up to 20 dBA reduction is expected.
Source: EIP Associates 2004. Calculation data and results are provided in Appendix C.

As discussed in Chapter 3 (Project Description), the Specific Plan would require the construction of a new fire station in order to meet the needs of the proposed residential land uses. The primary noise sources associates with fire stations include emergency sirens and alarms associated with responding to fires. Because these noise levels would occur only during emergency situations and/or on an infrequent basis, these noise levels would not be considered significant.

Heating, ventilation, and air conditioning (HVAC) systems would be installed for the new residential buildings located within the project site. Residential HVAC systems result in noise levels that average between 40 and 50 dBA L_{eq} at 50 feet from the equipment. These noise levels would not exceed the City's exterior noise level standards for locally regulated noise sources as identified previously in Table 4.7-11.

A new sewer pump station would be constructed at the north end of the valley near Pena Adobe Road. Mechanical equipment would include circulation pumps and an emergency back-up generator. All of the equipment would be enclosed in a masonry building, which would ensure that noise levels heard outside of the building would be low and isolated to the immediate vicinity of the building. There are also no existing uses that are sensitive to noise levels located in close proximity to the pump station site, and none are proposed as part of the project. However, it is possible that future plans proposed for the park area, or final locations of other equipment near residential areas, may include uses that should be shielded from potential equipment noise sources.

Based on this analysis, impacts associated with noise generated as a result of Specific Plan operation are expected be less than significant. However, because the actual effectiveness of the proposed berm would be based on the final design and placement, the possibility of new land uses being exposed to noise levels from I-80 that exceed City standards is considered to be a ***potentially significant impact***.

Mitigation Measure

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.7-3 (a) *Prior to the issuance of building permits for residential uses located within 2,000 feet of I-80, the project developer(s) shall submit an acoustical analysis to the City of Vacaville Community Development Depart that demonstrates that the final project design incorporates measures that reduce traffic noise levels within the exterior living environments of the residential uses will not exceed 60 dBA L_{dn}. The analysis shall be based on the final grading plan for the project.*

(b) Prior to the construction of public utility facilities, an acoustical analysis shall be prepared to identify projected noise levels from equipment and to identify project design measures, if required, that reduce noise effects on adjacent residential or other sensitive uses to levels meeting City standards.

4.7-4 The specific plan would generate increased local traffic volumes, which could result in a substantial permanent increase in off site ambient noise levels.

Locations in the vicinity of the project site could experience slight changes in noise levels as a result of an increase in the on-site population and resulting increase in motor vehicle trips. The changes in future noise levels at the selected noise-sensitive locations along the study-area roadway segments as well as along I-80 in the project vicinity are identified in Table 4.7-12. As shown, the Proposed Project development would increase local noise levels by a maximum of 1.6 dBA L_{dn}, which is inaudible/imperceptible to most people and would not exceed the identified thresholds of significance. This slight increase in ambient noise due to the specific plan can be attributed to the fact that the Specific Plan area is generally isolated and any traffic which may be generated would tend to use I-80 as their main access rather than local streets.

TABLE 4.7-12

PROJECT TRAFFIC NOISE IMPACTS

Roadway Segment[1]	Noise Levels in dBA L_{dn}			
	Existing Plus Approved Projects	Existing Plus Approved Projects Plus Project Traffic	Increase	Significance Threshold
Interstate 80, east of Alamo	75.6	76.4	0.8	3.0
Interstate 80, Pena Adobe Rd. to Alamo	76.8	77.3	0.5	3.0
Interstate 80, Lagoon Valley Rd. to Pena Adobe Rd.	65.9	66.1	0.2	3.0
Interstate 80, N. Texas to Lagoon Valley Rd.	77.1	76.9	-0.2	3.0
Interstate 80, Cherry Glen Rd. to Alamo/Merchant Rd.	75.9	77.1	1.2	3.0
Cherry Glen Rd., Lyon Rd. to WB I-80 Ramps	50.8	50.1	-0.7	3.0
Cherry Glen Rd., Lyon Rd. to Pleasant Valley Rd.	53.8	52.7	-1.5	3.0
Cherry Glen Rd., Pleasant Valley Rd. to EB I-80 Ramps	44.2	45.7	1.6	3.0
Pleasant Valley Rd., North of Cherry Glen Rd.	50.4	49.8	-0.6	
Alamo Dr., Merchant St. to EB I-80 Ramps	65.9	64.6	-1.3	3.0

1. Refer to Table 4.7-5 for the land uses and distances that were assumed in this analysis.

Source: EIP Associates 2004. Calculation data and results are provided in Appendix C.

In addition, users of Lagoon Valley Regional Park would only be subject to an estimated increase of 0.2 dBA L_{dn} due to traffic related noise. This increase in ambient noise would result from an increase in traffic on I-80. Noise levels generated solely by roadways within the specific plan area would be far less than those generated by I-80. Therefore, the use of noise attenuating features to reduce traffic related noise levels from the specific plan site would be unnecessary. In addition, the slight increase in ambient noise levels would be considered an inaudible increase over the existing ambient noise levels. As shown in Table 4.7-12, future noise levels along four off site roadway segments would actually be reduced as a result of changes in local circulation patterns that occur with the project. This is considered a ***less than significant impact*.**

Mitigation Measures

4.7-4 *None required.*

4.8 PUBLIC UTILITIES

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4.8.1 INTRODUCTION

This section evaluates impacts from the Proposed Project to the existing public utilities provided by the City and other special districts. Specific utilities included in this discussion are wastewater, electricity and natural gas, and cable TV. The section will describe the existing services, evaluate potential increases in service demands based on criteria provided by the service providers and commonly accepted professional standards, and recommend means by which any significant impacts may be reduced to a level of insignificance.

Information contained in this section is based on a review of existing documentation, including the Vacaville General Plan, Volume One: Plan Policies (Adopted August 1990; Amended November 1999), and a site visit conducted in July 2003.

The following issues were raised in the NOP comment letters (see Appendix B) with regard to wastewater collection: how wastewater generated by the project will be collected and treated; how the Proposed Project would fund its fair share of wastewater infrastructure operation and maintenance costs; and if wastewater generated by the Proposed Project would increase salinity at the wastewater treatment plant. If they are imposed in the future, effluent limits for treatment plant discharge would likely be in terms of the concentration of total dissolved solids (TDS), a common measure of salinity. While it is correct to say that the Proposed Project would increase the total amount (load) of TDS, neither the Proposed Project nor any other similar development is expected to affect the concentration of TDS at the Easterly Wastewater Treatment Plant. Appendix G includes a technical memorandum addressing off-site wastewater options for meeting Proposed Project demand.

Additional comments received in response to the Notice of Preparation for this project expressed concern about impacts on existing levels of service for electricity and natural gas, and if placement of utilities infrastructure for electricity and natural gas either overhead or under ground, in the Proposed Project area would adversely affect private property. Impacts to property (visual, biological, cultural, etc.) are addressed in the relevant sections of this EIR, as appropriate.

4.8.2 WASTEWATER

4.8.2a ENVIRONMENTAL SETTING

The Proposed Project is located within an area planned for sewer service via the City of Vacaville wastewater collection and treatment system.

Wastewater Collection System

No sewers currently serve the project area. Figure 4.8-1 shows the project area boundary and the existing trunk sewers that would convey wastewater from the project to the City's